



Knockcronal Wind Farm

EIA Scoping Report

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Abbreviations

Abbreviation	Description
ACoW	Archaeological Clerk of Works
AIL	Abnormal Indivisible Loads
AOD	Above Ordnance Datum
ATC	Air Traffic Control
BNG	British National Grid
BoCC	Birds of Conservation Concern
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CIEEM	Chartered Institute of Ecology and Environmental Management
COVID-19	Coronavirus Disease 2019
CRM	Collision Risk Modelling
CTMP	Construction Traffic Management Plan
DGWLCS	Dumfries & Galloway Windfarm Landscape Capacity Study
DIO	Defence Infrastructure Organisation
EALWCS	East Ayrshire Landscape Wind Capacity Study
ECoW	Environmental Clerk of Works
ECU	Energy Consents Unit
EEC	European Economic Community
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
FLS	Forestry and Land Scotland
FOI	Freedom of Information
FI	Financially Involved
FML	Fixed Minimum Limit
GDL	Garden and Designated Landscape
GIS	Geographic Information System
GPA	Glasgow Prestwick Airport
GWDE	Ground Water Dependent Ecosystems
ha	Hectares
HGV	Heavy Good Vehicle
HEPS	Historic Environment Policy Scotland



Abbreviation	Description
HER	Historic Environment Record
HES	Historic Environment Scotland
HIP	Heritage Interpretation Plan
HMP	Habitat Management Plan
HRA	Habitats Regulations Appraisal
IOA	Institute of Acoustics
km	kilometre
LBAP	Local Biodiversity Action Plan
LLA	Local Landscape Area
LCT	Landscape Character Type
LDP	Local Development Plan
LGV	Large Goods Vehicle
LVIA	Landscape and Visual Impact Assessment
m	metre
mm	Millimetre
MOD	Ministry of Defence
MW	Megawatt
NALWCS	North Ayrshire Landscape Wind Capacity Study
NCN	National Cycle Network
NERL	National Air Traffic Services En Route Ltd
NHZ	Natural Heritage Zone
NNR	National Nature Reserve
NRTF	National Road Traffic Forecast
NRHE	National Record of the Historic Environment
NS	NatureScot
NSA	National Scenic Area
NPF	National Planning Policy
NSR	Non-statutory register
NTS	Non Technical Summary
NVC	National Vegetation Classification
OPEN	Optimised Environment Limited
PAC	Pre-Application Report
PLHRA	Peat Landslide Hazard and Risk Assessment



Abbreviation	Description
PPA	Power Purchase Agreement
RLOS	Radar line of sight
RSG	Raptor Study Group
RSPB	Royal Society for the Protection of Birds
RP	Regional Park
RVAA	Residential Visual Amenity Assessment
SAC	Special Area of Conservation
SALWCS	South Ayrshire Landscape Wind Capacity Study
SBL	Scottish Biodiversity List
SG	Supplementary Guidance
SEPA	Scottish Environmental Protection Agency
SF	Scottish Forestry
SNIFFER	Scotland and Northern Ireland Forum for Environmental Research
SRTM	Shuttle Radar Topography Mission
SLLCS	South Lanarkshire Landscape Capacity Study for Wind Energy
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SPP	Scottish Planning Policy
SSSI	Site of Special Scientific Interest
SWSEIC	South West Scotland Environmental Information Centre
TA	Traffic Assessment
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VP	Vantage Point
WLA	Wild Land Area
WoSAS	West of Scotland Archaeology Service
WPAC	Wind Power Aviation Consultants Ltd
WSI	Written Scheme of Investigation
ZTV	Zone of Theoretical Visibility



1. Introduction

1.1 Background & Context

- 1.1.1 Statkraft Ltd (hereafter referred to as “the Applicant”) intends to apply to the Scottish Ministers for permission to construct and operate Knockcronal Wind Farm (hereafter referred to as the “Proposed Development”), at site centre British National Grid (BNG) NS 37746 00094 (refer to Figure 1.1).
- 1.1.2 The Applicant intends to submit an application for the Proposed Development to the Scottish Ministers via the Scottish Government Energy Consents Unit (ECU) under Section 36 of the Electricity Act 1989. The application will be supported by an Environmental Impact Assessment Report (EIA Report) as required by the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) (the EIA Regulations). This document forms the Scoping Report submitted to ECU in order to request a Scoping Opinion from the Scottish Ministers, on the content of Environmental Impact Assessment (EIA) of the Proposed Development.
- 1.1.3 The Proposed Development will consist of approximately 12 wind turbines with up to 200 m blade tip height, as well as associated on-site energy storage system. The total generating capacity is anticipated to be >50 MW in total. The associated infrastructure will include site access, internal access tracks, crane hardstanding, underground cabling, on-site substation and maintenance building, temporary construction compound(s), energy storage, laydown areas, borrow pit search areas and a met mast.
- 1.1.4 The Proposed Development turbine development area was previously the site of Linfairn Wind Farm application. Linfairn Wind Farm was withdrawn in 2018 and the Applicant has carefully considered the consultee responses to the Linfairn Wind Farm application when contemplating the design and site boundary of the Proposed Development.

1.2 The Applicant

- 1.2.1 Statkraft is a leading company in hydropower internationally and Europe’s largest generator of renewable energy. The Group produces hydropower, wind power, solar power, gas-fired power and supplies district heating. Statkraft is a global company in energy market operations with 4,000 employees in 17 countries.
- 1.2.2 Statkraft has operated in the United Kingdom since 2006, developing, owning and operating renewable production facilities including wind farms in Wales and Scotland.
- 1.2.3 Since 2006, Statkraft has invested £1.4 billion in the UK’s renewable energy infrastructure and facilitated over 6 GW of new-build renewable energy generation through Power Purchase Agreements (PPAs). With a portfolio now exceeding 10 TWh per year from almost 300 customers, Statkraft is the leading provider of short and long term PPAs in the UK.
- 1.2.4 As a state-owned utility, Statkraft is a solid, dependable partner, committed to playing a leading role in the UK energy market.

1.3 The Purpose of the EIA Scoping Report

- 1.3.1 The purpose of this EIA Scoping Report is to request an EIA Scoping Opinion as per Regulation 12 (1) of the EIA Regulations stating the information that ought to be provided by the EIA and included in the EIA Report. The EIA Scoping Opinion is to be offered following discussion with the consultation bodies.



1.3.2 This EIA Scoping Report:

- Describes the existing site and its context;
- Identifies key organisations to be consulted in the EIA process;
- Establishes the format of the EIA Report;
- Provides baseline information; and
- Describes potential significant effects and the proposed assessment methodologies for various technical assessments to be covered in the EIA Report.

1.4 Environmental Impact Assessment

1.4.1 The EIA Regulations require that before consent is granted for certain types of development, an EIA must be undertaken. The EIA Regulations set out the types of development which must always be subject to an EIA (Schedule 1 development) and other developments which may require EIA if there is the potential for significant environmental effects as a result of the development (Schedule 2 development).

1.4.2 The Proposed Development falls within Schedule 2 of the EIA Regulations and has the potential to have some significant environmental effects. Therefore, it is the opinion of the Applicant that the Proposed Development qualifies as “EIA Development” and therefore the Applicant will voluntarily submit an EIA Report, as part of the Section 36 application and has not requested an EIA Screening Opinion from Scottish Ministers.

1.4.3 EIA is an iterative process, which identifies the potential environmental effects that in turn inform the eventual design of the proposals. It seeks to avoid, reduce, offset and minimise any adverse environmental effects through mitigation. It considers the effects arising during the construction, operation and decommissioning phases. Consultation is an important part of the EIA process and assists in the identification of potential effects and mitigation measures.

1.4.4 The structure of the EIA Report will follow the requirements of the EIA Regulations (Schedule 4) and other relevant good practice guidance. Essentially, the EIA Report will comprise five volumes:

- Volume 1 – Written Statement
- Volumes 2 & 3 – Figures and Visualisations
- Volume 4 – Technical Appendices
- Volume 5 – Confidential Appendices (if required)

1.4.5 A Non Technical Summary (NTS) will also be provided.

1.4.6 Chapters 1 to 5 of Volume 1 will comprise:

- an introduction;
- a description of the site selection and design iteration process;
- a description of the site and its context;
- a description of the Proposed Development;
- information on the approach to EIA and determination of significance of effects; and
- a summary of the relevant planning and energy policy considerations.

1.4.7 The remainder of Volume 1 will present an assessment of a range of environmental topics. Based on the available baseline environment information and the details of the Proposed Development,



the environmental topics have been scoped on the basis of the potential for significant environmental effects. This has determined the need to undertake impact assessment to investigate each potential effect. Each of the topics will be reported as a chapter of Volume 1. The EIA Report will reference figures and technical studies, which will correspond to Volumes 2 to 5. The following topics will be considered:

- Chapter 6: Landscape and Visual;
- Chapter 7: Ornithology;
- Chapter 8: Ecology;
- Chapter 9: Geology, Peat, Hydrology & Hydrogeology;
- Chapter 10: Noise and Vibration;
- Chapter 11: Cultural Heritage;
- Chapter 12: Traffic and Transport;
- Chapter 13: Land-use, Socio-economics and Tourism;
- Chapter 14: Aviation;
- Chapter 15: Telecommunications;
- Chapter 16: Shadow Flicker;
- Chapter 17: Forestry; and
- Chapter 18: Carbon Calculator.

- 1.4.8 The EIA Report will also include a summary of cumulative effects, schedule of mitigation measures, and a summary of residual effects.
- 1.4.9 A standalone Planning Statement assessing the Proposed Development against all relevant planning and energy policy, along with a Pre-Application Consultation (PAC) Report explaining the consultation carried out with the local communities about the Proposed Development will also accompany the planning application.
- 1.4.10 Early consultation is key in the development process, and throughout the Applicant will ensure that local communities and stakeholders are given the opportunity to provide feedback and are kept informed of project progress.
- 1.4.11 Due to the Government guidance issued as a result of the COVID-19 pandemic, face-to-face consultation is unfortunately not possible at present and may not be permitted for the foreseeable future. The Scottish Government has brought forward regulations (The Electricity Works (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020) during this period which replaces the requirement for a physical, face-to-face public event with an alternative, online version.
- 1.4.12 We are committed to undertaking meaningful consultation with the local community and are currently identifying suitable alternative methods of engagement ahead of any potential online event. At this stage, these are expected to include formats such as utilising mail drops, use of a dedicated project website and project mailbox to distribute information and respond to the public, along with phone calls and virtual meetings with Community Council members. Consideration is being given to ensure that engagement methods reflect varying levels of access to technology.



2. Proposed Development

2.1 Turbine Development Area Description

- 2.1.1 The turbine development area is located approximately 4.2 km south of Straiton, 11 km south-west of Dalmellington and 17.5 km east of Girvan, (distances to the nearest proposed wind turbine) in South Ayrshire (refer to Figures 1.1). Access to the turbine development area from the public highway is still under consideration and will be included within the final application boundary. Once the location of the access point and the route of access to the turbine development area is confirmed the Applicant will re-consult with the relevant consultees to ensure that any changes to the EIA Scoping Opinion requirements are captured.
- 2.1.2 The turbine development area comprises an area of approximately 680 hectares (ha) of land, consisting of upland moorland in the south and west of the site, and farmland in the north-east. The turbine development area gradually rises from 120 m Above Ordnance Datum (AOD) in the north-east of the site, to 315 m at Knockbuckle in the south east of the site. The turbine development area possesses a strong wind resource which has been confirmed by onsite wind data collection.
- 2.1.3 The surrounding land comprises open moorland to the east and north-east, as well as farmland with some scattered individual properties, with further National Forest Estate commercial forest plantation to the north-west, west, south and south-east.
- 2.1.4 The Galloway Dark Sky Park buffer zone is adjacent to the turbine development area boundary to the west, south and south-east, with the Dark Sky Park core area approximately 2.7 km south of the nearest proposed wind turbine. To the south-east of the turbine development area lies the Galloway Forest Park International Bird Area.
- 2.1.5 Knockgardner Site of Special Scientific Interest (SSSI), designated for geological fossiliferous exposure, lies approximately 2.7 km north west of the site.
- 2.1.6 A number of watercourses traverse the turbine development area including the Shiel Burn in the centre of the turbine development area, and the Palmullan Burn in the west, which flow into the Water of Girvan to the north of the site. Small areas of Ancient Woodland are present in the far northern section of the site,
- 2.1.7 Two residential properties lie within the proposed turbine development area, Linfairn, and Glenlinn Cottage. Both properties are financially involved in the Proposed Development.
- 2.1.8 Figure 2.1 shows environmental designations within 5 km of the Proposed Development turbine development area boundary.

2.2 Proposed Development Description

- 2.2.1 The Proposed Development is still at an early stage in its design with a detailed turbine layout, based on the environmental constraints relating to the site, yet to be undertaken.
- 2.2.2 An initial layout for the Proposed Development suggests that the Proposed Development could consist of approximately 12 stand-alone, three bladed horizontal axis, wind turbines with a maximum tip height of 200 m, as shown in Figure 2.2. Turbine locations are noted in Table 2-1 below:



Table 2-1 Turbine Coordinates

Turbine Number	X Coordinate	Y Coordinate
T01	237697	600056
T02	238036	600352
T03	238401	600064
T04	237281	600177
T05	237477	599608
T06	237898	599581
T07	238322	599632
T08	237091	599785
T09	237807	599159
T10	238264	599176
T11	236821	599335
T12	237238	599204

2.2.3 In addition to the wind turbines, associated works will be required for the following:

- turbine foundations;
- crane hardstandings;
- site entrance and access tracks;
- on-site access tracks between turbines and from the point of access to the turbines;
- on-site substation and maintenance building with welfare facility;
- energy storage system;
- on site electrical cabling between the wind turbines and the substation and energy storage system;
- temporary construction compound(s), laydown area(s) and concrete batching plant;
- borrow pit search areas; and
- meteorological mast.

2.2.4 The Applicant is in the process of identifying suitable borrow pit search areas within the turbine development area and intends on including such an area(s) within the application for consent. Should suitable borrow pit search areas not be identified within the site, the Applicant will make provision for the import of aggregate from a suitable off-site source.

2.2.5 The parameters of the EIA will be such that an appropriate level of assessment is undertaken for a given hub height and rotor diameter, within the envelope of a maximum tip height. The turbine locations will evolve in response to the ongoing detailed assessment work, taking consideration of the environmental effects, terrain, current land use, technical and health and safety issues. The parameters of the Proposed Development will be explicitly identified in the EIA Report. The final locations of the turbines will be 'frozen' at an appropriate time in order to enable the EIA Report to describe fully the Proposed Development for which planning consent is sought.



- 2.2.6 Whilst the location of the infrastructure will be determined through an iterative environmental based design process, there is the potential for these exact locations to be further optimised through micro-siting allowances prior to construction. In this regard, there will be a micro-siting allowance of up to 100 m in all directions in respect of each turbine and the associated infrastructure in order to address any potential difficulties which may arise in the event that preconstruction surveys identify unsuitable ground conditions or environmental constraints that could be avoided.
- 2.2.7 At present, it is estimated that the Proposed Development will comprise 12 turbines and associated on-site energy storage system and have a total generating capacity of >50 MW. Consent will be sought for an operational life of at least 30 years from the date of commissioning the wind turbines.

2.3 Cumulative Developments

- 2.3.1 Schedule 4, regulation 5 (e) of the EIA Regulations states that cumulative effects should be considered as a part of the EIA. It will therefore be important to consider the cumulative effects of the Proposed Development in combination with other developments in the local area, including those that are currently operational, consented and in planning. The cumulative assessment will also consider the cumulative effects of different elements of the Proposed Development on environmental media and sensitive receptors, and in particular the cumulative effects upon individual and groups of receptors.
- 2.3.2 There are no operational and consented wind farm developments, within 5 km of the Proposed Development site. There are however a number of consented and operational wind farm developments within 10 km of the Proposed Development site. Wind farm developments of relevance will be considered in the cumulative assessment. The methodology to be adopted for assessing the cumulative effects of wind energy developments will be in accordance with the Scottish Natural Heritage (SNH, 2012) Guidance '*Assessing Cumulative Impacts of Onshore Wind Energy Developments*'. The scope of the cumulative assessment will be agreed through consultation with South Ayrshire Council, and NatureScot (formerly SNH).
- 2.3.3 Operational and consented wind farms as well as those at the application stage, within 35 km of the Proposed Development, are illustrated and listed on Figure 4.2 (see Section 4, Landscape and Visual Impact Assessment, below).
- 2.3.4 It should be noted that this record will be updated throughout the EIA process, up to an agreed point prior to submission of the application¹. We welcome any further information from stakeholders on additional proposed wind farm developments that should be considered.

¹ The Applicant is aware that there a number of potential wind farms in the area which have recently submitted Scoping Opinion requests. Should applications for these wind farms be submitted a minimum of three months prior to the submission of the application of the Proposed Development they will be included within the cumulative assessment of the EIA Report.



3. Planning and Energy Policy context

3.1 Project Need and the Renewable Energy Policy Framework

- 3.1.1 The EIA Report will describe, in summary, the renewable energy policy framework and associated need case for renewables, identified as a matter of both law and policy, at international, European and domestic levels.
- 3.1.2 The Proposed Development relates to the generation of electricity from renewable energy sources and comes as a direct response to national planning, energy policy and climate change objectives. The clear objectives of the UK and Scottish Governments will be summarised, in relation to encouraging increased deployment and application of renewable energy technologies, consistent with sustainable development policy principles and national and international obligations on climate change.
- 3.1.3 The UK Government has stated² (March 2020) that on 27 June 2019, a new legally binding target to reach net zero greenhouse gas emissions by 2050 came into UK law. By 2050, the UK will need an ultra-low carbon power sector to meet this economy wide net zero emissions target. In parallel, generation will need to increase to meet future demand and to achieve this, low carbon electricity generation will need to quadruple by 2050.
- 3.1.4 At a Scottish Government level, a "Climate Emergency" was declared by the First Minister in April 2019. Furthermore, the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 received Royal Assent on 31 October 2019. The Act sets a legally binding 'net zero' target for Scotland for 2045 (with challenging interim targets), five years ahead of the date set for the whole of the UK.
- 3.1.5 The Proposed Development relates to the generation of electricity from renewable energy sources and comes as a direct response to national planning and energy policy objectives. Reference will be made to the clear objective of the Scottish Government to encourage increased deployment and application of renewable energy technologies and in particular onshore wind, consistent with sustainable development policy principles and national and international obligations on climate change.
- 3.1.6 The Proposed Development would clearly make a contribution to the attainment of renewable energy, electricity and climate change targets at both the Scottish and UK levels and the quantification of this contribution would be described. The description of the renewable energy policy framework will also refer to the Scottish Government's Climate Change Plan, Energy Strategy and Onshore Wind Policy Statement.

3.2 National Planning Policy and Guidance

- 3.2.1 Reference will be made to various national planning policy and guidance documents including:
- The National Planning Policy Framework 3 (NPF3) and the emerging NPF 4;
 - Scottish Planning Policy (SPP), noting that NPF 4 will, in effect, replace NPF3 and the SPP;
 - Scottish Government web-based Renewables Guidance;

² 'Consultation on proposed amendments to the Contracts for Difference (CfD) scheme for low carbon electricity generation'. Issued by the Department for Business Energy and Industrial Strategy (BEIS), (March 2020).



- The Scottish Climate Change Plan, and emerging update expected to be published in late 2020; and
- Scottish Government policy and good practice guidance on community benefit funding and community shared ownership.

3.3 Local Development Plan

- 3.3.1 The planning policy context applicable to the turbine development area will be taken into account in the iterative EIA design process. The relevant planning policy framework will also be described in the EIA Report.
- 3.3.2 The statutory Development Plan for the turbine development area comprises the South Ayrshire Local Development Plan (the LDP) (adopted September 2014) and associated Supplementary Guidance (SG), specifically SG 'Wind Energy' (adopted, 2015).
- 3.3.3 The followings policies are deemed particularly relevant to the Proposed Development:
- LDP Policy – Renewable Energy;
 - LDP Policy – Wind Energy; and
 - LDP Policy – Outdoor Public Access and Core Paths.
- 3.3.4 The South Ayrshire Landscape Wind Capacity Study (SALWCS) adopted in August 2018 is a technical study which supports and informs the SG for Wind Energy. It will also be referenced. The emerging LDP2 and associated SG will also be considered. It is expected that LDP2 will be adopted in late 2020.
- 3.3.5 Further policies relevant to each technical assessment have been outlined in Sections 4 to 16 below.
- 3.3.6 It should be noted that a Planning Statement will be provided with the application (but separate from the EIA Report) which will contain an assessment of the accordence of the Proposed Development with the relevant policy and guidance documents as referred to above.



4. Landscape and Visual

4.1 Introduction

- 4.1.1 This section of the Scoping Report sets out the proposed methodology and approach to be applied in the production of the Landscape and Visual Impact Assessment (LVIA) to accompany the application for the Proposed Development. It presents the suggested scope of the LVIA in terms of those landscape and visual receptors to be scoped in and scoped out of the assessment process based on a preliminary assessment of relevant receptors to the Proposed Development.
- 4.1.2 The purpose of the LVIA is to identify and record the potential likely significant effects that the Proposed Development may have on physical elements of the landscape; landscape character; areas that have been designated for their scenic or landscape-related qualities; and views from various locations such as settlements, routes, hilltops and other sensitive locations. The potential cumulative effects that may arise from the addition of the Proposed Development to other wind farms are also considered.
- 4.1.3 The LVIA will consider the potential effects of the Proposed Development during the following development stages:
- Construction and decommissioning of the Proposed Development; and
 - Operation of the Proposed Development.
- 4.1.4 Receptors may not be affected at all three development stages.

4.2 Baseline Description

Site Context

- 4.2.1 The turbine development area of the Proposed Development in relation to the landscape and visual study area is shown on Figure 4.1. The turbine development area is located approximately 4.2 km south of Straiton, 11 km south-west of Dalmellington and 17.5 km east of Girvan, (distances to the nearest proposed wind turbine) in South Ayrshire.
- 4.2.2 The majority of the landscape of the turbine development area is made up of a series of undulated, moorland covered slopes and small hills. The most elevated part of the turbine development (Knockbuckle at 315 m AOD) is in the south-east corner and the lowest part of the turbine development area is in the north-east corner (Girvan Water at 120 m AOD). Big Benyaw and Knockcronal are the most distinct hills in the turbine development area at 313 m AOD and 286 m AOD respectively and are located centrally within the turbine development area. The turbine development area is surrounded by large scale, commercial forest to the south, west and north. Smaller strips of riparian woodland can also be found associated with the burns at lower elevations and in particular the Palmullan Burn. The farmland character of the north-eastern corner of the turbine development area contrasts with the upland moorland of the majority of the other parts of the turbine development area and its surrounding, large scale, commercial forest.
- 4.2.3 Two residential properties lie within the turbine development area, Linfairn, and Glenlinn Cottage. Settlement within the area immediately around the turbine development area is sparse with residential properties at Knockskae, Genoch Cottage and Tairlaw Toll. There are further properties found on the minor road network within the Girvan Water valley particularly between Tairlaw and Craig to the east of the site. Towns and villages in the area include the following: Straiton (4.2 km); Crosshill (7 km); Kirkmichael (7.7 km); Dailly (6.5 km); Barr (10 km); Dalmellington (11 km); Maybole



(11 km); and Girvan (17,5 km). The larger towns of Ayr, Troon and Kilmarnock to the north-west are more distant at 17 km, 28 km and 33 km from the proposed development respectively.

- 4.2.4 The A77 cuts across the north-western half of the study area before following the coast to Stranraer. Theoretical visibility on the A77 is found on sections near Maybole, Ayr and Troon although some of these sections of route are in cutting and are further limited by roadside vegetation. The A713 cuts across the north-eastern half of the study area connecting Ayr, Patna and Dalmellington to the Ken valley and ultimately to Castle Douglas in Dumfries and Galloway. The A70 crosses the northern half of the study area between Ayr and Muirkirk passing through Cumnock. The A76 cuts across the north-eastern quadrant of the study area between Kilmarnock and Sanquhar. Other key roads in the area include the B741 between Straiton and Dalmellington, B7045 between Straiton and Kirkmichael as well as the minor road between Straiton and Tairlaw.
- 4.2.5 Long distance walking routes in the study area include the Southern Upland Way, River Ayr Way, Ayrshire Coastal Path, Mull of Galloway Trail and the Arran Coastal Way. National Cycle Route 7 passes the turbine development area to the west on the minor road that crosses Carrick Forest.

Zone of Theoretical Visibility (ZTV) Overview

- 4.2.6 The blade tip ZTV is shown alongside landscape character, designations and visual receptors on Figures 4.4-4.6 and alongside viewpoints on detailed 1:50,000 mapping at A1 size on Figure 4.3 which for greater legibility has been produced for an approximate 30 km area within which the majority of ZTV extent is found. The landform of the turbine development area and surrounding area has a notable influence on the extent of visibility across the study area and the pattern of theoretical visibility produced by the Proposed Development responds to the surrounding landform in the following ways.
- 4.2.7 Blade tip theoretical visibility is relatively consistent across a localised area around the turbine development area which extends across upland and forested areas to the north and west by approximately 2-3 km and to the south by approximately 6-8 km. Theoretical visibility also extends east along the northern side of the Girvan Water valley for approximately 8 km and north along the valley towards Straiton village.
- 4.2.8 In the wider landscape the extent of theoretical visibility is more varied and can be summarised as follows. To the south, the northern hills in the Merrick range limit the theoretical visibility of the Proposed Development such that beyond around 6-8 km to the south theoretical visibility becomes fragmented and limited to the more elevated hill tops and north facing slopes. To the east, theoretical visibility is first limited by the uplands between the Girvan Water valley and Loch Doon, particularly by the west facing ridge of upland (approximately 7-8 km from the turbine development area), and is then further limited by the more elevated west facing slopes of the uplands of the Carsphairn Forest (approximately 12-14 km from the turbine development area) with patches of theoretical visibility found on elevated land to the north of the A713 road corridor at 11-13 km.
- 4.2.9 To the west, theoretical visibility is limited by successive layers of hills and uplands both close to the development area (approximately 3-6 km from the turbine development area) including Black Hill of Garleffan, Glenalla Fell and Barony Hill, such that theoretical visibility is limited to patches on elevated hills or east facing slopes of the Stinchar valley.
- 4.2.10 To the north-west a swathe of theoretical visibility extends across the settled landscape that follows the lower River Doon and Girvan Water between Straiton and Maybole and the A77 before being partly contained by the Brown Carrick Hills to the north-west (approximately 16-18 km from the turbine development area).
- 4.2.11 To the north and north-west the ZTV shows a band of distant theoretical visibility that follows the settled Ayrshire coastline including the towns of Ayr, Troon, Irvine and Ardrossan. This northern



band of ZTV also extends to patches on elevated land on the plateau moorlands of East Ayrshire at +32 km to the north-east and to Arran at +40 km from the development area. Elsewhere in the study area to the east, south and west, distant visibility beyond 20 km is very limited.

Landscape Character

- 4.2.12 In early 2019, NatureScot (formerly SNH) published an update to the characterisation of Scotland's landscape as a digital resource. The information builds on the characterisation studies published in the 1990's. Nature Scot (formerly SNH) describe the recent publication as now superseding the 1990s landscape character descriptions and mapping adding that 'Where there are topic-specific landscape capacity or sensitivity studies, they would take precedence for informing that development type, e.g. windfarms.'
- 4.2.13 The 'topic specific' characterisation studies relevant to the study area include the following studies:
- South Ayrshire Council Area – South Ayrshire Landscape Wind Capacity Study, 2018 (SALWCS);
 - East Ayrshire Council Area – East Ayrshire Landscape Wind Capacity Study, 2013 (EALWCS);
 - Dumfries & Galloway Council area - Dumfries & Galloway Windfarm Landscape Capacity Study, 2017 (DGWLCS);
 - North Ayrshire Council Area - North Ayrshire Landscape Wind Capacity Study, 2018 (NALWCS); and
 - South Lanarkshire Council area – South Lanarkshire Landscape Capacity Study for Wind Energy, 2016 (SLLCS).
- 4.2.14 These capacity studies therefore form the most up to date 'topic specific' characterisation studies in the study area and as such form the basis of character assessment that will be undertaken in the LVIA. The SALWCS defines the turbine development area's landscape characteristics as lying within the 'Foothills with Forest and Wind Farms' Landscape Character Type (LCT). Landscape Character is shown in Figure 4.4 with the blade tip ZTV overlaid.
- 4.2.15 Based on the overview of theoretical visibility of the Proposed Development described in section 4.2.2, it is considered that the potential for significant effects is considered to be limited in extent and may only arise within an area of approximately 20 km radius and as such the landscape character assessment will focus on this area. In particular, the landscape character assessment will focus on assessing the likely significant effects on the LCT in which the Proposed Development is located, where the Proposed Development may result in direct effects on the pattern of elements that comprise the landscape character, together with LCTs in the immediately adjacent area where the Proposed Development may result in indirect effects on the perception of the landscape character.

Landscape Designations and Wild Land

- 4.2.16 All Landscape Designations within the 45 km study area will be considered in the LVIA. In the first instance, a preliminary assessment will be carried out to establish which Landscape Designations have the potential to experience a significant effect as a result of the Proposed Development. Following this initial assessment, detailed assessments will be carried out for each of the Landscape Designations where the potential for a significant effect has been identified. To provide an initial understanding of the potential effect at this stage, Figure 4.5 shows the Landscape Designations and WLA overlain with the ZTV of the scoping layout.
- 4.2.17 South Ayrshire Council have carried out a designations review resulting in proposed Local Landscape Areas (LLAs), as shown on the proposed SAC LDP2, which will replace the SAC Scenic Area



designation. To avoid confusion, Figure 4.5 has not included the Scenic Area designation as it will be replaced by the proposed LLAs and it is therefore unlikely to require assessment in the LVIA.

- 4.2.18 LLAs of particular relevance to the Proposed Development are - the Girvan Water Valley LLA which lies to the north and east and covers the northern part of the Proposed Development turbine development area; the High Carrick Hills LLA to the south of the Proposed Development; and the Stinchar Valley LLA to the south-west.
- 4.2.19 In the wider study area the East Ayrshire Council Special Landscape Area lies immediately to the east of the Girvan Water Valley LLA at around 6 km from the Proposed Development and the Dumfries and Galloway Council Galloway Hills Regional Scenic Area lies to the south of the High Carrick Hills LLA at approximately 11 km from the Proposed Development.
- 4.2.20 In addition to these local landscape designations the Fleet Valley National Scenic Area (NSA) is found at the edges of the 45 km radius study area although the initial ZTV show no theoretical visibility. A number of Inventoried Gardens and Designed Landscapes (GDLs) are also found within the study area the closest of these are the Blairquhan GDL, Kilkeran GDL and Craigenkillan GDL at approximately 4 km, 5 km and 6 km from the Proposed Development respectively. Dumfries and Galloway Council non inventory Gardens are also found within the study area, however, the initial ZTV shows no theoretical visibility from these locations.
- 4.2.21 Following the identification of the WLAs in 2014, descriptions or citations were published by NatureScot (formerly SNH), which describe the key attributes and qualities of each of the 42 WLAs in Scotland. The Merrick WLA lies approximately 5 km to the south of the Proposed Development. In 2020, NatureScot published Assessing Impacts on Wild Land Areas - Technical Guidance. The likely effects of the Proposed Development on WLAs will therefore be carried out with reference to the new 2020 guidance.
- 4.2.22 The UNESCO Galloway and Southern Ayrshire Biosphere is a non-statutory designation that in itself has no formal status within the planning system, however the effect of the Proposed Development on the 'Sense of Place' and landscape value of the core and buffer of the Biosphere will be considered in relation to the underlying value and sensitivity of the Landscape Character and the Merrick WLA.

Visual Receptors and Visual Amenity

- 4.2.23 The LVIA will undertake an assessment of the likely visual effects of the Proposed Development through consideration of the specific visual effects at a selection of representative viewpoints and by considering the wider effects on visual amenity with reference to principal visual receptors (principal visual receptors are shown on Figure 4.6 with blade tip ZTV, viewpoints shown on 1:50,000 mapping on Figure 4.3).

Visualisations

- 4.2.24 Visualisations and figures will be produced to NatureScot's standards as set out in 'Visual Representation of Wind farms: Version 2.2' (February 2017). In line with NatureScot guidance, it is proposed that photomontages will be prepared for viewpoints where they are located within a 20 km radius of the outermost turbines.
- 4.2.25 A preliminary viewpoint list is shown in Table 4.1 below. In addition to the initial review of the turbine development area and surrounding landscape and visual resource, viewpoint selection has given consideration to the viewpoint locations used in the assessment and determination of the Linfairn Farm Wind Farm development.
- 4.2.26 The final list will be established through further fieldwork and the scoping process and in agreement with SAC and NatureScot. The viewpoints were selected to represent sensitive visual receptors with



the potential to undergo significant effects. They were also selected to represent landscape receptors and with consideration of the potential for cumulative effects to arise. The locations of the viewpoints are shown on Figure 4.3.

Table 4-1: Preliminary Representative Viewpoint Locations

ID	Viewpoint name	Grid (Preliminary)	ref.	Dist. nearest turbine (km)	Receptors represented
1	Minor Road near Tairlaw	240114	600841	2.4	Road Users
2	Minor Road near Craig	238595	602567	2.7	Road Users / Residents
3	Minor Road near Stinchar Bridge	239478	595920	3.5	Road Users
4	Craigengower Monument	239112	603925	4.1	Walkers / Visitors
5	NCN7, near Palmullan Bridge	233039	600386	3.8	Cyclists / Road Users
6	Straiton, minor road south of settlement	238288	604703	4.7	Road Users / Settlement
7	Straiton	237987	605036	5	Residents / Settlement
8	Shalloch on Minnoch	240412	590752	8.7	Walkers
9	Craigengillan GDL, Shear Hill	246726	603673	9.4	Walkers / Visitors
10	B7045, west of Kirkmichael	233566	608726	9.5	Road Users / Settlement
11	Auchensoul Hill	226398	594548	11.5	Walkers
12	Maybole	229907	609668	11.8	Residents / Settlement
13	A713 Eriff	251725	599913	13.6	Road Users
14	B741 near Clawfin	250519	607373	14.2	Road Users
15	Merrick	242746	585542	14.3	Walkers
16	A713 and B742 Road Junction	237915	616724	16.6	Road Users
17	Brown Carrick Hill	228356	615954	18	Walkers
18	Cairnmore of Carsphairn	259461	597964	21.3	Walkers
19	A77, Ayr	236722	622962	22.9	Road Users / Settlement
20	B749 near Royal Troon Golf Club	232978	629795	30	Visitors / Settlement

Potential Visual Effects of Turbine Lighting

4.2.27 A key factor in the development of turbines greater than 150 m in height is the likely requirement for them to have visible red, medium intensity (2,000 candela) lights fitted to the turbine hubs in accordance with CAA guidance. The details of the lighting requirements for the Proposed Development are currently being defined along with potential mitigation measures.



- 4.2.28 The assessor will, if required, prepare a night-time impact assessment section and visualisations illustrating turbine lighting at night, for inclusion in the LVIA. The hub height ZTV will be used to identify where there would be direct line of sight of the lights from the surrounding area. The assessor has undertaken night-time lighting assessments and visualisations for several other wind farm projects in the UK which will inform the approach to assessment of turbine lighting and the basis of our professional judgement about the level of effect arising from the proposed lighting.
- 4.2.29 In order to inform this assessment, the assessor will take photographs from three of the readily accessible viewpoints at dusk (photographs to be taken after the period of civil twilight) and will prepare visualisations to represent the effects of lighting on these views. Night-time visualisations will be in accordance with NatureScot guidance.
- 4.2.30 The Proposed Development lies on northern boundary of the Galloway Forest Dark Sky Park Buffer area and is approximately 2.7 km to the north of the Dark Sky Park Core area. The effects of turbine lighting on the Dark Sky Park will be considered in the night time assessment.

Cumulative Wind Farms

- 4.2.31 Figure 4.2 shows the cumulative wind farms within a 45 km radius of the Proposed Development and their status. Agreement will be sought from SAC and NatureScot with regard to which of these should be included in the assessment. Wind farms in the immediate area include Dersalloch Wind Farm (23 turbines at 125 m to tip) approximately 3.5 km to the north-east and Hadyard Hill Wind Farm (52 turbines at 101 m to tip) approximately 6.9 km to the west. It is also noted that in the area of landscape between the turbine development area and Hadyard Hill Wind Farm that two further developments, Craiginmoddie Wind Farm (approximately 16 turbines 180 to 230 m to tip) and Carrick Wind Farm (up to 17 turbines at 200 m to tip), have recently submitted a scoping request to SAC.
- 4.2.32 It is notable that there are numerous consented but as yet unbuilt wind farms and large numbers of sites at the scoping stage that may never come forward to application. In accordance with NatureScot and Scottish Government guidance it is not usual to assess scoping stage sites unless they are of particular relevance to the Development, where sufficient detail is available to inform the assessment and where they are likely to come forward to application. Both the Carrick Wind Farm and Craiginmoddie Wind Farm fall into this category (both of which were scoped in May 2020) and will be of particular relevance to the Proposed Development in the cumulative assessment due to their close proximity. Whilst there is no certainty on the detail of these applications at this stage, they may be able to be considered should that information become available prior to the cumulative cut off date.

4.3 Guidance and Legislation

- 4.3.1 Sources of guidance that will be used and referenced in the LVIA include the following:
- Visual Representation of Wind Farms Version 2.2 (SNH, 2017);
 - Visual Representation of Development Proposals, Technical Guidance Note 06/19. Landscape Institute (2019);
 - Assessing the Cumulative Impact of Onshore Wind Energy Proposed Developments. SNH (2012);
 - Assessing impacts on Wild Land Areas - Technical Guidance. NatureScot (2020);
 - Guidance for Assessing the Effects on Special Landscape Qualities. SNH (DRAFT 2018-2019 or as updated);
 - Technical Guidance Note 2/19 Residential Visual Amenity Assessment. Landscape Institute (2019);



- Landscape Character Assessment Guidance for England and Scotland. SNH and TCA (2002); and
- Siting and Designing of Windfarms in the Landscape: Version 3a. SNH (2017).

4.4 Study Area

- 4.4.1 In accordance with guidance and with a proposed turbine height of up to 200 m, the study area for the LVIA of the Proposed Development will cover a radius of 45 km from the nearest turbine, as shown in Figure 4.1. This is considered to be the maximum radius within which a significant landscape and/or visual effect could occur given the height of the turbines that are being considered.
- 4.4.2 A review of the broad wind farm context within a 45 km radius has been undertaken, based on the latest NatureScot mapping of large-scale wind farm development. It is considered that any cumulative effects that would occur, would arise as a result of the pattern of development within the 45 km Study Area radius, rather than as a result of changes beyond this. It is proposed that following a detailed review of the cumulative sites within the area, a plan will be produced showing the locations of wind farms within 45 km that are operational, under construction, consented or which are at application stage and where the turbines are greater than 50 m to blade tip, and would therefore be included within any cumulative assessment for the Proposed Development. Exceptionally, scoping stage sites may also be included where they are considered to be of specific relevance to the cumulative effect of the Proposed Development and where there is sufficient detail available to inform the assessment. Known cumulative wind farms within a 45 km Study Area are shown for scoping purposes in Figure 4.2.

4.5 Assessment Methodology

- 4.5.1 The LVIA will follow Optimised Environment Limited's (OPEN) methodology devised specifically for the assessment of wind farm developments and generally accords with 'Guidelines for Landscape and Visual Impact Assessment: Third Edition' (Landscape Institute and IEMA, 2013) ('GLVIA3'), the key source of guidance for LVIA.
- 4.5.2 The assessment has been initiated through a desk study of the turbine development area and 45 km radius Study Area, combined with a good working knowledge of this area. This study has identified aspects of the landscape and visual resource that will need to be considered in the LVIA, including:
- Landscape character typology;
 - Landscape-related planning designations;
 - Wild Land Areas (WLA);
 - Properties and settlements;
 - Routes (including roads, National Cycle Routes and long-distance walking routes); and
 - Potential cumulative wind farms.
- 4.5.3 The desk study has also utilised Geographic Information System (GIS) software to explore the potential visibility of the Proposed Development. The resultant ZTV diagrams (Figures 4.3 to 4.6) have provided an indication of which landscape and visual receptors are likely to have key sensitivities to the Proposed Development.
- 4.5.4 The LVIA is intended to determine the significant effects that the Proposed Development would have on the landscape and visual resource. For the purpose of assessment, the potential effects on the landscape and visual resource are grouped into the following categories:
- Physical effects: physical effects are restricted to the area within the site and are the direct effects on the existing fabric of the site. This category of effects is made up of landscape



elements, which are the components of the landscape such as rough grassland and moorland that may be directly and physically affected by the Proposed Development;

- Effects on landscape character: landscape character is the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape and the way that this pattern is perceived. Effects on landscape character arise either through the introduction of new elements that physically alter this pattern of elements or through visibility of the Proposed Development that may alter the way in which the pattern of elements is perceived. This category of effects is made up of landscape character receptors, which fall into two groups; landscape character types and landscape-related designated areas;
 - Effects on wild land: the assessment of the effects on the wild land qualities of the Wild Land Areas through consideration of the impacts on the physical attributes and perceptual responses identified;
 - Effects on views: the assessment of the effects on views is an assessment of how the introduction of the Proposed Development would affect views throughout the Study Area. The assessment of effects on views is carried out in relation to representative viewpoints and principal visual receptors;
 - Effects on views from properties: Residential Visual Amenity Assessment (RVAA) is carried out for properties within 2 km in line with Landscape Institute (LI) technical guidance;
 - Effects of Turbine Lighting: should lighting be required, a night time visual impact assessment is prepared to assess the potential visual impact of the turbine lights; and
 - Cumulative effects: cumulative effects arise where the study areas for two or more wind farms overlap so that both of the wind farms are experienced at a proximity where they may have a greater incremental effect, or where wind farms may combine to have a sequential effect. In accordance with guidance, the LVIA assesses the effect arising from the addition of the Proposed Development to the cumulative situation.
- 4.5.5 The objective of the assessment of the Proposed Development is to predict the likely significant effects on the landscape and visual resource. In line with the EIA regulations, the LVIA effects are assessed to be either significant or not significant.
- 4.5.6 The significance of effects is assessed through a combination of two considerations: the sensitivity of the landscape receptor or view and the magnitude of change that would result from the addition of the Proposed Development.
- 4.5.7 The geographic extent over which the landscape and visual effects would be experienced is also assessed, which is distinct from the size or scale of effect. This evaluation is not combined in the assessment of the level of magnitude but instead is used in determining the extent in which a particular magnitude of change is experienced and the extent of the significant and non-significant effects. The extent of the effects would vary depending on the specific nature of the development proposed and is principally assessed through analysis of the geographical extent of visibility of the Proposed Development across the visual receptor.
- 4.5.8 The duration and reversibility of effects on views are based on the period over which the Proposed Development is likely to exist and the extent to which the Proposed Development will be removed and its effects reversed at the end of that period. Duration and reversibility are not incorporated into the overall magnitude of change and may be stated separately in relation to the assessed effects.
- 4.5.9 The 'nature of effects' relates to whether the effects of the Proposed Development are adverse, neutral or beneficial. Guidance provided in GLVIA3 states that "thought must be given to whether the likely significant landscape and visual effects are judged to be positive (beneficial) or negative



(adverse) in their consequences for landscape or for views and visual amenity” but does not provide an indication as to how that may be established in practice. The nature of effect is therefore one that requires interpretation and reasoned professional opinion.

4.5.10 OPEN generally adopts a precautionary approach which assumes that significant landscape and visual effects will be weighed on the negative side of the planning balance, although positive or neutral effects may arise in certain situations.

4.6 Proposed Mitigation

4.6.1 The design and layout of the proposed turbines and associated infrastructure is a vital part of the EIA process and is the stage where the biggest contribution can be made to mitigate potential landscape and visual effects. A key design objective will be creating a wind farm which is appropriate for the existing landscape character and visual features of an area. The design of the Proposed Development will evolve as part of an iterative process which aims to provide an optimal design in environmental, as well as technical and economic terms and the mitigation of landscape and visual effects will be a central consideration in this process.

4.7 Potential Impacts

4.7.1 Potential adverse impacts upon landscape and visual resource to be assessed within the EIA Report which would result from the addition of the proposed development and are summarised below.

- Potential effects on landscape character, including cumulative effects, particularly on the host Foothills with Forest and Windfarm LCT 17c and the neighbouring Intimate Pastoral Valley LCT 13;
- Potential effects on the LLAs of the Girvan Water Valley, High Carrick Hills and Stinchar Valley;
- Potential effects on the wild land qualities within the Merrick WLA;
- Views from residential properties and small settlements in the area (in particular Straiton village);
- Views from key routes in the area in particular the minor road between Straiton and Tairlaw, NCN7, B741 and the A713;
- Sequential cumulative effects on users of the B741 and the A713; and
- Visibility of the Proposed Development at night due to turbine lighting and potential effects on the Galloway Forest Dark Sky Park.

4.8 Receptors and Impacts Scoped In or Out of Assessment

4.8.1 Table 4.2 below summarises the potential impacts proposed to be scoped in and out of the EIAR.

Table 4.2 – Receptors and Impacts Scoped In or Out -

Potential impacts/receptors	Construction	Operation	Decommissioning
Landscape character within 20 km	✓	✓	✓
Landscape character out with 20 km	X	X	X
Landscape Designations within 45 km	✓	✓	✓
Merrick WLA	✓	✓	✓
Visual receptors within 45 km	✓	✓	✓



Potential impacts/receptors	Construction	Operation	Decommissioning
Visual impacts of turbine lighting at night	X	✓	X
Residential visual amenity on properties within 2 km	✓	✓	✓
Cumulative landscape and visual impacts resulting from cumulative wind farms within 45 km	✓	✓	✓

4.9 Scoping Questions to Consultees

- Do you have any comments on the proposed approach and methodology?
- Are you in agreement with the proposed Study Areas?
- Are you in agreement that the assessment of the effects on landscape character receptors (except landscape planning designations) should focus on areas within a 20km radius?
- Do you have any comments or suggestions in relation to the Preliminary Representative Viewpoint Locations shown in Table 4.2 and illustrated on Figure 4.3?
- Do you have any comments on the landscape and visual effects of turbine lighting?
- Do you have any comments or suggestions on the approach to cumulative landscape and visual assessment?



5. Ornithology

5.1 Introduction

- 5.1.1 This section provides a summary of baseline ornithological information collected to date, and that proposed to inform the EIA of the Proposed Development. An overview of potential impacts to be addressed within the EIA Report is also provided.
- 5.1.2 All field surveys and subsequent assessment will be undertaken by suitably qualified, experienced and competent ecologists.
- 5.1.3 The receptors that will be the focus of the assessment will comprise:
- Relevant statutory designated sites, and their cited qualifying interests, such as Sites of Special Scientific Interest (SSSIs) and Special Protection Areas (SPAs); and
 - Populations of avian species listed on Annex IV of the EC Habitats Directive or Schedule 5 of the Wildlife & Countryside Act 1981 (as amended) or scarce or a priority for conservation under the UK BAP.

5.2 Baseline Description

- 5.2.1 Baseline ornithological conditions to inform the design and assessment of the Proposed Development, have been and will further be established through desk study and field surveys. Full details will be presented within the EIA Report. A brief summary of key findings to date is provided below.

Initial Desk Study

- 5.2.2 An initial desk study was undertaken in 2019 to inform the proposed approach to baseline information gathering, including the scope and requirement for baseline ornithological surveys.
- 5.2.3 The following key sources have been consulted:
- NatureScot Sitelink website;
 - Aerial imagery;
 - NatureScot (formerly SNH) general pre-application/scoping advice to developers of onshore wind farms applicable at the time (SNH, 2018a);
 - NatureScot guidance (2017) on bird survey methods at onshore wind farms;
 - An information request to the Raptor Study Group (RSG);
 - An information request to the Royal Society for the Protection of Birds (RSPB);
 - An information request to the South West Scotland Environmental Information Centre (SWSEIC);
 - A review of EIA documentation for the previous Linfairn Wind Farm project; and
 - Good practice NatureScot (formerly SNH) guidance on protected animals with relation to developments (SNH, 2019).
- 5.2.4 In addition, members of the field team were also able to advise on established local knowledge of potential ecological constraints.



Statutory Designated Sites for Nature Conservation

5.2.5 Statutory (international and national) designated sites located within 10 km of the turbine development area (extended to 20 km for any internationally designated sites with migratory waterfowl interests) are shown in Figure 5.1 and summarised in Table 5.1.

Table 5.1 Statutory Designated Sites with Ornithological Interest

Designated Site	Distance/Orientation	Qualifying Interests
European Sites		
None	-	-
Nationally Designated Sites		
Bogton Lochs SSSI	8.6 km north-east	Breeding bird assemblage of passerines and black-headed gull (<i>Chroicocephalus ridibundus</i>) colony
Merrick Kells SSSI	9.4 km south-east	Breeding bird assemblage

Previous Linfairn Wind Farm Baseline Surveys

5.2.6 Table 5.2 provides a summary of baseline data which informed the previous Linfairn Wind Farm application, following guidance applicable at the time (SNH, 2014).

Table 5.2: Baseline Ornithology Data from the Linfairn Wind Farm Application

Survey Methodology	Survey Dates	Results
Vantage Point Surveys	Minimum of 36 hours VP, per season from 3VPs. October 2011 – September 2012.	Low numbers of pink-footed goose (<i>Anser brachyrhynchus</i>), peregrine falcon (<i>Falco peregrinus</i>), osprey (<i>Pandion haliaetus</i>) and hen harrier (<i>Circus cyaneus</i>) flights. No other pertinent species were recorded and no collision risk modelling was undertaken.
Moorland Breeding Bird Survey	April to July 2012.	Assemblage of breeding woodland and farmland birds, with only two wading species (snipe <i>Gallinago gallinago</i> and lapwing <i>Vanellus vanellus</i>) breeding in low numbers.
Breeding Raptor Surveys	Mid-March to July 2012.	No evidence of scarce breeding raptors observed within the 2 km study area.
Black Grouse Surveys	March to mid-May 2012	No specific black grouse <i>Tetrao tetrix</i> survey results are provided, but by virtual of not being regarded in the previous EIA report, the species is assumed to be absent within the 1.5 km study area.



Survey Methodology	Survey Dates	Results
Winter Walkover Surveys	October 2011 to March 2012.	Assemblage of non-breeding woodland and farmland birds, with the only wetland/wading species recorded, snipe.

Field Surveys

- 5.2.7 The turbine development area is located within an area identified as on the order of 'Medium to Low / unknown ecological sensitivity' (RSPB – Scotland Wind Farm Sensitivity Map; Bright et al (2009)).
- 5.2.8 In accordance with NatureScot guidance (2017), two years of ornithological surveys are required unless it can be demonstrated that a reduced survey effort is appropriate.
- 5.2.9 Given the existing turbine development area information and following early consultation with NatureScot (see Section 5.5.5), the following scope of field surveys were undertaken:
- Vantage Point (VP) Flight Activity Surveys:
 - Comprising two VPs between April 2019 and March 2020.
 - Moorland Breeding Bird Survey (MBBS) comprising four visits of the turbine development area plus 500 m buffer (where access allowed):
 - April to July 2019
 - Breeding Raptor and Owl Searches comprising searches for Annex 1 and Schedule 1 raptors and owls within the turbine development area and within a 2 km buffer (where access allowed):
 - April to July 2019
 - Breeding Black Grouse Survey in suitable habitats within the turbine development area and within 1.5 km buffer (where access allowed):
 - May 2019.

Target Species

- 5.2.10 In review of existing ornithological information, the key ornithological sensitivities for a wind farm development at this location, target species are considered to comprise the following in accordance with NatureScot guidance (2017 and 2018b):
- Annex 1 and Schedule 1 species;
 - Birds of Conservation Concern (BoCC) Red list species where conservation status is considered likely to be affected by wind farm (Eaton *et al.* 2015); and
 - All waders and waterfowl (excl. feral species).
- 5.2.11 Secondary species are considered to comprise all non-Schedule 1 and non-Annex 1 raptors (buzzard, kestrel (*Falco tinnunculus*) and sparrowhawk (*Accipiter nisus*), raven (*Corvus corax*), all gulls and any notable passerines e.g. BoCC Red-listed and Schedule 1 listed species.

VP Flight Activity Surveys

- 5.2.12 Two VPs were used between April 2019 and March 2020 (36 hours breeding and 36 hours non-breeding per VP). VP viewsheds were provided to NatureScot during consultation in May 2019, for which they were in agreement that the turbine development area was adequately covered. VP locations used were:



- VP1: NS36721 00054; and
- VP2: NS38720 00211

5.2.13 Figure 5.2 shows the VP locations and VP viewsheds.

5.2.14 VP flight activity surveys recorded low numbers of mute swan (*Cygnus olor*), pink-footed goose, mallard *Anas (platyrhynchos)*, grey heron (*Ardea cinerea*), hen harrier, goshawk (*Accipiter gentilis*), snipe, black grouse (recorded outside the black grouse lekking season - 2 flights in October), golden plover (*Pluvialis apricaria*) and curlew (*Numenius arquata*) with 1-4 flights of each species recorded.

5.2.15 One Schedule 1 common crossbill (*Loxia curvirostra*) territory was recorded in plantation woodland along the western turbine development area boundary. The only wading species recorded breeding within the turbine development area were curlew and snipe with only one territory of each species.

5.2.16 The only breeding Annex 1/Schedule 1 raptor species recorded was osprey, approximately 1.5 km from the turbine development area, with no osprey flights passing through the turbine development area during VP surveys.

5.2.17 No black grouse were recorded during the breeding black grouse searches.

5.2.18 Collision Risk Modelling (CRMS) will not be undertaken for the Proposed Development as the low levels of target species flight activity (particularly at collision risk height) provide insufficient data to inform a robust model.

5.3 Guidance and Legislation

5.3.1 The following key pieces of legislation and policy will be referred to:

European

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive); and,
- Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (codified version of Directive 79/409/EEC as amended) (Birds Directive).

National

- The Habitat Regulations 1994 (as amended) and The Conservation of Habitats and Species Regulations 2010, as amended in Scotland (hereafter referred to as the 'Habitat Regulations');
- The Wildlife and Countryside Act 1981 (as amended);
- The Wildlife and Natural Environment (Scotland) Act 2011;
- The Nature Conservation (Scotland) Act 2004;
- The National Planning Policy Framework 3 (2014);
- Scottish Planning Policy (2014);
- The United Kingdom Biodiversity Action Plan (UK BAP) Priority Species and Habitats (2007); and
- Scottish Biodiversity List (SBL) (2013).

Local

- The Ayrshire Local Biodiversity Action Plan (LBAP);
- South Ayrshire Local Development Plan (adopted September 2014) and supplementary guidance concerning wind farm developments (adopted December 2015).



5.4 Study Area

5.4.1 Appropriate study areas will be adopted and updated over the course of the EIA to account for any development infrastructure design changes as Study areas for the field surveys previously undertaken are as follows:

- Breeding Raptors – turbine development area plus 2 km buffer area;
- Black Grouse – turbine development area plus a 1.5 km buffer area; and
- Moorland Breeding Birds – turbine development area plus a 500 m buffer area.

5.5 Assessment Methodology

Method of Assessment

5.5.1 Full details of baseline studies and consultations will be provided within the EIA Report. Appropriate Study Areas were adopted and extended out from the turbine development area where permitted land access allowed, according to the survey type.

5.5.2 Impact assessment presented within the EIA Report will be undertaken in accordance with NatureScot guidance (2018) and based on CIEEM guidance (2018).

5.5.3 The process assessment process will include the following stages:

- Determination and evaluation of important ornithological features;
- Identification and characterisation of impacts;
- Outline of mitigating measures to avoid and reduce significant impacts;
- Assessment of the significance of any residual effects after such measures;
- Identification of appropriate compensation measures to offset significant residual effects; and
- Identification of opportunities for ecological enhancement.

5.5.4 The approach to assessment will take account of existing guidance and published scientific literature in relation to birds and windfarms, together with professional judgement and experience of wind farm EIA.

5.5.5 The EIA Report will provide a detailed description of the existing baseline ornithological features of the study area, along with the assessment of the potential impacts of the Proposed Development on the identified important ornithological features.

Consultation

5.5.6 Prior to scoping, preliminary consultation with NatureScot was undertaken in May 2019 to discuss the scope for ornithology surveys.

5.5.7 The NatureScot Operations Officer for Strathclyde & Ayrshire confirmed approval with our ornithology survey scope in a letter dated 30th May 2019. This correspondence also confirmed that NatureScot is satisfied that no statutory designated sites are connected to the Proposed Development turbine development area.

5.5.8 Further consultation was made with NatureScot in April 2020 following the completion of Year 1 ornithology surveys. A response from Natalie Ward of NatureScot was received on 1st May 2020, in which she *“confirmed that based on the survey findings it is not necessary to undertake a further year of ornithology survey work for the site. However, we advise that a breeding bird protection plan*



should be prepared, which should include checks for scarce/rare breeding bird species prior to the commencement of any construction works”.

Determining Importance

- 5.5.9 The assessment within the EIA Report will only assess in detail impacts upon important ornithological features i.e. those that are considered important and potentially significantly affected by the Proposed Development. A detailed assessment of features that are sufficiently widespread, unthreatened and resilient to project impacts will not be undertaken and justification for “scoping out” provided.
- 5.5.10 Relevant European, national and local legislation policy and guidance will be referred to in order to determine the importance (or ‘sensitivity’) of ornithological features. In addition, importance will also be determined using professional judgement, specialist consultation advice and the results of baseline surveys and the importance of features within the context of the geographical area.
- 5.5.11 Importance will not necessarily relate solely to the level of legal protection that a feature receives and ornithological features may be important for a variety of reasons, such as their connectivity to a designated site and the rarity of species or the geographical location of species relative to their known range.
- 5.5.12 The importance of ecological features will be defined in a geographical context from “Local” to “International”.

Identification and Characterisation of Impacts

- 5.5.13 The identification and characterisation of impacts on important ornithological feature will be undertaken in accordance with the CIEEM guidelines (2018) with reference made to magnitude (e.g. area or number of individuals to be impacted), extent, duration and reversibility as appropriate.
- 5.5.14 Impacts will be considered during the construction, operational and decommissioning phases and will be assessed on the basis that a clearly defined range of avoidance and standard good practice measures are implemented.

Significant Effects

- 5.5.15 CIEEM guidelines define a ‘significant effect’ as an effect that either supports or undermines biodiversity conservation objectives for ‘important ornithological features’ or for biodiversity in general (i.e. the feature could be positively or negatively significantly affected).
- 5.5.16 CIEEM guidelines on ecological impact assessment note that *“A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant negative ecological effects can be lawfully permitted following EIA procedures as long as the mitigation hierarchy has been applied effectively as part of the decision-making process.”*
- 5.5.17 Potentially significant effects identified will be expressed with reference to an appropriate geographic scale. For example a significant effect on a nationally designated site is likely to be of national significance. However, the scale of significance does not necessarily always relate to the importance of an ecological feature. For example an effect on a species which is considered of national importance, may not have a significant effect upon its national population.
- 5.5.18 In cases of reasonable doubt, where it is not possible to robustly justify a conclusion of no significant effect, a significant effect will be assumed as a precautionary approach. Where uncertainty exists, this will be acknowledged.



Cumulative Impacts

- 5.5.19 Cumulative impacts will be assessed with reference to NatureScot guidance (2012 and 2018a) for all ornithological features subject to a detailed assessment. The potential for significant cumulative effects due to habitat loss, disturbance/displacement and collision risk mortality will be assessed. The assessment will be based on the consideration of residual effects i.e. assuming that proposed mitigation and compensation measures (where relevant) are implemented.
- 5.5.20 The cumulative assessment will include consideration of:
- Existing wind farm developments, either built or under construction;
 - Approved wind farm developments, awaiting implementation; and
 - Wind farm proposals awaiting determination within the planning process with design information in the public domain.
- 5.5.21 With regard to the spatial extent of the cumulative assessment, NatureScot guidance (2012 and 2018a) stipulates that cumulative effects should typically be assessed at the relevant Regional NHZ scale, unless there is a reasonable alternative. The Proposed Development is located just within the NHZ 19 'Western Southern Uplands and Inner Solway'.
- 5.5.22 NatureScot guidance (2018a) does recognise that access to relevant data for other developments may be limited and therefore a meaningful assessment of cumulative effects of such developments is not always possible.

5.6 Proposed Mitigation

- 5.6.1 The adoption of embedded mitigation measures to avoid or minimise adverse impacts upon ornithological features resulting from the proposed development will be part of the iterative design process of the Proposed Development.
- 5.6.2 Full details of the Proposed Development design evolution and embedded mitigation measures in relation to ornithology will be detailed within the EIA Report. This will include the specification of any species-specific working buffers as necessary to ensure legislative compliance following the completion of baseline studies outlined.
- 5.6.3 Measures to ensure protection of ornithological interests will include the appointment of an ECoW to supervise construction works and pre-construction breeding ornithology surveys as part of a breeding bird protection plan to be considered.

Residual Effects

- 5.6.4 Where the EIA proposes measures to mitigate potentially significant adverse effects on ornithological features, a further assessment of residual effects, taking into account any mitigation recommended, will be undertaken.

Compensation

- 5.6.5 Where significant residual effects still remain, after the adoption of mitigation measures, compensation will be provided. This could include replacement habitat, or habitat improvements which would offset the significant residual effects.

Enhancement

- 5.6.6 Suitable principles for biodiversity enhancement to be delivered as part of the Proposed Development will be outlined within the EIA Report. The appropriateness and feasibility of principles will be confirmed with NatureScot and relevant consultees over the course of the EIA,



with view to prescriptive enhancement measures being detailed post-consent within a Habitat Management Plan (HMP).

Presentation of Sensitive Information

- 5.6.7 Any sensitive data (e.g. breeding raptor and black grouse locations, including desk study data) will be included in a confidential appendix to the EIA Report which will not be made publicly available, but will be issued to NatureScot (formerly SNH) (as per SNH guidance 2017).

5.7 Potential Impacts

- 5.7.1 Potential adverse impacts upon ecological features to be assessed within the EIA Report which could arise during the construction, operational and decommissioning phases of the Proposed Development and are summarised below.
- 5.7.2 Impacts will be assessed and informed on the basis of baseline study findings and through consultation with relevant specialist groups as required.

Important Ornithological Features

- 5.7.3 The identification of important ornithological features for detailed assessment will be undertaken on the basis of baseline study results with reference to NatureScot (formerly SNH) guidance (2017 and 2018) and will broadly include:
- Species listed on Annex 1 of the Birds Directive; and
 - Species listed on Schedule 1 of the Wildlife and Countryside Act.
- 5.7.4 In addition, red-listed Birds of Conservation Concern (BoCC) (Eaton et al., 2015), will also be identified where the conservation status of such species may reasonably be adversely affected by the Proposed Development. Waders/waterfowl were also considered in the assessment, particularly breeding wading/waterfowl species.

Construction

- 5.7.5 During construction of the Proposed Development, in the absence of mitigation, impacts upon ornithological features to be addressed within the EIA Report may arise from:
- Habitat loss, fragmentation or change as a result of the delivery and installation of development infrastructure; and,
 - Disturbance to and loss of nest sites, eggs and/or dependent young.
- 5.7.6 Construction activities are predicted to result in a temporary increase in noise, vibration and human presence within construction areas. This has the potential to displace birds from the vicinity of construction areas for the duration of construction works.
- 5.7.7 There will be no direct impact on ornithological interests of any designated site for nature conservation. The potential for direct disturbance to species associated with nearby designated sites is considered unlikely by virtue of spatial separation from the designations, with no international statutory site with ornithological qualifying features within 10 km of the Proposed Development site.
- 5.7.8 Overall construction disturbance would be considered temporary and would occur only when construction activities are taking place. Furthermore, construction would be not expected to take place over the whole site, but within defined working areas, phased over small areas.



Operation

- 5.7.9 The operation of turbines and maintenance activities has the potential to cause disturbance and displacement of birds throughout the Proposed Development's operational lifetime. The extent of displacement is, however, highly variable between species and species-group and therefore a species-specific assessment will take place on the basis of baseline studies.
- 5.7.10 Given the limited number of flight activity of target species (particularly at collision risk height) collision risk modelling is not considered appropriate to inform a robust model.
- 5.7.11 There is unlikely to be an impact on ornithological interests of any designated site for nature conservation during the operation of the Proposed Development due to the spatial segregation of the designated sites from the turbine development area.

Decommissioning

- 5.7.12 Potential impacts associated with the decommissioning phase are likely to be similar to those identified for the construction phase.

5.8 Receptors and Impacts Scoped In or Out of Assessment

Issues Scoped Out of the Assessment

- 5.8.1 The above scope is based on the requirement for EIA to consider likely significant effects of a Proposed Development. Effects that are not likely to be significant do not require assessing under the EIA regulations.
- 5.8.2 On review of desk study and field survey information gathered to date, Table 5.3 outlines the ornithological features can be scoped out of detailed assessment.
- 5.8.3 Based on the distances from the site, and the features for which they are designated, there is considered to be no connectivity and therefore no likely significant effects between the Proposed Development turbine development area and the designated sites with ornithological interest listed in Table 5.2.
- 5.8.4 Furthermore, the turbine development area is not within a distance of any Special Protected Areas (SPA) whereby the core foraging range of any qualifying species (SNH, 2016) would overlap, and therefore the potential for connectivity is not considered.
- 5.8.5 For the reasons given above, operational collision impacts for important ornithological features are scoped out.
- 5.8.6 Additionally, a Habitats Regulations Appraisal (HRA) is not required given the spatial segregation between the Proposed Development turbine development area and the designated sites for nature conservation.

Table 5.3 – Receptors and Impacts to be Scoped In and Out

Potential impacts/receptors	Construction	Operation	Decommissioning
Connectivity with SPA's	X	X	X
Designated Sites with Ornithological Interest	X	X	X
Important Ornithological Features	X	X	X
Red-Listed Birds of Conservation Concern	✓	X	✓
Habitat Loss, Fragmentation or Change	X	✓	X



Potential impacts/receptors	Construction	Operation	Decommissioning
Disturbance to and loss of nest sites, eggs and/or dependent young	✓	X	✓
Displacement	✓	✓	✓
Mortality due to collision	X	X	X

5.9 Scoping Questions to Consultees

- Do consultees agree that the range of desk study and ecological surveys proposed is sufficient and proportionate to inform the design and assessment of the Proposed Development?
- Do consultees agree that the full range of likely effects to be assessed within the EIAR has been adequately identified and is proportionate to the nature of the Proposed Development?
- Are there any other relevant consultees who should be contacted with respect to the ecology assessment and scope of baseline information gathering?
- Do consultees agree with the assessment and evaluation methodology proposed?



6. Ecology

6.1 Introduction

- 6.1.1 This section provides a summary of baseline (non-avian) ecological information collected to date, and that proposed to inform the EIA of the Proposed Development. An overview of potential impacts to be addressed within the EIA Report is also provided.
- 6.1.2 All field surveys and subsequent assessment will be undertaken by suitably qualified, experienced and competent ecologists.
- 6.1.3 The receptors that will be the focus of the assessment will comprise:
- Relevant statutory designated sites, and their cited qualifying interests, such as Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SACs) and National Nature Reserves (NNR's);
 - Internationally or nationally important habitats (e.g. habitats listed on Annex I of EC Habitats Directive (1992), habitats of principal importance for biodiversity conservation in Scotland (Scottish Biodiversity List); and,
 - Populations of non-avian species listed on Annex IV of the EC Habitats Directive or Schedule 5 of the Wildlife & Countryside Act 1981 (as amended) or scarce or a priority for conservation under the UK BAP.

6.2 Baseline Description

Baseline Conditions

- 6.2.1 Baseline ecological conditions to inform the design and assessment of the Proposed Development, have been and will further be established through desk study and field surveys. Full details will be presented within the EIA Report. A brief summary of key findings to date is provided below.

Initial Desk Study

- 6.2.2 An initial desk study was undertaken in 2019 to inform the proposed approach to baseline information gathering, including the scope and requirement for baseline ecological surveys.
- 6.2.3 The following key sources have been consulted:
- NatureScot Sitelink website;
 - Aerial imagery;
 - NatureScot (formerly SNH) general pre-application/scoping advice to developers of onshore wind farms applicable at the time (SNH, 2020);
 - An information request to the South West Scotland Environmental Information Centre (SWSEIC);
 - A review of EIA documentation for the previous Linfairn Wind Farm application which was withdrawn by the applicant in July 2018; and
 - Good practice NatureScot (formerly SNH) guidance on protected species with relation to developments (SNH, 2019).
- 6.2.4 In addition, members of the field team were also able to advise on established local knowledge of potential ecological constraints.



Statutory Designated Sites for Nature Conservation

- 6.2.5 The nearest internationally designated site (with non-avian interest) to the turbine development area is Merrick Kells SAC located 9.4 km south-east, and the nearest nationally designated site (with non-avian interest) to the turbine development area is Knockgardner SSSI, located 2.9 km north-west.
- 6.2.6 Statutory (international and national) designated sites located within 10 km of the Proposed Development turbine development area are shown in Figure 6.1 and summarised in Table 6.1.

Table 6.1: Statutory Designated Sites with Non-ornithological Interest

Designated Site	Distance / Orientation	Qualifying Interests
European Sites		
Merrick Kells SAC	9.4km south-east	Multiple interests, including: <ul style="list-style-type: none"> ➤ Blanket bog ➤ Dry heaths ➤ Otter (<i>Lutra lutra</i>) ➤ Montane acid grasslands ➤ Acidic scree
Nationally Designated Sites		
Auchalton SSSI	4.6km north-west	Lowland neutral grassland
Bogton Lochs SSSI	8.6km north-east	Openwater transition fen
Loch Doon SSSI	8.8km east	Arctic charr <i>Salvelinus alpinus</i>
Ness Glen SSSI	8.8km east	Upland mixed ash woodland
Dalmellington Moss SSSI	8.9km north-east	Raised bog
Merrick Kells SSSI	9.4km south-east	Multiple interests, including: <ul style="list-style-type: none"> ➤ Blanket bog ➤ Upland plants ➤ Invertebrates ➤ Dragonflies

Previous Liffairn Wind Farm Baseline Surveys

Table 6.2 provides a summary of baseline data which informed the previous Liffairn Wind Farm application.



Table 6.2 Baseline Ecology Data from Linfairn Wind Farm Application

Receptor	Survey Dates	Results
Habitats	Phase 1 Habitat Survey – 2012 and 2013. National Vegetation Classification Survey 2012 and 2013	Turbine development area comprises of a mosaic habitat mainly of the habitats: <ul style="list-style-type: none"> ➤ Wet dwarf shrub heath (D2); ➤ Unimproved neutral grassland (B2.1); ➤ Unimproved acid grassland (B1.1); ➤ Blanket bog (E1.6.1); and, ➤ Wet modified bog (E1.8)
Bats	Jun, Jul, Aug, Sept 2012 and Sept 2013	A combination of static and walked transect surveys identified the presence of soprano pipistrelle (<i>Pipistrellus pygmaeus</i>), common pipistrelle (<i>P.pipistrellus</i>), <i>Pipistrellus</i> species, <i>Myotis</i> species noctule <i>Nyctalus noctula</i> and Leisler's (<i>Nyctalus leisleri</i>) bat. Results suggested bat use favoured open habitats compared to forested areas and activity was considered to be representative of the locale. Woodland edge is likely to represent a commuting route. No roost sites were identified and adjacent plantation habitats were considered unsuitable.
Otter	2013	No resting sites found but otter spraint was found along Palmullan Burn and Water of Girvan. Habitat considered suitable for foraging, but unsuitable for holt creation.
Water Vole	2013	Watercourses considered largely sub-optimal to support water vole (<i>Arvicola amphibius</i>). No evidence of presence was recorded during survey.
Badger	2013	Badger (<i>Meles meles</i>) setts identified, although these were considered outliers and only occasionally used. Other evidence included badger foraging signs and a latrine.
Red Squirrel	2013	Coniferous habitats adjacent to the turbine development area afford limited habitat for red squirrel and possible foraging evidence was found (although could not be differentiated from grey squirrel).

Field Surveys

6.2.7 The scope for field surveys was determined through a review of Key Sources listed above. Baseline surveys undertaken for the previous Linfairn Wind Farm application are over 5 years old but it is recognised that for some features, the baseline is unlikely to substantially change during that time. After consultation and agreement with NatureScot, the following surveys have been completed to confirm baseline features

- Extended Phase 1 Habitat Survey (July 2020);
- National Vegetation Classification (NVC) Survey (July 2020);



- Ground-level Static Bat Activity Surveys (April – September 2020);
- Terrestrial Mammal Walkovers (July 2020); and,
- Fish Habitat and freshwater pearl mussel Surveys (July 2020).

Habitats and Vegetation

6.2.8 Habitat surveys referred to the following guidance documents:

- Averis, A., Averis, B., Birks, J., Horsfield, D., Thompson, D., Yeo, M. (2004). An Illustrated Guide to British Upland Vegetation. JNCC, Peterborough;
- JNCC (2010). Handbook for Phase 1 Habitat Survey - a technique for environmental audit. Revised Reprint 2016. JNCC, Peterborough;
- Rodwell, J. S. (2006). National Vegetation Community Users' Handbook. JNCC, Peterborough;
- Rodwell, J. S. (ed.) (1992). British Plant Communities. Volume 3. Grasslands and montane communities. Cambridge University Press, Cambridge;
- Rodwell, J. S. (ed.) (1993). British Plant Communities. Volume 2. Mires and Heaths. Cambridge University Press, Cambridge; and,
- Scotland and Northern Ireland Forum for Environmental Research (SNIFFER, 2009) WFD95: A Functional Wetland Typology for Scotland – Field Survey Manual. Version 1.

6.2.9 The north of the turbine development area consists predominantly of improved grassland which is bordered by the Water of Girvan and its tributary the Palmullan Burn. There are some remnant semi-natural broad-leaved woodland remnants along these watercourses.

6.2.10 The southern part of the turbine development area is on a higher elevation and consists of a complex of undulating hills, watercourses and small basins. Here, the plant communities largely consist of patches of semi improved acid grassland, large swathes of *Juncus* dominated marshy grassland and a few large pockets of bog, which have formed in flat basin areas.

6.2.11 Where habitats were deemed to potentially support Annex I or GWDTE's habitats, they were subject to further NVC survey. The following NVC communities were identified in the turbine development area:

- Acid grassland U4, U6;
- Blanket bog M17, M25; and,
- Mire and rush/pasture M23a, M23b.

6.2.12 The southern part of the turbine development area supports a high proportion of habitats potentially defined as ground water dependant terrestrial ecosystems (GWDTE), including the following NVC communities:

- M23a *Juncus effusus/acuteiflorus-Galium palustre* rush pasture, *Juncus acuteiflorus* subcommunity;
- M23b *Juncus effusus/acuteiflorus-Galium palustre* rush pasture, *Juncus effusus* subcommunity;
- M25 *Molinia carulea- Potentilla erecta* mire; and
- M17 *Scirpus cespitosus – Eriophorum vaginatum* blanket mire.

Protected and Notable Species

6.2.13 Protected species surveys referred to the following guidance documents:



- Collins, J. (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd Edition). The Bat Conservation Trust, London;
 - Scottish Natural Heritage (SNH) (2019) *Bats and Onshore Wind Turbines: Survey Assessment and Mitigation* SNH Inverness;
 - SNH (2020) *Standing Advice for Planning Consultation. Protected Species: Badger*, SNH, Inverness;
 - SNH (2020) *Standing Advice for Planning Consultation. Protected Species: Bats*, SNH, Inverness;
 - SNH (2020) *Standing Advice for Planning Consultation. Protected Species: Otter*, SNH, Inverness;
 - SNH (2020) *Standing Advice for Planning Consultation. Protected Species: Red Squirrel*, SNH, Inverness; and
 - SNH (2020) *Standing Advice for Planning Consultation. Protected Species: Water Vole*, SNH, Inverness.
- 6.2.14 Bat activity surveys will be completed in autumn 2020. The bat survey data when all gathered will be presented in the EIA Report, including analysis of the data from an Ecobat assessment, as per NatureScot (formerly SNH) (2019) guidance.
- 6.2.15 The presence of badger (consisting of setts and latrine) and water vole (burrow, droppings and runs) was confirmed onsite.
- 6.2.16 No evidence of otter or red squirrel was recorded, and the habitats within the turbine development area are considered unsuitable for red squirrel due to the lack of suitable woodland habitat.

Fish Habitat and Freshwater Pearl Mussel Habitat Surveys

- 6.2.17 Fish habitat and freshwater pearl mussel *Margaritifera margaritifera* habitat surveys were undertaken in July 2020 and results are yet to be assessed. The results will provide information into those most suitable parts of the watercourses for supporting fish and freshwater pearl mussel.

Additional Field Surveys

- 6.2.18 In accordance with NatureScot guidance (2020) there are some species groups which, providing the implementation of suitable mitigation measures, are unlikely to be subject to significant effects as a result of wind farm developments. As such, they do not require surveys to inform an EIA. This includes invertebrates, reptiles and amphibians.
- 6.2.19 Amphibian and reptile surveys will not be undertaken. Presence of great crested newt *Triturus cristatus* is considered unlikely owing to the lack of suitable waterbodies on, and adjacent to, the site. Reptiles are also considered unlikely to be present, given the turbine development area is heavily grazed, although presence cannot be entirely discounted. Significant adverse effects are considered unlikely to occur with the adoption of standard construction mitigation, embedded into the design of the Proposed Development.
- 6.2.20 The Proposed Development is not located within any 'Wildcat Priority Area' (as defined by Scottish Wildcat Action, 2015) and the species presence or potential presence was not identified during previous baseline surveys for the Linfairn Wind Farm EIA.

6.3 Guidance and Legislation

- 6.3.1 The following key pieces of legislation and policy will be referred to:



European

- Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (hereafter the 'Habitats Directive').

National

- The Habitat Regulations 1994 (as amended) and The Conservation of Habitats and Species Regulations 2010, as amended in Scotland (hereafter the 'Habitat Regulations');
- The Wildlife and Countryside Act 1981 (as amended);
- The Wildlife and Natural Environment (Scotland) Act 2011;
- The Nature Conservation (Scotland) Act 2004;
- Protection of Badgers Act 1992;
- The National Planning Policy Framework 3 (2014);
- Scottish Planning Policy (2014);
- The United Kingdom Biodiversity Action Plan (UK BAP) Priority Species and Habitats (2007); and,
- Scottish Biodiversity List (SBL) (2013).

Local

- The Ayrshire Local Biodiversity Action Plan (LBAP); and
- South Ayrshire Local Development Plan (adopted September 2014) and supplementary guidance concerning wind farm developments (adopted December 2015).

6.4 Study Area

- 6.4.1 The Study Area for ecology surveys was typically the area within and including the turbine development area, but for the habitat surveys this was extended out to 200m from the turbine development area (where access allowed).

6.5 Assessment Methodology

Approach to the Assessment

- 6.5.1 Full details of baseline studies and consultations will be provided within the EIA Report. Impact assessment presented within the EIA Report for ecological features will be based on current Chartered Institute of Ecological and Environmental Management (CIEEM) guidance (2018).
- 6.5.2 The process assessment process will include the following stages:
- Determination and evaluation of important ecological features;
 - Identification and characterisation of impacts;
 - Outline of mitigating measures to avoid and reduce significant impacts;
 - Assessment of the significance of any residual effects after such measures;
 - Identification of appropriate compensation measures to offset significant residual effects; and
 - Identification of opportunities for ecological enhancement.
- 6.5.3 The Ecology Chapter of the EIA Report will be supported by Technical Appendices detailing the desk study results, consultation, survey methods and results, and will be further supported by relevant



figures, tables and photographs, where necessary. Where sensitive data is recorded, the Ecology Chapter will be supported by confidential appendices which will not be released to the public domain.

Consultation

- 6.5.4 Prior to scoping, preliminary consultation with NatureScot was undertaken in May 2019 to discuss the scope for ecology surveys.
- 6.5.5 The NatureScot Operations Officer for Strathclyde & Ayrshire confirmed approval with the proposed ecology survey scope in a letter dated 30th May 2019. This correspondence also confirmed that NatureScot is satisfied that no statutory designated sites are connected to the turbine development area.

Determining Importance

- 6.5.6 The assessment within the EIA Report will only assess in detail impacts upon important ecological features i.e. those that are considered important and potentially significantly affected by the Proposed Development. A detailed assessment of features that are sufficiently widespread, unthreatened and resilient to project impacts will not be undertaken and justification for “scoping out” provided.
- 6.5.7 Relevant European, national and local legislation policy and guidance will be referred to in order to determine the importance (or ‘sensitivity’) of ecological features. In addition, importance will also be determined using professional judgement, specialist consultation advice and the results of baseline surveys and the importance of features within the context of the geographical area.
- 6.5.8 Importance will not necessarily relate solely to the level of legal protection that a feature receives and ecological features may be important for a variety of reasons, such as their connectivity to a designated site and the rarity of species or the geographical location of species relative to their known range.
- 6.5.9 The importance of ecological features will be defined in a geographical context from “Local” to “International”.

Identification and Characterisation of Impacts

- 6.5.10 The identification and characterisation of impacts on important ecological feature will be undertaken in accordance with the CIEEM guidelines with reference made to magnitude (e.g. area or number of individuals to be impacted), extent, duration and reversibility as appropriate.
- 6.5.11 Impacts will be considered during the construction, operational and decommissioning phases and will be assessed on the basis that a clearly defined range of avoidance and standard good practice measures are implemented.

Significant Effects

- 6.5.12 CIEEM guidelines define a ‘significant effect’ as an effect that either supports or undermines biodiversity conservation objectives for ‘important ecological features’ or for biodiversity in general (i.e. the feature could be positively or negatively significantly affected).
- 6.5.13 CIEEM guidelines on ecological impact assessment note that *“A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant negative ecological effects can be lawfully permitted following EIA procedures as long as the mitigation hierarchy has been applied effectively as part of the decision-making process.”*



- 6.5.14 Potentially significant effects identified will be expressed with reference to an appropriate geographic scale. For example, a significant effect on a nationally designated site is likely to be of national significance. However, the scale of significance does not necessarily always relate to the importance of an ecological feature. For example, an effect on a species which is considered of national importance, may not have a significant effect upon its national population.
- 6.5.15 In cases of reasonable doubt, where it is not possible to robustly justify a conclusion of no significant effect, a significant effect will be assumed as a precautionary approach. Where uncertainty exists, this will be acknowledged.

Cumulative Impacts

- 6.5.16 The potential for cumulative effects on ecological features with other wind farm proposals will be assessed in accordance with SNH guidance (2012) but will be restricted to those developments located within the same hydrological catchment(s) or within the regular range of mobile species (e.g. bats).
- 6.5.17 The assessment will encompass the effects of the proposal in-combination with existing developments, either built or under construction; approved developments; awaiting implementation; and, proposals awaiting determination within the planning process with design information in the public domain.

6.6 Proposed Mitigation

- 6.6.1 The adoption of embedded mitigation measures to avoid or minimise adverse impacts upon ecological features will be part of the iterative design process for the Proposed Development.
- 6.6.2 Measures to avoid or otherwise minimise potentially adverse impacts upon ecological features during Proposed Development design and construction will include:
- Land-take
 - Development infrastructure will be designed to minimise the requirement for land-take and the number of watercourse crossings and woodland felling.
 - Watercourse crossings
 - New watercourse crossings required will be designed in accordance with best practice and enable the free passage of fish and other wildlife.
 - Watercourse Buffers
 - A minimum 50 m buffer between Proposed Development infrastructure will be applied around all watercourses in so far as possible having regard to other ecological and non-ecological constraints.
 - Construction Environmental Management Plan
 - A Construction Environmental Management Plan (CEMP) (or similar) will be in place during the construction, operational and decommissioning phases of the Proposed Development. The CEMP will include all good practice construction measures, pollution prevention controls and monitoring to be implemented over the course of the development in line with current guidance.
 - Bat Habitat Features
 - A minimum 50 m buffer (from blade tip) will be applied to watercourses and woodland in so far as possible having regard to other ecological and non-ecological constraints.



- Ecological Clerk of Works (ECoW)
 - An ECoW will be appointed to supervise works during the construction phase to ensure the agreed ecological mitigation and management measures are implemented.

6.6.3 Full details of embedded mitigation measures in relation to ecology will be detailed within the EIA report.

Residual Effects

6.6.4 Where the EIA proposes measures to mitigate potentially significant adverse effects on ecological features, a further assessment of residual ecological effects, taking into account any ecological mitigation recommended, will be undertaken.

Compensation

6.6.5 Where significant residual effects still remain, after the adoption of mitigation measures, compensation will be provided. This could include replacement habitat, or habitat improvements which would offset the significant residual effects.

Enhancement

6.6.6 Suitable principles for biodiversity enhancement to be delivered as part of the proposed development will be outlined within the EIA Report. The appropriateness and feasibility of principles will be discussed with NatureScot and relevant consultees over the course of the EIA, with view to prescriptive enhancement measures being detailed post-consent, within a Habitat Management Plan (HMP).

6.7 Potential Impacts

6.7.1 Potential adverse impacts upon ecological features to be assessed within the EIA Report which could arise during the construction, operational and decommissioning phases of the Proposed Development and are summarised below.

6.7.2 Impacts will be assessed and informed on the basis of baseline study findings and through consultation with relevant specialist groups as required.

6.7.3 Potential impacts upon deer will be considered as part of the ecology assessment.

6.7.4 Potential impacts upon Ground Water Dependent Terrestrial Ecosystems (GWDTEs), hydrology, peat and forestry will be addressed separately in the EIA.

Construction

6.7.5 During construction of the Proposed Development, in the absence of mitigation, impacts upon ecological features to be addressed within the EIA Report may arise from:

- Habitat loss, fragmentation or change as a result of the delivery and installation of development infrastructure; and
- Disturbance, inadvertent killing or injuring of protected or otherwise notable species or inadvertent damage to their breeding sites or resting places.

6.7.6 The potential for indirect impacts upon ecological features as a result of the potential spillage and/or mitigation of pollutants and sediments during the construction phase will be considered, however potentially significant effects will be highly unlikely on the basis of embedded mitigation measures (see Section 6.6.)



- 6.7.7 Given the considerable spatial segregation between the turbine development area and nearest internationally designated site (Merrick Kells SAC, >9 km) potential effects on the SAC are discounted.
- 6.7.8 There will be no direct impacts on any designated site for nature conservation given the considerable spatial segregation between these sites and the Proposed Development. The potential for impacts on mobile qualifying interests will however be considered.

Operation

- 6.7.9 During operation of the Proposed Development, in the absence of mitigation, impacts upon ecological features to be addressed within the EIA Report may arise from:
- Disturbance to protected or otherwise notable species as a result of operational activities such as vehicular traffic and maintenance works;
 - Habitat loss or change, inadvertent killing or injuring of protected or otherwise notable species resulting from the potential spillage of pollutants; and
 - Interaction of bats with operational turbine blades leading to mortality due to collision or barotrauma.

Decommissioning

- 6.7.10 Potential impacts associated with the decommissioning phase are likely to be similar to those identified for the construction phase.

6.8 Receptors and Impacts Scoped In or Out of Assessment

Issues Scoped Out of the Assessment

- 6.8.1 The above scope is based on the requirement for EIA to consider likely significant effects of a Proposed Development. Effects that are not likely to be significant do not require assessing under the EIA regulations. CIEEM (2018) guidance further allows features to be scoped out if they are not considered to qualify as 'important'.
- 6.8.2 On review of desk study and field survey information gathered to date, Table 6.3 outlines the ecological features can be scoped out of detailed assessment.
- 6.8.3 Based on the distances from the site, and the features for which they are designated, there is considered to be no connectivity and therefore no likely significant effects between the turbine development area and all statutory designated sites with non-avian qualifying features listed in Table 6.1.
- 6.8.4 Effects on habitats and species (excluding bats) during operation can also be scoped out. No further damage is anticipated to habitats during operation, and maintenance visits will be rare and unlikely to result in disturbance to protected species.



Table 6.3 – Receptors and Impacts Scoped In or Out Scoping

Potential impacts/receptors	Construction	Operation	Decommissioning
Merrick Kells SAC	X	X	X
Designated Sites for Nature Conservation	X	X	X
Mobile qualifying interests	X	X	X
Mortality or barotrauma due to collision (bats)	X	✓	X
Habitat Loss, Fragmentation or Change	✓	X	✓
Disturbance or inadvertent killing or injuring of protected or notable species	✓	X	✓
Displacement	✓	X	✓
Inadvertent damage to breeding sites or resting places	✓	X	✓

6.9 Questions to Consultees

- Do consultees agree that the range of desk study and ecological surveys proposed is sufficient and proportionate to inform the design and assessment of the Proposed Development?
- Do consultees agree that the full range of likely effects to be assessed within the EIA Report has been adequately identified and is proportionate to the nature of the Proposed Development?
- Are there any other relevant consultees who should be contacted with respect to the ecology assessment and scope of baseline information gathering?
- Do consultees agree with the assessment and evaluation methodology proposed?



7. Geology, Peat, Hydrology & Hydrogeology

7.1 Introduction

- 7.1.1 This chapter sets out the proposed approach to the assessment of potential effects on hydrology, hydrogeology, geology and peat during construction, operation and decommissioning of the Proposed Development.

7.2 Baseline Description

Hydrology

- 7.2.1 The turbine development area is entirely within the surface water catchment of the Water of Girvan which is located to the east of the turbine development area and flows northwards and then westwards to the Irish Sea at Girvan. The Water of Girvan, where it receives surface waters from the site, has a moderate overall condition as classified by SEPA with pressures from modifications to bed, banks and shores and a good water quality.
- 7.2.2 There are a number of tributary surface watercourses within the turbine development area that generally flow east to discharge to the Water of Girvan. The Palmullan Burn is classified by SEPA as High overall quality with no pressures. There are no ponds or lochans within the turbine development area.
- 7.2.3 Areas of flooding are associated with the Palmullan Burn according to the SEPA flood risk map.

Hydrogeology

- 7.2.4 Where the turbine development area is underlain by sandstones, in some places flaggy, yields up to 12 L/s are possible. These are layered with lower permeability siltstones, mudstones and conglomerates and interbedded lavas. Where extrusive rocks are present there are small amounts of groundwater, generally only in the near surface weathered zone or in fractures resulting in low yields. The majority of the site is underlain by relatively impermeable bedrock. There may also be some very localised groundwater within localised alluvial superficial deposits.
- 7.2.5 Based on the hydrogeological regime of the site, there is unlikely to be any significant, truly groundwater dependent habitats, however this will be assessed further based on the NVC ecological surveys.

Geology

- 7.2.6 The bedrock in the area is a series of sandstone, siltstone and mudstone formations formed in the Silurian and Devonian Periods with various igneous intrusions. The superficial deposits comprise glacial deposits, alluvium and peat, as well as areas where there are no superficial deposits.
- 7.2.7 The superficial geology shows the presence of glacial till in general on the lower slopes, minor areas of alluvium and some patchy areas of peat deposits. Bedrock outcrops in large areas of the turbine development area.

Peat

- 7.2.8 Phase 1 peat probing of the turbine development area indicates that peat is occasionally present and this approximately aligns with the indicated presence of Class 1 carbon-rich soils, deep peat



and priority peatland habitats on the Carbon and Peatland 2016 Map (SNH, 2016). There are some areas of artificial drainage and areas of bare peat in the south of the turbine development area which may provide opportunities for re-use of excavated peat in compensatory restoration.

Designated Sites

- 7.2.9 There are several designated sites in the area including the Galloway and Southern Ayrshire Biosphere which encompasses the whole of the county. The Knockgardner Site of Special Scientific Interest (SSSI), is located approximately 3 km south west of Straiton and about 2.7 km to the north-west of the turbine development area. The turbine development area presents a fossiliferous exposure of the Knockgardner Formation, which consists of thinly bedded, grey-green turbidites.
- 7.2.10 Auchalton SSSI is an area of dry and wet grassland and is located approximately 4.2 km north-west of the turbine development area. The Blair Farm SSSI is a geological site containing well-preserved fossil remains of microscopic fossils known as acritarchs as is located about 4.6 km west of the turbine development area.

7.3 Guidance and Legislation

- 7.3.1 In regard to hydrology and hydrogeology, management of water-borne pollution and protection of natural heritage areas, the Scottish Environment Protection Agency (SEPA) have statutory obligations in terms of the management and control of pollution into water resources in Scotland.
- 7.3.2 SEPA, NatureScot and the Scottish Government provides guidance for peat surveys (Peatland Survey: Guidance on Developments on Peatland (Scottish Government, SNH, SEPA 2017) and Peat Slide Risk Hazard Assessment (Proposed electricity generation developments: Peat landslide hazard best practice guide: Second edition of guidance on best practice methods to identify, mitigate and manage peat slide hazards and associated risks (Scottish Government, April 2017).
- 7.3.3 Where careful design has avoided sensitive receptors, it would be reasonable to assume that the adoption of the Government's, NatureScot and SEPA's Best Practice Guidelines will, in general, prevent pollution to acceptable standards and make the majority of any 'significant' effects unlikely. Specific mitigation measures may be required in certain areas or at certain times of the turbine development area.

7.4 Study Area

- 7.4.1 The assessment will cover both the planning application boundary and the wider catchment areas associated with the planning application boundary.

7.5 Assessment Methodology

- 7.5.1 The potential effects on the water, geological and peat environment will be developed through both a desk study and site inspection. The baseline conditions will be compiled through consultation with regulatory bodies and stakeholders, through review of available data relating to the water and geological environment such as the Water Environment Hub, British Geological Survey Geoviewer, the Hydrogeological Map of Scotland and online viewer, the SEPA flood risk map, the soil map of Scotland and NatureScot (formerly SNH) Carbon Rich Soils, Priority Peatland and Deep Peat map, examination and interpretation of mapping information including aerial imagery and topography for the identification of peatland geomorphological features, and the collection of site data such as identification of relevant water features and including the ecological mapping information to identify potential groundwater dependent terrestrial ecosystems and peat depth and characteristics, substrate and examination of outcropping formations.



- 7.5.2 Potential for groundwater terrestrial ecosystems on site will be assessed from ecological National Vegetation Classification (NVC) mapping together with the hydrogeological regime to determine if they are habitats present that have the potential to be groundwater dependent in accordance with SEPA LUPS31 Guidance Notes: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA 2017).
- 7.5.3 A Peat Landslide Hazard and Risk Assessment (PLHRA) will be undertaken in accordance with Best Practice Guidance (Scottish Government, 2017). The approach will combine qualitative and quantitative methods to assess ground stability and assess the potential consequences of peat instability for all receptors (including offsite watercourses where these are hydrologically connected to the site). The assessment will identify appropriate mitigation measures to minimise risks at individual infrastructure locations, while general site-wide good practice and control measures will be also be detailed. The PLHRA will be informed by Phase 1 and Phase 2 peat depth probing, detailed geomorphological mapping and site walkover, and will take into consideration temporary peat storage locations identified in the Peat Management Plan and load effects from construction traffic on floating roads.
- 7.5.4 The information collated will enable the constraints to be determined and incorporated into the design of the infrastructure.
- 7.5.5 Where there are potential impacts on the water, geological or peat environment these will be assessed using standard impact assessment methodology to determine the significance of those impacts. Impacts that are identified at moderate or higher levels and are unable to be avoided by design will require specific additional mitigation in order for the residual impact to be acceptable.

7.6 Proposed Mitigation

- 7.6.1 There are numerous mitigation measures that will be employed in the design of the wind farm and the methodologies used for the construction and operation, including:
- The infrastructure will be located outside of 50 m buffers for all watercourses and water bodies identified on 1:50,000 Ordnance Survey mapping except where watercourse crossings are required, the number of watercourse crossings will be minimised, areas of potential flooding will be avoided and the areas of influence of GWDTE's will be avoided.
 - Any potential GWDTE habitats will be assessed, and the infrastructure design adjusted or mitigation determined to avoid any significant impact from the Proposed Development.
 - Any water abstractions will be identified, and the associated catchment areas determined so that they can be protected.
- 7.6.2 Other standard best practice measures will also be adopted such as:
- Good practice management of potential sediment release with appropriately designed drainage, control structures and infrastructure and stockpile design; and
 - Monitoring of water quality during baseline, construction and post construction periods.
- 7.6.3 Specific procedures for activities will be developed such as:
- Fuel handling and storage, including the locations of both periodic and regular fuelling points and emergency spill response. These should be agreed with the ECoW.
 - Management of concrete wash out areas, including pollution prevention measures and drainage controls.
 - Responsibilities and details for monitoring and training in relation to pollution prevention and mitigation measures.



- Design, management and mitigation measures for surface water drainage.
 - Design, management and mitigation measures for watercourse crossings.
- 7.6.4 The infrastructure will be designed to avoid peat where possible and particularly deep peat as defined by the detailed probing and coring across the infrastructure footprint. Where deep peat is unable to be avoided floating tracks will be used and if necessary piled foundations.
- 7.6.5 A Peat Management Plan will be developed to present the total peat volumes that will be excavated, the methodologies for extraction and management to minimise impact on peat, and the strategy for storage and restoration or reuse. Peat restoration strategies will be in accordance with guidance including: Good practice during windfarm construction (Scottish Renewables, NatureScot (formerly SNH), SEPA & Forestry Commission Scotland, 4th Edition 2019); and Regulatory Position Statement – Developments on peat (SEPA, 2010). Peat restoration will focus on areas where peat has been removed, eroded or degraded or where forestry will be felled resulting in opportunities for restoration.
- 7.6.6 Any peat slide risk may require additional mitigation measures to be employed such as installation of catch-fences as a precaution against runout into sensitive watercourses and the preparation of a geotechnical risk register providing explicit mitigation measures tailored to location with elevated risk.
- 7.6.7 With respect to peat, mitigation of impacts through sensitive layout design will provide the best opportunity to limit the potential for significant effects. This is applicable both to minimising peat excavation and ensuring that undue risks associated with peat instability are avoided. Findings from the geomorphological assessment of peat will be compared with those from ecological surveys to enable a holistic assessment of peatland condition across the turbine development area and avoidance of the highest quality habitats.

7.7 Potential Impacts

- 7.7.1 Wind farm development has the potential to impact on the local hydrology and hydrogeology during the construction and operation phases. These impacts may include:
- changes in surface or groundwater quality due to oil and fuel spills or leaks, other chemicals stored on site and sediment release;
 - alteration of the network and form of drainage;
 - alteration of watercourse flow rates, sediment loading and geomorphology;
 - impacts on the recharge and flow within shallow and deep groundwater systems; and
 - change to the geology or soils of an area through removal, erosion or dewatering, particularly peat.
- 7.7.2 These impacts could potentially affect water users (private water supplies for domestic use, livestock or irrigation), fisheries or aquatic habitats and the status of water bodies throughout the life of the Proposed Development.
- 7.7.3 Wind farm development also has the potential to impact on the geological resource and peat. These impacts may include:
- Change to the geology or soils of an area through direct removal or from erosion due to the infrastructure changing the hydrological environment;
 - dewatering of peat due to excavations or pumping;
 - removal of peat; and



- an increase in the peat slide risk.

7.7.4 These impacts could potentially affect the geological resource, result in the release of carbon due to peat deterioration or removal and incorrect restoration or reuse, and a peat slide could impact on water users (private water supplies for domestic use, livestock or irrigation), fisheries or aquatic habitats, the status of water bodies, ecological habitats or human life.

7.8 Receptors and Impacts Scoped In or Out of Assessment

7.8.1 The proposed receptors and impacts scoped into the assessment are shown below in Table 7.2.

Table 7.2: Receptors and Impacts Scoped In

Potential Receptors	impacts/	Construction	Operation	Decommissioning
Private Water Supplies		✓	✓	✓
Surface water quality		✓	✓	✓
Natural drainage patterns and flooding		✓	✓	✓
Groundwater Dependent Terrestrial Ecosystems		✓	✓	✓
Groundwater		✓	✓	✓
Peat (resource)		✓	✓	✓
Peat slide risk		✓	✓	✓

7.9 Scoping Questions to Consultees

- We would request advice from SEPA on the upper limiting depths for borrow pit restoration given the variable peat depths present across the site.
- Do consultees agree to the proposed methodology and scope of works?



8. Noise

8.1 Introduction

- 8.1.1 A detailed assessment will be completed of construction, operation and decommissioning of the Proposed Development following relevance guidance and standards for the assessment of noise applicable in Scotland.
- 8.1.2 This section is accompanied by Appendix 8.1, which details the baseline background noise levels to be used in the noise assessment. Further details of this data is provided below.

8.2 Baseline Description

- 8.2.1 A comprehensive survey of background noise levels was completed for the Linfairn Wind Farm at six locations (see Table 8.1) around the Proposed Development in accordance with a protocol. This protocol was agreed with SAC's noise consultants ACCON UK to define the scope and methodology for conducting a background noise surveys in accordance with relevant guidance. Whilst these surveys were completed, the results of these surveys were not presented to SAC before the planning appeal for Linfairn Wind Farm was withdrawn. Accordingly, full details of these baseline background noise levels have been presented in a Technical Report shown as Appendix 8.1. This Technical Report includes the protocol agreed with SAC's noise consultants ACCON UK in Annex F. These baseline background noise levels are sufficiently representative and would form the basis for assessment of noise from the Proposed Development.

Table 8.1: Baseline noise survey locations near to the Proposed Development

No	Background noise survey location	Easting (approx.)	Northing (approx.)
1	Glenalla Farm	234709	600152
2	Knockskae	237279	601396
3	Linfairn Farm	238159	601207
4	Genoch Cottage	239049	600791
5	Tairlaw Toll Cottage	239762	599541
6	Tairlaw Toll House	239830	599542

8.3 Guidance and Legislation

- 8.3.1 The noise assessment will be undertaken with reference to the following documents:
- The Working Group on Noise from Wind Turbines (1996). ETSU-R-97 The Assessment and Rating of Noise from Wind Farms.
 - Scottish Government (2011). PAN 01/2011 Planning and Noise and associated Technical Advice Note.
 - Scottish Government (2014c). Onshore Wind Turbines: Planning Advice. Online planning advice.



- (Institute of Acoustics (IoA) (2013). A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise.
- British Standards Institution (2014). BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.
- HMSO Department of Transport (1988). Calculation of Road Traffic Noise.
- The Highways Agency, Transport Scotland, Transport Wales, the Department for Regional Development (Northern Ireland), (2011). Design Manual for Roads and Bridges (DMRB), Volume 11, section 3, Part 7, Traffic Noise and Vibration.

8.4 Study Area

- 8.4.1 The study area for the assessment of operational noise will include noise-sensitive residential properties nearest to the operational wind turbines around the periphery of the site. Additional noise sensitive receptor locations may be included to consider cumulative effects of operating the Proposed Development with other nearby wind farms.
- 8.4.2 Assessment of construction noise will consider a similar list of noise sensitive receptors as the operational assessment, as well as those which may be located alongside the proposed site access tracks and associated construction traffic routes.

8.5 Assessment Methodology

- 8.5.1 Noise emitted during the construction and decommissioning of the Proposed Development will be temporary and intermittent and can be minimised through appropriate construction practices. The noise levels predicted can be assessed against acceptable limits in order to safeguard the amenity of residential properties. The assessment of construction and decommissioning noise effects will be undertaken in accordance with the guidance contained within BS 5228:2009+A1:2014: 'Code of Practice for Noise and Vibration Control on Construction and Open sites. Part 1: Noise' (BS 5228 1). An assessment of potential impacts arising from any changes in traffic flows as a result of the Proposed Development will also be undertaken as part of the construction noise assessment.
- 8.5.2 The assessment of operational noise from the Proposed Development will be carried out according to the recommendations of ETSU R 97, 'The Assessment and Rating of Noise from Wind Farms' (ETSU 1996) as well as the Good Practice Guide (GPG) from the Institute of Acoustics (IOA): 'A Good Practice Guide to the Application of ETSU R 97 for the Assessment and Rating of Wind Turbine Noise', Institute of Acoustics (IoA), 2013.
- 8.5.3 ETSU R 97 recommends that noise limits should be set relative to existing background noise levels at the nearest receptors and that these limits should reflect the variation in background noise with wind speed. Separate noise limits apply for day time and for night time periods. Day time limits are chosen to protect a property's external amenity, and night time limits are chosen to prevent sleep disturbance indoors, with windows open.
- 8.5.4 Derived from baseline background noise surveys already completed, quiet day time and night time wind varying background noise levels will be defined for each identified noise sensitive receptor in accordance with the methodology set out in ETSU-R-97. The significance of the predicted scheme noise emission levels will then be determined against ETSU R 97 criteria, derived from these representative baseline survey results, when operating in combination with other wind energy schemes (operating, consented but not yet operational or proposed within the planning system, but not including those at scoping stage). Consideration of cumulative operational noise effects will be completed in accordance with the IOA GPG.



- 8.5.5 A representative wind turbine that meets the design requirements for the Proposed Development will be nominated for the assessment of operational noise. A computer model will be used to predict noise levels resulting from the operation of the Proposed Development and other nearby wind farms, based on the methodology detailed in ISO 9613-2:1996, with the specific modelling procedure defined in the IOA GPG.

8.6 Proposed Mitigation

- 8.6.1 It is proposed that the following measures would be adhered to in order to minimise construction and decommissioning noise levels:
- Activities that may impact on residential amenity will be limited to periods between 07:00 and 19:00 Monday to Friday, and 07:00 and 13:00 on Saturdays. The exception would be for turbine component delivery and Abnormal Indivisible Loads (AILs). Prior consent from South Ayrshire Council and Police Scotland would be sought in advance;
 - Where practicable, construction activities will be separated from NSRs by the maximum distance possible;
 - Plant machinery will be selected with consideration given to their noise immission profile. Noise attenuation provisions such as engine casings and exhaust silencers will not be removed at any time.
- 8.6.2 The Proposed Development will be iteratively design in terms of turbines type, size and layout to demonstrate that noise from the wind turbines when operated with other nearby wind farms would remain within relevant ETSU R 97 criteria at all locations.

8.7 Potential Impacts

- 8.7.1 During construction and decommissioning, noise could arise from both onsite activities, such as the construction of onsite access tracks, turbine foundations, the substation/control building etc., and from the movement of construction related traffic both onsite and travelling on public roads to and from the site.
- 8.7.2 During operation, wind turbines have the potential to create noise effects through both aerodynamic noise and mechanical noise. Noise emitted from other operational elements of the Proposed Development are likely to be negligible, and so the operational noise assessment will focus on the noise emitted from the proposed wind turbines.

8.8 Receptors and Impacts Scoped In or Out of Assessment

- 8.8.1 Ground borne vibration resulting from the operation of wind turbines is imperceptible at typical receptor separation distances and is therefore proposed to be scoped out from the noise impact assessment.
- 8.8.2 Noise associated with the operation of the substation and routine maintenance visits and operational traffic is likely to be negligible, and therefore will be scoped out of the noise impact assessment.
- 8.8.3 Due to advances in turbine design, low frequency noise and vibration from turbines has been reduced. The Scottish Government references a report for the UK Government and concerning Low Frequency Noise that notes: *"...there is no evidence of health effects arising from infrasound or low frequency noise generated by wind turbines that were tested."* Therefore, it is proposed that low frequency noise is scoped out from the impact assessment.



8.8.4 The proposed receptors and impacts scoped into and out of the assessment are shown below in Table 8.2.

Table 8.2 – Receptors and Impacts Scoped In and Out

Potential impacts/receptors	Construction	Operation	Decommissioning
Construction and decommissioning noise from on site activities	✓	X	✓
Operational noise from turbines (aerodynamic and mechanical)	X	✓	X
Ground borne vibration	X	X	X
Noise associated with substation operation	X	X	X
Noise associated with routine maintenance visits and operational traffic	X	X	X

8.9 Scoping Questions to Consultees

- Do consultees agree that the baseline background noise survey results (Appendix 8.1), as presented in the baseline noise assessment are suitable and representative for the purposes of an assessment in accordance with ETSU R 97 and the IOA GPG?
- Do consultees agree with the proposed approach to the noise and vibration assessment as set out above?



9. Cultural Heritage

9.1 Introduction

9.1.1 This section provides an overview of the Archaeology and Cultural Heritage context for the Proposed Development. It sets out the proposed study areas for the EIA, an initial appraisal of the baseline within those study areas and identifies additional surveys or studies required to confirm the baseline. The proposed approach to the desk-based assessment and field surveys required is set out and the methodology to be adopted for the assessment of effects is described. An initial appraisal of potential significant effects is provided along with an assessment of what receptors and/or impacts can be scoped out of the EIA.

9.2 Baseline Description

Inner Study Area (Figure 9.1)

- 9.2.1 The West of Scotland Archaeology Service (WoSAS) Historic Environment Record (HER) contains records for four non-designated heritage assets within the turbine development area. These are a possible motte, an historic Farmstead ('Knockoner') of probable 16th century origins, a memorial to a Covenanters martyr, and a natural boulder known as 'McHaffie's Stone'.
- 9.2.2 An assessment of modern aerial photography has identified a small cluster of fields, defined by low earthwork banks, that are most likely associated with the 'Knockoner' farmstead.
- 9.2.3 An assessment of historic maps has identified four other features all associated with sheep husbandry (sheepfold and sheep shelters).

Outer Study Area(s) (Figure 9.2)

- 9.2.4 Preliminary assessment of the HES designations database shows that there are no historic battlefields within 10 km of the Proposed Development (outermost scoping turbine layout). There are, however, three Inventory Gardens and Designed Landscapes (Kilkerran, Blairquhan and Craingengillan) and three Conservation Areas (Crosshill, Straiton and Kirkmichael) within 10 km of these, Blairquhan Garden and Designed Landscape and Straiton Conservation Area are within 5 km of the Proposed Development. Kilkerran Garden and Designed Landscape has no predicted visibility (based on the initial 12 turbine, 200 m to tip, ZTV).
- 9.2.5 The initial assessment shows that there are 12 Scheduled Monuments within 10 km of the Proposed Development (outermost scoping turbine layout); only one of which (Knockinculloch, enclosures on E slope of, 600 m NW of Glenalla (SM 3357)) is within 5 km of the Proposed Development. Only two of those Scheduled Monuments that are at least partly within 10 km of the Proposed Development have any predicted visibility of the Proposed Development: Knockinculloch, enclosures on E slope of, 600 m NW of Glenalla (SM 3357); and, Munteoch, settlement and field systems (SM 5200).
- 9.2.6 The initial assessment shows that there are 131 Listed Buildings within 10 km (eight of Category A; 64 of Category B and 59 of Category C). The Category A Listed Buildings include, amongst others: Straiton Parish Church and Graveyard (LB 19089), within 5 km of the Proposed Development; Blairquhan (LB 19094); Kilkerran House (LB 1114); and Craingengillan (LB 18793) and associated stables (LB 18794).



Further Baseline Identification Methodology

Desk-based Assessment

- 9.2.7 A detailed desk-based assessment will be conducted covering the Inner Study Area in order to identify all known heritage assets, designated or otherwise, that could be directly affected by the Proposed Development, and to inform an assessment of the archaeological potential of the Proposed Development turbine development area.
- 9.2.8 Sources to be consulted for the collation of data will include:
- Historic Environment Scotland's on-line GIS Spatial Data Warehouse;
 - The West of Scotland Archaeology Service (WoSAS) Historic Environment Record (HER);
 - National Record of the Historic Environment (NRHE);
 - Historic maps held by National Library of Scotland;
 - Historic Land-Use Assessment Data for Scotland (HLAmap);
 - Modern aerial photographic imagery (available online);
 - Lidar data, where available (available through the Scottish Government's Scottish Remote Sensing Portal); and,
 - Readily accessible bibliographic resources, including any archaeological reports referenced in HER/NRHE records and previous studies covering the Proposed Development turbine development area.
- 9.2.9 Data will be gathered for the Outer Study Area to identify designated heritage assets that may be subject to effects on their settings and to provide baseline information for the assessment of setting effects.

Field Surveys

- 9.2.10 Walk-over field surveys of the Proposed Development turbine development area and access route(s) will be carried out. The purpose of field survey will be:
- To record the baseline character of heritage assets within the Proposed Development turbine development area that have been identified through the desk-based assessment; and
 - To identify any other heritage assets not revealed through the desk-based study, and to record their baseline character, condition and heritage value.
- 9.2.11 Identified sites will be recorded on pro-forma monument recording forms and by digital photography, and their positions (and where appropriate their extents) logged using a Global Positioning System (GPS). The survey data will be compiled in a Geographic Information System (GIS) and used during further design iteration work and to inform construction phase mitigation work. The results of the survey work will be provided to WoSAS, for inclusion in the HER following completion of the planning application.
- 9.2.12 Site visits to key heritage assets in the Outer Study Area will be carried out, where necessary and in as far as access is possible, to assess the predicted effect of the Proposed Development on their settings. Site visits will include any assets specifically identified by consultees as requiring assessment and those identified through analysis of the Proposed Development ZTV, where it is considered, on the basis of professional judgement, that the effect on their settings could be significant.



9.3 Guidance and Legislation

9.3.1 The assessment will be prepared following the advice and guidance in the following documents.

Legislation

- Ancient Monuments and Archaeological Areas Act 1979;
- Planning (Listed Buildings and Conservation Areas (Scotland) Act 1997 (as amended by Historic Environment (Amendment) (Scotland) Act 2011);
- Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013; and,
- Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

Planning Policies

- National Planning Framework (NPF 3);
- Scottish Planning Policy (SPP) (2014);
- Historic Environment Policy for Scotland (HEPS) (2019) (HES 2019); and,
- South Ayrshire Local Development Plan (2014), including Supplementary Guidance.

Guidance

- Environmental Impact Assessment Handbook (SNH and HES, 2018);
- Standard and Guidance for Historic Environment Desk-Based Assessment (Chartered Institute for Archaeologists, 2014);
- Designation Policy and Selection Guidance (HES, 2019);
- Managing Change in the Historic Environment: Setting (HES, 2016);
- Planning Advice Note 1/2013: Environmental Impact Assessment (PAN 1/2013); and,
- Planning Advice Note 2/2011: Planning and Archaeology (PAN 2/2011).

9.4 Study Area

9.4.1 Two study areas will be used for the assessment:

- The Inner Study Area: the application site boundary (including main site access track once confirmed), within which turbines and associated infrastructure are proposed, will form the study area for the identification of heritage assets that could receive direct effects arising from the construction of the Proposed Development.
- The Outer Study Area: a wider study area, extending 10 km from the outermost finalised proposed turbine locations, will be used for the identification of cultural heritage assets whose settings may be affected by the Proposed Development (including cumulative effects). Views towards any assets identified as having settings sensitive to change will also be considered, even where no visibility is predicted from the asset. The wider ZTV will also be assessed to identify any designated assets beyond 10 km that have settings that may be especially sensitive to the Proposed Development.



9.5 Assessment Methodology

9.5.1 The assessment of significance of effects will be undertaken using two key criteria: the sensitivity of the cultural heritage asset and the magnitude of the predicted impact, which measures the degree of change to the baseline condition of an asset resulting from the Proposed Development.

Assigning Sensitivity to Heritage Assets

9.5.2 Cultural heritage assets are given weight through the designation process. Designation ensures that sites and places are recognised by law through the planning system and other regulatory processes. The level of protection and how a site or place is managed varies depending on the type of designation and its laws and policies (HES, 2019).

9.5.3 Table 9.1 summarises the relative sensitivity of key cultural heritage assets (and their settings) relevant to the Proposed Development (excluding, in this instance, World Heritage Sites and Marine Resources).

Table 9.1: Sensitivity of Heritage Assets

Sensitivity of Asset	Definition/Criteria
High	Assets valued at an international or national level, including: Scheduled Monuments Category A Listed Buildings Inventory Gardens and Designed Landscapes Inventory Historic Battlefields Non-designated assets that meet the relevant criteria for designation (including sites identified in the HER with non-statutory register (NSR) codes C and V)
Medium	Assets valued at a regional level, including: Archaeological sites and areas that have regional value (contributing to the aims of regional research frameworks) Category B Listed Buildings Conservation Areas Non-inventory designed landscapes (NIDL)
Low	Assets valued at a local level, including: Archaeological sites that have local heritage value Category C listed buildings Unlisted historic buildings and townscapes with local (vernacular) characteristics
Negligible	Assets of little or no intrinsic heritage value, including: Artefact find-spots (where the artefacts are no longer in situ and where their provenance is uncertain) Poorly preserved examples of particular types of features (e.g. quarries and gravel pits, dilapidated sheepfolds, etc)

Criteria for Assessing the Significance of Effects

9.5.4 The magnitude of impact (adverse or beneficial) will be assessed in the categories, high, medium, low and negligible and described in Table 9.2.



Table 9.2: Magnitude of Change

Magnitude of Impact	Criteria	
	Adverse	Beneficial
High	Changes to the fabric or setting of a heritage asset resulting in the complete or near complete loss of the asset’s cultural significance. Changes that substantially detract from how a heritage asset is understood, appreciated and experienced.	Preservation of a heritage asset in situ where it would otherwise be completely or almost completely lost. Changes that appreciably enhance the cultural significance of a heritage asset and how it is understood, appreciated and experienced.
Medium	Changes to those elements of the fabric or setting of a heritage asset that contribute to its cultural significance such that this quality is appreciably altered. Changes that appreciably detract from how a heritage asset is understood, appreciated and experienced.	Changes to important elements of a heritage asset’s fabric or setting, resulting in its cultural significance being preserved (where this would otherwise be lost) or restored. Changes that improve the way in which the heritage asset is understood, appreciated and experienced.
Low	Changes to those elements of the fabric or setting of a heritage asset that contribute to its cultural significance such that this quality is slightly altered. Changes that slightly detract from how a heritage asset is understood, appreciated and experienced.	Changes that result in elements of a heritage asset’s fabric or setting detracting from its cultural significance being removed. Changes that result in a slight improvement in the way a heritage asset is understood, appreciated and experienced.
Negligible	Changes to fabric or setting of a heritage asset that leave its cultural significance unchanged and do not affect how it is understood, appreciated and experienced.	

Assessment of Effects on Setting

9.5.5 Historic Environment Scotland’s guidance document, 'Managing Change in the Historic Environment: Setting' (HES 2016), notes that:

“Setting can be important to the way in which historic structures or places are understood, appreciated and experienced. It can often be integral to a historic asset’s cultural significance.”

“Setting often extends beyond the property boundary or ‘curtilage’ of an individual historic asset into a broader landscape context”.

9.5.6 The guidance also advises that:

“If proposed development is likely to affect the setting of a key historic asset, an objective written assessment should be prepared by the applicant to inform the decision-making



process. The conclusions should take into account the significance of the asset and its setting and attempt to quantify the extent of any impact. The methodology and level of information should be tailored to the circumstances of each case”.

- 9.5.7 The guidance recommends that there are three stages in assessing the impact of a development on the setting of a historic asset or place:
- Stage 1: identify the historic assets that might be affected by the Proposed Development;
 - Stage 2: define and analyse the setting by establishing how the surroundings contribute to the ways in which the historic asset or place is understood, appreciated and experienced; and
 - Stage 3: evaluate the potential impact of the proposed changes on the setting, and the extent to which any negative impacts can be mitigated.
- 9.5.8 Following this approach, the turbine blade tip and hub height ZTVs for the Proposed Development will be used to identify those heritage assets from which there would be theoretical visibility of one or more of the proposed wind turbines.
- Scheduled Monuments, non-statutory register (NSR) sites identified in the HER with NSR codes C and V, Category A and B Listed Buildings, Conservation Areas, Inventory Gardens and Designed Landscapes, non-inventory designed landscapes (NIDL), and Inventory Historic Battlefields, where present within the blade tip height ZTV and within 10 km of the outermost turbines, will be included in the assessment.
 - Category C Listed buildings within the blade tip height ZTV and within 10 km of the outermost turbines will be included in the assessment.

Assigning Significance of Effects

- 9.5.9 The sensitivity of the asset (Table 9.1) and the magnitude of the predicted impact (Table 9.2) will be used to inform the professional judgement of the potential significance of the resultant effect. Table 9.3 summarises the criteria for assigning significance of effect. Where two outcomes are possible through application of the matrix and where a potentially significant effect may result, professional judgement supported by reasoned justification, will be employed to determine the level of significance.

Table 9.3: Significance of Effect

Magnitude of Impact	Sensitivity of Asset			
	High	Medium	Low	Negligible
High	major	major / moderate	moderate / minor	minor
Medium	major / moderate	moderate	minor	minor / negligible
Low	moderate / minor	minor	minor / negligible	minor / negligible
Negligible	minor	minor / Negligible	minor / negligible	negligible

- 9.5.10 Major and moderate effects are considered to be ‘significant’ in the context of Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA Regulations). Minor and negligible effects are considered to be ‘not significant’.



9.6 Proposed Mitigation

9.6.1 A range of measures will be applied as part of the iterative design process, to avoid heritage assets within the Proposed Development site. Standard mitigation measures include the following, some of which will be submitted in outline as part of the application:

- Appointment of an archaeological contractor to act as an Archaeological Clerk of Works (ACoW) to advise on and oversee all aspects of the construction phase archaeological mitigation work;
- Preparation of a Written Scheme of Investigation (WSI) to be submitted to the planning authority for approval prior to any construction works (including enabling works) commencing on site; and,
- Implementation of the scope of works outlined in WSI during the construction phase.

9.6.2 Embedded mitigation will include:

- Avoidance of identified areas of constraint during the design of the turbine layout and the onsite infrastructure.
- Minimisation, of visual impact on Straiton Conservation Area.
- Where heritage assets lie within the micrositing allowance, no component of the Proposed Development would be relocated to a position where it would intersect with any of the heritage assets without consultation and approval by an appointed ACoW. Any heritage asset identified as potentially being affected by micrositing would be marked out for avoidance, where possible, or other mitigation to be agreed with WoSAS, implemented to reduce and offset the impact.
- Written guidelines will be issued for use by all construction contractors, outlining the need to avoid causing unnecessary damage to known heritage assets. The guidelines will set out arrangements for calling upon retained professional support in the event that buried archaeological remains of potential archaeological interest (such as building remains, human remains, artefacts, etc.) should be discovered in areas not subject to archaeological monitoring. The guidelines will also make clear the legal responsibilities placed upon those who disturb artefacts or human remains.

9.6.3 In addition to the above, project specific mitigation measures for the avoidance, reduction or offsetting of direct effects will be set out in the EIA Report chapter.

9.7 Potential Impacts

Construction

9.7.1 Potential direct impacts on surviving, upstanding remains and on buried archaeological remains arising from the construction of the Proposed Development.

Operation

9.7.2 Impacts on the settings of designated heritage assets in the landscape surrounding the Proposed Development.

9.7.3 Post-scoping consultation will be carried out with consultees to agree a final list of designated heritage assets to be included for assessment and to agree any visualisation requirements. Any assets identified through appraisal of the Proposed Development ZTVs that lie beyond the proposed Outer Study Area, or any specifically identified by consultees as requiring consideration, and which have settings considered to be potentially sensitive to change, will be included in the assessment.



Decommissioning

- 9.7.4 No adverse direct impacts on archaeology and cultural heritage resulting from decommissioning of the Proposed Development.
- 9.7.5 No adverse impacts on the settings of designated heritage assets resulting from decommissioning of the Proposed Development.

9.8 Receptors and Impacts Scoped In and Out of Assessment

Table 9.4 below summarises the potential impacts proposed to be scoped in (yes) and out (no) of the EIAR.

Table 9.4: Summary of Potential Impacts on Cultural Heritage

Potential Impacts	Construction	Operation	Decommissioning
Direct effects on heritage assets within the Inner Study Area	✓	X	X
Direct effects on heritage assets along off road access routes	✓	X	X
Effects on the settings of heritage assets within the Outer Study Area	X	✓	X
Effects on the settings of heritage assets outwith the Outer Study Area	X	X	X
Cumulative effects on the settings of heritage assets during operation	X	✓	X

Proposed Visualisation Viewpoints

- 9.8.1 Table 9.5 below identifies those designated heritage assets within the Outer Study Area for which, based on the Scoping blade tip height ZTV, visualisations would be included in support of the assessment in the EIAR. In addition to these, reference will be made to LVIS viewpoints where these are helpful to the assessment.

Table 9.5: Proposed Visualisation Viewpoints

VP Ref	Site Name & Ref No	Visualisation type (suggested) to be agreed with consultees (Reasoning)
CH1	Knockinculloch, enclosures on E slope of, 600 m NW of Glenalla (SM 3357)	Wireline (including cumulative wirelines) (medieval / prehistoric enclosure – 3 km to west in forestry – wireline for predicted bare-earth visibility)
CH2	Knockdon, enclosure 700 m NE of (SM 7491)	Wireline (including cumulative wirelines) (prehistoric settlement enclosure – 5.5 km to east – wireline for predicted bare-earth visibility)



VP Ref	Site Name & Ref No	Visualisation type (suggested) to be agreed with consultees (Reasoning)
CH3	Munteoch, settlement and field systems (SM 5200)	Wireline (including cumulative wirelines) (medieval settlement adjacent to Dersalloch Wind Farm)
CH4	Blairquhan GDL (GDL 063)	Photomontage (& cumulative wirelines) GDL (view across GDL from B7045 near Cloncaird Castle – cumulative with Dersalloch and Hadyard Hill)
CH5	Craigengillan GDL (GDL 111)	Photomontage (& cumulative wirelines) GDL (view across GDL from minor road Bellsbank to Loch Doon – cumulative with Dersalloch) (also see LVIA VP 9)

9.9 Scoping Questions to Consultees

- Do you agree that the proposed study areas are appropriate to the nature and scale of the Proposed Development?
- If not, can you advise what you would consider to be appropriate in the specific circumstances, providing reasoning?
- Are there any specific designated heritage assets that you consider have settings that are especially sensitive to change relative to the nature and scale of the Proposed Development that require to be addressed through detailed assessment?
- Do you agree with the proposed scope of the assessment: assets to be included/excluded from assessment?
- Do you agree with the potential impacts identified, or do you have any additional potential impacts that should also be considered?
- Do you agree with the proposed embedded mitigation and do you have any additional mitigation requirements not included in the proposals?
- Do you agree with the proposed visualisation viewpoints or do you have any alternative/additional requirements?



10. Traffic and Transport

10.1 Introduction

- 10.1.1 The chapter covers the predicted transport and access issues that may arise from the construction of the Proposed Development, the significance of these effects and what suitable mitigation can be put in place to offset any adverse impacts.
- 10.1.2 The Transport & Access Chapter will be supported by a Transport Assessment report, Abnormal Load Route Survey and technical figures.
- 10.1.3 The key issues for consideration as part of the assessment will be:
- The temporary change in traffic flows and the resultant, temporary effects on the study network during the construction phase;
 - The physical mitigation associated with the delivery of abnormal loads;
 - The design of new access infrastructure; and
 - The consideration of appropriate and practical mitigation measures to offset any temporary effects.
- 10.1.4 The potential effects of these will be examined in detail.

10.2 Baseline Description

- 10.2.1 It is proposed that all vehicular access would use this access, including Abnormal Indivisible Loads (AIL). A detailed Route Survey Report will support the application and will identify the necessary access improvements that will be required to enable loads to access the site.
- 10.2.2 Local material sourced will be used where feasible and traffic will avoid impacting n local communities as far is possible.

10.3 Guidance and Legislation

- 10.3.1 A Transport Assessment (TA) will be provided to review the impact of transport related matters associated with the proposed development. This will be appended to the EIA Report and will be summarised into a Transport and Access Chapter within the EIA Report.
- 10.3.2 The following policy and guidance documents will be used to inform the Transport & Access Chapter:
- Transport Assessment Guidance (Transport Scotland, 2012);
 - The Guidelines for the Environmental Assessment of Road Traffic (Institute of Environmental Assessment (IEA), 1993);
 - SPP (Scottish Government, 2014); and
 - South Ayrshire Council Local Transport Strategy.

10.4 Study Area

- 10.4.1 Baseline traffic count data will be obtained from new Automatic Traffic Survey (ATC) counts located on the proposed access route. These are:
- A77, to the north of the junction with the B705;



- B7045, to the southeast of Maybole;
- B7023 in Crosshill; and
- B741 to the east of Dailly and relevant adjoining roads.

10.4.2 Traffic data for the A77 will be obtained from UK Government Department for Transport (DfT) traffic count data. National Road Traffic Forecast (NRTF) Low Traffic Growth assumptions will be used to provide a common future year baseline to coincide with the expected construction traffic peak. Traffic accident data would be obtained from Crashmap UK for the study network to inform the accident review for the immediate road study area. Three years worth of data for the B7045, B7023, B741 and relevant adjoining roads would be collated.

10.5 Assessment Methodology

10.5.1 The main transport impacts will be associated with the movement of general HGV traffic travelling to and from the turbine development area during the construction phase of the development.

10.5.2 The Guidelines for the Environmental Assessment of Road Traffic (IEMA 1993) sets out a methodology for assessing potentially significant environmental effects. In accordance with this guidance, the scope of assessment will focus on:

- Potential impacts (of changes in traffic flows) on local roads and the users of those roads; and
- Potential impacts (of changes in traffic flows) on land uses and environmental resources fronting these roads, including the relevant occupiers and users.

10.5.3 The following rules taken from the guidance would be used as a screening process to define the scale and extent of the assessment:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%); and
- Rule 2: Include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

10.5.4 Increases below these thresholds are generally considered to be insignificant given that daily variations in background traffic flow may fluctuate by this amount. Changes in traffic flow below this level predicted as a consequence of the Proposed Development will therefore be assumed to result in no discernible environmental impact and as such no further consideration will be given to the associated environmental effects.

10.5.5 The estimated traffic generation of the Proposed Development will be compared with baseline traffic flows, obtained from existing traffic survey data, in order to determine the percentage increase in traffic.

10.5.6 Potentially significant environmental effects will then be assessed where the thresholds as defined above are exceeded. Suitable mitigation measures will be proposed, where appropriate.

10.5.7 Committed development traffic, i.e. those from proposals with planning consent will be included in baseline traffic flows, where traffic data for these schemes is considered significant and is publicly available. Developments that are proposed or at scoping would not be included.

10.5.8 It is not anticipated that a formal Transport Assessment will be required as these are not generally considered necessary for temporary construction works. A reduced scope Transport Assessment is therefore proposed.



- 10.5.9 Each turbine is likely to require between 11 and 14 abnormal loads to deliver the components to site. The components will be delivered on extendable trailers which will then be retracted to the size of a standard HGV for the return journey.
- 10.5.10 Detailed swept path analysis will be undertaken for the main constraint points on the route from the port of entry through to the site access junction to demonstrate that the turbine components can be delivered to site and to identify any temporary road works which may be necessary.

10.6 Proposed Mitigation

- 10.6.1 Standard mitigation measures that are likely to be included in the assessment are:
- Production of a Construction Traffic Management Plan;
 - The design of suitable access arrangements with full consideration given to the road safety of all road users;
 - A Staff Sustainable Access Plan; and
 - A Framework Abnormal Load Transport Management Plan.
- 10.6.2 Additional mitigation will be included should the assessment reveal criteria that are significant following the application of standard mitigation measures.

10.7 Potential Impacts

- 10.7.1 Potential impacts that may arise during the assessment may include the following for users of the road and those resident along the delivery routes:
- severance;
 - driver delay;
 - pedestrian delay;
 - pedestrian amenity;
 - fear and intimidation; and
 - accidents and safety.

10.8 Receptors and Impacts Scoped In and Out of Assessment

- 10.8.1 Traffic levels associated with this stage of the Proposed Development's life cycle will be less than those associated with the construction phase as elements such as access junctions and associated items of infrastructure are likely to be retained on site following the decommissioning of the turbine equipment. As such, the construction phase represents a worst case assessment scenario.
- 10.8.2 Once operational, it is envisaged that the level of traffic associated with the Proposed Development would be minimal. Regular monthly or weekly visits would be made to the wind farm for maintenance checks. The vehicles used for these visits are likely to be 4x4 vehicles and there may also be the occasional need for an HGV to access the wind farm for specific maintenance and/or repairs. It is considered that the effects of operational traffic would be negligible and therefore no detailed assessment of the operational phase of the Proposed Development is proposed.
- 10.8.3 The traffic generation levels associated with the decommissioning phase will be less than those associated with the construction phase as some elements such as access roads would be left in place on the site. As such, the construction phase is considered the worst case assessment to review the impact on the study area. An assessment of the decommissioning phase would therefore not



be undertaken, although a commitment to reviewing the impact of this phase would be made immediately prior to decommissioning works proceeding.

10.8.4 The proposed receptors and impacts scoped into the assessment are shown below in Table 10.1.

Table 10.1 – Receptors and Impacts Scoped In and Out

Potential Impacts	Construction	Operation	Decommissioning
Severance	✓	X	X
Driver Delay	✓	X	X
Pedestrian Delay	✓	X	X
Pedestrian Amenity	✓	X	X
Fear and Intimidation	✓	X	X
Accidents and Safety	✓	X	X

10.9 Scoping Questions to Consultees

- That the proposed methodology is acceptable?
- That the methods proposed for obtaining traffic flow data are acceptable?
- That the use of Low National Road Traffic Forecasts (NRTF) is acceptable for the whole of the study?
- What developments should be included as committed developments within the baseline traffic flows in the assessment, noting that these should have planning consent at the time of scoping?
- Details of any upgrades or network changes that may be undertaken to the study area network within the next five years?



11. Socio-economics & Tourism

11.1 Introduction

- 11.1.1 Based on the available evidence from similar developments, in south-west Scotland and elsewhere, it is not expected that there will be significant adverse socio-economics and tourism effects.
- 11.1.2 Whilst the expected socio-economic effects could be important to the local economy and communities and would be consistent with national and local economic development priorities, the scale of the effects is unlikely to be significant in EIA terms and would be beneficial, not adverse.
- 11.1.3 Research on the effects of onshore wind farm development on tourism suggest that there is no link between the two and therefore significant adverse effects on the tourism economy are not expected.
- 11.1.4 Nevertheless, it is recognised that an understanding of potential socio-economic and tourism effects can be useful and so it is proposed to include a socio-economics and tourism assessment in the EIA Report. Whilst this assessment will consider whether there is potential for adverse effects, including on the tourism economy, it is expected that it will focus on potential socio-economic benefits arising from the Proposed Development.

Proposed Scope of the Assessment

- 11.1.5 The proposed socio-economic assessment will include:
 - Introduction, including scope of assessment and methodology;
 - Economic development and tourism strategic context;
 - Baseline socio-economic and tourism context;
 - Direct and indirect socio-economic impacts;
 - Assessment of potential tourism effects; and
 - Conclusions and summary of findings.

11.2 Baseline Description

- 11.2.1 The baseline assessment will describe existing socio-economic conditions. This will include a summary of economic performance data for each study area and will identify the relevant tourism assets. The baseline assessment will consider socio-economic conditions in South Ayrshire and Scotland and, where the evidence is available, the local area in the immediate vicinity of the Proposed Development.
- 11.2.2 The socio-economic baseline will include:
 - the national and local economic strategic context;
 - the demographic and economic profile of the local area within the context of the regional and national demographic trends, employment, economic activity and wage levels;
 - the sectoral profile of the local area within the context of regional and national economies; and
 - the role of the tourism sector in the local and regional economy.



11.3 Guidance and Legislation

- 11.3.1 There is no specific legislation or guidance available on the methods that should be used to assess the socio-economic impacts of a proposed onshore wind farm development. The method will be based on established best practice, including government and industry reports on the economic contribution of the sector.
- 11.3.2 There is also no formal legislation or guidance on the methods that should be used to assess the effects that wind farm development may have on tourism. The method will consider individual attractions and tourism facilities to assess if there could be any effects from the Proposed Development.

11.4 Assessment Methodology

- 11.4.1 The direct socio-economic impacts of the Proposed Development will be quantified. This will be undertaken using the methodology developed by BiGGAR Economics, which has been used to assess over 100 onshore wind farms across the UK. This is informed by research on the economic impacts of existing wind farms, during construction and operation. The Applicant is constructing two onshore wind developments in south west Scotland, and the assessment will consider any evidence that can inform assumptions on the potential local and regional socio-economic impacts and impacts on tourism.

11.5 Proposed Mitigation

- 11.5.1 No significant socio-economic adverse effects that require mitigation are expected. However, there may be potential to enhance the beneficial socio-economic effects. This will be highlighted in the report. They might include measures to maximise the supply chain opportunities for local businesses and proposals for community benefit funding that can optimise local economic and community development.

11.6 Potential Impacts

- 11.6.1 The potential direct socio-economic effects will include:
- Temporary effects on the regional and national economy due to expenditure during the construction phase; and
 - Permanent effects on the regional and national economy due to expenditure associated with the operational phase.
- 11.6.2 The potential indirect socio-economic effects will include:
- Permanent effects as a result of any additional public expenditure that could be supported by the additional tax revenue that would be generated during the operational phase; and
 - Permanent effects on the local economy that could be supported by any community funding or shared ownership proposals during the operational phase.
- 11.6.3 The link between onshore wind energy developments and the tourism sector has been the subject of several research reports. The most recent research has not found no relationship between the development of onshore wind farms and tourism employment. Nevertheless, the tourism sector is an important contributor to the Scottish economy and so there is merit in considering whether the development will have any effect on the local tourism sector. The report will include an assessment that considers potential effects on tourism attractions, routes and local accommodation providers.



11.7 Receptors and Impacts Scoped In and Out of Assessment

11.7.1 The proposed receptors and impacts scoped into the assessment are shown below in Table 11.1.

Table 11.1 – Receptors and Impacts Scoped In and Out

Potential Impacts	Construction	Operation	Decommissioning
Temporary effects on the regional and national economy	✓	X	X
Permanent effects on the regional and national economy	X	✓	X
Permanent effects as a result of any additional public expenditure	X	✓	X
Permanent effects on the local economy	X	✓	X
Effects on tourism, routes and local accommodation	✓	✓	X

11.8 Scoping Questions to Consultees

- Do you agree with the proposed approach for the Socio-economics and Tourism assessment set out above? ?



12. Aviation

12.1 Introduction

12.1.1 Wind turbines have the potential to affect civil and military aviation. This chapter explains the methodology used to undertake the aviation safeguarding scoping assessment, lists the aviation references used and describes the aviation baseline condition, consultation requirements and mitigations to be applied if required.

12.2 Baseline Description

12.2.1 The Proposed Development is located in an area relatively remote from significant aviation features. As shown in Figure 12.1 it is 26 km to the south of Glasgow Prestwick Airport (GPA) and 7km to the south of the southern boundary of the Prestwick Control Area (CTA), delineated by the thick blue lines which converge at Turnberry, 15 km to the north-west. Figure 12.1 also shows that there are a number of operational wind turbines marked on the chart in the area.

12.2.2 The turbine development area is located under Class G unregulated airspace up to 5000 ft above mean sea level (AMSL) and above that is the Scottish TMA (Class D Regulated Airspace), controlled by NATS En Route Ltd (NERL). This is a busy area of airspace used to sequence and separate aircraft climbing and descending into and out of GPA, Glasgow and Edinburgh Airports. In a military context the turbine development area is remote from any military Air Traffic Control (ATC) facilities, the closest being the dormant airfield at West Freugh, 50 km to the south-west. The turbine development area is also located within MOD Low Flying Area (LFA) 20.

12.3 Guidance and Legislation

12.3.1 There are a number of aviation publications relevant to the interaction of wind turbines and aviation containing guidance and legislation, which cover the complete spectrum of aviation activity in the UK as shown below.

➤ Reference Documents

- Civil Aviation Publication (CAP) 764 Civil Aviation Authority (CAA) Policy and Guidance on Wind Turbines Version 6, Feb 2016;
- CAP 168 Licensing of Aerodromes, Version 11 March 2019;
- CAP 670 ATS Safety Requirements Version 3 June 2019;
- CAP 774 UK Flight Information Services, Ed 3 May 2017;
- CAP 738 Safeguarding of Aerodromes Version 2 Dec 2006
- CAP 793 Safe Operating Practices at Unlicensed Aerodromes Ed 1 July 2010;
- CAP 493 Manual of Air Traffic Services Part 1 Ed 7.0 2017;
- CAP 660 Parachuting Ed 5 March 2020;
- Military Aviation Authority Regulatory Article 2330 (Low Flying);
- UK Military Aeronautical Information Publication (MIL AIP);
- UK Aeronautical Information Publications (AIP);
- CAA 1:250,000 and 1:500,000 VFR Charts; and



- CAA Policy Statement: Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150m Above Ground Level dated 01/06/17.

12.4 Study Area

12.4.1 The assessment of effects of the proposed turbines will be based upon the guidance laid down in CAA Publication CAP 764 Policy and Guidelines on Wind Turbines Version 6 Dated February 2016. Consultation criteria for aviation stakeholders is defined in Chapter 4. These distances inform the size of the study area and include:

- Airfield with a surveillance radar – 30 km;
- Non radar licensed aerodrome with a runway of more than 1,100 metres – 17 km;
- Non radar licensed aerodrome with a runway of less than 1,100 metres – 5 km;
- Licensed aerodromes where the turbines would lie within airspace coincidental with any published Instrument Flight Procedure (IFP);
- Unlicensed aerodromes with runways of more than 800 metres – 4 km;
- Unlicensed aerodromes with runways of less than 800 metres – 3 km;
- Gliding sites – 10 km; and
- Other aviation activity such as parachute sites and microlight sites within 3 km – in such instances developers are referred to appropriate organisations.

12.4.2 CAP 764 goes on to state that these distances are for guidance purposes only and do not represent ranges beyond which all wind turbine developments will be approved or within which they will always be objected to. These ranges are intended as a prompt for further discussion between developers and aviation stakeholders and will be reported upon in the EIA Report. For example in the case of GPA, they have stated that they wish to be consulted in relation to wind farms out to 40km.

12.5 Assessment Methodology and Potential Impacts

Radar Modelling Methodology

12.5.1 The radar calculation results shown in this report have been produced using specialist propagation prediction software (RView Version 5). Developed over a number of years, it has been designed and refined specifically for the task. RView uses a comprehensive systems database which incorporates the safeguarding criteria for a wide range of radar and radio navigation systems. RView models terrain using the Ordnance Survey (OS) Terrain 50 digital terrain model, which has a post spacing of 50 metres and has a root mean square (RMS) error of 4 metres. The results are verified using the Shuttle Radar Topography Mission (SRTM) dataset, a separate smoothed digital terrain model with data spacing of 3 arc seconds. By using two separate and independently generated digital terrain models, anomalies are identified, and consistent results assured. RView models the refractive effects of the atmosphere on radio waves and the First Fresnel Zone. A feature of RView is that as well as performing calculations in the manner believed to be most appropriate it also allows comparison with results from simpler models. For example, RView can perform calculations using the true Earth Radius at the midpoint between the radar and the wind turbine or the simplified 4/3 Earth Radius model. If needed, RView is also capable of modelling a range of atmospheric refractive conditions. RView models the trajectory of radar signals at different elevations enabling modelling of both volume surveillance and pencil beam radars as well as the effects of angular sterilisation as applied, for example, in Met Office radars.



Licensed Aerodromes

- 12.5.2 As well as examining the technical impact of wind turbines on Air Traffic Control (ATC) facilities, it is also necessary to consider the physical safeguarding of ATC operations using the criteria laid down in CAP 168 Licensing of Aerodromes to determine whether a proposed development will breach obstacle clearance criteria. This will also be reported on in the EIA Report but initial surveys show there are no physical safeguarding issues associated with this proposal.
- 12.5.3 An initial review undertaken by Wind Power Aviation Consultants Ltd (WPAC) using the above criteria shows that only civil licensed radar equipped aerodrome within 30 km is at Glasgow Prestwick Airport (GPA), 26 km to the north. GPA has two primary surveillance radars (PSR), including a new Terma Scanter 4002 radar installed specifically to mitigate the effect of wind turbines on the original PSR. Radar line of sight (RLOS) modelling has been undertaken against both radars with the results shown in Tables 12.1 and 12.2 below. Assuming a 200 m turbine tip height, any figures in the tables that are less than 200 metres indicate that turbines are in line of sight of the radar, where the figure exceeds 200 m, the turbine will be completely screened by the intervening terrain.

Table 12.1: Prestwick PSR Results

Turbine	Radar Line of Sight	Turbine	Radar Line of Sight
1	21.3	7	14.7
2	27.1	8	50.6
3	22.2	9	26.1
4	40.8	10	9.5
5	43.7	11	52.4
6	21.1	12	34.6

Table 12.2: Prestwick Terma Radar Results

Turbine	Radar Line of Sight	Turbine	Radar Line of Sight
1	6.7	7	8
2	26.9	8	36.7
3	14.1	9	13.4
4	24	10	2.8
5	27.6	11	52.2
6	17.5	12	19.5

- 12.5.4 The results show that all of the turbines within the Proposed Development will be in line of sight of both radars at GPA. The result will be that an area of radar clutter will be generated on the PSR, in a location that is almost certainly already affected by clutter from other wind turbines, however, it will be for GPA to determine if the technical effect will have any operational effect. It should be possible to utilise the Terma Radar to mitigate the effect subject to the conclusions of a suitable



technical study. The Applicant will undertake consultation with Prestwick and the outcome reported in the EIA Report.

Unlicensed Aerodromes

- 12.5.5 There are no unlicensed aerodromes within or even close to consultation distance, the closest is a small grass airstrip at Kilkerran, over 7 km to the north west, consultation is not required.
- 12.5.6 An online search for private airfields has been conducted and none identified within consultation distance, however, not all private strips are listed in publications or marked on charts. Operators of any such private airstrips that are identified during EIA Report preparation will be consulted in accordance with CAP 764 and CAP 793 Safe Operating Practices at Unlicensed Aerodromes

Ministry of Defence

- 12.5.7 It is necessary to take into account the aviation and air defence activities of the Ministry of Defence (MOD) as safeguarded by the Defence Infrastructure Organisation (DIO). The types of issues that will be addressed in the EIA Report include:
- Ministry of Defence Airfields, both radar and non-radar equipped;
 - Ministry of Defence Air Defence Radars;
 - Ministry of Defence Meteorological Radars; and
 - Military Low Flying.
- 12.5.8 The closest military ATC radar is at the former RAF West Freugh, 52 km to the south-west. The radar is mainly used for range safety in the Luce Bay danger area complex and is not normally used to provide ATC services to the north of the danger areas. However, for completeness, radar modelling was undertaken. The results show that due to the intervening terrain, there is no radar line of sight below 1000 m above ground level (AGL). The MOD will be consulted about the Proposed Development during scoping and the outcome reported in the EIA Report, however, it is clear that there will no MOD ATC radar objection to the Proposed Development.

Air Defence Radars

- 12.5.9 The closest Air Defence radar is located at Brizlee Wood, well over 100 km to the east. Radar modelling shows that there is no radar line of sight below 1000 m AGL and there will be no MOD Air Defence objection to the Proposed Development.

Low Flying

- 12.5.10 The Proposed Development is located in an MOD Tactical Training Area and designated in wind farm consultation guidance as a Red Zone, however, this does not necessarily lead to an objection. The MOD will closely examine the Proposed Development but in this case it would appear that an objection is unlikely as they did not object to a previous consultation on this turbine development area when it was called Linfairn (MOD DIO Reference 1921 dated 27 Jan 2015), since when low flying has decreased significantly. The MOD will be consulted and it is likely that they will require the installation of infra-red lights to the MOD specification. The consultation outcome will be reported in the EIA Report.

NATS En Route Ltd (NERL)

- 12.5.11 It is necessary to take into account the possible effects of wind turbines upon the National Air Traffic Services En Route Ltd (NERL) communications, navigation and surveillance systems – a network of primary and secondary radars and navigation facilities around the country.



12.5.12 An initial assessment has been conducted to determine any effect of the Proposed Development on NERL communications, navigation and surveillance infrastructure (CNS). The closest radars in the NERL network are at Lowther Hill and Great Dun Fell. The results for Lowther Hill are shown in Table 12.3. All of the turbines are potentially visible to the radar as a distance of 52km. In the case of Great Dun Fell, radar line of sight is in excess of 500 m AGL across the site and radar will not be affected.

Table 12.3: Lowther Hill Radar Results

Turbine	Radar Line of Sight	Turbine	Radar Line of Sight
1	185.2	7	169.1
2	191.7	8	197.4
3	177.3	9	135.5
4	196.3	10	130.8
5	184.6	11	185.1
6	173	12	150.7

12.5.13 NERL are installing a new radar at Lowther Hill which will enable wind farm mitigation to be achieved, however, it will be necessary to consult with them and agree a mitigation scheme if required. The outcome of the consultation will be reported in the EIA Report.

Met Office Radars

12.5.14 The Met Office safeguards its network of radars using a European methodology known as OPERA. In general they will object to any turbine within 5 km in line of sight and will examine the impact of any turbines within 20 km. Where a site is within 20 km, the Met Office will undertake an operational assessment based on three main criteria, having determined if there is a technical effect on the radar. The factors they will consider include the following:

- Proximity to Airports;
- River catchment response times; and
- Population density.

12.5.15 In this case the closest Met Office radar is at Holehead, north of Glasgow and well beyond 20 km. There will be no Met Office radar objection to the Proposed Development and consultation is not required. This issue can be scoped out of the EIA Report.

Aviation Obstruction Lighting

12.5.16 CAA extant lighting policy is covered in Reference M; it states that any obstruction in excess of 150 m above ground level constitutes an “en route navigation hazard”. Wind turbines are lit with medium intensity (2000 candela) fixed red lights located on the highest practical point, in this case the nacelle. There is also currently a requirement for low intensity, 32 candela lights halfway up the tower. There are a number of mitigations that can be applied to minimise the effect of lighting on the surrounding area including reducing the number of turbines that need to be lit, reducing the brilliance of the lights to a minimum of 10% when the visibility in all directions exceeds 5 km and designing the lights to minimise downwards illumination. The CAA have recently released a draft change to the lighting requirements which is expected to be ratified shortly. A full lighting assessment will be undertaken for inclusion within the EIA Report which will reflect the new CAA guidance.



12.6 Consultation

12.6.1 Consultation with relevant aviation stakeholders is a routine part of wind farm development and in accordance with CAP 764, consultees will include:

- MOD Defence Infrastructure Organisation;
- NERL;
- Glasgow Prestwick Airport; and
- CAA for lighting

12.7 Receptors and Impacts Scoped In and Out of Assessment

12.7.1 The proposed receptors and impacts scoped into the assessment are shown below in Table 12.4.

Table 12.4 – Receptors and Impacts Scoped In and Out

Potential impacts/receptors	Construction	Operation	Decommissioning
Licensed aerodromes	X	✓	X
Radar	X	✓	X
Unlicensed aerodromes	X	X	X
MoD airfields, defence and meteorological radars, low flying	X	✓	X
NERL communications, navigation and surveillance infrastructure	X	✓	X
MET Office Radars	X	X	X
Aviation Obstruction Lighting	X	✓	X

12.8 Scoping Questions to Consultees

- Are there any other relevant consultees who should be contacted in respect to the aviation assessment?
- Is the spatial extent of the aviation study area considered to be appropriate?



13. Telecommunications and Television

13.1 Introduction

13.1.1 This section considers potential issues associated with telecommunications as a result of the Proposed Development during the operational phase.

13.2 Proposed Scope of Assessment

Telecommunications

13.2.1 Any potential effects on communication links will be sought through formal consultation with Spectrum Licensing (previously known as Ofcom) and all relevant link operators. Where possible and applicable, the turbines will be designed to take into account the minimum separation distance from identified communication link(s). An assessment will be made as to the significance of potential operational effects and where appropriate, suitable mitigation measures will be discussed.

Television

13.2.2 The closest television transmitters are the Kirkmichael and Girvan transmitters. The Kirkmichael Transmitter is located approximately 6.1 km north-north west of the site, and the Girvan Transmitter is located approximately 15.7 km west of the site. These transmitters have switched to digital transmission only. Currently there is no widely accepted method of determining the potential effects of wind turbines on digital television reception, however digital television signals are better at coping with signal reflections, and do not suffer from ghosting that may occur with analogue signals.

13.2.3 To date, there are very few cases of wind turbine interference with digital television reception post-digital switchover. Given the strength of the digital signal in the area and the inherently resilient nature of digital television reception, there is considered to be a low risk of any interference from a wind energy development at this location on domestic television reception.

13.2.4 Due to the low risk of interference with television reception, the requirement to address any reception issues once the Proposed Development is operational could be conditioned in any consent granted. For the above reasons, it is not proposed to carry out a detailed assessment of potential effects on television reception and this topic therefore will be scoped out of further assessment.

13.3 Assessment Methodology and Potential Impacts

13.3.1 No assessment is proposed at this stage; should the need to assess potential impacts arise following consultation with relevant stakeholders, the studies will be commissioned as necessary.

13.4 Potential Mitigation

13.4.1 Should they be required; the mitigation will be agreed through direct dialogue between the Applicant and relevant stakeholders.

13.5 Receptors and Impacts Scoped In and Out of Assessment

13.5.1 The proposed receptors and impacts scoped into the assessment are shown below in Table 13.1.



Table 13.1 – Receptors and Impacts Scoped In and Out

Potential impacts/receptors	Construction	Operation	Decommissioning
Telecommunications	X	✓	X
Television	X	X	X



14. Shadow Flicker

14.1 Introduction

- 14.1.1 This section considers shadow flicker, an effect caused by the rotation of the turbine blades when the sun is shining, which can create a flickering or strobe like effect. It can be distracting and disturbing for people who are affected. Effects occur usually when the frequency of the flicker is less than 1.5 Hz.

14.2 Guidance and Legislation

- 14.2.1 There are at present no formal guidelines available on what exposure would be acceptable in relation to shadow flicker. There is no standard for the assessment of shadow flicker. The specific advice sheet from Scottish Government, Onshore Wind Turbines, a web-based guide (Scottish Government, 2014) sets out the potential geographic area which may fall under assessment: *“Where this (shadow flicker) could be a problem, developers should provide calculations to quantify effect. In most cases however, where separation is provided between wind turbines and nearby dwellings (as a general rule ten rotor diameters), ‘shadow flicker’ should not be a problem.”*
- 14.2.2 Published research by the Department of Energy and Climate Change (DECC), Update of UK Shadow Flicker Evidence Base (DECC, un-dated), evaluates the current international understanding of shadow flicker and confirms an acceptable study area for assessment is ten rotor diameters from each turbine and within 130 degrees either side of north.

14.3 Proposed Scope of Assessment

- 14.3.1 Potential for shadow flicker impacts will be assessed at all residential receptors within the shadow flicker study area.
- 14.3.2 As detailed above the shadow flicker study area includes the area within a distance of 10 times the rotor diameter and 130 degrees either side of north for each turbine.

14.4 Assessment Methodology and Potential Impacts

- 14.4.1 The shadow flicker assessment will be undertaken using WindPRO computer modelling software and will be run for both a worst case scenario (accounting for 365 sunshine days per year and 100 % turbine operation) and realistic scenario (using, where possible, measured meteorological data and 85 % turbine operation) on the potential shadow flicker occurrence for a 1 m x 1 m ground floor window at each identified sensitive receptor location, assumed to be facing directly towards the Proposed Development.
- 14.4.2 The sensitivity of the receptors will be considered to be high unless there are particular reasons for reduced sensitivity. A significant effect will be noted where a receptor is identified as experiencing greater than 30 hours of flicker a year or more than 30 minutes per day on the worst affected day (based on the realistic scenario), which ever if greater (DECC, 2011).
- 14.4.3 The assessment will present clear findings on the estimated number of hours of shadow flicker impact anticipated for each receptor, for both scenarios. Where required, potential mitigation measures will be discussed.



14.5 Potential Mitigation

14.5.1 The results of the assessment will be reported in the EIA chapter which will also consider any potential mitigation options if required.

14.6 Receptors and Impacts Scoped In and Out of Assessment

14.6.1 The proposed receptors and impacts scoped into the assessment are shown below in Table 14.1.

Table 14.1 – Receptors and Impacts Scoped In and Out

Potential impacts/receptors	Construction	Operation	Decommissioning
Shadow Flicker	X	✓	X

14.7 Scoping Questions to Consultees

- Do you agree with the study area outlined above?
- Do you agree to the above methodology to identify significant effects?



15. Forestry

15.1 Introduction

15.1.1 This section of the Scoping Report provides a summary of baseline forestry information collected to date, and that proposed to inform the EIA of the Proposed Development. An overview of potential impacts to be addressed within the EIA Report is also provided.

15.2 Baseline Description

15.2.1 The Proposed Development access would run through privately owned and managed woodlands, and therefore felling may be required to accommodate access to the turbine development area.

15.2.2 A desk-based assessment reveals a small area of the woodlands within the turbine development area identified as ancient woodland. The Ancient Woodland Inventory Scotland (AWI) identifies a pocket of 'ancient of semi natural origin' on the open hill to the north.

15.2.3 A forestry baseline will be prepared which will detail the woodlands existing at the time of preparation of the EIA Report. This will include current species; planting year; and other relevant woodland information. There are no felling or restocking plans available at the time of writing this report. It will be prepared from existing forest records; desk-based assessments; consultation with Forestry Land Scotland (FLS); and field surveys.

15.3 Proposed Scope of Assessment

15.3.1 Commercial forests are dynamic and constantly changing through landowner activities; market forces; and natural events, such as windblow or pest and diseases. The forestry assessment will be a factual assessment describing the changes to the forest structure resulting from the incorporation of the Proposed Development into the forest which will be presented as a Technical Appendix to Chapter 3 Proposed Development of the EIA Report. Other Chapters of the EIA Report will identify the sensitive receptors relevant to their disciplines and report on the effects of the Proposed Development related to forest felling and restocking. The relevant Chapters of the EIA Report include Chapter 6: LVIA; Chapter 7: Ornithology; Chapter 8: Ecology; and Chapter 9: Geology, Peat, Hydrology and Hydrogeology.

Consultation

15.3.2 At this stage it is anticipated that the main consultee will be Scottish Forestry (SF), South Scotland Conservancy. SF will be consulted to ensure that the proposed changes to the woodlands address the requirements of the Scottish Government's Control of Woodland Removal Policy and other relevant guidance. In addition, there may be interrelated issues raised by other consultees and this will be clearly set out in the EIAR.

15.4 Assessment Methodology

15.4.1 The forestry assessment will be limited to the forest area contained within the site boundary. A Wind Farm Forest Plan will be prepared, which will detail felling and any replanting proposals, illustrating the forestry requirements associated with the construction and operation of the Proposed Development. This will include a felling plan to show which woodlands are to be felled, and when, for the construction and operation of the Proposed Development. It will further include a restocking plan showing which woodlands, if any, are to be replanted and with which species and areas to be left unplanted for the Proposed Development infrastructure.



15.4.2 The changes to the woodland structure will be analysed and described including changes to woodland composition, timber production, traffic movements and the felling and restocking plans. The resulting changes to the woodland structure will be assessed for compliance with the UK Forestry Standard and the requirement for compensation planting to mitigate against any woodland loss. The Wind Farm Forest Plan will be assessed against the baseline data in line with the Control of Woodland Removal Guidance.

15.5 Potential Mitigation

15.5.1 Measures to avoid or mitigate potential impacts upon the forest will, as far as practicable, sought to be embedded in the design of the Proposed Development through consideration of the siting of the wind turbines; and by using existing access tracks and forest tracks. Woodland loss would be minimised by keyholing infrastructure into the felling and restocking plans.

15.5.2 Potential forms of mitigation may include a redesign of the existing forest in consultation with FLS including, for example, changes to the felling programme; the use of designed open space; alternative species and woodland types; changing the management intensity; or the provision of compensation planting on or offsite.

15.6 Potential Impacts

15.6.1 There is potential for changes to the forest structure resulting from the Proposed Development, with consequential implications for the wider felling and restocking plans across the forest area. Areas of woodland are anticipated to be required to be felled for the construction and operation of the Proposed Development including for access tracks, wind turbine locations and other infrastructure. The potential effects will be changes to the structure of the woodlands, which may result in a loss of woodland area.

15.7 Receptors and Impacts Scoped In or Out of Assessment

15.7.1 The changes to the forest for a particular development are regarded as site specific and it is considered that there are no cumulative onsite forestry issues to be addressed, therefore cumulative effects are scoped out of the EIA Report. The proposed receptors and impacts scoped into the assessment are shown below in Table 15.1.

Table 15.1 – Receptors and Impacts Scoped In and Out

Potential impacts/receptors	Construction	Operation	Decommissioning
Changes to the forest structure	✓	✓	X
Cumulative effects	X	X	X

15.8 Scoping Questions to Consultees

- Do you agree that the forestry assessment will not assess effects, but be considered as an Appendix to Chapter 3 Proposed Development of the EIA Report?



16. Carbon Calculator

16.1 Introduction

- 16.1.1 This section of the document sets out the proposed approach to the assessment of potential effects of the Proposed Development on carbon balance as a result of the construction and operation of the Proposed Development.
- 16.1.2 Calculation of the carbon footprint will be based on best practice guidelines including the Scottish Government Carbon Calculator Tool.

16.2 Proposed Scope of Assessment

- 16.2.1 A wind farm has the potential to displace electricity generated from fossil fuels during its operational lifespan and consequently prevent carbon dioxide (CO₂) from being released. The EIA will provide an estimate of the potential amount of CO₂ savings that can be made will be based on assessing the electricity generation mix that the Proposed Development is displacing at any given time and the carbon released due to the construction of the Proposed Development.

16.3 Assessment Methodology

- 16.3.1 A wind farm constructed on peatland habitat also has the potential to generate CO₂ emissions as a result of the degradation of peat and felling of woodland. The current best practice guidance available on the Scottish Government website provides a method to calculate carbon emission savings associated with wind farm developments on Scottish peatlands using a full life cycle analysis approach using a web-based application. The tool was originally published in 2008 and the latest version published in December 2018 (Scottish Government, 2018b). The tool compares the carbon costs of wind farm developments with the carbon emissions savings attributable to the wind farm. The calculation is summarised as the length of the time (in years) it will take the carbon savings to amount to the carbon costs also referred as the “*payback period*”. An assessment of effect of significance will not be undertaken but the volumes of CO₂ savings and emissions will be provided in the Chapter.

16.4 Potential Mitigation

- 16.4.1 During the design process, the turbines will be sited to avoid the areas of deep peat as far as possible and measures to minimise peat disturbance especially during excavation will be taken into consideration. Best practice measures will be also be considered to minimise peat disturbance during construction and decommissioning that will be provided as a part of the Construction Environment Management Plan.

16.5 Questions for Consultees

- Do you agree with the above methodology for assessing carbon emissions and savings as a result of the Proposed Development?



17. Summary

- 17.1.1 This EIA Scoping Report outlines the proposed technical and environmental assessment that will be included within the EIA Report for the Proposed Development. The proposed scope and methodologies for each assessment have been provided and the guidance to be followed set out. Should any further information be required in order that a full EIA Scoping Opinion can be provided we would be happy to provide further information and/or discuss any further requirements.



18. References

Averis, A., Averis, B., Birks, J., Horsfield, D., Thompson, D., Yeo, M. (2004). An Illustrated Guide to British Upland Vegetation. JNCC, Peterborough.

Ayrshire Biodiversity Group (2008). *Ayrshire Biodiversity Action Plan*. Available at: <https://www.south-ayrshire.gov.uk/documents/2008%20ayrshire%20bap.pdf>

BRIG (2007) The United Kingdom Biodiversity Action Plan (UK BAP) Priority Species and Habitats. Available at: <https://hub.jncc.gov.uk/assets/bdd8ad64-c247-4b69-ab33-19c2e0d63736>

Bright, J.A., Langston, R.H.W. & Anthony, S. (2009). Mapped and written guidance in relation to birds and onshore wind energy development in England. *RSPB Research Report*, 35, RSPB: Sandy.

British Standards Institution (2014). BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise. Available at: <https://www.thenbs.com/PublicationIndex/documents/details?Pub=BSI&DocID=305965>

Chartered Institute for Archaeologists (2014) Standard and Guidance for Historic Environment Desk-Based Assessment. Available at : https://www.archaeologists.net/sites/default/files/CifAS&GDBA_2.pdf

CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland*. Available at: <https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1.pdf>

Collins, J. (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition)*. The Bat Conservation Trust, London.

Eaton et al. (2015) Bird of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108, 708-746.

European Union (1992) *Natural Habitats and Wild Fauna and Flora Directive*. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31992L0043>

Historic Environment Scotland & Scottish Natural Heritage (2018) *Environmental Impact Assessment Handbook*. Available at: <https://www.nature.scot/sites/default/files/2018-05/Publication%202018%20-%20Environmental%20Impact%20Assessment%20Handbook%20V5.pdf>

Historic Environment Scotland (2016) *Managing Change in the Historic Environment: Setting*. Available at: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationid=80b7c0a0-584b-4625-b1fd-a60b009c2549>

Historic Environment Scotland (2019a) Historic Environment Policy for Scotland. Available at: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationid=1bcfa7b1-28fb-4d4b-b1e6-aa2500f942e7>

Historic Environment Scotland (2019b) Designation Policy and Selection Guidance. Available at: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationid=8d8bbaeb-ce5a-46c1-a558-aa2500ff7d3b>

HMSO Department of Transport (1988) Calculation of Road Traffic Noise. Available at: <https://www.thenbs.com/PublicationIndex/documents/details?Pub=DOT&DocID=200484>

Institute of Acoustics (IoA), (2013) A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise. Available at:



<https://www.ioa.org.uk/sites/default/files/IOA%20Good%20Practice%20Guide%20on%20Wind%20Turbine%20Noise%20-%20May%202013.pdf>

Institute of Environmental Assessment (1993) *The Guidelines for the Environmental Assessment of Road Traffic*. Available at: <http://programmeofficers.co.uk/Cuadrilla2018/CD8/CD8.3.pdf>

JNCC (2010) *Handbook for Phase 1 Habitat Survey - a technique for environmental audit*. Revised Reprint 2016. JNCC, Peterborough.

Landscape Institute (2019a) *Visual Representation of Development Proposals*, Technical Guidance Note 06/19. Available at: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-02-17-Visual-Representationwithdrawn.pdf

Landscape Institute (2019) *Technical Guidance Note 2/19 Residential Visual Amenity Assessment*. Available at: <https://www.landscapeinstitute.org/technical-resource/rvaa/>

NatureScot (2019) *Planning and Development: Protected Animals*. Available at: <https://www.nature.scot/professional-advice/protected-areas-and-species/protected-species/protected-species-z-guide>

NatureScot (2020a) *Assessing impacts on Wild Land Areas - Technical Guidance*. Available at: <https://www.nature.scot/assessing-impacts-wild-land-areas-technical-guidance>

NatureScot (2020b) *General pre-application and scoping advice to developers of onshore wind farms*. Available at: <https://www.nature.scot/general-pre-application-and-scoping-advice-onshore-wind-farms>

NatureScot (2020c) *Scottish Biodiversity List*. Available at: <https://www.nature.scot/scottish-biodiversity-list>

Rodwell, J. S. (2006) *National Vegetation Community Users' Handbook*. JNCC, Peterborough.

Rodwell, J. S. (ed.) (1992) *British Plant Communities. Volume 3. Grasslands and montane communities*. Cambridge University Press, Cambridge.

Rodwell, J. S. (ed.) (1993) *British Plant Communities. Volume 2. Mires and Heaths*. Cambridge University Press, Cambridge.

RSPB (2006) *Scottish Wind Farm Sensitivity Map*. Available at: <https://www.rspb.org.uk/our-work/our-positions-and-casework/our-positions/climate-change/action-to-tackle-climate-change/uk-energy-policy/wind-farms/mapping-and-locational-guidance/>

Scotland and Northern Ireland Forum for Environmental Research (SNIFFER, 2009) *WFD95: A Functional Wetland Typology for Scotland – Field Survey Manual. Version 1*.

Scottish Government, (2004) *Nature Conservation (Scotland) Act 2004*. Available at: <https://www.legislation.gov.uk/asp/2004/6/contents>

Scottish Government, (2011a) PAN 01/2011 *Planning and Noise and associated Technical Advice Note*. Available at: <https://www.gov.scot/publications/planning-advice-note-1-2011-planning-noise/>

Scottish Government (2011b) *Historic Environment (Amendment) (Scotland) Act 2011*. Available at: <https://www.legislation.gov.uk/asp/2011/3/contents/enacted>

Scottish Government (2014a) *The National Planning Framework for Scotland (NPF3)*. Available at: <http://www.gov.scot/Publications/2014/06/3539>

Scottish Government (2014b) *Scottish Planning Policy (SPP)*. Available at: <http://www.gov.scot/Publications/2014/06/5823>



Scottish Government (2014c) *Onshore wind turbines: planning advice*. Available at: <https://www.gov.scot/publications/onshore-wind-turbines-planning-advice/>

Scottish Government (2017) Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: <https://www.legislation.gov.uk/ssi/2017/101/made>

Scottish Government (2018) Climate Change Plan. Available at: <https://www.gov.scot/publications/scottish-governments-climate-change-plan-third-report-proposals-policies-2018-9781788516488/>

Scottish Wildcat Action (2015) *Priority Areas*. Available at: <http://www.scottishwildcataction.org/about-us/#priority-areas>

SNH (2012) *Assessing the Cumulative Impact of Onshore Wind Energy Developments*. Inverness.

SNH (2014). *Survey Methods for use in Assessment of the Impacts of Proposed Onshore Wind Farms on Bird Communities*. SNH, Battleby, Perth.

SNH (2016) *Assessing connectivity with Special Protection Areas (SPAs)*.

SNH (2017a) Visual Representation of Wind Farms Version 2.2. Available at: <https://www.nature.scot/visual-representation-wind-farms-guidance>

SNH (2017b) *Siting and Designing of Windfarms in the Landscape: Version 3a*. Available at: <https://www.nature.scot/siting-and-designing-wind-farms-landscape-version-3a>

SNH (2017c) *Recommended bird survey methods to inform impact assessment of onshore wind farm*.

SNH (2018a) *Assessing the cumulative impacts of onshore wind farms on birds*. Guidance.

SNH (2018b) *Assessing significance of impacts from onshore wind farms outwith designated sites*. Guidance. Version 2, February 2018.

SNH (2019) *Bats and Onshore Wind Turbines: Survey Assessment and Mitigation* SNH Inverness.

SNH (2020a) *Standing Advice for Planning Consultation. Protected Species: Badger*, SNH, Inverness.

SNH (2020b) *Standing Advice for Planning Consultation. Protected Species: Bats*, SNH, Inverness.

SNH (2020c) *Standing Advice for Planning Consultation. Protected Species: Otter*, SNH, Inverness.

SNH (2020d) *Standing Advice for Planning Consultation. Protected Species: Red Squirrel*, SNH, Inverness.

SNH (2020d) *Standing Advice for Planning Consultation. Protected Species: Water Vole*, SNH, Inverness.

South Ayrshire Council (2019) *South Ayrshire Council Local Transport Strategy*. Available at: <https://www.south-ayrshire.gov.uk/documents/lts%20main%20doc%20issued%20with%20sea.pdf>

South Ayrshire Council (2014) *Local Development Plan*. Available at: https://www.south-ayrshire.gov.uk/documents/localdevplan_final.pdf

South Ayrshire Council (2015) *Supplementary Guidance: Wind Energy*. Available at: <https://www.south-ayrshire.gov.uk/documents/adopted%20wind%20energy-supplementary%20guidance.pdf>

South Ayrshire Council (2018) *South Ayrshire Landscape Wind Capacity Study*. Available at: <https://www.south-ayrshire.gov.uk/planning/documents/south%20ayrshire%20landscape%20wind%20capacity%20study%20-%20final%20august%202018.pdf>

Transport Scotland (2012) *Transport Assessment Guidance*. Available at: https://www.transport.gov.scot/media/4589/planning_reform_-_dpmtag_-_



[_development_management_dpmtag_ref_17_-_transport_assessment_guidance_final_-_june_2012.pdf](#)

The Highways Agency, Transport Scotland, Transport Wales, the Department for Regional Development (Northern Ireland), (2011) Design Manual for Roads and Bridges (DMRB), Volume 11, section 3, Part 7, Traffic Noise and Vibration. Available at: <https://programmeofficers.co.uk/Preston/CoreDocuments/LCC026.pdf>

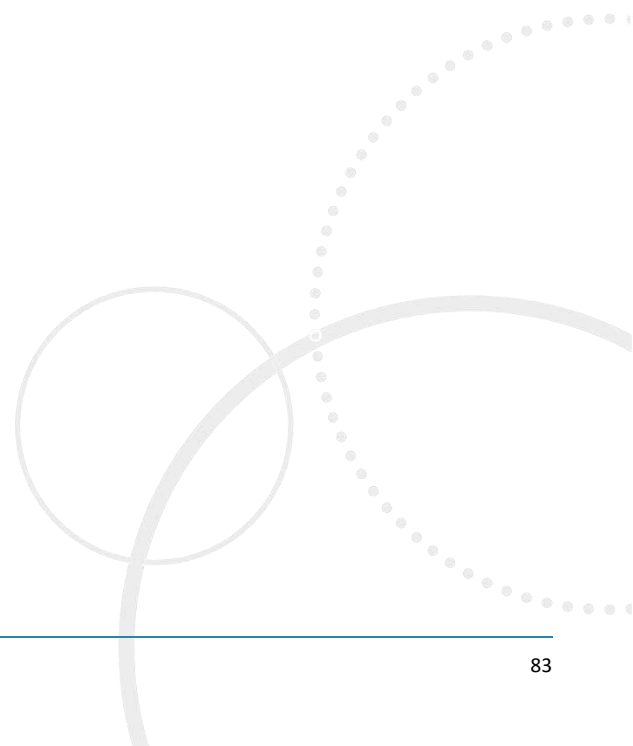
The Working Group on Noise from Wind Turbines, (1996) *ETSU-R-97 The Assessment and Rating of Noise from Wind Farms*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/49869/ETSU_Full_copy_Searchable_.pdf

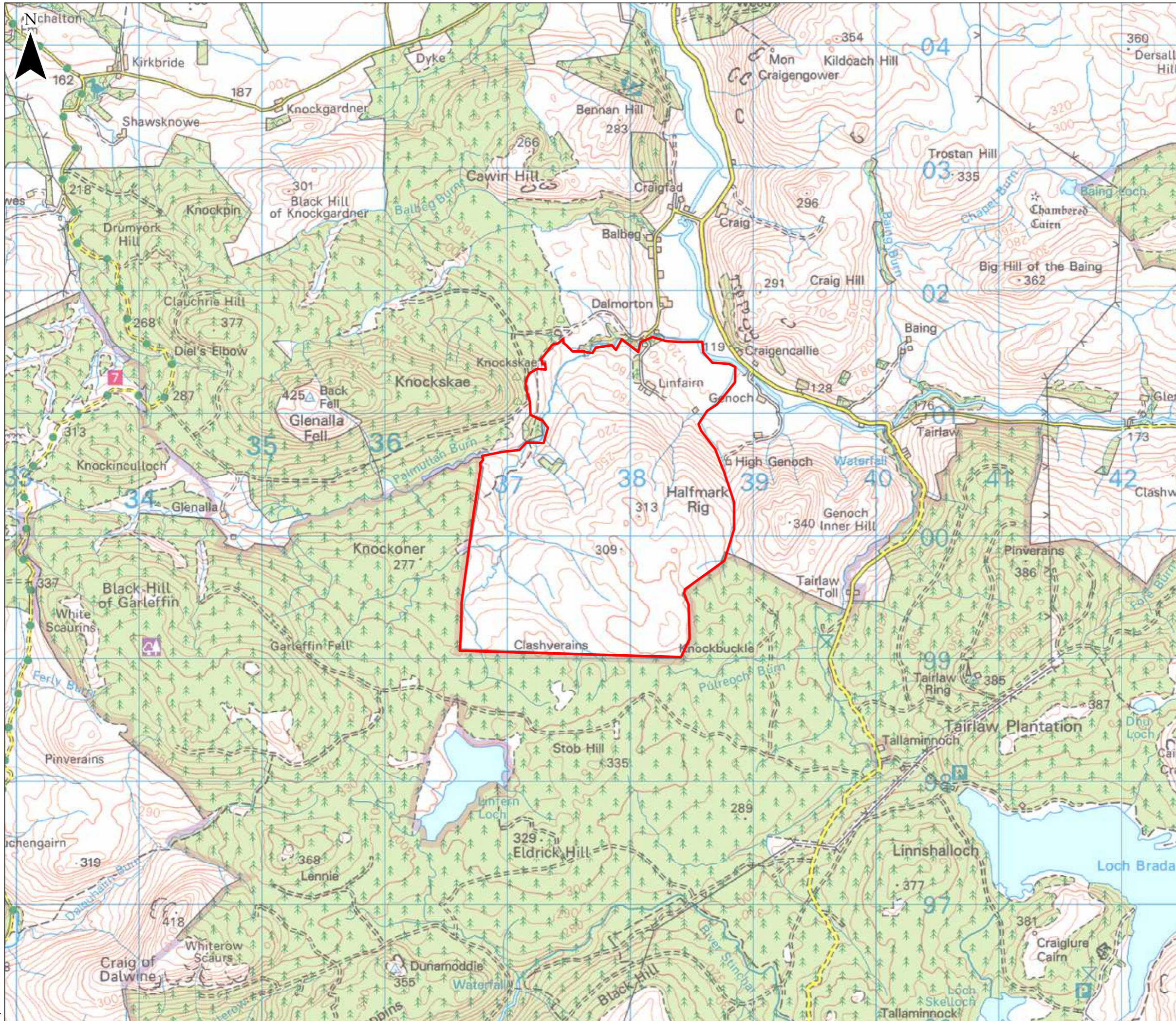
UK Government (1979) *Ancient Monuments and Archaeological Areas Act 1979*. Available at: <https://www.legislation.gov.uk/ukpga/1979/46>


UK Government (1992) *Protection of Badgers Act 1992*. Available at: <https://www.legislation.gov.uk/ukpga/1992/51/contents>

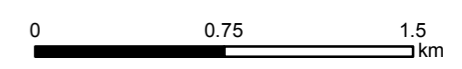


Figures





KEY
 Turbine Development Area



Scale 1:30,000 @ A3



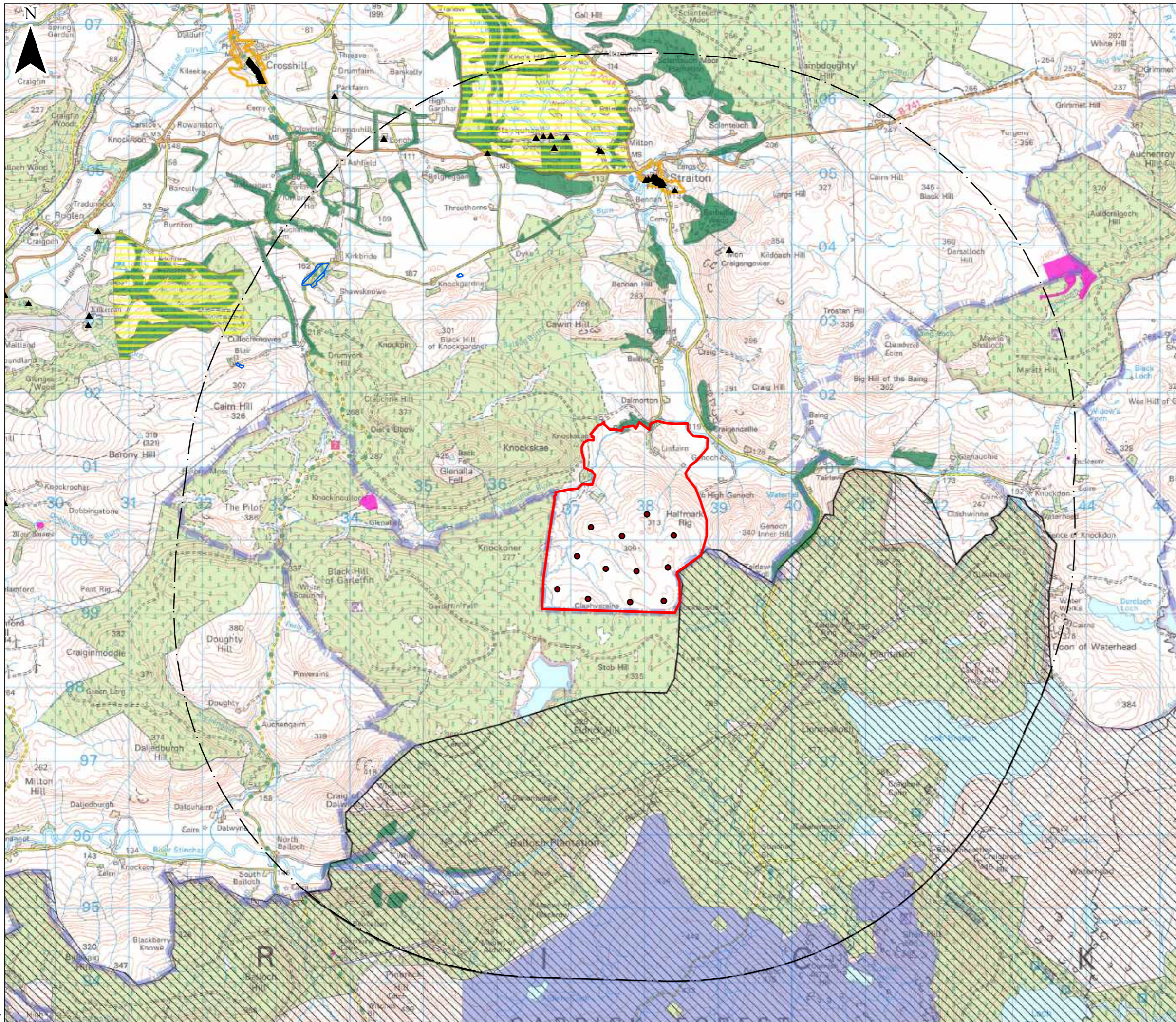
Knockcronal Wind Farm
 EIA Scoping Report

Figure 1.1

Site Location

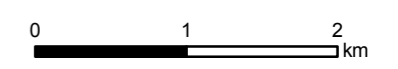
Date: 02/10/2020	Drawn by: JY	Checked by: RT	Version: v1
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Project Number: 3206



- KEY**
- Site Boundary
 - Indicative Turbine Location
 - 5 km Study Area
 - Listed Buildings
 - Scheduled Monuments
 - Site of Special Scientific Interest
 - Gardens & Designed Landscape
 - Conservation Area
 - Ancient Woodland
 - International Bird Area (IBA)

- Galloway Dark Sky Park**
- Core Area
 - Park Boundary

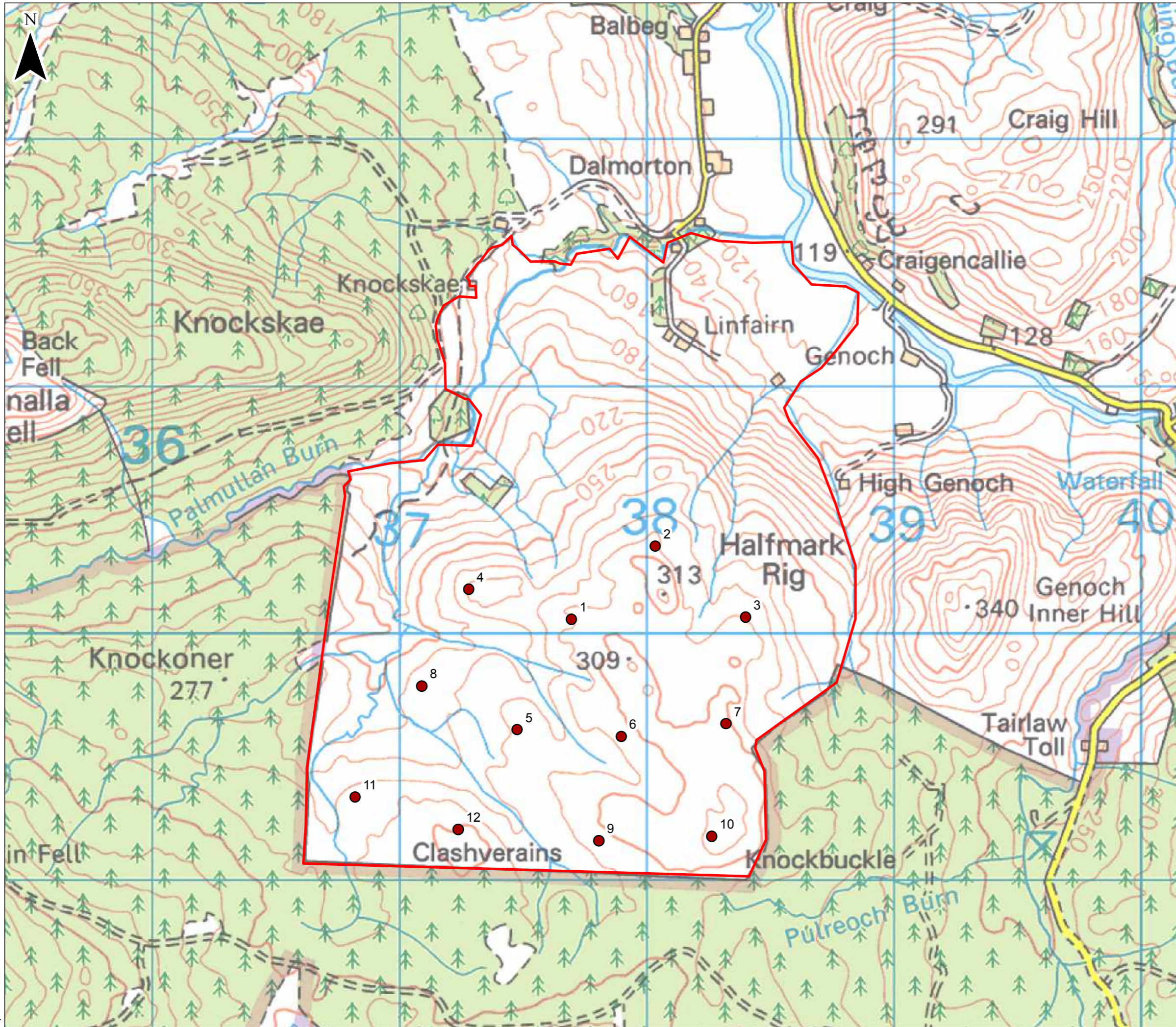


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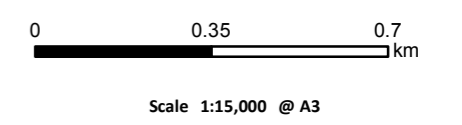
Knockcronan Wind Farm
EIA Scoping Report

Figure 2.1
Environmental Designations within 5km



KEY

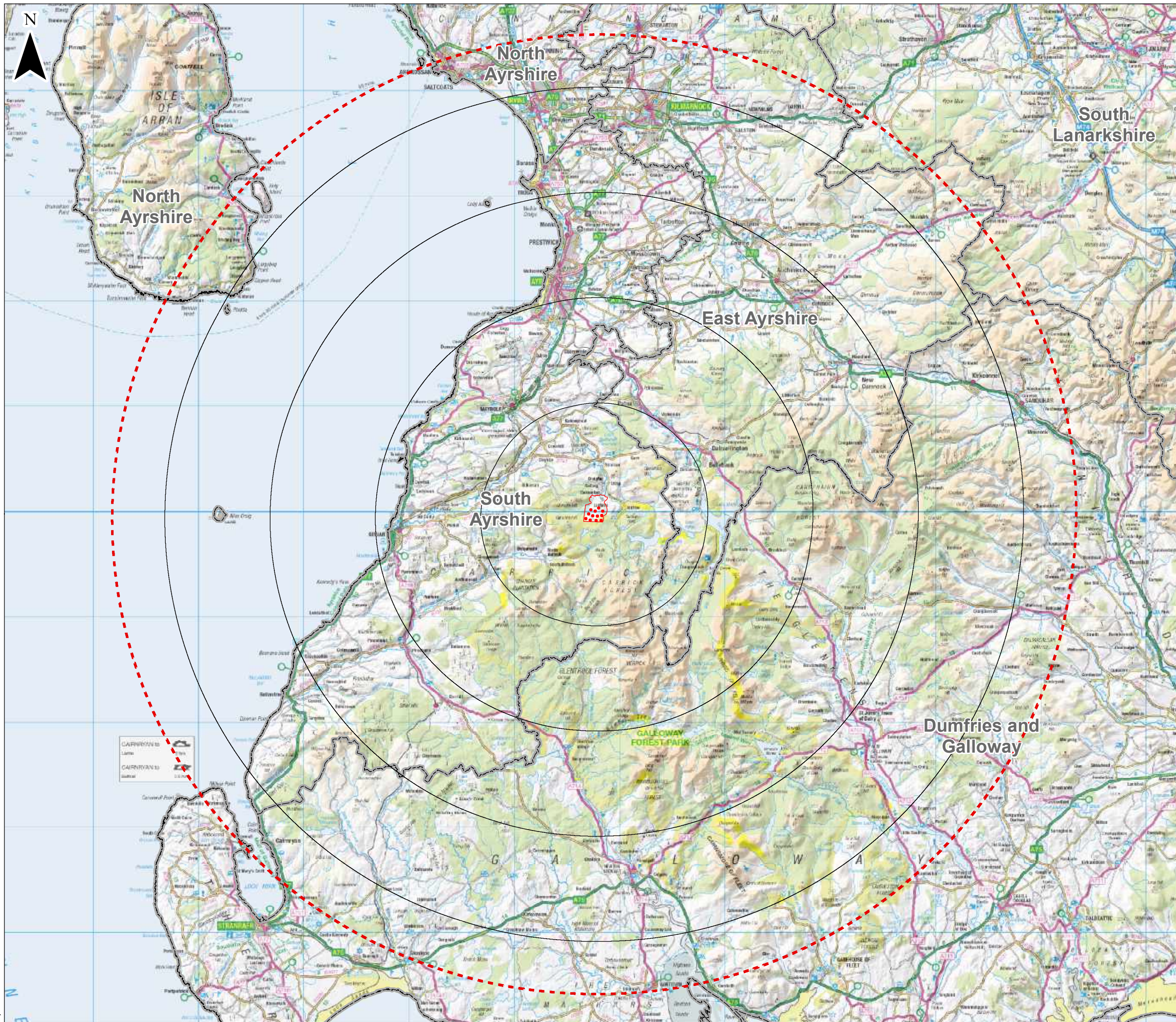
- Turbine Development Area
- Indicative Turbine Locations



Knockcrae Wind Farm
EIA Scoping Report
Figure 2.2
Site Layout

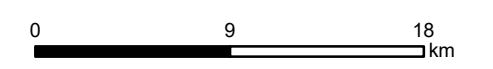
Date: 09/10/2020 Drawn by: JY Checked by: RT Version: v1

Project Number: 3206



KEY

- Proposed Turbines
- Turbine Development Area
- 10km Radii
- 45km Radius
- Local Authority Boundary



Scale 1:350,000@ A3



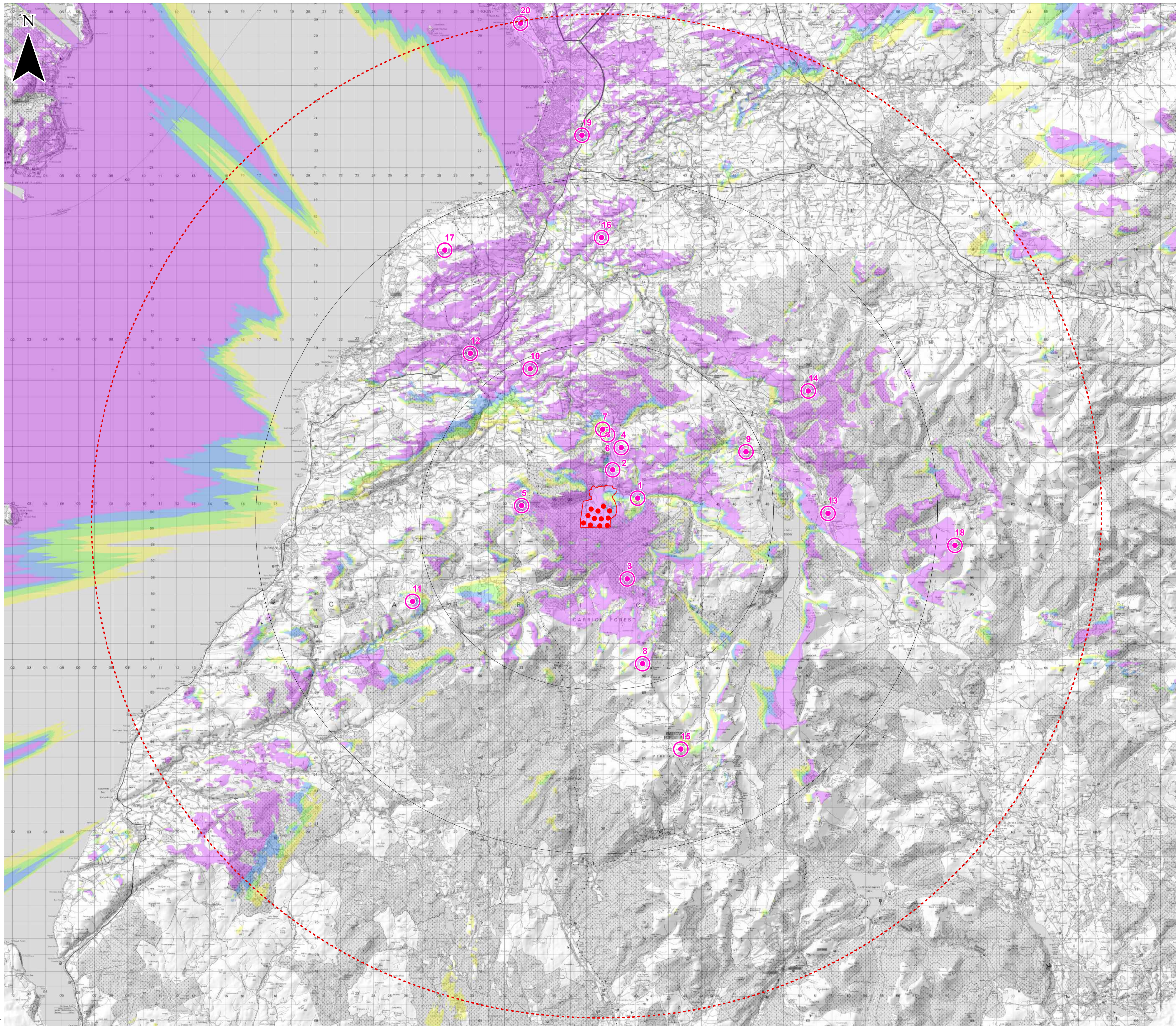
Knockcronal Wind Farm
EIA Scoping Report

Figure 4.1

LVIA Study Area

Date: 01/10/2020	Drawn by: SH	Checked by: SC	Version: V2
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Project Number: 3206



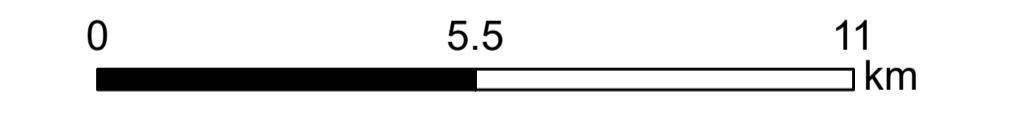
KEY

- Proposed Turbines
- Turbine Development Area
- 10km Radii
- 30km Radius
- Viewpoints
 1. Minor Road near Tairlaw
 2. Minor Road near Craig
 3. Minor Road near Stinchar Bridge
 4. Craigengower Monument
 5. NCN7, near Palmullan Bridge
 6. Straiton, minor road south of settlement
 7. Straiton
 8. Shalloch on Minnoch
 9. Craigengillan GDL, Shear Hill
 10. B7045, west of Kirkmichael
 11. Auchensoul Hill
 12. Maybole
 13. A713 Eriff
 14. B741 near Clawfin
 15. Merrick
 16. A713 and B742 Road Junction
 17. Brown Carrick Hill
 18. Cairnsmore of Carsphairn
 19. A77, Ayr
 20. B749 near Royal Troon Golf Club

No. of Blade Tips Theoretically Visible

- 1 - 3
- 4 - 6
- 7 - 9
- 10 - 12

Blade tip:	200m	Observer height:	2m
DTM:	OS T5/T50 DTM	Surface features:	Excluded
DTM resolution:	5m	Earth curvature:	Included



Scale 1:110,000 @ A1

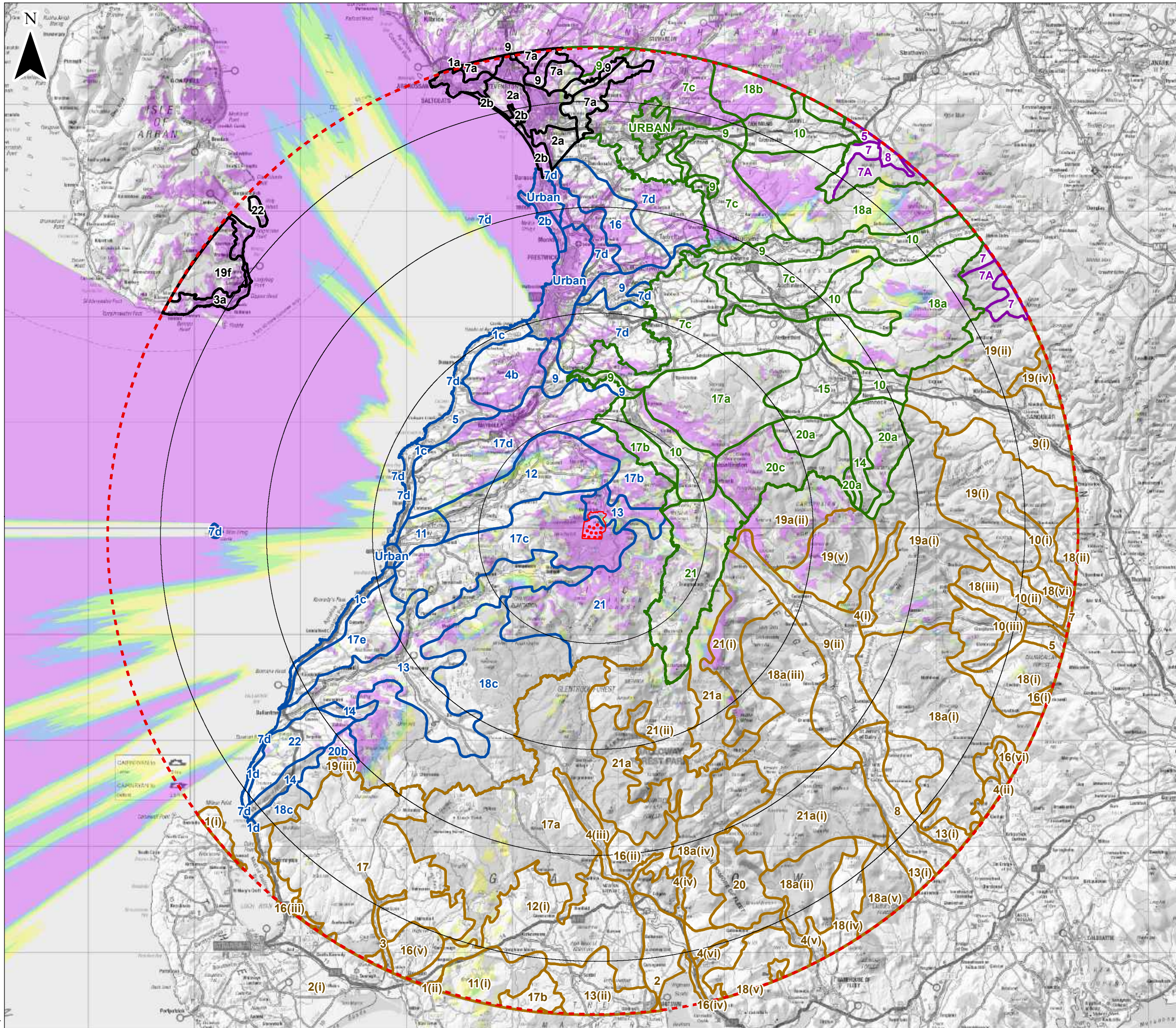


Knockcronal Wind Farm
EIA Scoping Report

Figure 4.3

Blade Tip ZTV with Proposed Viewpoints

Date:	01/10/2020	Drawn by:	SH	Checked by:	SC	Version:	v2
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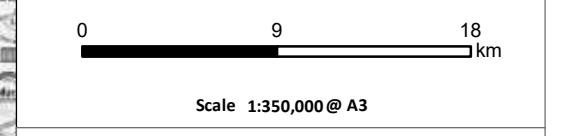
KEY

- Proposed Turbines
- Turbine Development Area
- 10km Radii
- 45km Radius
- North Ayrshire Landscape Character Areas
- East Ayrshire Landscape Character Types
- South Lanarkshire Landscape Character Areas
- Dumfries and Galloway Landscape Character Areas
- South Ayrshire Landscape Character Types

No. of Blade Tips Theoretically Visible

- 1 - 3
- 4 - 6
- 7 - 9
- 10 - 12

Blade tip:	200m	Observer height:	2m
DTM:	OS T5/T50 DTM	Surface features:	Excluded
DTM resolution:	5m	Earth curvature:	Included



Knockcronal Wind Farm
EIA Scoping Report

Figure 4.4a

Landscape Character and Blade Tip ZTV

Date:	01/10/2020	Drawn by:	SH	Checked by:	SC	Version:	v2
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Project Number: 3206

- North Ayrshire Landscape Character Areas
 - Urban
 - 1a. North Ayrshire Raised Beach Coast
 - 2a. Coastal Lowlands with Industry
 - 2b. Coastal Edge
 - 3a. Arran Coastal Fringe with Agriculture
 - 7a. North Ayrshire Lowlands
 - 9. Lowland River Valleys
 - 19f. Arran Rugged Moorland Hills & Valleys with Forestry
 - 22. Rocky Volcanic Island

- East Ayrshire Landscape Character Types
 - Urban
 - 7c. East Ayrshire Lowlands
 - 9. Lowland River Valley
 - 10. Upland River Valley
 - 14. Upland Glen
 - 15. Upland Basin
 - 17a. Foothills with Forest & Opencast Mining
 - 17b. Foothills with Forest west of Doon Valley
 - 18a. East Ayrshire Plateau Moorlands
 - 18b. East Ayrshire Plateau Moorlands & Forestry & Wind Farms
 - 20a. East Ayrshire Southern Uplands
 - 20c. Southern Uplands & Forestry
 - 21. Rugged Uplands - Lochs & Forest

- South Lanarkshire Landscape Character Areas
 - 5. Plateau Farmland
 - 7. Rolling Moorland Foothills
 - 7A. Rolling Moorland Forestry
 - 7A. Rolling Moorland Forestry
 - 8. Upland River Valley

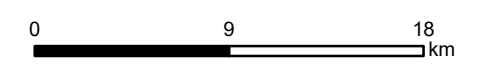
- Dumfries and Galloway Landscape Character Areas
 - 1(i). Peninsula. Rhins
 - 1(ii). Peninsula. Machars
 - 10(i). Upland Glens. Scar
 - 10(ii). Upland Glens. Shinnel
 - 10(iii). Upland Glens. Castlefairn & Dalwhat
 - 11(i). Moss and Forest Lowland. Machars

- 11(ii). Moss and Forest Lowland. Glenling
- 12(i). Drumlin Pasture in Moss and Moor Lowland. Machars
- 13(i). Drumlin Pastures. Deeside
- 13(ii). Drumlin Pastures. Machars
- 16(i). Upland Fringe. Cairn Fringe
- 16(ii). Upland Fringe. Glentrool Fringe
- 16(iii). Upland Fringe. Balker Moor Fringe
- 16(iv). Upland Fringe. Cairnharrow Fringe
- 16(v). Upland Fringe. Camrie Fringe
- 16(vi). Upland Fringe. Corsock Fringe
- 17. Plateau Moorland. Balker Moor
- 17a. Plateau Moorland with Forest. Glentrool
- 17b. Plateau Moorland with Lochs. Mochrum Lochs
- 18(i). Foothills. Dalmacallan
- 18(ii). Foothills. Nithsdale
- 18(iii). Foothills. Keir
- 18(iv). Foothills. Fleet
- 18(v). Foothills. Cairnharrow
- 18(vi). Foothills. Tynron
- 18a(i). Foothills with Forest. Stroan
- 18a(ii). Foothills with Forest. Cullendoch
- 18a(iii). Foothills with Forest. Rhinns of Kells
- 18a(iv). Foothills with Forest. Cairnsmore
- 18a(v). Foothills with Forest. Lauriston
- 19(i). Southern Uplands. Nithsdale
- 19(ii). Southern Uplands. North West Lowthers
- 19(iii). Southern Uplands. Beneraird
- 19(iv). Southern Uplands. Lowthers
- 19(v). Southern Uplands. Carsphairn
- 19a(i). Southern Uplands with Forest. Ken
- 19a(ii). Southern Uplands with Forest. Carsphairn
- 2(i). Coastal Flats. Stranraer Basin
- 2. Coastal Flats. Wigtown & Cree/Fleet Fringe
- 20. Coastal Granite Uplands. Cairnsmore Coastal Granite
- 21(i). Rugged Granite Upland. Rhinns of Kells
- 21(ii). Rugged Granite Upland. Merrick
- 21a(i). Rugged Granite Upland with Forest. Cairn Edward

- 21a. Rugged Granite Upland with Forest. Merrick
- 3. Shallow Flat Bottomed Valley. Water of Luce
- 4(i). Narrow Wooded River Valleys. Ken
- 4(ii). Narrow Wooded River Valleys. Urr Water
- 4(iii). Narrow Wooded River Valleys. Cree
- 4(iv). Narrow Wooded River Valleys. Palnure
- 4(v). Narrow Wooded River Valleys. Fleet
- 4(vi). Narrow Wooded River Valleys. Moneypool
- 5. Intimate Pastoral Valley. Cairn & Old Water
- 7. Middle Dale (Valley). Mid Nithsdale
- 8. Flooded Valley. Ken Valley
- 9(i). Upper Dale (Valley). Upper Nithsdale
- 9(ii). Upper Dale (Valley). Upper Glenkens
- South Ayrshire Landscape Character Types
 - 11. Lower Dale
 - 12. Middle Dale
 - 13. Intimate Pastoral Valley
 - 14. Upland Glens
 - 16. Lowland Hills
 - 17b. Foothills with Forest west of Doon Valley
 - 17c. Foothills with Forest & Wind Farm
 - 17d. Maybole Foothills
 - 17e. Coastal Foothills
 - 18c. Plateau Moorlands with Forestry & Wind Farms
 - 1c. Raised Beach Coast with Flat Fields & Headlands
 - 1d. Raised Beach Coast with Rocky Shore
 - 20b. South Ayrshire Southern Uplands
 - 21. Rugged Uplands with Loch & Forest
 - 22. Glenapp Coastal Farmland & the Policies
 - 2b. Coastal Edge
 - 4b. Brown Carrick Hills
 - 5. Coastal Valley with Policies
 - 7d. South Ayrshire Lowlands
 - 9. Lowland River Valley
 - Urban. Urban

KEY

Blade tip:	180m	Observer height:	2m
DTM:	OS T5/T50 DTM	Surface features:	Excluded
DTM resolution:	5m	Earth curvature:	Included



Scale 1:350,000 @ A3

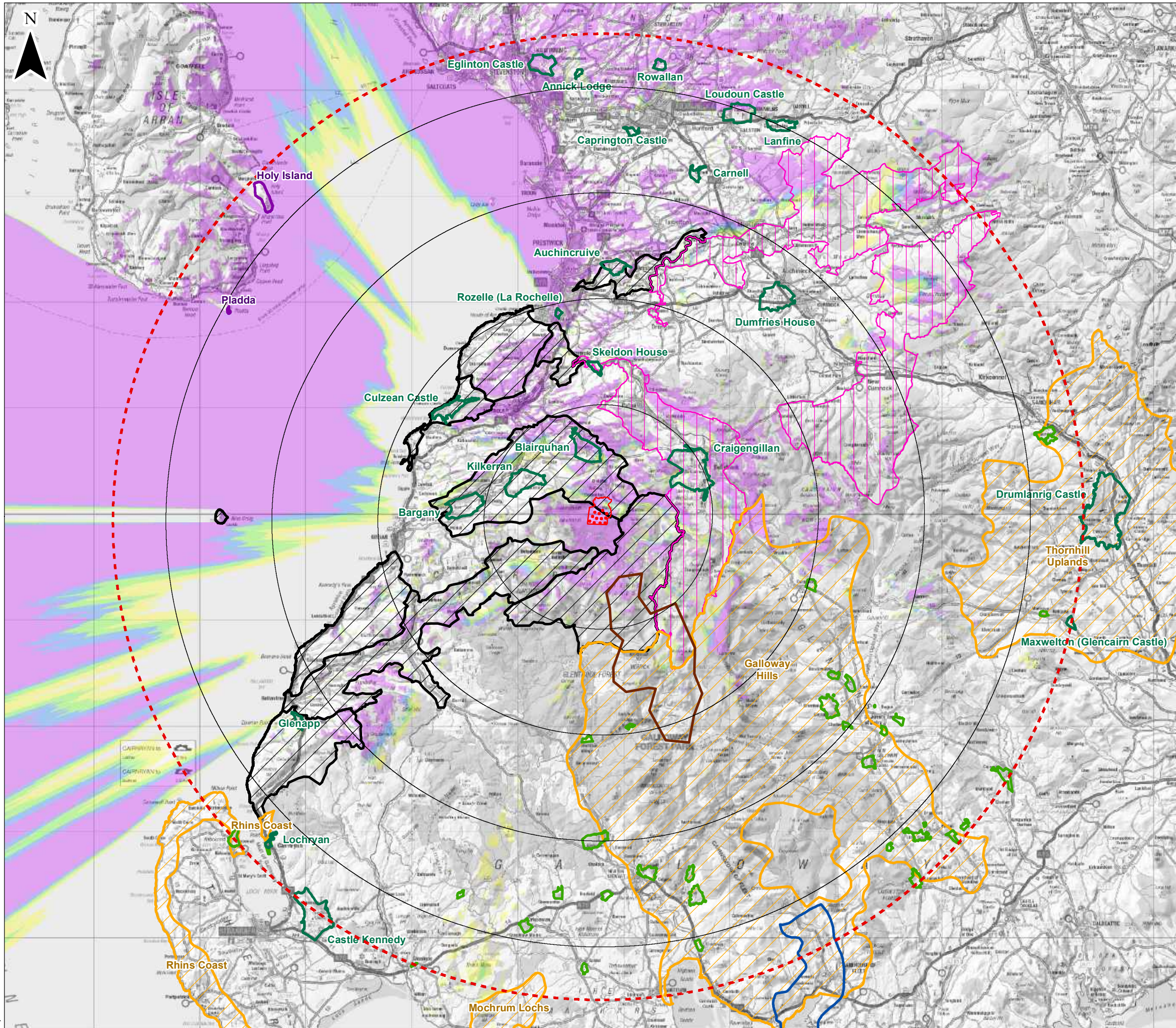


Knockcronal Wind Farm
EIA Scoping Report

Figure 4.4b

Landscape Character Legend

Date:	10/09/2020	Drawn by:	SH	Checked by:	SC	Version:	v1
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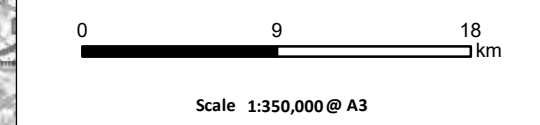
KEY

- Proposed Turbines
- Turbine Development Area
- 10km Radii
- 45km Radius
- Garden and Designed Landscape
- Merrick Wild Land Area
- Dumfries & Galloway Non-Inventory Gardens
- Fleet Valley National Scenic Area
- Dumfries & Galloway Regional Scenic Areas
- East Ayrshire Special Landscape Areas
- North Ayrshire Special Landscape Area
- South Ayrshire Local Landscape Areas

No. of Blade Tips Theoretically Visible

- 1 - 3
- 4 - 6
- 7 - 9
- 10 - 12

Blade tip:	200m	Observer height:	2m
DTM:	OS T5/T50 DTM	Surface features:	Excluded
DTM resolution:	5m	Earth curvature:	Included

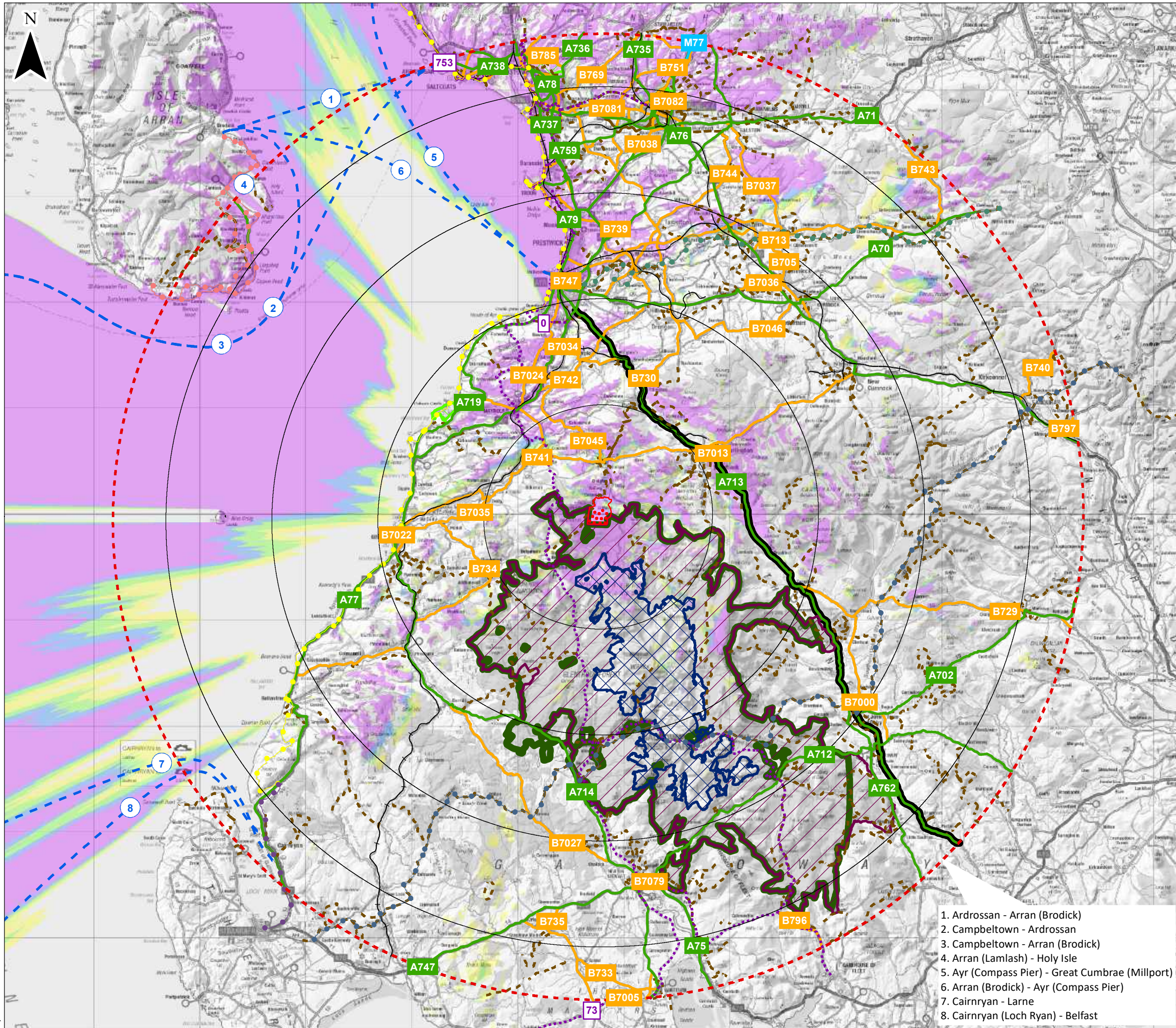


Knockcronal Wind Farm
EIA Scoping Report

Figure 4.5
Landscape Designations and Wild Land Areas
with Blade Tip ZTV

Date:	01/10/2020	Drawn by:	XX	Checked by:	XX	Version:	V2
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Project Number: 3206



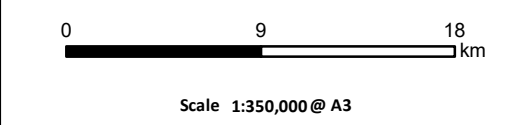
KEY

- Proposed Turbines
- Turbine Development Area
- 10km Radii
- 45km Radius
- Arran Coastal Way
- Ayrshire Coastal Path
- Mull of Galloway Trail
- River Ayr Way
- Southern Upland Way
- National Cycle Network
- Railway
- Motorway
- A Road
- B Road
- Ferry Routes
- Core Paths
- Dark Sky Park Core
- Dark Sky Park Buffer Area
- Galloway Forest Park
- Culzean Country Park
- Scenic Roads

No. of Blade Tips Theoretically Visible

- 1 - 3
- 4 - 6
- 7 - 9
- 10 - 12

Blade tip:	200m	Observer height:	2m
DTM:	OS T5/T50 DTM	Surface features:	Excluded
DTM resolution:	5m	Earth curvature:	Included



1. Ardrossan - Arran (Brodick)
2. Campbeltown - Ardrossan
3. Campbeltown - Arran (Brodick)
4. Arran (Lamlash) - Holy Isle
5. Ayr (Compass Pier) - Great Cumbrae (Millport)
6. Arran (Brodick) - Ayr (Compass Pier)
7. Cairnryan - Larne
8. Cairnryan (Loch Ryan) - Belfast

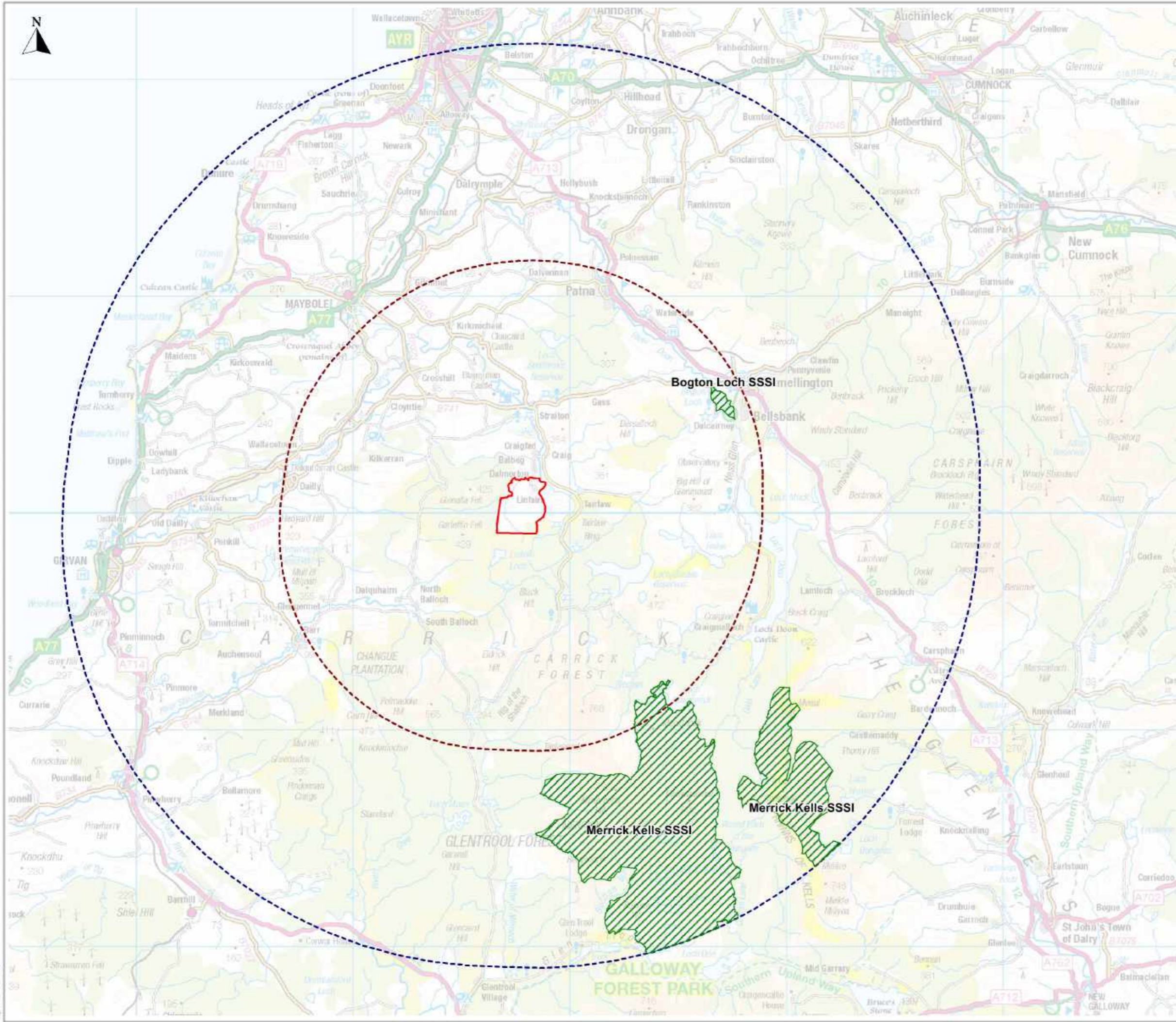
Knockcronal Wind Farm
EIA Scoping Report

Figure 4.6

Visual Receptors with Blade Tip ZTV

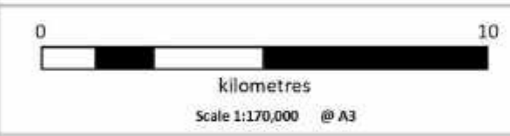
Date: 01/10/2020 Drawn by: XX Checked by: XX Version: v2

Project Number: 3206

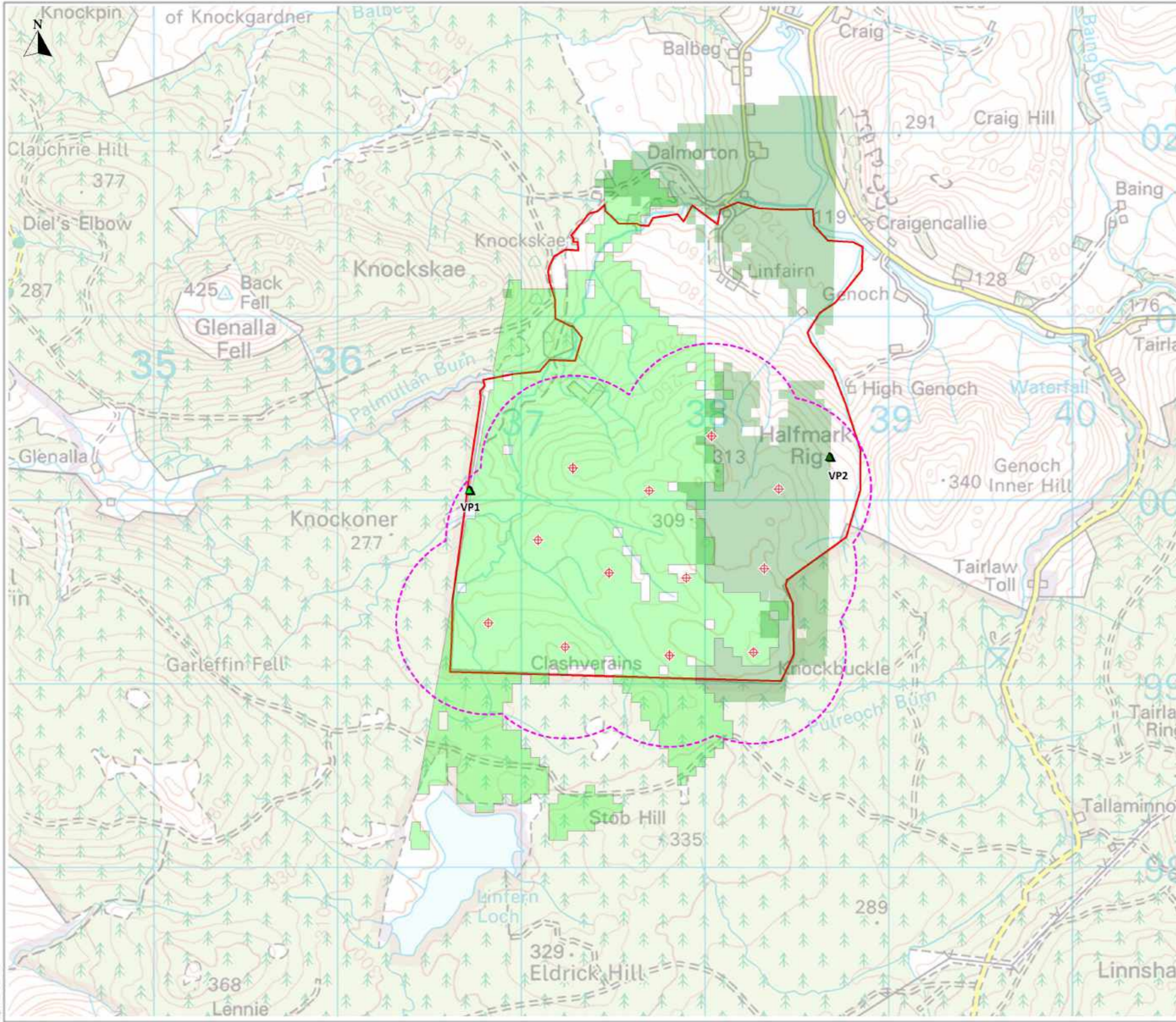


KEY

- Turbine development area
- 10km buffer
- 20km buffer
- Designated Sites
- SSSIs



Knockcronal Wind Farm
EIA Scoping Report
Figure 5.1
Ornithological Designated Sites



KEY

- Turbine development area
- + Proposed turbine
- 500m proposed turbine buffer

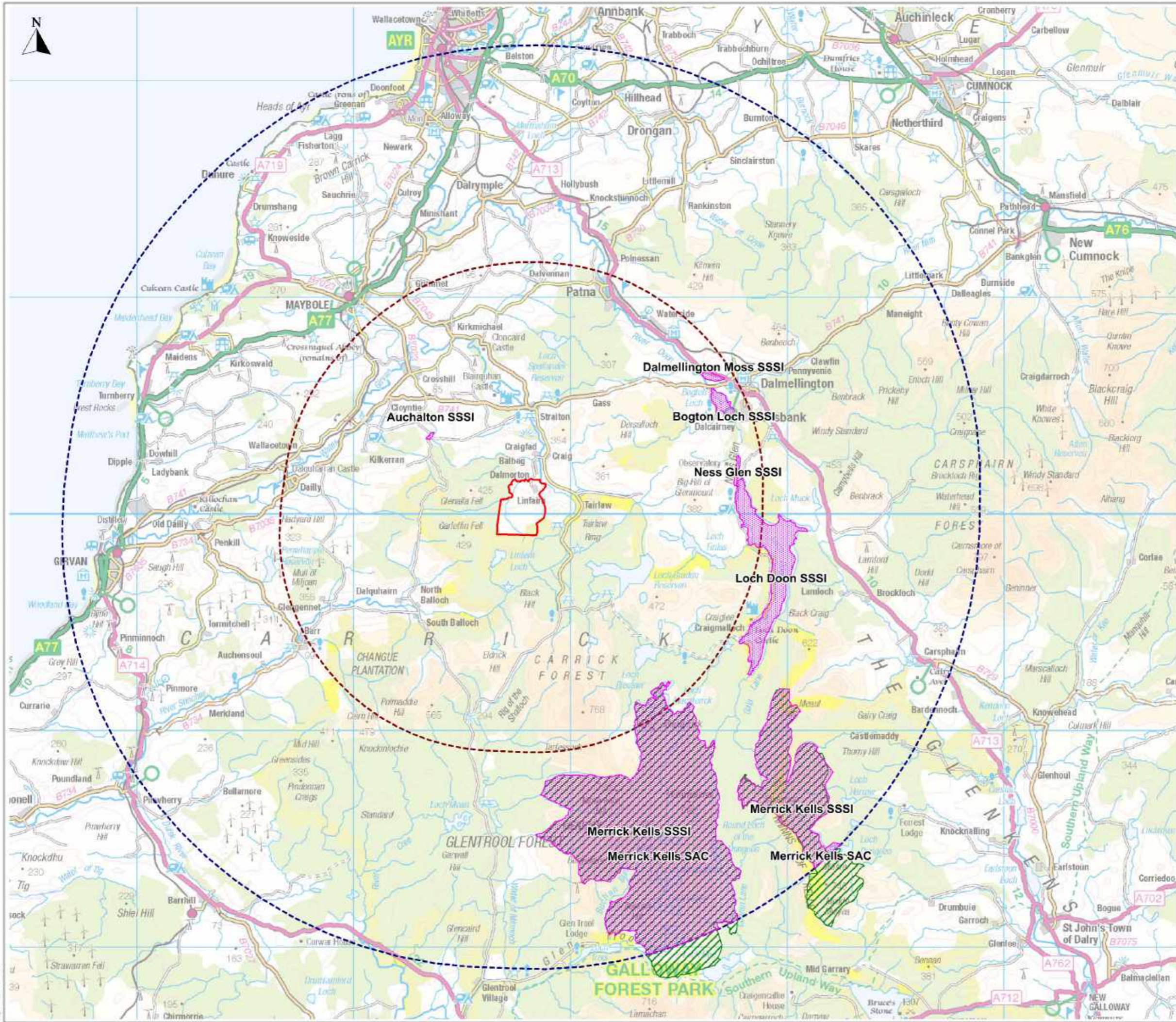
Vantage Point (VP) Locations

- ▲ VP1
- ▲ VP2
- VP1 2km viewshed
- VP2 2km viewshed



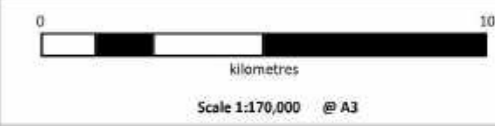
Knockcronal Wind Farm
EIA Scoping Report
Figure 5.2
Vantage Point Viewshed Location Plan

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KEY

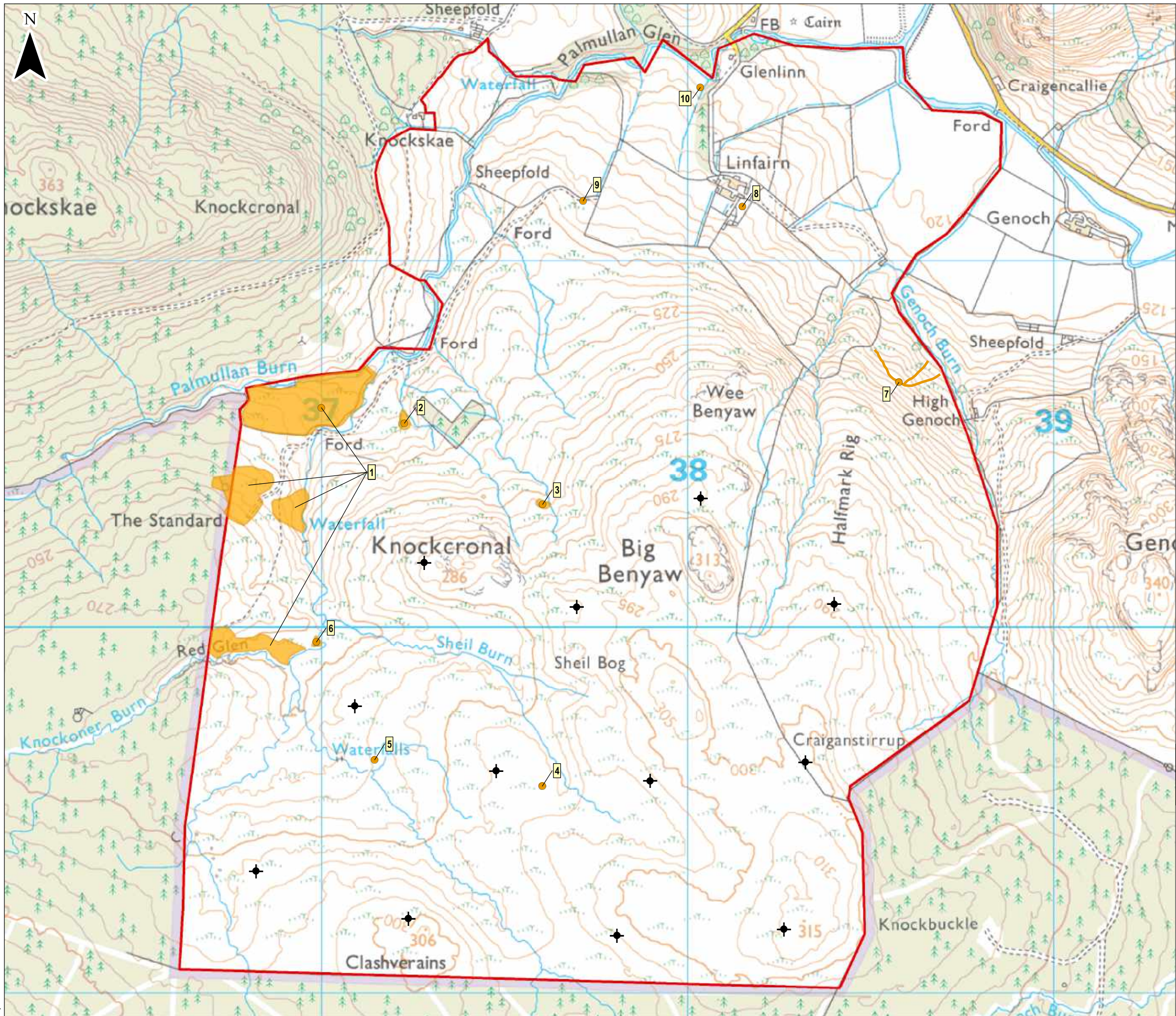
- Turbine development area
- 10km buffer
- 20km buffer
- SACs
- SSSIs



Knockcronal Wind Farm
EIA Scoping Report

Figure 6.1
Non-Ornithological Designated Sites

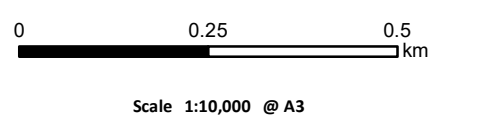
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KEY

- Site Boundary (Turbine Development Area)
- +

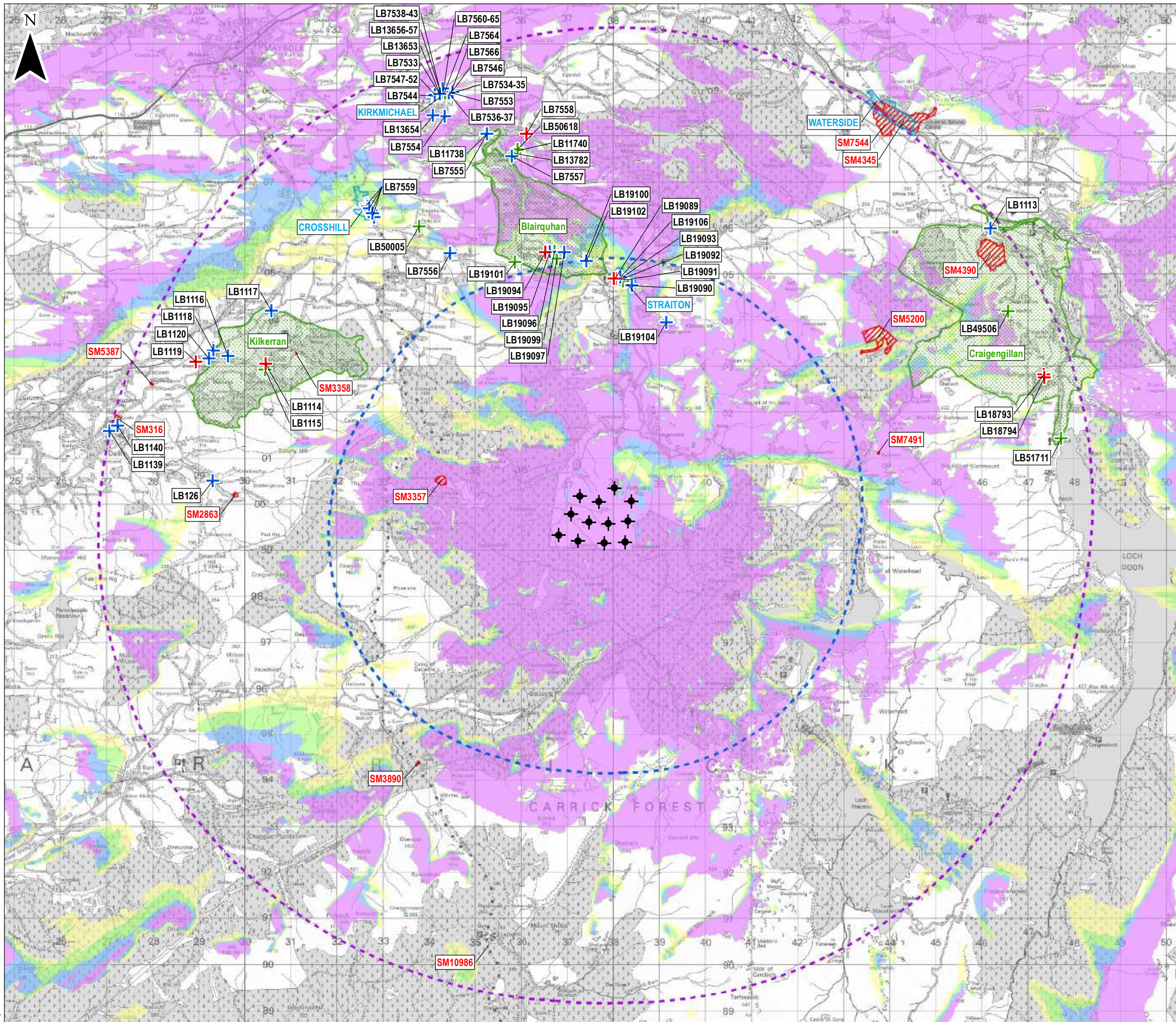
 Turbine Location
- Cultural Heritage Site (point)
- Cultural Heritage Site (linear)
- Cultural Heritage Site (area)



Knockcronal Wind Farm
EIA Scoping Report

Figure 9.1

Cultural Heritage: Inner Study Area

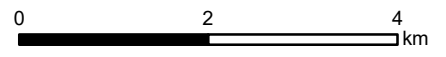


KEY

- Turbine Location
- 10km Study Area
- 5km Study Area
- Scheduled Monument
- Category A Listed Building
- Category B Listed Building
- Category C Listed Building
- Garden and Designed Landscape
- Conservation Area

No. of Blade Tips Theoretically Visible

- 1 - 3
- 4 - 6
- 7 - 9
- 10 - 12



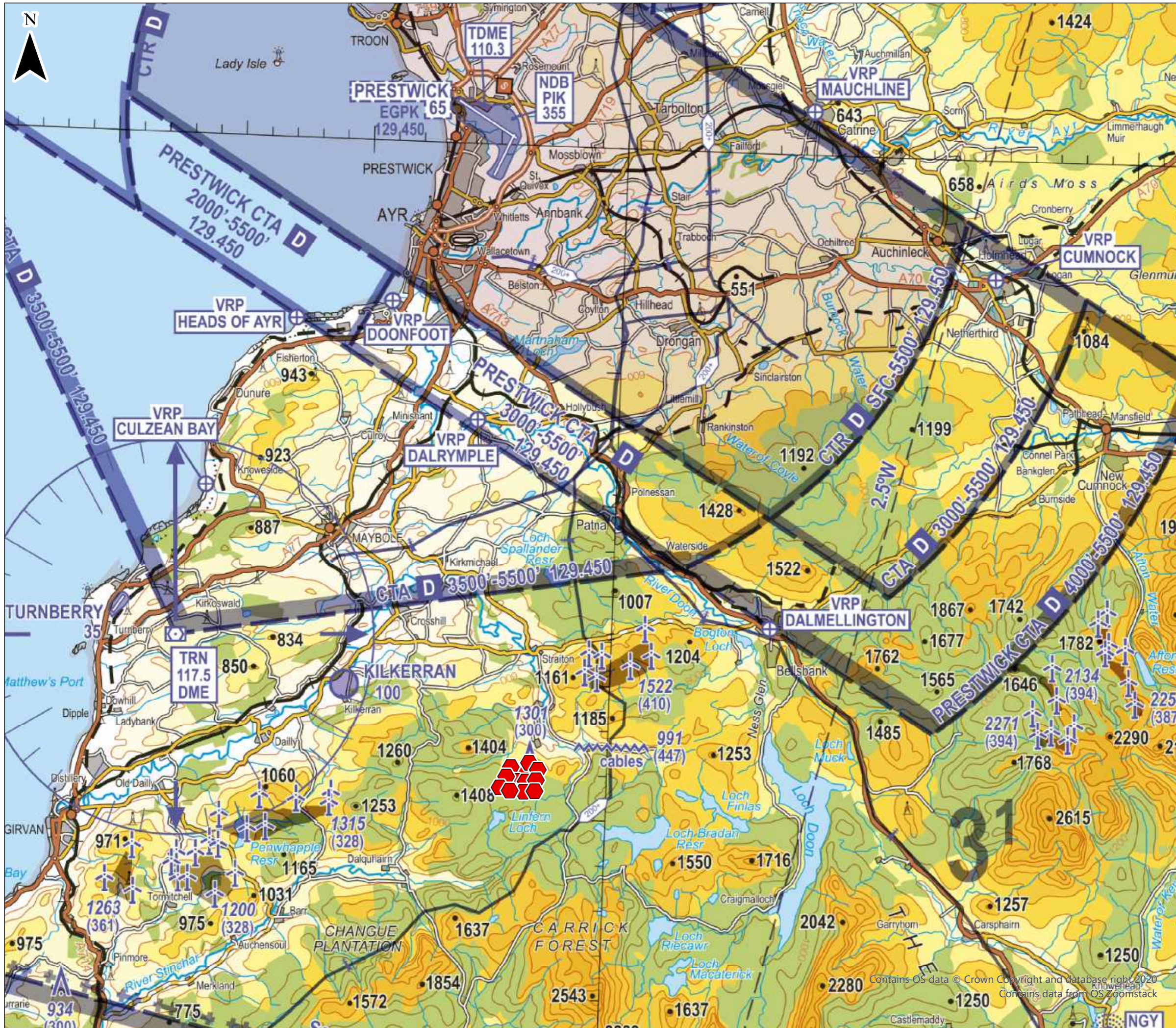
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


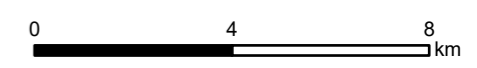
Knockcronal Wind Farm
EIA Scoping Report

Figure 9.2

Cultural Heritage: Outer Study Area



KEY
 TURBINES



Scale 1:60,000m @ A3



Knockcronal Wind Farm
 EIA Scoping Report

Figure 12.1

OS 1,10,000 Chart Extract

Date: 21/10/2020 Drawn by: ST Checked by: JT Version: v1

Project Number: 3206

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