



Kilgallioch Windfarm Extension

Scoping Report

April 2019

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Kilgallioch Windfarm Extension Scoping Report

Executive Summary

1. ScottishPower Renewables UK Limited (SPR) intends to apply to the Scottish Government Energy Consents Unit (ECU) for permission under Section 36 of the Electricity Act 1989 to develop an extension to the existing Kilgallioch Windfarm (Operational Kilgallioch Windfarm) on land approximately 12 kilometres (km) north-west of Kirkcowan in Dumfries and Galloway (the Site). The location of the Site is shown in **Figure 1.1**.
2. Kilgallioch Windfarm Extension (the Development) is an extension to the existing Kilgallioch Windfarm (the Operational Kilgallioch Windfarm) which has been operational since 2017 and has a capacity of up to 239 megawatts (MW).
3. The Development is anticipated to comprise up to 11 turbines with tip heights of up to 180 m with associated infrastructure, in addition to the potential for battery storage and solar photovoltaic arrays. The Turbine Developable Area is shown on **Figure 1.2**.
4. The Development will constitute a Schedule 2 development as provided by the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) (the EIA Regulations), and it is the intention of SPR to submit an Environmental Impact Assessment Report (EIA Report) along with the application for consent. As per Regulation 12 of the EIA Regulations, the Applicant is seeking to confirm, with the ECU and key consultees, the scope of the required assessment which is to be provided in the EIA Report, i.e. a "Scoping Opinion".
5. This document has been prepared following a number of preliminary exercises including initial consultation with key consultees, desk-based assessments, site visits, and review of the data gathered during field surveys undertaken for the Operational Kilgallioch Windfarm. This document summarises the preliminary work undertaken to date and, in line with the EIA Regulations, aims to focus the assessment solely on those effects likely to be assessed as significant and identify those topics and / or receptors which can be scoped out as the effects are not likely to be significant.
6. **Table A** provides a summary of effects that are deemed to be not significant and therefore will not be considered further within the EIA Report for the Development. The evidence, on which these decisions have been based, is described within each technical section of this document. Any reference to 'new' or 'updated' surveys in this document refers to updating the previous surveys undertaken in 2009 for the Operational Kilgallioch Windfarm.

Table A: Technical aspects and assessments that can be scoped out

Technical Area	Elements to be Scoped out of EIA
Landscape and Visual (Section 6)	<ul style="list-style-type: none"> • Landscape Character assessment on receptors and designations where they are located at a distance of greater than 10 km from the Turbine Developable Area; • Landscape Character assessment on the Merrick Wild Land Area; • Landscape Character assessment on The Dark Sky Park; and • All visual assessment on receptors located at a distance greater than 20 km from the Turbine Developable Area.
Archaeology (Section 7)	<ul style="list-style-type: none"> • A new or updated Desk-Based Assessment (DBA); • A new site walkover; • Any form of site investigation pre-consent; • Assessment of setting effects on non-designated features outside of 1 km of the Site; and • Assessment of setting effects on all features other than: Laggangarn Stones, Wood Cairn, Wells of the Rees and Carn-na-Gath Cairn.
Ecology (Section 8)	<ul style="list-style-type: none"> • Repeating peat probing and NVC survey at locations previously surveyed; • Updating Fish Habitat Surveys; • Pine marten and red squirrel surveys and assessment; • All survey and assessment regarding Blood Moss SSSI; and • Bat Transect Surveys.
Ornithology (Section 9)	<ul style="list-style-type: none"> • Assessment of effects on Hen Harrier to be discussed with consultees following survey findings; • Operational collision risk on Barn Owl; and • All effects, following mitigation for construction phase effects on breeding birds.
Hydrology, Hydrogeology, Geology and Peat (Section 10)	<ul style="list-style-type: none"> • Soil geology; • Repeating Peat and GWDTE surveys at locations previously surveyed; • All Private Water Supply surveys and assessment if updated baseline shows no changes since 2009; and • Standalone Flood Risk Assessment.
Noise (Section 11)	<ul style="list-style-type: none"> • Background noise survey; • All assessment regarding construction noise; • Operational noise from solar infrastructure; • AM assessment; and • Low Frequency Noise assessment.
Traffic and Transport (Section 12)	<ul style="list-style-type: none"> • Effect on operational traffic for the residents along the C22W and road users on the abnormal loads route; and • Traffic Count Surveys.
Socio-Economics, Recreation and Tourism and Land-Use (Section 13)	<ul style="list-style-type: none"> • Direct physical effects on all tourism receptors except the Southern Upland Way (SUW); • Indirect effects on all tourism receptors except the SUW; and • All assessment regarding cumulative land-use effects.
Climate Change and Carbon Balance (Section 14)	<ul style="list-style-type: none"> • All assessment regarding the Development's vulnerability and resilience to climate change.
Other Issues (Section 15)	<ul style="list-style-type: none"> • Effects on television reception; • Turbine blade reflectivity assessment; • Shadow flicker assessment; • Assessment regarding glint and glare effects on residential and road receptors; • Air quality assessment; • Human health assessment; and • Negligible interrelationship effects

7. **Table B** summarises key terms (unless otherwise refined in a Technical Section) used throughout this Document.

Table B: Key Terms and Definitions

Term	Definition
The Site	Refers to the land that falls within the red line identified in Figure 1.1 .
The Site Boundary	Refers to the red line as identified in Figure 1.2 .
SPR	Refers to ScottishPower Renewables UK Ltd.
Original application for Kilgallioch Windfarm	Refers to all areas of the site (including all surveyed areas) included in the original Section 36 application for Kilgallioch Windfarm.
Operational Kilgallioch Windfarm	Refers to the existing Kilgallioch Windfarm which has been operational since 2017.
The Development	Refers to the application for the Kilgallioch Windfarm Extension, details of which are set out in Section 4: The Proposed Development
Turbine Developable Area	Refers to an indicative area within the Site Boundary where turbines may be located, as shown in Figure 1.2 .
D&GC	Refers to Dumfries and Galloway Council
EIA Report	The Environmental Impact Assessment Report, which documents the findings of the EIA process and would accompany the application for consent for the Development.

1 Introduction

1.1 Overview

8. ScottishPower Renewables (SPR) intends to apply to the Scottish Government Energy Consents Unit (ECU) for permission under Section 36 of the Electricity Act (and deemed planning permission) to develop an extension to the Operational Kilgallioch Windfarm on land approximately 12 kilometres (km) north-west of Kirkcowan in Dumfries and Galloway (the Site). The location of the Site is shown in **Figure 1.1**.
9. Kilgallioch Windfarm Extension (the Development) is an extension of the existing Kilgallioch Windfarm (the Operational Kilgallioch Windfarm) which has been operational since 2017 with a capacity of up to 239 megawatts (MW). Given the Development is an extension to a windfarm which was granted consent under Section 36 of the Electricity Act 1989 (the 1989 Act), the extension would require an application for consent under Section 36 of the 1989 Act. The Development will constitute a Schedule 2 development as provided by the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) (the EIA Regulations), and it is the intention of SPR to submit an EIA Report along with the application for consent.
10. The Operational Kilgallioch Windfarm is located within two local authorities - South Ayrshire and Dumfries and Galloway. The Site is located solely within Dumfries and Galloway Council (D&GC) area.
11. It is anticipated that the Development would comprise up to 11 turbines with associated infrastructure including external transformers, crane hardstandings, access tracks, cabling, borrow pits and a single substation. It may also contain ground-mounted solar panels. It will be connected to the Operational Kilgallioch Windfarm control building.
12. The Site was part of the original application for consent for Kilgallioch Windfarm. Prior to consent, however, turbines proposed within the Site were removed from the layout in order to address consultee concerns. It is the view of the Applicant and its advisors that the issues leading to those concerns have either changed materially or are able to be addressed through further survey and careful design. These concerns were, principally:
 - Potential landscape effects on the wildness characteristics of the non-forested area to the south-east of the Operational Kilgallioch Windfarm, including the Site;
 - Potential visual effects from the Southern Upland Way near Knockniehourrie, in views east towards the Galloway Hills; and
 - Potential hydrological effects on the Kirkcowan Flow Special Area of Conservation (SAC), due to potential hydrological connectivity between areas proposed for construction activity and land within the SAC.
13. Further information on how these concerns have either changed materially or are able to be addressed through further survey and careful design is provided in Section 3 of this document. These potential effects will be fully assessed in the EIA Report.
14. SPR has appointed Arcus Consultancy Services Limited (Arcus) with input from landscape architects Optimised Environmental (Open) and ornithologists Natural Research Projects (NRP) to prepare this Scoping Report (the Report) to accompany a request to the ECU to adopt a Scoping Opinion.
15. The EIA Scoping Opinion, consultation responses and the findings of the EIA process will be used to inform the final design of the Development and assess its predicted environmental effects. The results of the EIA will be presented in an EIA Report that will be submitted with the application for consent to development a windfarm to the ECU.

1.2 The Applicant

16. SPR is part of the ScottishPower group of companies operating in the UK under the Iberdrola Group, one of the world's largest integrated utility companies and a world leader in wind energy. ScottishPower now only produces 100% green electricity – focusing on wind energy, smart grids and driving the change to a cleaner, electric future. The company is investing over £4m every working day in 2019 to make this happen and is committed to speeding up the transition to cleaner electric transport, improving air quality and over time, driving down bills to deliver a better future, quicker for everyone.

17. SPR is at the forefront of the development of the renewables industry through pioneering ideas, forward thinking and outstanding innovation. Its ambitious growth plans include expansion of its existing onshore wind portfolio, investment in new large scale solar deployment and innovative grid storage systems including batteries. The company is also delivering the Iberdrola Group's offshore windfarms in the Southern North Sea off East Anglia as part of an international pipeline of projects across Europe and the USA.
18. With over 40 operational windfarms, SPR manages all its sites through its world leading Control Centre at Whitelee Windfarm, near Glasgow.
19. SPR has made substantial investment in south-west Scotland and currently owns and operates four windfarms in the D&GC region (Wether Hill, Harestanes, Ewe Hill and Kilgallioch Windfarms). Through their established presence in Dumfries and Galloway, they have to-date, contributed over £5,000,000 in community benefits, with in the region of £30,000,000 committed during the operational lifetime of these existing assets. These funds contribute to a variety of groups and organisations to assist them in delivering projects which they have identified as having benefit to those living, working or visiting the surrounding area. It is expected that the Development would establish a community benefit arrangement with local communities which may include an opportunity for the community to invest in the operational windfarm.
20. SPR recognise the importance of the economic benefits to Scotland and the rest of the UK from investing in onshore wind generation. They constructed 8 onshore windfarms in south-west Scotland in 2016 and 2017, with a combined capacity of 474 MegaWatts (MW). It is estimated that this £1.6 billion investment will have 51% Scottish expenditure content over the lifetime of the projects, provide 31,118 UK Full Time Equivalent (FTE) job-years, including 7,768 local FTE years (within south-west Scotland), provide £297 million local value-added and £59 million in community benefit funding. It is expected that the Development would further enhance the economic opportunities within the region and would contribute significant local income through business rates¹.

1.3 The Need for and Benefits of the Development

21. The Scottish Government has committed, through the Climate Change (Scotland) Act 2009², to reduce greenhouse gas emissions, and in support of this objective, to generate the equivalent of 100% national electricity needs from renewable energy development by 2020. In order to reduce greenhouse gas emissions, the Climate Change (Scotland) Act has set targets of an 80% reduction by 2050 with an interim target for 2020 of at least a 42% reduction.
22. Reducing emissions in Scotland - 2018 Progress Report (September 2018)³ (the Progress Report) documents Scotland's progress towards meeting emissions targets set out above. The Progress Report mentions that Scotland is performing well on reducing greenhouse gas emissions with emissions now sitting at 49% below baseline 1990 levels and on track to outperform interim emissions with a reduction target of at least 56% by 2020. However, the Progress Report states that further deployment of renewable energy generating facilities is required to continue in order for this target to be achieved.
23. Using the Progress Report's 2016 gross consumption as a proxy for 2019, the share for renewable electricity consumption in Scotland increased by 27% to 25 TeraWatt-hours (TWh) from 2016 to 2017. The Progress Report emphasises that although Scotland is leading the UK on renewable electricity, community and locally-owned low-carbon energy generation can play a useful role to further progress achieving carbon targets. The Scottish Government had a target for local community ownership of at least 500 MW of renewable energy by 2020. The 2015 target was achieved and as such, the Energy Strategy increased future targets as follows:

¹ BVG Associates (2017) Economic Benefits from Onshore Wind Farms [Online] Available at: <https://bvgassociates.com/wp-content/uploads/2017/09/BVGA-18510-Economic-impact-onshore-wind-report-r3.pdf> (Accessed 11/02/2019)

² Scottish Government (2009) Climate Change (Scotland) Act 2009 [Online] Available at: <https://www.legislation.gov.uk/asp/2009/12/contents> (Accessed 11/03/2019)

³ Committee on Climate Change (2018) Reducing emissions in Scotland - 2018 Progress Report [Online] Available at: <https://www.theccc.org.uk/wp-content/uploads/2018/09/Reducing-emissions-in-Scotland-2018-Progress-Report-to-Parliament.pdf> (Accessed 11/03/2019)

- 50% of Scotland's total energy consumption to be met by renewable energy by 2030; and
 - Interim target of 30% of total Scottish Energy Consumption from renewables by 2020.
24. Policy statements recognise that delivery of targets requires an intensification of development, as noted in paragraph 9.7 of the Pencloe Inquiry report, in which the reporter noted that, "*I see no sign that the Scottish Government is slackening the pace; rather, the latest policy statements on energy and onshore wind indicate that the effort is being intensified. The latest target of generating 50% of energy from renewable sources by 2030 is a deliberately challenging one, which may require around 17GW of installed capacity by that date. The newly adopted Scottish Energy Strategy and the accompanying Onshore Wind Policy Statement are explicit that onshore wind will continue to play a vital role in that regard.*"
25. As set out in the Scottish Government's Onshore Wind Policy Statement (2017)⁴, innovative solutions such as the integration of energy storage within onshore windfarm proposals not only help improve the ability of variable generators, such as onshore wind, to manage generation and demand but can also help grow the supply chain:
26. "*This continuing support for innovation – for example, the development of smarter networks, active management and storage technology – can have a positive effect on the integration and economics of onshore wind generation. Innovation in the onshore wind sector can help the Scottish supply chain to grow, creating jobs and opportunities, and securing Scotland's position as a hub for innovation and investment*".
27. The UK Government is also committed to ensuring that current coal fired power generation is phased out by 2025, meaning that over a quarter of the UK's energy generation needs to be replaced. ScottishPower has become the first major UK utility to completely switch from the generation of fossil fuels to renewables. As a result, SPR are now investing more in the development of UK renewable sources, such as wind and solar.
28. The UK and Scotland's current climate change ambitions, as detailed above, are amongst the highest in Europe; the Development, which combines two forms of renewable energy technologies, and provides a fully integrated renewable energy development solution, is a direct response to meeting these targets. The hybrid site would be a state-of-the-art development for Dumfries and Galloway. Additionally, with on-site energy storage, the Development will be able to regulate output and provide clean power to people's homes when they need it the most.
29. The Development pioneers established and new renewable technologies and provides a fully integrated renewable energy development solution that would make a valuable and tangible contribution to emission reduction and renewable energy targets, while playing a positive role in the diversification of the UK's energy mix. SPR is also committed to ensuring all renewable energy developments promote and foster environmental sustainability for the social and economic well-being of the local communities.

1.4 Purpose of the Scoping Request

30. As per Regulation 12 of the EIA Regulations, the Applicant is seeking to confirm, with the ECU and key consultees, the scope of the required assessment which is to be provided in the EIA Report, i.e. a "Scoping Opinion". To aid this process, this document includes the following:
- A description of the location of the Development including figures identifying the Site and the parameters of development;
 - Figures identifying the designated and sensitive environmental receptors surrounding the Site; and
 - A brief description of the nature and purpose of the Development and its potential resultant effects.
31. The aim of the scoping process is to identify key environmental issues at an early stage, to help determine which elements of the proposal are likely to cause significant environmental effects, and to also identify elements of the EIA that can be 'scoped out' of the assessment. As the area was part of the original Section 36 application, substantial survey and assessment of the Site has already been carried out. The level of information, and understanding of

⁴ Scottish Government (2017). Onshore Wind Policy Statement. Available at: <https://www.gov.scot/publications/onshore-wind-policy-statement-9781788515283/> [Accessed on 27/03/2019].

potential effects, available at this (Scoping) stage is therefore substantially higher than would normally be the case. This has meant that the authors of this document have much more information to conclude on the likely significant effects and the proposed scope of the EIA than might typically be the case. As a result of this, more focus has been made on tailoring the proposed scope to cover the key issues. It is noted that the EIA Regulations require the EIA Report to identify and assess the likely significant effects; the assessment of other effects can be scoped out, and this document sets out, with justification based on evidence, what effects are proposed to be scoped out of the EIA.

32. Comments are invited from consultees and any other interested parties as to the scope of the EIA and the methodologies proposed for use in the technical assessments.

2 Environmental Impact Assessment

2.1 Introduction

33. EIA is an iterative assessment process with the aim of avoiding or reducing the potential effects resulting from a proposed development through the continual refinement of the design of the Development. These effects can occur throughout all phases of the Development from construction, through operation and during decommissioning. Potential effects will be mitigated, where practicable, utilising the mitigation hierarchy of avoid, reduce, offset and compensate.
34. The results of the EIA will be presented in an EIA Report. Schedule 4 of the EIA Regulations details what information is required to be included within the EIA Report and states:
35. 3. "A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge."
36. 4. "A description of the factors specified in regulation 4(3) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape."
37. Effects which are not considered to be "likely significant" do not need to be described in the EIA Report. It is therefore necessary for the scope of the EIA to be appropriately defined to ensure all significant effects are covered.

2.2 The EIA Process

38. As stated previously, EIA is an iterative process aimed at identifying and assessing the potential effects arising as a result of a proposed development. Any effects identified will be used to inform and refine the design of the proposed development. Where adverse effects are identified that cannot be avoided through embedded mitigation, suitable mitigation measures to reduce or offset effects will be proposed. In addition, the EIA will be used to identify potential enhancement measures that could be applied to maximise beneficial effects.
39. The main steps of the EIA process are broadly summarised as follows:
- Scoping: The Scoping Opinion from ECU (as informed by key consultees) will be used to inform and focus the scope of the EIA on likely significant effects that could be anticipated to occur as a result of the Development;
 - Baseline studies: Desk-based assessment, baseline surveys and site visits will be undertaken, where appropriate, in order to determine the baseline conditions of the environment and area that may be affected by the Development;
 - Predicting and assessing effects: Potential interactions between the Development and the baseline conditions will be considered. The nature of the effects, e.g., direct or indirect; positive or negative; long, medium or short term;

temporary or permanent, will be predicted and assessed. Potential cumulative effects arising from Development in conjunction with other proposed or consented developments will also be considered;

- Mitigation and assessment of residual effects: Potential effects will be avoided or reduced wherever possible through embedded mitigation (built into the design). Where this is not possible, operational mitigation or other measures to reduce and/or offset significant effects will be proposed. The residual effects will then be assessed to determine any effects predicted to remain following implementation of the recommended mitigation measures; and
- Production of the EIA Report: The results of the EIA will be set out in the EIA Report.

2.3 Assessment Methodology

40. In order to assess the potential effects arising from the Development, the significance of such effects will be determined. The determination of significance relates to the sensitivity of the resource or receptor being affected and the magnitude of change as a result of the Development. The assessment of effects will combine professional judgement together with consideration of the following:
- The sensitivity of the resource or receptor under consideration;
 - The magnitude of the potential effect in relation to the degree of change which occurs as a result of the Development;
 - The type of effect, i.e., adverse, beneficial, neutral or uncertain;
 - The probability of the effect occurring, i.e., certain, likely or unlikely; and
 - Whether the effect is temporary, permanent and/or reversible.
41. A generalised methodology for assessing significant effects is detailed below; however, each individual technical area will have a specific assessment methodology which may vary from that detailed in the following subsections.
42. As set out in Section 4, there is no proposal to limit the lifetime of the Development. Therefore, the assessment of potential effects on all environmental aspects considers the operational phase of the Development without time limitations. Should decommissioning of any of the Development be required, e.g., as a result of failure of a wind turbine beyond economic repair, any effects would be of lesser magnitude than those resulting from construction phase of the Development and, as such, effects associated with the decommissioning phase have been scoped out of further assessment. Should consent be granted, it is anticipated that there would be a condition which would deal with the requirement to remove turbines if they become non-operational for a defined period of time.
43. Each technical assessment, unless specified otherwise, elsewhere in this document, will consider potential effects during the construction and operational phases of the Development.

2.3.1.1 Sensitivity of Receptors

44. The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Site or the sensitivity of potentially affected receptors, will be assessed in line with best practice guidance, legislation, statutory designations and/or professional judgement and experience.
45. **Table 2.1** details a general framework for determining the sensitivity of receptors. Each technical assessment will specify their own appropriate sensitivity criteria that will be applied during the EIA and details will be provided in the relevant EIA Report chapter.

Table 2.1: Framework for Determining Sensitivity of Receptors

Sensitivity of Receptor	Definition
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance.
High	The receptor has low ability to absorb change without fundamentally altering its present character, is of high environmental value, or of national importance.
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value, or is of regional importance.
Low	The receptor is tolerant of change without detriment to its character, is low environmental value, or local importance.

Negligible	The receptor is resistant to change and is of little environmental value.
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2.3.1.2 Magnitude of Effect

46. The magnitude of potential effects will be identified through consideration of the Development, the degree of change to baseline conditions predicted as a result of the Development, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.
47. General criteria for assessing the magnitude of an effect are presented in **Table 2.2**. Each technical assessment will apply their own appropriate magnitude of effects criteria during the EIA, with the details provided in the relevant EIA Report chapter.

Table 2.2: Framework for Determining Magnitude of Effects

Magnitude of Effect	Definition
High	A fundamental change to the baseline condition of the asset, leading to total loss or major alteration of character.
Medium	A material, partial loss or alteration of character.
Low	A slight, detectable, alteration of the baseline condition of the asset.
Negligible	A barely distinguishable change from baseline conditions.

48. If effects of zero magnitude (i.e. none / no change) are identified, this will be made clear in the assessment.

2.3.1.3 Significance of Effect

49. The sensitivity of the asset and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects. **Table 2.3** summarises guideline criteria for assessing the significance of effects.

Table 2.3: Framework for Assessment of the Significance of Effect

Magnitude of Effect	Sensitivity of Receptor				
	Very High	High	Medium	Low	Negligible
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

50. Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA Regulations, and are shaded in light green in the above table.

51. Zero magnitude effects upon a receptor will result in no effect, regardless of sensitivity.

2.3.1.4 Mitigation

52. Where the EIA identifies likely significant adverse environmental effects, mitigation measures will be proposed where practicable in order to avoid, reduce, offset or compensate those effects. These mitigation measures may be embedded in the design or compensatory. Such embedded mitigation measures will likely include the relocation or removal from the layout of turbines, access tracks and other infrastructure; and management and operational measures.

53. In line with the mitigation hierarchy identified in Planning Advice Note (PAN) 1/2013, the strategy of avoidance, reduction, offsetting and compensation seeks:

- First to avoid significant adverse effects;

- Then to minimise those which remain; and
- Lastly, where no other remediation measures are possible, to propose appropriate compensation.

54. In addition, enhancement measures may be incorporated into design of the Development to maximise environmental benefits.

2.3.1.5 Residual Effects

55. Taking cognisance of the suggested mitigation (and enhancement) measures, the predicted effects will be re-assessed to determine whether any likely significant residual effects remain.

2.3.1.6 Cumulative Effects

56. In accordance with the EIA Regulations, this EIA Report will also give consideration to 'cumulative effects'. By definition, these are effects that result from incremental changes caused by past, present or reasonably foreseeable future actions together with the Development. For cumulative assessment, two types of effects will be considered:

- The interrelationship of individual effects, for example noise, airborne dust or traffic or a single receptor; and
- The cumulative effect of several developments that may on an individual basis be insignificant but, cumulatively, have a significant effect, such as landscape and visual effects of many wind developments.

57. In line with good practice, the methodology to be adopted for assessing the cumulative effects of wind energy developments will be in accordance with advice from Scottish Natural Heritage (SNH)^{5,6} and the Scottish Government⁷. The extent of any cumulative assessment relevant to each technical assessment will be agreed during the Scoping process and can include both existing and proposed windfarm developments as well as other forms of development.

58. Windfarms in the immediate vicinity of the Site, with the greatest potential for cumulative effects, with their directions from the Site, are shown on **Figure 6.2b**. Those closest are:

- Kilgallioch Windfarm (adjacent to the west and up to 3km north of the Site boundary, operational);
- Balmurrie Fell Wind Farm (3 km south-west, operational);
- Artfield Fell Wind Farm (2 km south-west, operational);
- Gass Wind Farm (1 km south, consented but not constructed); and
- Airies Wind Farm (1 km south-east, operational).

2.4 Consultation

59. The process of identifying environmental effects is both iterative and cyclical, running in tandem with the design process. Consultation forms an integral role throughout the EIA process, and two rounds of public consultation events will be held (following scoping, and prior to submission of the application) in communities nearest to the Site providing members of the public the opportunity to learn more about the proposal and give feedback and comments to the project team. Consultation on specific technical issues has been, and will continue to be, undertaken with relevant consultees, where appropriate, as part of the EIA process.

2.5 Structure and Content of the EIA Report

60. The content of the EIA Report will broadly follow the specifications detailed within Schedule 4 of the EIA Regulations. The EIA Report will consist of three volumes and a Non-Technical Summary (NTS).

- Volume 1 – Main EIA Report text;
- Volume 2 – Figures; and

⁵ SNH (2005) Cumulative effect of Windfarms (Version 2). [Online] Available at: <http://www.snh.org.uk/pdfs/strategy/cumulativeeffectsonwindfarms> (Accessed 11/02/2019)

⁶ SNH (2012). Assessing the Cumulative Impact of Onshore Renewable Energy Developments. [Online] Available at: <http://www.snh.gov.uk/docs/A675503.pdf> (Accessed 11/02/2019)

⁷ Scottish Government (2017) Onshore Wind Policy Statement [Online] Available at: https://consult.gov.scot/energy-and-climate-change-directorate/draft-onshore-wind-policy-statement/user_uploads/final-version-23-january.pdf (Accessed 11/02/2019)

- Volume 3 – Technical Appendices.
61. The main EIA Report text will begin with:
- An introduction, including a summary of the EIA process and methodology;
 - A description of the site and its surroundings;
 - Details of the site selection process and layouts considered; and
 - A description of the Development.
62. The technical chapters of the EIA Report will present details of the assessments undertaken, including any cumulative effects, required mitigation and residual effects.

3 Site Selection and Alternatives

63. The EIA Report will include a chapter setting out the alternatives that have been considered prior to and during the EIA process, as required by the EIA Regulations.
64. The default alternative is the “do nothing” scenario. There is strong UK and Scottish policy support for decarbonising the energy sector, and an increase in renewable energy generation is the lowest cost solution to this. The chapter will briefly examine the need for the Development, or similar developments, concluding that the “do nothing” scenario is not desirable.
65. The chapter will contain a description of the process of site selection that led to the proposal to develop a windfarm at the Site, setting out the economic and environmental reasons for selecting this Site. The Site was included in the Operational Kilgallioch Windfarm application, and turbines in this area were removed from proposals to meet design criteria identified by consultees, prior to consent being granted. This chapter will set out what has changed since that consultation process, such that the Development may now be considered acceptable. The issues, and the changes in design and/or circumstances, are set out in Table 3.1.

Table 3.1: Previous Issues and Subsequent Changes

Issue	Change
Potential landscape effects on the wildness characteristics of the non-forested area to the south-east of the Operational Kilgallioch Windfarm, including the Site;	Cumulative developments, most notably the Operational Kilgallioch Windfarm, Airies Wind Farm and Balmurrie Fell Wind Farm, have been built since the original application for Kilgallioch Windfarm, and are now operational. When considered together with the consented Gass Wind Farm, these have reduced the wildness characteristics of the area of open land including the Site, and hence the sensitivity of the area to the addition of further wind turbines, and the potential for significant effects from locating turbines within the Site has reduced.
Potential visual effects from the Southern Upland Way near Knockniehourrie, in views east towards the Galloway Hills;	Careful design of turbines within the Site can enable certain views from near Knockniehourrie through to the Galloway Hills to be retained without wind turbines.
Potential hydrological effects on the Kirkcowan Flow Special Area of Conservation (SAC), due to potential hydrological connectivity between areas proposed for construction activity and land within the SAC; and	Further survey of peat and vegetation will enable a fuller picture of hydrological connectivity with the SAC to be developed. Careful design of the turbine layout and infrastructure layout and routing will then avoid areas with hydrological connectivity, eliminating the potential for effects on the SAC.

66. The Development design strategy will be set out, identifying the specific design principles, which design iterations will seek to meet. These will include the following aspects:
- Economic viability;
 - Buildability;
 - Electricity generation potential;
 - Visual integration with the surrounding windfarms;
 - Acceptability of views from the Southern Upland Way (SUW), which passes c. 1 km to the west and c. 2 km to the north of the Site;
 - Avoiding effects on the Kirkcowan Flow Special Area of Conservation (SAC), which is adjacent to the site;
 - Avoiding effects on the River Bladnoch SAC, which includes the Tarf Water adjacent to the site;
 - Avoiding harm to archaeological and cultural heritage assets;
 - No construction works will take place within 500 m of known hen harrier roost sites during dusk and dawn (defined as 2 hours before sunset to 2 hours after sunrise) during the non-breeding period (October-February inclusive) while the roost sites remain active;
 - Should any breeding schedule 1 (or otherwise sensitive) bird species be recorded during construction, no construction works will take place at any time within an appropriate buffer during the breeding season. (March-August inclusive); and
 - Minimising other environmental effects as far as practicable.
67. The design process will involve a series of iterations to improve the fit of the design to the design principles. This will include the location of the turbines and other infrastructure. The chapter will set out the changes made at each iteration, and the reasons for these changes, with reference to the design principles and input from the consultation process.

4 The Proposed Development

4.1 Site Description

68. The Site location is shown in **Figure 1.1**, and the Site boundary is shown in **Figure 1.2**. The Site boundary encompasses an area of approximately 550 ha. Land elevations within the Site range from c. 150 m above sea level (a.s.l.) on the south and west sides of the Site boundary along the Tarf Water, to c. 200 m a.s.l. along the north-eastern part of the Site boundary, with a relatively steep-sided small hill, Eldrig Fell, rising to 227 m a.s.l. in the south-east of the Site. The land generally slopes down from north to south within the Site. There are a number of small unnamed watercourses within the Site, the majority of which drain in a westerly or southerly direction into the Tarf Water. The Site is vegetated with a mix of bog and grassland, reflecting the patchy distribution of peat soils across the site, and land use by humans is limited to low-density sheep grazing. Access to the site is limited to a single, unclassified road, the C22W, which approaches from the A75 near Kirkcowan, to the south-east, enters the site in its south-eastern corner for c. 1.3 km, almost as far as the ruined High Eldrig farmstead.
69. The only statutory designation of any kind within the Site is the scheduled monument, Wood Cairn, located on the summit of Eldrig Fell, in the south-east of the Site. The Tarf Water, which is part of the River Bladnoch SAC (designated principally for its populations of Atlantic Salmon) flows south and east along the western and southern sides of the Site boundary.
70. The Site is bordered to the north and east by further open moorland designated as the Kirkcowan Flow SAC. The designation has been applied principally to protect valued areas of blanket bog, most notably Lodens Moss and Eldrig Moss. Immediately to the west of the Site lies the Operational Kilgallioch Windfarm, which consists of 96 turbines with tip heights typically of 146.5 m and associated infrastructure including access tracks, control building and a meteorological mast. To the south and south-east of the site, beyond the Tarf Water, lies privately owned commercial forestry plantations, which contain the consented (but not yet constructed) Gass Wind Farm (9 turbines with tip heights up to 126.5 m) and the operational Airies Wind Farm. Airies Wind Farm includes 14 turbines with tip heights of 135 m, located either side of the C22W unclassified road. Further to the south-east of the Site lie Artfield Fell Wind Farm and Balmurrie Fell Wind Farm, which consist of 15 and 7, respectively, smaller, more closely-spaced turbines on small fells with tip heights of 105 m.

71. The nearest residential properties to the Turbine Developable Area are detailed in **Table 4.1** below

Table 4.1: Approximate Distances of Residential Properties to the Development (km)

Residential Property	Approx. Distance from Turbine Developable Area (km)	Approx. Distance from Site Boundary (km)
Low Airies	c. 2.5 km to the south-east	c. 1.5 km to the south
Artfield	c. 2.5 km to the south	c. 2.5 km to the south
Kilmacfadzean	c. 3 km to the south-west	c. 3 km to the south-west
Balminnoch	c. 3.5 km to the south-west	c. 2.5 km south
Three properties at Polbae	c. 4 km to the north-east	c. 4 km to the north-east

4.2 The Proposal

72. It is currently anticipated that the Development would consist of up to 11 turbines with blade tip heights of up to 180 m. An initial design area is shown in **Figure 1.2**. The turbines will require ancillary infrastructure that is likely include the following components:

- Internal or external transformers at the base of each turbine;
- Crane hardstandings adjacent to each turbine;
- Power cables linking the turbines in laid trenches underground including cable markers;
- Upgraded and new site access tracks, passing places and turning circles;
- Substation compound and energy storage area;
- Permanent and temporary power performance assessment (PPA) anemometry masts;
- Communication mast(s);
- Temporary construction compounds; and
- Borrow pits.

73. The ancillary infrastructure proposed may change as the final parameters of the Development are identified throughout the iterative EIA process.

74. In addition to the turbines, the Development may contain ground-mounted solar panels.

75. Similarly to the large majority of development types, there is no proposal to limit the lifetime of the Development.

4.3 Turbines

76. A candidate turbine manufacturer and model would be selected for each technical and environmental discipline for the purposes of the EIA. A competitive procurement process would be undertaken prior to construction, to select the final turbine that would be installed on Site.

77. A summary of the proposed turbine details are set out in **Table 4.2** and an indicative turbine layout is shown in **Figure 1.2: Turbine Developable Area**.

Table 4.2: Proposed Turbines Characteristics

Characteristic	Description
Number of turbines	Up to 11
Height to blade tip of turbines	Up to 180 m
Type of turbines	Three bladed, horizontal axis
Generating capacity (per turbine)	Likely range: 3.5 MW to 5.5 MW

78. The wind turbines would be of a typical horizontal axis design, comprising of three rotor blades, a hub and a nacelle. The tower would be tubular and tapered in design and finished in a light grey semi-matt colour.

79. Each turbine would be served by its own electrical transformer that may be internal or external to the turbine tower. For assessment purposes, it would be assumed to be external in order to assess the maximum case scenario. The transformers would be located close to the base of each wind turbine.

4.4 Substation

80. The Development would include a new substation. Underground cabling, laid where possible alongside the access tracks, will link the turbine transformers to the onsite substation. From this substation, cables would be routed underground alongside access tracks to the Operational Kilgallioch Windfarm substation, for onward connection to the national electricity network.

4.5 Access and Access Tracks

81. Access for construction could either be taken along the A75 and the unclassified C22W road from near Kirkcowan, the same route that was used for construction of the Airies Wind Farm, or taken along the Operational Kilgallioch Windfarm route to the north of the Site (A75, A714 and west along the haul road through Forestry Commission Scotland land). Both routes would be inspected and may require upgrading to be suitable for the Development's construction traffic.
82. Access tracks will be required to provide access from the public highway (the C22W unclassified road) or the Operational Kilgallioch Windfarm route, to the turbines, the construction compound and substation.
83. Irrespective of the route selected, an access track would be constructed to link with the Operational Kilgallioch Windfarm, and electricity export cables would be routed alongside this track, to join the Operational Kilgallioch Windfarm substation before export to the national electricity network. During the operational phase, access for maintenance of the Development would be taken from the Operational Kilgallioch Windfarm site.
84. Access tracks will be constructed of a graded stone and be approximately 5 m in width, or as appropriate for the ground conditions. On site borrow pits will be utilised to provide stone for the access track construction, as well as for other areas of hardstanding.

4.6 Borrow Pits

85. It is the intention to source aggregate for the construction of access tracks, structural fill beneath turbine foundations, construction compounds and turbine hardstandings from on-site borrow pits as far as possible. By sourcing aggregate from within the Site, rather than an off-site quarry, this has the advantage of reducing the number of heavy goods vehicles (HGV) on public roads.

4.7 Temporary Construction Compound

86. A temporary construction compound will be required during the construction of the Development, forming an area of hardstanding providing space for Portakabins, parking, lay down areas and potentially concrete batching.

4.8 Anemometry Mast

87. An anemometry mast will be required for the life span of the windfarm, of a height similar to the hub height of the proposed wind turbines.

4.9 Energy Storage Area

88. An area would be prepared for use for energy storage, such as containerised batteries. Such systems are designed to complement renewable energy generation and assist with management of the wider electrical network. In terms of appearance, the system would be comparable to the onsite substation.

4.10 Solar Photovoltaic Arrays

89. Suitable areas of the Site may be used to locate ground mounted solar photovoltaic arrays (solar PV arrays). Suitable areas will be determined by environmental and technical constraints and will be subject to a similar iterative design evolution process as other aspects of the Development.

4.11 The Development Description Chapter

90. The EIA Report will include a chapter setting out a description of the Development in sufficient detail as to enable the assessment of the likely significant effects. This will include descriptions of the components of the site, as above but

with more detail, and will include a description of the activities proposed during the construction and operation phases.

91. It is expected that this chapter will be supported by the following technical appendices:
- An Outline Construction Environment Management Plan (CEMP), which will specify measures that would be employed to protect the environment, and most notably peat and water receptors; and
 - A Habitat Management Plan (HMP), which will set out post-construction site restoration measures and any proposed enhancement measures for habitats and ecological resources.

5 Planning Policy Context

92. A Planning Policy section is not required within the EIA Report by the EIA Regulations. The purpose of an EIA is not to assess the compliance with the development plan policy, but to assess and protect the environmental by ensuring the decision maker, in this case the Scottish Government, when deciding to grant planning permission for a project, does so in the full knowledge of the likely significant effects, and takes this into account in the decision making process.
93. A Planning Policy Chapter identifying the key policy documents of relevance to the Development will not be included in the EIA Report but will be set out in full in the Planning Statement that will accompany the Section 36 application for consent.
94. Local and national policy, where relevant to the assessment of likely significant effects, will be set out in the technical chapters of the EIA Report. For example, where policy identifies that an environmental aspect, such as a particular habitat or landscape component, is of particular value, this will be taken into account, typically in consideration of its sensitivity to change, when assessing the significance of effects. This is different to assessing the compliance of the Development with policies that set out how decisions on development consent should be made.
95. The information provided in the EIA Report will meet the requirements of Schedule 9 of the Electricity Act, and this will be demonstrated in the Planning Statement that will accompany the application for consent.

6 Landscape and Visual

6.1 Introduction

96. This Section of the Scoping Request sets out the proposed methodology and approach to be applied in the production of the Landscape and Visual Impact Assessment (LVIA) for the application for the Development and 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. Justification of the scope is presented through an initial baseline assessment of the relevant receptors, and an initial assessment of their sensitivity to the Development.
97. The purpose of the LVIA is to identify and assess the likely significant effects that the Development may have on physical elements of the landscape; landscape character; areas that have been designated for their scenic or landscape-related qualities; Wild Land Areas 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 Development to other windfarms are also considered.

6.2 Suggested Methodology

98. The LVIA will follow Optimised Environments Ltd's (OPEN's) methodology devised specifically for the assessment of windfarm 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.
99. Other sources of guidance that will be used and referenced in the LVIA include the following:

- Visual Representation of Wind Farms Version 2.2 (Scottish Natural Heritage, February 2017);
 - Advice Note 01/11 Photography and Photomontage in Landscape and Visual Impact Assessment (Landscape Institute, 2011);
 - Visual representation of development proposals Technical Guidance Note 02/17 (Landscape Institute 31 March 2017);
 - Assessing the Cumulative Impact of Onshore Wind Energy Proposed Developments (SNH, 2012);
 - Landscape Character Assessment Guidance for England and Scotland (SNH and TCA, 2002);
 - Scottish Natural Heritage consultation on draft guidance: Assessing impacts on Wild Land Areas – technical guidance (2017);
 - Residential Visual Amenity Assessment (RVAA) - Technical Guidance Note 2/19. (Landscape Institute 2019); and
 - Siting and Designing of Windfarms in the Landscape: Version 3a (SNH, August 2017).
100. In accordance with guidance the study area for the LVIA of the Development would cover a radius of 45 km from the nearest turbine, as shown in **Figure 6.1**. However, OPEN has reviewed the potential effects of the Development through analysis of cumulative wirelines (in particular those used in the Kilgallioch Windfarm LVIA) and the comparative ZTV on **Figure 6.7**. It is also relevant that the most distant receptor where a significant effect was identified in the LVIA for the Operational Kilgallioch Windfarm was located at a distance of 9.4 km.
101. It has been assessed that due to the nature of the Development as an extension of an operational windfarm and the wider context that includes other windfarms there is unlikely to be any significant effects that occur beyond a 20 km radius. The ZTV on **Figure 6.2a** and b illustrates that there would be limited theoretical visibility across the land at distances of between 30-45 km. This is shown to occur on the land extending southwards out to the Mull of Galloway and Burrow Head. From locations within these areas the Development would be seen on the skyline in the immediate context of other operational windfarms visible at closer range as can be determined from **Figure 6.2b: ZTV with Viewpoints and Cumulative Windfarms**. At ranges of 20-30 km the Development would be seen in the immediate context of other windfarms and as an extension to Kilgallioch. It is therefore proposed that the Study Area for the Development is reduced from a 45 km radius to a 20 km radius.
102. The Development is located in close proximity to the Operational Kilgallioch Windfarm (as shown in **Figure 6.2b**). It is considered that any cumulative effects that will occur will arise as a result of the pattern of development within a relatively localised area. It is proposed that following a detailed review of the cumulative sites within the area, a plan will be produced showing the locations of windfarms within a 20 km radius that are operational, under construction, consented or which are at application stage and where the turbines are greater than 50 m to blade tip. A list of windfarms within 'influencing distance' will then be prepared for agreement with Dumfries and Galloway Council (DGC) and Scottish Natural Heritage (SNH). DGC and SNH will be consulted over the final list of sites to be considered within the detailed cumulative assessment. Exceptionally, scoping stage sites may also be included where they are considered to be of specific relevance to the cumulative effect of the Development.
103. The assessment has been initiated through a desk study of the site combined with a good working knowledge of the wider area. This study has identified aspects of the landscape and visual resource that will need to be considered in the landscape and visual assessment, including landscape-related planning designations, Wild Land Areas, landscape character typology, and potential cumulative windfarms, routes (including roads, National Cycle Routes and long distance walking routes), and settlements.
104. The desk study has also utilised Geographic Information System (GIS) and Resoft Windfarm software to explore the potential visibility of the Development, using 11 turbine co-ordinates distributed within the Turbine Developable Area shown in **Figure 1.2**. The resultant ZTV diagrams (**Figures 6.2 to 6.6**) and wirelines have provided an indication of which landscape and visual receptors are likely to have key sensitivities in the assessment.
105. The LVIA is intended to identify and assess the likely significant effects that the Development will have on the landscape and visual resource. For the purpose of assessment, the potential effects on the landscape and visual resource are generally grouped into five 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 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 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 areas and landscape-related designated areas;
- Effects on wild land: effects on the wild land qualities of the defined Wild Land Area;
- Effects on views: the assessment of the effects on views is an assessment of how the introduction of the Development will affect views throughout the study area. The assessment of effects on views is carried out in relation to representative viewpoints and principal visual receptors; and
- Cumulative effects: cumulative effects arise where the study areas for two or more windfarms overlap so that both of the windfarms are experienced at a proximity where they may have a greater incremental effect, or where windfarms may combine to have a sequential effect. In accordance with guidance, the LVIA assesses the effect arising from the addition of the Development to the cumulative situation.

106. In line with the EIA regulations, the LVIA effects are assessed to be either significant or not significant.

107. The significance of effects will be assessed through a combination of two considerations: the sensitivity of the landscape receptor or view and the magnitude of change that will result from the addition of the Development.

108. The geographic extent over which the landscape and visual effects will be experienced will also be 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 will vary depending on the specific nature of the development proposed and is principally assessed through analysis of the geographical extent of visibility of the Development across the visual receptor.

109. The duration and reversibility of effects on views are based on the period over which the Development is likely to exist and the extent to which the Development may be removed and its effects reversed at the end of that period. There is no proposal to limit the lifetime of the Development and duration and reversibility will not be incorporated into the overall magnitude of change, and may be stated separately in relation to the assessed effects.

110. The 'nature of effects' relates to whether the effects of the 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 will require interpretation and reasoned professional opinion in the SLVIA.

6.3 Baseline / survey to date

6.3.1 Site context

111. The site is located to the east of the southern part of the Operational Kilgallioch Windfarm and to the north of the operational Balmurrie Fell, Artfield Fell and Aries windfarms, and the site of the consented Gass Wind Farm, as shown on **Figure 6.2b**. The Site forms part of a larger open area of rough grass moorland which is undulating with some notable and craggy small hills, including Craigmoddie Fell in the north and Eldrig Fell in the south.

6.3.2 Landscape Character

112. **Figure 6.5** illustrates the landscape character defined within the Study Area along with the ZTV.

113. The landscape character of the site is classified as Plateau with Forest in Land Use Consultants (1998), Dumfries and Galloway Landscape Character Assessment (D&GLCA), Scottish Natural Heritage Review No 94. The D&GLCA provides broad guidance on the characteristics and sensitivities of landscape character types (LCTs) and, until recently, has been used as guidance in the identification of the sensitivity of the landscape to windfarm development. Whilst aspects of the assessment remain relevant, it was written at a time when there was very limited windfarm development across Scotland and when comparatively little was known about its potential effects or scale.

114. In early 2019 SNH released a revised dataset of the landscape character type boundaries and the associated landscape descriptions. The site lies within LCT 174 - Plateau Moorland with Forest – Dumfries and Galloway. Within the description one of the Key Characteristics is noted as:
115. *‘Wind farm development of forested or recently clear-felled areas north-western, western and south-western areas.’*
116. Within the landscape character description under the heading of ‘Settlement’ it notes the following:
117. *‘Large-scale wind farms are a key and defining characteristic in the west of the Plateau Moorland with Forest - Dumfries & Galloway with development forming an arc around the watersheds of the Water of Luce and Tarf Waters, surrounding the large area of open moorland between Eldrig and Craigmaddie Fells. Forestry has been restructured to accommodate turbines. The development has detracted from the qualities of wild character and remoteness in some to the west, but these qualities persist in the east and more expansive areas of open moorland.’*
118. In 2011 the Dumfries and Galloway Wind Farm Landscape Capacity Study (DGWLCS), which accompanies the Local Development Plan (LDP) Supplementary Guidance (SG), redefined some of the SNH (1998) boundaries for the LCTs. It is this mapping that is shown in **Figure 6.5**.
119. The current version of the DGWLCS was adopted on 22nd June 2017. A revision to this has been published as part of the LDP review, which is currently underway. The baseline, capacity and sensitivity of the landscape to large scale windfarm development will be considered within the LVIA with reference to the above documents.
120. Some of the changes to the landscape that have occurred, primarily through windfarm development within the area, have altered the landscape character to Plateau Moorland with Windfarms and Plateau Moorland with Forestry and Windfarms. Where relevant this changed landscape will form part of the baseline descriptions.
121. It is proposed that the assessment of the effects on landscape character should focus on the area lying within 10 km of the Development.

6.3.3 Landscape Planning Designations and Wild Land Areas

122. The site does not lie within any landscape planning designations or Wild Land Areas (WLA) as shown on **Figures 6.3** and **6.4**. The closest designated area is the South Ayrshire Regional Scenic Area (RSA) which covers part of the Study Area to the north and lies at a distance of 6 km from the nearest turbine in the north-east. The ZTV shows that there would be theoretical visibility of the Development from this area at a minimum range of approximately 6 km at Loch Maberry. Much of the visibility from this RSA would be screened by intervening forestry or otherwise the Development would be seen behind or to a lesser extent than the Operational Kilgallioch Windfarm.
123. Dumfries and Galloway Council has also designated a large area to the east of the site as part of a RSA through policies in its Local Development Plan. Views from the closest parts of this area are strongly characterised by forestry and the operational windfarm context where the Development would be seen in the context of a windfarm developed skyline to the west.
124. Within the Study Area there are three Gardens and Designed Landscapes (GDL) identified in the Historic Environments Scotland (HES) Inventory. The closest of these is Castle Kennedy, which lies at a distance of approximately 12 km to the south-west of the Site. The ZTV illustrates that there would be very limited visibility from within the Castle Kennedy grounds.
125. Lochryan and Glenapp GDLs lie at a greater distance to the north-west and west respectively and are shown to have no theoretical visibility.
126. The Merrick WLA lies at a distance of approximately 20 km from the proposed extension and would gain views to it in the context of the other cumulative windfarms from high points and west facing high ground.
127. **Table 6.1** below lists the WLA and designated areas and provides information about their distance to the Turbine Developable Area and relationship to the ZTV, as shown in **Figures 6.3** and **6.4**. Thereafter, it is assessed in the final column whether or not, in OPEN’s opinion, these designated areas can be scoped out of the assessment,

unless changes to the layout during the detailed design process materially alter the potential for significant effects. The boxes that are shaded grey will be assessed further within the LVIA. DGC's and SNH's agreement to this is sought through this scoping exercise in order to enable the LVIA to be focussed on key considerations.

Table 6.1: Landscape Planning Designations and Wild Land Areas

Designation/ WLA	Distance to nearest turbine (km)	Subject to ZTV- theoretical visibility?	Need to assess effects further within LVIA?
National Scenic Areas			
Fleet Valley	30.5	Yes	No - due to distance and limited extent of theoretical visibility.
Gardens and Designed Landscapes			
Castle Kennedy	12.7	Yes	No - due to distance and limited extent of ZTV.
Lochryan	15.7	No	No
Glenapp	16.0	No	No
Ardwell House	25.3	Yes	No - due to distance and fact that the Development would be seen on the skyline in the immediate context of other operational windfarms visible at closer range. GDL is also heavily influenced by woodland context. Orientation of buildings is to east across Luce Bay.
Monreith	26.9	Yes	No - due to distance and limited extent of ZTV.
Logan House (Balzieland)	28.0	Yes	No - due to distance and fact that the Development would be seen on the skyline in the immediate context of other operational windfarms visible at closer range. GDL is also heavily influenced by woodland context.
Bargany	28.7	No	No
Logan Botanic Garden	30.0	Yes	No - due to distance and fact that the Development would be seen on the skyline in the immediate context of other operational windfarms visible at closer range. GDL is also heavily influenced by woodland context.
Galloway House	31.3	Yes	No - due to distance and limited extent of ZTV.
Kilkerran	31.3	No	No
Blairquhan	36.3	No	No
Cally	36.6	No	No
Craigengillan	37.6	No	No
Culzean Castle	37.7	No	No
Skeldon House	44.3	No	No
Regional Scenic Areas			
South Ayrshire Regional Scenic Area	5.8	Yes	Yes
Galloway Hills	11.2	Yes	No - due to distance and fact that the Development would be seen on the skyline in the immediate context of other operational windfarms visible at closer range. Windfarm influence is part of baseline character in this part of the context to this RSA.
Mochrum Lochs	13.8	Yes	No - due to distance and fact that the Development would be seen on the skyline in the immediate context of other operational windfarms visible at closer range. Character of RSA relates primarily to lochside/coastal context.

Rhins Coast	16.0	Yes	No - due to distance and fact that the Development would be seen on the skyline in the immediate context of other operational windfarms visible at closer range. Character of RSA relates primarily to coastal/seaward context including the machars rather than the uplands to the north.
Machars Coast	26.8	Yes	No - due to distance and fact that the Development would be seen on the skyline in the immediate context of other operational windfarms visible at closer range. Character of RSA relates primarily to coastal/seaward context.
Solway Coast	35.7	Yes	No - due to distance and very limited theoretical visibility. Character of RSA relates primarily to coastal/seaward context.
Wild Land Areas			
Merrick	19.7	Yes	No - due to distance and fact that windfarms are already a characteristic of views in this direction. The Development is located within the immediate context of other windfarm developments with the Operational Kilgallioch Windfarm visible at closer proximity.

6.3.4 Visual Receptors and Visual Amenity

128. The LVIA will undertake an assessment of the likely visual effects from the Development through consideration of the specific visual effects at a selection of representative viewpoints (**Figures 6.2a and b**) and by considering the wider effects on visual amenity with reference to some of the of principal visual receptors (**Figure 6.6**).

6.3.4.1 Visualisations

129. Visualisations and figures will be produced to SNH's standards as set out in 'Visual Representation of Wind farms: Version 2.2' (February 2017). In line with SNH guidance, it is proposed that photomontages will be prepared for viewpoints where they are located within a 20 km radius of the Turbine Developable Area.

6.3.4.2 Viewpoint Selection

130. A preliminary viewpoint list is shown in **Table 6.2** below. The locations of the viewpoints are shown on **Figures 6.2a and b**. The final list will be established through fieldwork and the scoping process and in agreement with DGC and SNH. 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.
131. The starting point for assembling this viewpoint list was a review of the representative viewpoints used in the Kilgallioch Windfarm Environmental Statement and the Supplementary Environmental Information. Cumulative wirelines were reviewed for each of these viewpoints. Some of these viewpoints are not in the ZTV for the Development and were therefore discounted. Where this occurred, consideration was given to the receptor that the viewpoint was representing, and possible alternatives sought within areas located within the ZTV. **Figure 6.7** illustrates the comparative visibility of the Operational Kilgallioch Windfarm and the Development. This is also a useful indicator of the areas where the Development would only be seen in the immediate context of the Development. Another factor that became evident in reviewing the wirelines was the relationship of the Development to all of the nearby operational windfarms and whether or not these would be seen at closer proximity to the viewpoint.
132. The list below includes those viewpoints where it was considered there to be the possibility of a significant landscape or visual effect or where they are useful to demonstrate the comparative scale of the turbines for assessment or design iteration purposes. Additional viewpoints have been located where the addition of the Development to the operational windfarms is most pronounced or where they represent specific receptors that may be affected by such views.
133. Consideration has also been given to the potential visibility of a proposed solar array. The LVIA would include a ZTV for this component of the Development. It would cover a 5 km radius from the proposed site. Two of the viewpoints

would include a photomontage of the solar array. The locations of these will be agreed with DGC and SNH but are likely to be Viewpoint 1: Craig Airie Fell and Viewpoint 2: SUW (Knockniehourie). Other viewpoints would indicate the location of the solar array where visible.

Table 6.2: Preliminary Viewpoints

ID	Viewpoint Name	Grid ref. (Preliminary) Text	Approximate Dist. to Turbine Developable Area (km)	Receptors at this location
1	Craig Airie Fell	223601 573661	2.8	Recreational (Walkers) Landscape (Plateau Moorland with Forest Landscape Type)
2	SUW (Knockniehourie)	221297 568275	2.2	Recreational (walkers)
3	West of Derry (SUW)	225871 573419	3.1	Recreational (walkers)
4	Mains of Larg	216950 564139	8.2	Settlement (New Luce) Landscape (Shallow Valley Landscape Type) Route corridor (road users / rail passengers)
5	B7027 Loch Maberry	228697 575756	6.5	Route corridor (road users) Recreational (Fishing)
6	SUW (Glenvernoch Fell)	232700 574099	8.7	Recreational (walkers)
7 For design	Bennylow (Culvennan Fell)	230341 563516	7.4	Landscape (Drumlin Pastures Landscape Type) Route corridor (road users)
8	SUW (Glenwhan Moor)	214403 561565	11.8	Recreational (walkers)
9	A75 Dergoals	224654 559174	9.7	Route corridor (road users)
10	Bruce's Stone, Glentool	241585 580346	19.4	Landscape (Regional Scenic Area) Visitor attraction Recreational (walkers) Dark Sky Park Buffer

134. Further viewpoints were considered during this preliminary exercise but were discounted as it is considered the effect of the Development on these locations would be not significant. These locations are as follows (as shown on **Figures 6.2a and b**):

- Viewpoint A: The Merrick (Regional Scenic Area/Wild Land Area);
- Viewpoint B: Mochrum Loch (Regional Scenic Area);
- Viewpoint C: A75, Point Nets;
- Viewpoint D: A77 by Cairnpat; and
- Viewpoint E: A714 north of Newton Stewart.

135. Wirelines from these Viewpoints have been included to illustrate that these effects are not significant.

6.3.5 Dark Sky Park

136. A key factor in the development of turbines greater than 150 m in height is the requirement for them to have steady red, medium intensity (2,000 candela) lights fitted to all of their hubs and steady red, low intensity (32 candela) lights fitted on the towers in accordance with CAA guidance.

137. It is proposed that a night time assessment will be required in order to provide an understanding of the effect of the proposed lighting on the local area.

138. **Figure 6.6** illustrates that The Dark Sky Park covers an area located at a distance of 17 km at its closest point to the east-north-east of the Site. There is also a buffer to this area located at a distance of approximately 12 km at its closest point, and the Site lies just within Dumfries and Galloway Council's lighting 'transition zone'. All operational external lighting within the zone would be dark sky friendly⁸. It is considered that there would not be a significant effect on the Dark Sky Park at this distance and is therefore proposed to be scoped out of further assessment.

6.3.6 Cumulative windfarms

139. **Figure 6.8** shows the cumulative windfarms within a 45 km radius of the Site and their status. Agreement will be sought from DGC and SNH with regard to which of these should be included in the assessment. It is notable that there are numerous consented but as yet unbuilt windfarms and large numbers of sites at the scoping stage that may never come forward to application. Whilst there is a 5 year window for a consented development to start construction there is no currently defined timescale for when sites for which a scoping opinion has been sought, can be discounted and therefore removed from the cumulative windfarm mapping. In accordance with SNH 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. At this stage, it is not proposed to include any developments at scoping stage.

6.4 Key Sensitivities

- Views from residential properties and small settlements in the vicinity of the site;
- Sequential cumulative effects on users of the Southern Upland Way, the A75, the B7027 and the Girvan to Stranraer rail line;
- Localised cumulative effects on landscape character of the Plateau Moorland and Plateau Moorland with Forest LCTs;
- Visibility of the Development and cumulative windfarms from the Regional Scenic Areas may affect their character; and
- Visibility of the Development at night due to turbine lighting.

6.5 Summary of Scoped In and Out Surveys and Effects

140. **Table 6.3** shows a summary of aspects scoped in and out of the EIA process.

Table 6.3: Summary of Scope

Receptor Type	Scoped In	Scoped Out
Landscape Character	Receptors within 10 km of the Turbine Developable Area.	Receptors and designations where they are located at a distance of greater than 10 km from the Turbine Developable Area. The Merrick Wild Land Area. The Dark Sky Park.
Visual	Effects on representative viewpoints. Effects on settlements. Effects on Southern Upland Way, the A75, the B7027 and the Girvan to Stranraer rail line. Night time effects on the local area.	Receptors located at a distance greater than 20 km from the Turbine Developable Area.

⁸ Dumfries and Galloway Council (2018) Dark Skies Friendly Lighting – Draft Supplementary Guidance [Online] Available at: <https://www.gov.scot/binaries/content/documents/govscot/publications/factsheet/2018/06/dumfries-and-galloway-council-planning-authority-core-documents/documents/cd20---draft-dark-skies-friendly-lighting-supplementary-guidance-2018/cd20---draft-dark-skies-friendly-lighting-supplementary-guidance-2018/govscot%3Adocument> (Accessed 08/04/2019)

6.6 Key Questions for Consultees

- Do you have any comments on the proposed methodology?
- Are you in agreement with the proposed Study Areas?
- Are you in agreement that the assessment of the effects on landscape character receptors should focus on areas within a 10 km radius?
- Are you in agreement with the proposal to scope out the Landscape Planning Designations where no further assessment is proposed in the LVIA as set out in **Table 6.1**?
- Do you have any comments or suggestions in relation to the Preliminary Representative Viewpoint Locations shown in **Table 6.2** and illustrated on **Figures 6.2a and b**?
- Do you have any comments on the proposed cumulative windfarm assessment?

7 Archaeology

7.1 Introduction

148. The assessment of the potential effects of the Development on the archaeology and cultural heritage resource will consider both the potential for direct effects within the Site and the potential for indirect effects and cumulative effects upon the setting of key heritage assets within the wider landscape.

7.2 Proposed Assessment Methodology

149. The assessment will be conducted with reference to the relevant statutory and planning frameworks for cultural heritage. In addition to those mentioned in the Planning and Policy Section, cognisance will also be taken of Historic Environment Scotland Policy Statement June 2016 (HESPS)⁹. The assessment will be undertaken in accordance with current best practice and guidelines which includes Planning Advice Note (PAN) PAN 2/2011¹⁰; the Chartered Institute for Archaeologists (CIfA) Standards and Guidance¹¹ and Historic Environment Scotland's Managing Change in the specifically 'Managing Change in the Historic Environment: Setting'¹².
150. A Desk-Based Assessment (DBA) of cultural heritage records was created for the Operational Kilgallioch Windfarm in 2009. The 2009 DBA, as detailed in **Appendix 7.1**, covers the Development site and concludes:
151. *"Outside forested areas, the Development area has seen relatively little modern activity that is likely to destroy upstanding archaeological remains; therefore, it is to be expected that archaeological sites with a surface expression will have been identified. Certain types of archaeological sites, such as timber structures, would not be expected to present surface remains but to survive purely as below ground archaeology...In moorland areas, the lack of development and industrial activity means that the potential for survival (of unknown buried archaeology) is high.*
152. *It is recommended that at least a 50 m (metre) buffer is established around all features of cultural heritage identified in this desk assessment in order to avoid accidental damage."*¹³
153. As the Development is to be located in open moorland that was part of the 2009 DBA and walkover survey, the 2009 DBA would be used to inform the baseline for the assessment of direct effects and archaeological potential of the

⁹ Historic Environment Scotland (2016) Scottish Environment Scotland Policy Statement [Online] Available at: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=f413711b-bb7b-4a8d-a3e8-a619008ca8b5> (Accessed 18/02/2019)

¹⁰ The Scottish Government (2011) Planning Advice Note 2/2011. Available at <http://www.gov.scot/Resource/Doc/355385/0120020.pdf> (Accessed 18/02/2019)

¹¹ Chartered Institute for Archaeologists (2017) Standard Guidance for Historic Environment Desk-Based Assessment – 2017 Ed. [Online] Available at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_3.pdf (Accessed 18/02/2019)

¹² Historic Environment Scotland (2016) Managing Change in the Historic Environment: Setting [Online] Available at: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549> (Accessed 18/02/2019)

¹³ Headland Archaeology (2009) Archaeological Desk Based Assessment at Kilgallioch, South Ayrshire and Dumfries and Galloway.

Development, and no new DBA or walkover survey is proposed. An updated DBA is scoped out of the assessment requirements.

154. A setting assessment which will take account of the extent of the potential effects upon setting of designated heritage assets will be undertaken as part of the EIA. The assessment will include “wireline” visual representations from the following receptor locations, as was provided for the original application for the Kilgallioch Windfarm:
- Wood Cairn/Eldrig Fell;
 - Cairn-na-Gath;
 - Caves of Kilhern Cairn;
 - Bennan of Garvilland (Fort); and
 - Linn’s Grave.
155. The setting of a designated heritage asset such as a Scheduled Monument or Listed Building can be loosely interpreted as features, spaces and views that are historically and functionally related, and which can be considered vital to their understanding, appreciation and experience.
156. The setting assessment for the Development will be undertaken using the same approach as for the Operational Kilgallioch Windfarm.
157. The original application for Kilgallioch Windfarm divided heritage assets into two groups to assess setting:
- ‘Outward’ group – included features for which visibility to, from or across the feature is considered to be an essential element of its function or an essential part of the feature’s special interest (e.g., cairns, forts, castles and other defensive works); and
 - ‘Inward group’ – included features such as clearance cairns, enclosure walls and features with no specific visual relationships.
158. The original application for Kilgallioch Windfarm Cultural Heritage Chapter and associated figures and wirelines of the Environmental Statement are included in **Appendix 7.2** for reference.
159. The assessment will proceed from a consideration of the ‘sensitivity’ of a cultural heritage feature against the ‘magnitude’ of any potential change, to arrive at the ‘significance’ of the effect. The assessment of sensitivity of archaeological and historical assets reflects the relative weight which statute and policy attach to them, principally as published in HESPS, with final determination of the significance of the effect made with regards to professional judgement
160. All proposed surveys and assessment detailed in the sections below will also be applicable for the potential solar development on-Site.

7.3 Potential Effects, Baseline Conditions and Proposed Surveys

161. For the purpose of this document, designated heritage assets include Listed Buildings, Scheduled Monuments, Gardens and Designed Landscapes, Inventoried Battlefields and World Heritage Sites as well as Conservation Areas.
162. Approximately 3 km to the east of the Site lies an Archaeologically Sensitive Area (ASA) as designated on the Proposed Dumfries and Galloway Local Development Plan 2¹⁴. General policy states that D&GC will “safeguard the character, archaeological interest and setting of Archaeologically Sensitive Areas (ASAs)”.
163. There are non-designated heritage features within the Site and its surroundings. On-site heritage features are shown on **Figure 7.1**. There is the potential for direct effects on known and unknown assets within the Site, at the location

¹⁴ Dumfries and Galloway Council (2018) Local Development Plan 2 – Proposed Plan [Online] Available at: https://www.dumgal.gov.uk/media/19739/LDP2-Proposed-Plan/pdf/PROPOSED_PLAN_JAN_2018.pdf?m=636564441676770000 (Accessed 18/02/2019)

of proposed infrastructure and construction activity. Site design will seek to avoid and minimise these as far as practicable, within the design strategy (see **Section 3**). Mitigation will be proposed to reduce effects where practicable.

164. As discussed previously, the 2010 EIA for the application for the Operational Kilgallioch Windfarm covered the Site. As such, the assessment within the 2010 Environmental Statement has informed the selection of heritage assets requiring assessment for the current Development.
165. The EIA for the application for the Operational Kilgallioch Windfarm assessed the potential effects upon the setting of designated heritage assets within 15 km, and found no effects that were significant. Minor effects (the only non-negligible effects) were identified at only the receptors shown in **Table 7.1** and further detailed in **Figure 7.2**, with all other effects negligible.
166. All cultural heritage features beyond 15 km of the Site are unlikely to receive a significant effect and therefore, are proposed to be scoped out of further assessment.
167. Effects that were previously assessed as being negligible would not, even with an increase in turbine tip height of c. 30 m, become moderate, and hence effects on all receptors assessed as negligible in the original application for Kilgallioch Windfarm are scoped out of the EIA for the Development, unless the receptor is within 1 km of the Site (and these will be included in the EIA).
168. Receptors receiving effects that were assessed as being minor are considered individually in **Table 7.1**.

Table 7.1: Receptors Previously Assessed as Receiving a Minor Effect

Receptor	Distance from the original application site	Distance from the Site	Include in Scope?
Laggangarn Stones (SM90199)	Within the site	c. 250 m	Yes
Wood Cairn (SM1953)	Within the site	Within the site	Yes
Wells of the Rees (SM2002)	Within the site	c. 250 m	Yes
Quarter Fell/Pultadie group (SM4795, SM4867, SM4832, SM4943, SM4927)	Within the site	c. 3 km	No – the features are on a south-west-facing slope, and the Site is to the east. There will be no or very limited intervisibility, through the Operational Kilgallioch Windfarm.
Glenkitten hut circle (SM4902, SM4900, SM4851)	Within the site	c. 4 km	No - the features are on a west-facing slope, and the Site is to the east. There will be no or very limited intervisibility, through the Operational Kilgallioch Windfarm.
Cairn Kenny (SM1925, SM4861, SM4848, SM4893, SM4911, SM4869, SM4809)	c. 3 km, and only 700 m from Arecleoch Windfarm turbines	c. 7 km	No - there will be no or very limited intervisibility at distance because of intervening topography, and any visibility would be through the Operational Kilgallioch Windfarm.

Receptor	Distance from the original application site	Distance from the Site	Include in Scope?
Craigbirnoch Cairn group (SM4932, SM4946, SM4956, SM4951, SM4926, SM4941, SM4791, SM5045, SM4799, SM7474, SM7476, SM7478, SM7476)	c. 1.5 km	c. 4.5 km	No – the features are on a south-west-facing slope, and the Site is to the east. There will be no or very limited intervisibility at distance because of intervening topography, and any visibility would be through the Operational Kilgallioch Windfarm.
Carn-na-Gath Cairn (SM1922)	c. 1 km	c. 3 km	Yes
Caves of Kilhern Cairn (SM1928)	c. 4 km	c. 7 km	No – cumulative effects are unlikely as the Development will sit directly behind the Operational Kilgallioch Windfarm, Artfield Fell Wind Farm and Balmurrie Fell Wind Farm resulting in the Development's appearing as one large windfarm and, therefore, will not increase the splay of turbines from the feature.
Listed buildings in Glenwhilly (HB17376, HB19376)	1 to 2 km	c. 6 km	No – the features are at the foot of a west-facing slope, and the Site is to the east. There will be no intervisibility.
ASA	Partially within the site	c. 3 km	No – the ASA is focused around the Water of Luce valley, and there will be limited intervisibility because of intervening topography. Any visibility would be away from the immediate setting of the ASA, and through the Operational Kilgallioch Windfarm.

^{169.} Consultation will be undertaken with Historic Environment Scotland (HES) and D&GC, as part of the assessment process. Results will be considered within the design of the Development and included within the discussion of the archaeological potential within the Site. The archaeology and cultural heritage assessment will include proposals for mitigation of any identified effects where appropriate.

7.4 Summary of Scoped in and Out Surveys and Effects

^{170.} **Table 7.2** shows a summary of aspects scoped in and out of the EIA process.

Table 7.2: Summary of Scope

Aspect	Scoped In	Scoped Out
Survey	Use of the previous DBA	A new or updated DBA A new site walkover Any form of site investigation pre-consent
Direct effects	Assessment of potential within the Site	
Setting effects on non-designated features	All features within 1 km of the Site	All features outside 1 km of the Site
Setting effects on designated features	Limited to: Lagganarn Stones, Wood Cairn, Wells of the Rees, Carn-na-Gath Cairn	All other features.

7.5 Key Questions for Consultees

171. The above scope is based on the requirement for EIA to consider the likely significant effects. Effects that are not likely significant do not require assessing under the EIA Regulations.
172. Key questions for consultees are:
- Do the consultees agree with the proposed methodology and scope of assessment?
 - Do consultees have any information regarding current or recent archaeological work or projects being undertaken within or in the vicinity of the Development site, particularly those whose results may not yet be recorded in the Historic Environment Record?

8 Ecology

8.1 Introduction

173. The aim of the Ecological Impact Assessment (EclA) is to identify, quantify and evaluate the likely significant effects of the Development on ecosystems and their components, including designated sites, flora and fauna. This Section considers all terrestrial and freshwater ecological receptors with the exception of birds, which are assessed in **Section 9: Ornithology**.

8.2 Proposed Assessment Methodology

174. The assessment of ecological effects will follow the Chartered Institute of Ecology and Environmental Management (CIEEM) guidance¹⁵ ensuring a transparent and robust approach to the EclA. These guidelines set out the process for assessment through the following:
- Collation of updated baseline ecological information through desk study and field surveys;

¹⁵ CIEEM. (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Winchester: Chartered Institute of Ecology and Environmental Management

- Identification of Important Ecological Features (IEFs) including designated sites, protected / priority species and habitats;
- Identification and characterisation of effects on IEFs including positive or negative, extent, magnitude, duration, timing, frequency and reversibility;
- Assessment of cumulative effects;
- Proposals for design and mitigation measures to avoid and / or minimise effects on IEFs;
- An assessment of residual effects following the implementation of design and mitigation measures; and
- Identification of appropriate compensation measures to offset significant residual effects and opportunities for ecological enhancement.

175. All proposed surveys and assessment detailed in following sections will also be applicable for the potential solar development on-Site.

8.2.1 Previous Surveys

176. The following surveys were undertaken on/around the Site as part of the Operational Kilgallioch Windfarm, either pre-application and/or before, during and after construction:

- Extended Phase 1 Habitat and National Vegetation Classification (NVC) surveys from May and August 2009, with a further visit in November 2009.
- Protected species surveys between May and September 2009;
- Bat Activity and Roost Assessment surveys between May and September 2009;
- Fisheries Habitat and Fauna (electrofishing) surveys between September and November 2009;
- Water quality surveys in 2008 and from 2014 to 2018 (see also **Section 10**); and
- Peat surveys between 2008 and 2019 (see also **Section 10**).

8.3 Potential Effects, Baseline Conditions and Proposed Surveys

8.3.1 Statutory Designated Sites

177. The Site is adjacent to two designated sites; the Kirkcowan Flow Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) and the River Bladnoch SAC. Designated sites for nature conservation and ecological importance are shown in **Figure 8.1**. **Table 8.1** details designated sites within 5 km of the Site.

Table 8.1: Designated Sites Details

Site	Designation	Qualifying Interests	Distance from Site
Kirkcowan Flow SAC and SSSI	SAC, SSSI	Blanket mire of international importance	Adjacent to the northern boundary
River Bladnoch SAC	SAC	<i>Salmo salar</i> – Atlantic salmon	Adjacent to the eastern boundary
Blood Moss SSSI	SSSI	Extensive natural blanket mire	2.8 km north-east

8.3.1.1 Kirkcowan Flow SAC and SSSI

178. Kirkcowan Flow has been recognised as being a blanket mire of international importance, being the largest of four “flows” in the region of Scotland, and supporting habitat features not present on other flows in the region. No development is proposed within this SAC, however, the potential for indirect effects will be assessed.

179. There are two potential mechanisms through which indirect effects would be possible:

- Pollution or nutrient enrichment from construction works; and
- Hydrological disruption.

180. Significant effects on the SAC from pollution or nutrient enrichment during construction will not occur, as the Development infrastructure would be down-gradient of the SAC. The Site boundary shared with the SAC broadly follows a ridge of high, rocky ground which forms the watershed between three different catchments.
181. The potential for more subtle hydrological disruption requires a more careful consideration of the hydrology of Kirkcowan Flow SAC area and that of the Site. Substantial peat probing and NVC survey was carried out in 2008-2009, and in the absence of notable change in land use since then, these findings are expected to remain valid. They will be supplemented by further peat probing and NVC survey to complete the information about areas in proximity to the SAC, and a rigorous examination of hydrological connectivity will be made to demonstrate that the hydrology of the SAC would not be affected. It is expected that an “appropriate assessment” will be required before consent for the Development could be granted, and text to inform this would be included in the Ecology chapter of the EIA Report.

8.3.1.2 River Bladnoch SAC

182. The Tarf Water is part of the River Bladnoch SAC. Potential effects on the Tarf Water may arise as the majority of the Site drains into the Tarf Water.
183. There is no development proposed within the Tarf Water, and no crossing of the Tarf Water is proposed, so no direct effects are anticipated. Potential indirect effects may arise from construction activity within the Tarf Water catchment, leading to changes in the quantity and quality of water entering the Tarf Water. These would be minimised through the application of a Construction Environment Management Plan (CEMP).
184. SPR has extensive recent experience of Development in the catchment of the Tarf Water, from the construction of the Operational Kilgallioch Windfarm, which included in the Tarf Water catchment: 46 turbines and associated infrastructure, the upgrading of a track crossing of the Tarf Water itself, 4 borrow pits and extensive tree felling activity, including in close proximity to the Tarf Water. Extensive water quality monitoring was undertaken throughout the period of construction activity, including a substrate assessment survey carried out by the Galloway Fisheries Trust. The report of this monitoring¹⁶ concluded that all effects were as a result of the clear-felling of trees that occurred during site preparation works (see Chapter 10: Hydrology, Hydrogeology, Geology and Peat):
185. *“In conclusion, wind farm construction activities have not had a significant impact on water quality within the main Tarf Water stream (SW10 and SW11A) with concentrations of determinands within EQS assessment criteria or within baseline ranges when the watercourse is naturally high (pH, aluminium and iron). DOC, TOC, colour and DO have had a noticeable change in baseline seasonality with exceedances noted in summer months. This has been attributed to clear felling and loss of interception/shade provided by the forest canopy providing pathways for forestry detritus to enter watercourses as runoff from cleared areas. It is noted that nitrate concentrations have increased within the Tarf Water catchment however results at all monitoring locations have remained significantly below EQS assessment criteria.”*
186. It has been assessed that the change in water quality of the Purgatory Burn sub-catchment (DO, aluminium, manganese, nitrate and phosphate) that is not noted within the wider Tarf Water catchment is a result of the significant clear felling within this specific sub-catchment and that as vegetation cover returns in this catchment, water quality will return to baseline ranges. However, data from Sonde 2 located downstream of both SW7 (Purgatory Burn) and SW11A (Tarf Water) indicates that the water quality here shows little impact from the specific changes noted in the Purgatory Burn sub-catchment.”
187. The Site does not contain any areas of woodland, and hence tree felling would not be a cause of effects on water quality as a result of the Development. No other causes of water quality effects were identified.
188. The Operational Kilgallioch Windfarm construction works used and followed a CEMP, and that CEMP will be used as a starting point for the Development.

¹⁶ SLR (2018). Kilgallioch Windfarm: Tarf Water Surface Water Catchment: Water Quality Report. SLR Ref: 405.00481.00041.

189. Given the high level of previous survey, the very high level of experience from previous construction and monitoring in the same catchment, the lack of significant effects previously and the lack of forestry within the Site, the adoption of a robust and effective CEMP (as per the Operational Kilgallioch Windfarm and informed by further monitoring) and the lack of direct impacts (i.e., no crossing of the Tarf Water), no significant effects on the Tarf Water (nor its qualifying species) are anticipated.
190. With the use of a CEMP that is as robust as that used for the Operational Kilgallioch Windfarm, combined with design measures to ensure the CEMP can be effective, effects on the hydrological environment will be minimised.
191. On this basis, no significant effects on water quality or fish habitat are anticipated. However, the 2009 surveys included fish habitat surveys along the banks of the Tarf Water, and electrofishing, carried out by the Galloway Fisheries Trust. Fisheries surveys confirmed that suitable salmonid habitats exist with the site, and salmonid species have been recorded. Therefore, update fish fauna surveys are required in order to inform the assessment of likely significant effects, and the Habitats Regulations Assessment (HRA).
192. The EIA Report will include an assessment of effects on the Tarf Water, however, and it is expected that a HRA will be required before consent for the Development could be granted, and text to inform this would be included in the Ecology chapter of the EIA Report.

8.3.1.3 Blood Moss SSSI

193. Blood Moss SSSI is located 2.8 km to the north-east of the Site, and is hydrologically up-gradient of the Site because of intervening topography. Kirkcowan Flow SAC and SSSI lies between Blood Moss SSSI and the Site. On this basis, no effects on Blood Moss SSSI are anticipated, and this receptor is proposed to be scoped out of the EIA.

8.3.2 Habitats and Vegetation

194. Habitat surveys were carried out using the methods and classification system of the Handbook for Phase 1 habitat survey¹⁷.
195. The vegetation was surveyed using the NVC scheme (Rowdell, 1991 – 2000; 5 volumes) and in accordance with NVC surveys guidelines^{18,19}.
196. The most common and widespread semi-natural communities which make up the main bulk of the landscape are M25 *Molinia caerulea* – *Potentilla erecta* mire, M15 *Tricophorum cespitosum*-*Erica tetralix* wet heath and U20 *Pteridium aquilinum* – *Galium saxatile* grassland and U4 *Festuca ovina*-*Agrostis capillaris*-*Galium saxatile* grassland. The remainder of the study area is made up of a relatively small number mainly mire, grassland and heath communities.
197. The categories of vegetation within the study area, based on the data from the 2009 survey, include the following communities recorded during the survey:
- Mires and flushes M6, M17, M23, M25;
 - Wet heaths: M15; and
 - Grasslands and bracken: U4, U20.
198. To allow the conservation importance of these habitats to be determined, the survey results will be considered against the following sensitivity classifications comprising:
- Annex 1 of the Habitats Directive;
 - Scottish Biodiversity List (SBL);
 - Priority Peatland and Carbon Rich Soils; and

¹⁷ Joint Nature Conservation Committee (2010). Handbook for Phase 1 Habitat Survey – a technique for environmental audit [Online] Available at: http://jncc.defra.gov.uk/PDF/pub10_handbookforphase1habitatsurvey.pdf (Accessed 13/02/2019)

¹⁸ Rodwell, J.S. (ed.) 1991. British Plant Communities. Volume 2. Mires and heath.

¹⁹ Rodwell J.S. (1992-2005) *British Plant Communities*. Vol. 1-5. Cambridge University Press.

- Potential Ground Water Dependant Terrestrial Ecosystems (GWDTE) habitats.

199. Survey was carried out in areas where infrastructure was formerly proposed, which may not match where the Development infrastructure is to be located.
200. Additionally, solar PV arrays, if deployed, will create localised areas of shading, which will change the light environment locally. This is not expected to lead to any significant effects on habitats or protected species and growth between the solar PV arrays will benefit shade tolerant species post construction.
201. An updated Extended Phase 1 Habitat survey will be carried out to confirm that no substantial changes have occurred since previous surveys. Should additional sensitive habitats (such as Annex 1 habitats, or potential Ground Water Dependent Terrestrial Ecosystems (GWDTEs) be recorded, additional NVC survey will be required. These surveys will be carried out following the same guidelines as previous surveys, and will inform the design of the Development and ensure that effects on vegetation are understood and assessed in the EIA Report.

8.3.3 Protected Species Surveys

202. In accordance with SNH advice²⁰, protected species data is only valid for 18 months, so update surveys are required.

8.3.3.1 Otter

203. All accessible watercourses within the Site were surveyed for otter field signs between May and September 2009 as per the survey methods described in Bang and Dahlstrøm²¹.
204. Evidence of otter was recorded during the 2009 survey in the Tarf Water at the south-west of the Site. No protected features were recorded.
205. Suitable habitat for this species is present on the Site. The otter survey on the Site will be updated in accordance with SNH survey guidelines²², and used to inform the design of the Development and to inform the assessment of effects.

8.3.3.2 Water Vole

206. All watercourses within the Site were surveyed for water vole field signs following the methodology prescribed in Strachan and Moorhouse²³.
207. Water vole was recorded in numerous areas within the Site during the 2009 survey. The uplands generally are increasingly being recognised as an important habitat for this species which has declined in lowland habitats²⁴.
208. Suitable habitat for this species is present throughout the Site. The water vole survey on the Site will be updated in accordance with SNH survey guidelines²⁵, and used to inform the design of the Development and to inform the assessment of effects.

²⁰ SNH (2018). SNH general pre-application/ scoping advice to developers of onshore wind farms. Available at: <https://www.nature.scot/sites/default/files/2018-02/SNH%20General%20pre-application%20and%20scoping%20advice%20to%20developers%20of%20onshore%20wind%20farms.pdf> [accessed on 22/02/2019].

²¹ Bang and Dahlstrøm (2001) *Animals Tracks and Signs*. Volume 1. Oxford University Press.

²² SNH (2019) Protected Species Advice for Developers: Otter. [Online] Available at: <https://www.nature.scot/sites/default/files/2019-01/Species%20Planning%20Advice%20Project%20-%20Otter.pdf> (Accessed 22/02/2019)

²³ Strachan R. and Moorhouse T. (2006) *Water Vole Conservation Handbook*. 2nd Ed. Wildlife Conservation Research Unit. University of Oxford.

²⁴ SNH (2018) Water Voles [Online] Available at: <https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/water-voles> (Accessed: 14th February 2019)

²⁵ SNH (2019) Protected Species Advice for Developers: Badger [Online] Available at: <https://www.nature.scot/sites/default/files/2019-01/Species%20Planning%20Advice%20Project%20-%20badger.pdf> (Accessed 22/02/2019)

8.3.3.3 Badger

209. Signs of badger were surveyed between May and September 2009. The surveys included tracking any field signs of badger as described by Neal and Cheesman, Band and Dahlstrøm and Sargent and Morris.
210. No evidence of badger was recorded in the surveys; however, it is assumed that badgers are present at a very low density. Signs of badger will be surveyed at the same time as updating the Protected Species Survey, and will be carried out in accordance with SNH survey guidelines²⁶ to update previous findings.

8.3.3.4 Red Squirrel

211. The 2009 survey area included large areas of coniferous forestry plantation, a suitable habitat for red squirrel. The surveys concluded red squirrels to be present within the forested areas at low levels. However, as the Site does not include any areas of forestry, effects on red squirrel have been scoped out of further assessment.

8.3.3.5 Pine Marten

212. A watching brief was maintained during the course of the 2009 protected species surveys for potential pine marten scats. Since the 2009 surveys, updated published studies have confirmed the expansion of the species in Dumfries and Galloway. However, as the Site does not include any areas of forestry, effects on pine marten have been scoped out of further assessment.

8.3.3.6 Bat Surveys

213. All bat species in Scotland are European protected species under Annex IV of the Conservation (Natural Habitats, &c.) Regulations 1994.
214. The Site was assessed as low risk in the 2009, with spatial and temporal surveys carried out as per recommended by Bat Conservation Trust (BCT) guidance²⁷ at that time.
215. The 2009 surveys showed bat activity to be low. The majority of activity was from pipistrelle species, both common and soprano (*Pipistrellus pipistrellus* and *Pipistrellus pygmaeus*). Activity was also confirmed from brown long-eared bat (*Plecotus auritus*), and noctule (*Nyctalus noctula*). Calls were also recorded from a *Myotis* sp and a possible Leisler's bat (*Nyctalus leisleri*).
216. The Bladnoch corridor, located along the western boundary of the Site, was found to have a higher level of bat activity compared to other areas surveyed; however, activity levels were still low relative to suitable habitats.
217. Due to the low levels of bat activity observed on Site during the 2009 surveys and the moorland/upland characteristics of the Site, the Site is assessed as low risk; however, updated surveys will be carried out according to current guidance^{Error! Bookmark not defined.}.
- Remote monitoring – passive bat detectors will be used to automatically record bat activity over a minimum of 10 consecutive nights (more if weather conditions are unfavourable) on three seasonal sessions between April-May, June-mid-August and mid-August-October 2019 inclusive. Bat detectors and loggers will be placed at the approximate location of each of the proposed turbine locations;
 - Transect Survey – in accordance with SNH guidelines, due to the often limited value of transect data (compared to remote monitoring data), the requirement for transect surveys is to be assessed on a site by site basis. As the Site is largely open, exposed habitat, and thus assessed to be of largely of low value to bats, the requirement for transect surveys has been scoped out; and
 - Roost Surveys – data searches will be conducted to identify known roosts sites within 200 m of the Site Layout. However due to the lack of trees and other suitable roosting features, no formal roost assessment surveys are proposed at this stage. However, a watching brief for potential bat roosts on site will be identified during the Extended Phase 1 Habitats Survey.

²⁶ SNH (2019). Species Planning Advice - badger. Available at: <https://www.nature.scot/species-planning-advice-badger> [accessed on 22/02/2019].

²⁷ Hundt. L (ed.) (2016) Bat Surveys for Professional Ecologists – Good Practice Guidelines. [Online] Available at: https://cdn.bats.org.uk/pdf/Resources/Bat_Survey_Guidelines_2016_NON_PRINTABLE.pdf?mtime=20181115113931 (Accessed: 14th February 2019)

8.3.4 Fish

218. Potential effects on fish are restricted to the Tarf Water, as the majority of the Site drains into the Tarf Water. As set out in **Section 8.3.1**, the Tarf Water is part of the River Bladnoch SAC, and no significant effects on this nor on its qualifying species are anticipated.
219. The 2009 surveys included fish habitat surveys along the banks of the Tarf Water, and electrofishing, carried out by the Galloway Fisheries Trust. Fisheries surveys confirmed that suitable salmonid habitats exist with the site, and salmonid species have been recorded. Therefore, update fish fauna surveys are required in order to inform the assessment of likely significant effects, and the HRA.

8.4 Summary of Scoped In and Out Surveys and Effects

220. **Table 8.2** shows a summary of aspects scoped in and out of the EIA process.

Table 8.2: Summary of Scope

Receptor	Scoped In	Scoped Out
Kirkcowan Flow SAC and SSSI	Peat probing Assessment of hydrological connectivity. HRA screening.	Repeating survey at locations previously surveyed.
River Bladnoch SAC	Inclusion in the EIA Report of a CEMP based on that used for the Operational Kilgallioch Windfarm. Update Fish Fauna Surveys Assessment using baseline data from previous surveys. HRA Screening.	Update Fish Habitat Surveys
Blood Moss SSSI		All survey and assessment
Habitats	Updated Extended Phase 1 Habitat Survey NVC Survey to complete the NVC dataset where required.	
Protected Species	Bat survey and assessment. Otter survey and assessment. Water vole survey and assessment. Badger survey and assessment	Bat Transect Surveys Red Squirrel survey and assessment. Pine marten survey and assessment.
Fish	Assessment within the Tarf Water catchment. Update Fish Fauna Surveys	Update Fish Habitat Surveys

8.5 Key Questions for Consultees

221. The above scope is based on the requirement for EclA to consider the likely significant effects. Effects that are not likely significant do not require assessing under the EIA Regulations.
222. Key questions for consultees are:
- Do you agree with the proposed scope of assessments?
 - Do you agree with the proposed scope of surveys?
 - For surveys that are proposed, do you agree with the methodologies proposed?
 - Do you have any further information that could help inform the assessment of likely significant effects from the Development?

9 Ornithology

9.1 Introduction

223. The aim of the ornithological assessment is to identify, quantify and evaluate the likely significant effects of the Development on birds. Other terrestrial and freshwater ecological receptors are assessed in **Section 8: Ecology**.

9.2 Proposed Assessment Methodology

224. The assessment of ornithological effects will follow the Chartered Institute of Ecology and Environmental Management (CIEEM) guidance (REF) ensuring a transparent and robust approach. These guidelines set out the process for assessment through the following:
- Collation of updated baseline ecological information through desk study and field surveys;
 - Identification of Important Ecological Features (IEFs) including designated sites and protected / priority species;
 - Identification and characterisation of effects on IEFs including positive or negative, extent, magnitude, duration, timing, frequency and reversibility;
 - Assessment of cumulative effects;
 - If required, proposals for design and mitigation measures to avoid and / or minimise effects on IEFs;
 - An assessment of residual effects following the implementation of design and mitigation measures; and
 - If required, identification of appropriate compensation measures to offset significant residual effects and opportunities for ecological enhancement.

9.2.1 Previous Surveys and Findings

225. For the summary below, surveys and findings for the wider Kilgallioch site have been reviewed at high level and are reported for only the Site, where practicable.
226. The following surveys were undertaken on/around the Site as part of the Operational Kilgallioch Windfarm between April 2007 and October 2009:
- Four generic vantage points (VPs) covered the Site (numbers 7A, 8, 13 and 17) and were used for flight activity survey using the methods described by Band et al. (2007)²⁸; survey effort of at least 36 hours per season were completed from each for one non-breeding season (VP 7a, 8 and 13, September 2007 to March 2008; VP 17, September 2008 to March 2009) and for one breeding season (April 2008 to August 2008). VP 7a, 8 and 13 had an additional 15 hours for a second non-breeding season (September 2008 to March 2009) and 12.5 hours for a second breeding season (April 2009 to August 2009); VP8 and VP13 also had at least 12 hours completed during an initial breeding season during April to August 2007;

²⁸ Band, W., Madders, M. & Whitfield, D.P. (2007). Developing field and analytical methods to assess avian collision risk at wind farms. In de Lucas, M, Janss, G. and Ferrer, M. (eds) "Birds and Wind Power". Lynx Edicions, Barcelona.

- 1 migration period watch point covered the site (point B), recording for 42 hours during autumn migration (September 2007 to November 2007) and 36 hours during spring migration (March and April 2008);
- An additional 72.85 hours of focal watches were undertaken to search for hen harrier roosts between November 2007 and March 2008, September 2008 to March 2009 and October 2009, using survey methods given in Gilbert et al. (1998);
- In addition to the generic vantage point watches, across the whole site covered by the original application for Kilgallioch Windfarm, 15 hours were spent searching for evidence of scarce breeding raptors in 2007, 61.8 hours during 2008 and 170.7 hours in 2009, using survey methods given in Hardey et al. (2006);
- Breeding bird territories were surveyed three times in each breeding season of 2008 and 2009, following a modified Brown and Shepherd (1993)²⁹ method;
- Black grouse surveys were carried out in April and May 2008, using survey methods based on those in Gilbert et al. (1998)³⁰; and
- Autumn/winter walk-over surveys (effectively mobile VP watches) were undertaken during September 2007 to March 2008 and November 2008 to January 2009.

227. Further surveys have been carried out for the Development, prior to issue of this document:

- One season of breeding season survey (April 2018 to August 2018); and
- One autumn/winter non-breeding season survey (September 2018 to March 2019); and
- One further breeding season is scheduled for April to August 2019.

228. These have comprised the following:

- Three generic VPs covered the Site for a minimum of 36 hours in the breeding season and the non-breeding season;
- Four visits were completed between April and July to survey for breeding waders;
- Checks for scarce breeding raptors and owls;
- Searches for signs of displaying black grouse; and
- Focal watches for hen harrier roosts during the non-breeding season.

9.3 Previous Survey Findings Summary

9.3.1 2007 to 2009 Surveys

229. Hen harriers foraged around the outside of the forest, within the environs of the Site. Flight time across the whole site covered by the original application for Kilgallioch Windfarm, which included the area of the Development, comprised c. 0.1 % of observation time, with only 4% of flight time being between 50 m and 150 m above ground level. There were no nests of hen harrier located within any of the 2 km buffered survey areas.
230. Golden plovers were present during the non-breeding season (maximum count about 150 birds). They occurred in three locations surveyed, one of which was the Site.
231. Hen harrier and golden plover were the most frequently recorded species in the open ground areas of the site covered by the original application for Kilgallioch Windfarm.
232. Merlin had 9 flights recorded in total within the Site. No merlin nests were found within the 2 km buffered survey boundaries.
233. No peregrine, osprey, short-eared owl or red kite flights were recorded within the Site. No nests of any of these species were located during surveys.
234. Barn owls nested successfully in all 3 years in one location within a 1 km buffer of the Site. 7 flights were observed within 1 km of the Site in the breeding season with no activity between 50 and 150 m above ground level. Only 2 flights were recorded during the non-breeding season, again with no activity between 50 and 150 m above ground level.

²⁹ Brown, A.F. and Shepherd, K.B. (1993). A method for censusing upland breeding waders. *Bird study* 40: 3 pp189-195.

³⁰ Gilbert, G., Gibbons, D.W. and Evans, J. (1998). *Bird monitoring methods*. RSPB Sandy, Bedfordshire.

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235. Within 500 m of the Site, curlew were recorded as having 2 breeding territories in 2008 and none in 2009; snipe had 4 territories in 2008 and 6 during 2009. No oystercatcher or lapwing territories were recorded.
236. There were very few flights of geese or swans recorded during the whole survey period, and the Site does not lie on a regular flight route for migratory or wintering wildfowl.
237. There were modest numbers of several passerine species of conservation concern recorded (including the forestry outside the Site): crossbill, song thrush, dunnock, lesser redpoll, bullfinch, fieldfare, redwing, starling, grasshopper warbler, linnet, reed bunting and brambling. Skylarks were common in open ground.
238. There were no black grouse or signs of black grouse located in any survey.
239. No nightjar were recorded on night-time searches. Woodcock (25 records) were recorded on winter transects. The largest count of ravens was eighteen (once, in August, at mid-day), and although the species was fairly frequently recorded there was no indication of the historical pre-roost gathering mentioned by SNH as a frequent or regular occurrence.

9.3.2 2018 to 2019 Surveys

240. These surveys are ongoing, and have not yet been reported in full, however a preliminary summary is provided.
241. To date, GVP watches during the breeding season have recorded flight activity by: peregrine, hen harrier and red kite. During the non-breeding season: short-eared owl, merlin, hen harrier, golden plover, goshawk and pink-footed goose have been observed. As in the previous surveys hen harrier and golden plover are the most frequently recorded.
242. Snipe were the only wader species breeding within the 500 m survey buffer in 2018, and no black grouse or nightjar were located.

9.4 Potential Effects

9.4.1 Designated Sites

243. The Site is 7.7 km, at its closest point, from the Glen App and Galloway Moors Special Protection Area (SPA), Ramsar and Site of Special Scientific Interest (SSSI). The SPA and SSSI are classified for their breeding hen harrier interest.
244. The ES submitted along with the original application for Kilgallioch Windfarm, which lay 3 to 5 km from the SPA and included approximately 3 times as much open ground as the Site and included the Site, concluded that there was no likely significant effect on the qualifying interests of the SPA. This finding will be reviewed for the Development site based on recent survey findings and discussed with consultees.

9.4.2 Species Scoped In

245. Based on the findings of surveys carried out to date, the following effects on the following species will be assessed: birds considered of high and moderate Nature Conservation Importance: hen harrier, red kite, peregrine, merlin, short-eared owl, goshawk, black grouse, barn owl and golden plover. Unless subsequent surveys find observations that are in contrast to previous survey findings, all other effects will be scoped out of the EIA. This will be justified in the EIA Report with reference to the final survey data.

9.4.3 Construction Phase: Breeding Birds

246. Prior to commencement of construction, a Breeding Bird Protection Plan will be submitted to the Council for consultation with SNH. Surveys to locate the nests of birds will be undertaken in advance of construction works progressing across the Site during the period March-August. Dedicated surveys at known and potential barn owl breeding sites will be conducted earlier, as this species is known sometimes to start breeding in winter. In the event that an active nest of a Schedule 1 species is discovered within distances given by Whitfield et al. (2008)³¹ (or a 500 m radius of the nest for species not listed by Whitfield et al.) then activities, including vehicle movements, will be halted immediately within the specified distance. A disturbance risk assessment (prepared under a Breeding Bird Protection Plan for the site) would

³¹ Whitfield, D.P., Ruddock, M. and Bullman, R., (2008). Expert opinion as a tool for quantifying bird tolerance to human disturbance. *Biological Conservation* 141, 2708-2717.

be undertaken and any measures considered necessary to safeguard the breeding attempt (e.g., exclusion zones or restrictions on timing of works) will be submitted to SNH for agreement before recommencing work. Following implementation of these measures, no significant effects on breeding birds during the construction phase are anticipated.

9.4.4 Construction Phase: Roosting Birds

247. Similarly, to the above, surveys to locate roosts used by hen harriers and barn owls (or any other Schedule 1 or otherwise sensitive bird species) will be undertaken and appropriate measures to safeguard these birds agreed with SNH. Due to the confirmed presence of roosting hen harriers, no construction works will take place within 500 m of the any hen harrier roost sites during dusk and dawn (defined as 2 hours before sunset to 2 hours after sunrise) during the non-breeding period (October-February inclusive). This mitigation will be proposed in the EIA Report.

9.4.5 Construction Phase: Displacement

248. It is probable that potential displacement effects during construction on the following species will be assessed:

- Golden Plover;
- Diurnal Raptors (including Hen Harrier) and Short-Eared Owl; and
- Barn Owl.

249. Effects on all other species were scoped out in the original application for Kilgallioch Windfarm, and the surveys to date suggest the baseline has not changed substantially since then.

9.4.6 Operational Phase: Displacement

250. The presence and operation of wind turbines and solar panels could potentially displace birds from nesting and foraging areas. Potential displacement effects during operation on the following species will be assessed:

- Diurnal Raptors (including Hen Harrier) and Short-Eared Owl;
- Barn Owl; and
- Golden Plover.

251. Effects on all other species were either scoped out or assessed as negligible in the original application for Kilgallioch Windfarm, and the surveys to date suggest the baseline has not changed substantially since then.

9.4.7 Operational Phase: Collision Risk

252. If flight activity is recorded for species of high or moderate Nature Conservation Importance with sufficient duration within the 500 m buffer of the turbine locations then the potential for collision with the rotating turbine blades will be assessed for those species. These are anticipated to be:

- Golden Plover; and
- Diurnal Raptors (including Hen Harrier) and Short-Eared Owl.

253. Effects on all other species were scoped out in the original application for Kilgallioch Windfarm, and the surveys to date suggest the baseline has not changed substantially since then.

9.4.8 Cumulative Effects

254. An assessment of the potential cumulative ornithological effects of the Development and other windfarms during the operational phase will be undertaken.

255. 'Target' species will be identified as those species of high nature conservation importance and for which there is some indication of a potential effect as a result of the Development that may be exacerbated cumulatively.

9.5 Proposed Consultation and Survey

256. Once the autumn/winter season survey is complete and the findings from that and the previous breeding season have been collated, consultation will be sought with SNH and RSPB to discuss the survey findings and seek to agree further survey and assessment requirements. In the meantime, a second breeding season survey will be commenced. At the

time of writing, site observations suggest that further survey, following the second breeding season survey, should not be required.

9.6 Summary of Scoped In and Out Surveys and Effects

257. **Table 9.2** shows a summary of aspects scoped in and out of the EIA process.

Table 9.2: Summary of Scope

Receptor	Scoped In	Scoped Out
Glen App and Galloway Moors SPA, SSSI and Ramsar Site	Assessment of effects on Hen Harrier to be discussed with consultees following survey findings.	Direct effects on the designated site.
Golden Plover	Construction: displacement Operation: displacement and collision risk	
Diurnal Raptors (including Hen Harrier) and Short-Eared Owl	Construction: displacement Operation: displacement and collision risk	
Barn Owl	Construction: displacement Operation: displacement	Operation: collision risk
All other bird species		All effects, following mitigation for construction phase effects on breeding birds.

9.7 Key Questions for Consultees

258. The above scope is based on the requirement for EIA to consider the likely significant effects. Effects that are not likely significant do not require assessing under the EIA Regulations.

259. Key questions for consultees are:

- Do you agree with the proposed scope of surveys (subject to consultation with SNH and RSPB following completion of the autumn/winter survey currently underway)?
- Do you agree with the proposed scope of assessments?
- Do you have any further information that could help inform the assessment of likely significant effects from the Development?

10 Hydrology, Hydrogeology, Geology and Peat

10.1 Introduction

260. This Section of the document sets out the proposed approach to the assessment of the potential effects of the Development on the water environment (which includes hydrology and hydrogeology) and peat and geology (which includes an assessment of the distribution and thickness of peat the Site) during construction and operation of the Development.

10.2 Proposed Assessment Methodology

261. The potential effects from the Development on the water environment and ground conditions will be assessed based on a desk study and field investigation followed by an assessment of effects.
262. Updated consultation, desk studies and data requests will be undertaken to inform the baseline for the assessment. An updated site walkover will focus on the key receptors identified through the desk study, such as watercourses and near-surface water.
263. The following activities will be undertaken to inform the hydrological and hydrogeological assessment:
- Review of published data and maps;
 - Consultation with the Scottish Environmental Protection Agency (SEPA) and D&GC and the British Geological Survey (BGS);
 - Confirmation of solid and surface geologies from Operational Kilgallioch Windfarm data;
 - Review of Pollution Prevention Guidelines and GPPs;
 - Identification of surface water features, catchments and Groundwater Dependent Terrestrial Ecosystems (GWDTEs);
 - Identification of data on public and private abstractions and supplies;
 - Identification of other similar developments within 10 km within the same surface water catchment;
 - Additional peat depth survey in certain areas;
 - Contribution to Construction Environmental Management Plan (CEMP) detailing good practice construction measures to safeguard the hydrological environment; and
 - Collation of flood plain information, water quality data and groundwater vulnerability information.
264. The EIA Report chapter will describe potential effects of the Development including:
- Details of consultation undertaken;
 - Assessment methodologies for construction phase;
 - Updated hydrological walkover survey details and results;
 - Assessment of the operational phase of the project to establish the effect on the hydrological resource;
 - Identify mitigation measures, where necessary;
 - Identify any residual effects following mitigation;
 - Cumulative assessment with other developments within 10 km and within the same surface water catchment of the Development; and
 - Statement of significance.
265. All proposed surveys and assessment detailed in the sections below will also be applicable for the potential solar development on-Site.

10.2.1 Previous Surveys

266. The following hydrology and hydrogeology surveys were undertaken on/around the Site as part of the Operational Kilgallioch Windfarm, either pre-application and/or before, during and after construction:
- Site Walkover Surveys in May 2009;
 - Private Water Supply (PWS) Survey 2009; and
 - Peat depth surveys:
 - In the Site and in the Kirkcowan Flow SAC to the north and east of the Site in 2006 (8,929 locations); and
 - Within the Site along and around roads and other infrastructure proposed as part of the original application for Kilgallioch Windfarm.
267. In the absence of notable change in land use within and surrounding the Site since the previous surveys, these findings are expected to remain valid.

10.3 Potential Effects, Baseline Conditions and Proposed Surveys

268. An initial review of the hydrological and ground conditions of the Site has been undertaken as well as a review of the data collected for the Operational Kilgallioch Windfarm. This Section outlines the potential hydrological and geological receptors which have been identified within the Site and the wider area.

10.3.1 Surface Water

269. The Site lies within the catchments of the Tarf Water and River Bladnoch. Both of these watercourses are classified by SEPA as having an overall status of 'Moderate'.
270. The Tarf Water is a tributary of the River Bladnoch and flows south-east before meeting the River Bladnoch catchment.
271. Updated site surveys will ground truth the presence of watercourses and drainage features and appropriate buffers will be applied to watercourses and drains during the design phase.

10.3.2 Geology

272. Published superficial soils mapping by BGS indicates the site to be underlain primarily by peat with some localised outcrops of glacial till. The south eastern site area at Eldrig Fell was indicated to be absent of any significant superficial soils.
273. Published solid geology mapping by BGS indicates the main body of the site to be underlain by Caradoc aged rocks belonging to the Kirkcolm Formation Wacke. Within the south eastern site area, the Portpatrick Formation Wacke is noted. A band of Moffat Shale Group Mudstone was present through the central area, just to the north-west of Eldrig Loch.
274. The solid geology of the Development site influences the site design and will not receive a significant effect as a result of the Development. It is therefore proposed to scope effects on solid geology out of further assessment.

10.3.3 Peat

275. The Soil Survey of Scotland and previous assessment undertaken for the Operational Kilgallioch Windfarm indicates the Site is dominated by peat, which varies in thickness from 0.1 m, typically on slopes, to over 3 m in some level boggy areas. Low lying areas, which dominate the Site, are typically boggy and have deeper peat, two such areas are noted on the 1:25,000 Ordnance Survey mapping: Lodens Moss and Eldrig Moss. The exception of this is the slopes and peak of Eldrig Fell at the south-east of the Site.
276. Development of windfarms in peatlands can lead to potential peat slide risk. An assessment of the likely impact on peatlands for peat slide risk will be undertaken as part of the EIA.
277. A Peat Slide Risk Assessment (PSRA) will be carried out to inform the design of the Development and to assess the residual risks associated with the design for which consent is applied. This will follow the approach set out in the ECU and Scottish Governments guidance 'Peat Landslide Hazard and Risk Assessments – Best Practice Guide for Proposed Electricity Generation Developments, 2017'³².
278. A PSRA was carried out for the application for the Operational Kilgallioch Windfarm, and found the entirety of the Site to be of negligible or low hazard, not requiring a risk register. It is likely, however, that the Development layout will not exactly match that for which consent was previously applied at the Site, and therefore the risks may vary from that assessment.
279. The initial phase of probing will be based predominantly on the extremely large quantity of peat depth data already collected, as set out in **Section 10.2.1**. This data will be supplemented by further peat probing where required to complete the dataset where:

³² ECU and Scottish Government (2017) Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments [Online] Available at: <https://www.gov.scot/publications/peat-landslide-hazard-risk-assessments-best-practice-guide-proposed-electricity/> (Accessed 19/02/2019)

- Required in order to understand the peat distribution sufficiently to design the Development to ensure hydrological discontinuity with the Kirkcowan Flow SAC area; and/or
- Development infrastructure is proposed in design iterations, during the EIA process.

280. The second phase of probing will be to confirm peat depth and characteristics at the location of proposed infrastructure for the Development design for which consent will be applied.

281. The PSRA will be reported as a technical appendix to the EIA Report, and the potential for significant effects will be assessed in the EIA Report chapter.

282. Should effects on peat not be avoidable through design, the EIA Report will include, as an appendix, an outline Peat Management Plan that will set out measures relating to the handling of peat during the construction phase, to minimise effects.

10.3.4 Designated Sites

283. There are no hydrological, geological or hydrogeological designations within the Site. Hydrogeological designations within 5 km of the Site are detailed in **Table 8.1**, and are discussed in **Section 8.3.1: Designated Sites** of this document.

284. It is expected that an “appropriate assessment” will be required in relation to Kirkcowan Flow SAC before consent for the Development could be granted, and information to inform this would be included in the Ecology chapter of the EIA Report, supported by evidence from the Hydrology, Hydrogeology, Geology and Peat chapter.

10.3.5 Private and Public Water Supplies

285. Assessment carried out in 2009 identified that no private water supplies were located within the Site or within 2 km of the Site. The Site is not hydrologically up-gradient of any residential property, the nearest being Low Airies, located 1.5 km south of the nearest part of the Site, and c. 2.5 km south of the nearest part of the Turbine Developable Area.

286. A data request will be sent to the Council to update the 2009 baseline. Should no private water supplies be registered within a 2 km study area then effects on PWS will be scoped out of the EIA Report.

10.3.6 Flood Risk

287. The Indicative River and Coastal Flood Map (Scotland) produced by SEPA³³ shows that the Tarf River, located adjacent to the western boundary, has minor areas on either side which have a 0.5 % of greater risk of flooding.

288. No turbines or ancillary infrastructure will be located within these areas and an initial 50 m buffer will be placed around watercourses. A concise section within the EIA Report will consider how the Development will affect surface water run-off and affect off-site receptors, in accordance with paragraphs 255 to 268 of the Scottish Planning Policy (SPP)³⁴.

10.4 Summary of Scoped In and Out Surveys and Effects

289. **Table 10.2** shows a summary of aspects scoped in and out of the EIA process.

Table 10.2: Summary of Scope

Receptor	Scoped In	Scoped Out
Surface Water	Updated Site Walkover to supplement previous surveys.	

³³ SEPA (2015) Indicative River, Surface Water and Coastal Flood Map [Online] Available at: <http://map.sepa.org.uk/floodmap/map.htm> (Accessed 18/02/2019)

³⁴ Scottish Government (2014) Scottish Planning Policy [Online] Available at: <https://www.gov.scot/binaries/content/documents/govscot/publications/publication/2014/06/scottish-planning-policy/documents/00453827-pdf/00453827-pdf/govscot%3Adocument> (Accessed 18/02/2019)

Geology		Solid geology
Peat	Peat probing to supplement previous surveys. Peat Slide Risk Assessment. Input to Appropriate Assessment	Repeating survey at locations previously surveyed.
GWDTEs	Updated NVC survey around areas of proposed infrastructure to supplement previous surveys	Repeating survey at locations previously surveyed.
PWS	Updated baseline dataset	All survey and assessment if updated baseline shows no changes since 2009
Flood Risk	Assessment of risk within EIA Report chapter	Standalone Flood Risk Assessment

10.5 Key Questions for Consultees

290. The above scope is based on the requirement for EIA to consider the likely significant effects. Effects that are not likely significant do not require assessing under the EIA Regulations.

291. Key questions for consultees are:

- Do you agree with the proposed scope of assessments?
- Do you agree with the proposed scope of surveys?
- For surveys that are proposed, do you agree with the methodologies proposed?
- Do you have any further information that could help inform the assessment of likely significant effects from the Development?

11 Noise

11.1 Introduction

292. Sources of noise during operation of a wind turbine are both mechanical (from machinery housed within the turbine nacelle) and aerodynamic (from the movement of the blades through the air). Modern turbines are designed to minimise mechanical noise emissions from the nacelle through isolation of mechanical components and acoustic insulation of the nacelle. Aerodynamic noise is controlled through the design of the blade tips and edges. In most modern wind turbines, aerodynamic noise is also restricted by control systems which actively regulate the pitch of the blades.

293. While noise from the wind turbines does increase with wind speed, at the same time ambient background noise (for example wind in trees) usually increases at a greater rate. Planning conditions are used to enforce compliance with specified limits.

294. The effects of noise from the Development will be assessed in consultation with the Environmental Health Department of D&GC.

11.2 Proposed Assessment Methodology

11.2.1 Construction Noise

295. Construction noise and vibration are associated with works of a temporary nature. Methods for assessing the potential effects due to noise emissions during construction are set out in the BS 5228 British Standard guidance '*Code of practice for noise and vibration control on construction and open sites: Noise*'.
296. The assessment of the temporary effects of construction noise is primarily aimed at understanding the need for dedicated management measures and, if so, the types of measures that are required.
297. The acceptability of construction noise is likely to be affected by the location of the Development relative to the noise sensitive premises; existing ambient noise levels; the duration and working hours of site operations; the characteristics of the noise produced and the attitude of local residents to the site operator.

11.2.2 Operational Windfarm Noise

298. The operational noise assessment will be carried out in accordance with the following guidance:
- ETSU-R-97: The Assessment and Rating of Noise from Wind Farms³⁵; and
 - A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise³⁶ (GPG).
299. The methodology for the assessment of operational noise from windfarms in Scotland recommended in planning guidance is that documented in ETSU-R-97. In summary, the assessment shall:
- Identify the nearest noise sensitive receptors;
 - Determine the quiet day time and night time noise limits from the measured background noise levels at the nearest noise sensitive receptors (see below);
 - Specify the type and noise emission characteristics of the wind turbines proposed for the Site;
 - Calculate noise emission levels which would be due to the operation of the wind turbines as a function of Site wind speed at the nearest neighbours, including the cumulative effect of all turbines; and
 - Compare the calculated windfarm noise emission levels with the derived noise limits.
300. Noise criteria (or limits) are specified, which are a combination of a margin of 5 decibels (dB) above the prevailing, wind speed-dependent, background noise level and fixed lower noise limits, which are applicable in low background noise situations. The fixed lower noise limits are defined as:
- 35 - 40 dB, LA90,10min during the day, with the value chosen dependent on the number of affected properties, the effect of the number of kWh (kilowatt-hours) generated and the duration and level of exposure;
 - 43 dB, LA90,10min at night, a level chosen to safeguard against sleep disturbance; and
 - 45 dB, LA90,10min at properties where the occupier has a financial involvement in the Development, during both the day and night.
301. The specified noise limits relate to the cumulative effects of all turbines that affect a particular location. The specific methodologies involved in applying ETSU-R-97 to a proposed new development will be detailed in full in the EIA Report but, in summary, these provide recommendations for noise limits relating to the existing levels of background noise for quiet day-time and night-time periods.
302. As noted above, ETSU-R-97 defines acceptability criteria, in terms of operational noise level limits. As such, operational noise levels below the ETSU-R-97 limits are considered to be non-significant in terms of the EIA Regulations, whereas levels greater than the ETSU-R-97 limits are considered to be significant.
303. The GPG was published by the Institute of Acoustics (IOA) in May 2013 and has been endorsed by the Scottish Government as current industry good practice. The guide presents current good practice in the application of

³⁵ ETSU (1996) ETSU-R-97 The Assessment and Rating of Noise from Wind Farms

³⁶ Institute of Acoustics (2013) A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise

ETSU-R-97 assessment methodology for wind turbine developments at the various stages of the assessment, and will be followed throughout the assessment.

11.2.3 Cumulative Windfarm Noise

304. ETSU-R-97 and the GPG state that the noise limits apply to the cumulative effect of noise from all wind turbines that may affect a particular location. As the Development is located within an area with multiple windfarms in the immediate vicinity (detailed in **Section 2.3.1.6**), a search will be undertaken to identify any wind energy developments either operational, consented or in planning which may require consideration in the assessment process. A screening exercise will then be carried out to identify which of these require inclusion in the cumulative assessment, based on consideration of the '10 dB difference' rule described in the GPG.

305. There will have been an increase in cumulative wind turbine noise since the Operational Kilgallioch Windfarm background surveys were carried out in 2009, because of the construction of nearby windfarms, most notable Kilgallioch, Airies and Balmurrie Fell, with Gass Wind Farm consented but not built.

11.2.4 Previous Surveys

306. As outlined above, a background noise survey was undertaken to inform the application for the Operational Kilgallioch Windfarm in 2009 at Kilmacfadzean, c. 3 km to the south-west. This data will be reviewed as part of this application. Background noise data for Low Airies is available from the environmental reports used to support the applications for Gass Wind Farm; this will also be examined.

307. Given the rural nature and absence of notable change in land use since the baseline data was established for other windfarm applications, it is considered that these findings are valid, subject to appropriate reanalysis, where required.

11.3 Potential Effects, Baseline Conditions and Proposed Surveys

11.3.1 Potential Receptors and Baseline Noise Conditions

308. Potential noise-sensitive receptors (principally occupied dwellings) within the area will be identified through the examination of Ordnance Survey 1:25,000 scale digital mapping and Ordnance Survey Address Base data.

309. The nearest residential properties to the Turbine Developable Area are:

- Low Airies, c. 2.5 km to the south (c. 1.5 km from the Site Boundary);
- Artfield, c. 2.5 km to the south (c. 2.5 km from the Site Boundary);
- Kilmacfadzean, c. 3 km to the south-west (c. 3 km from the Site Boundary);
- Balminnoch, c. 3.5 km to the south (c. 2.5 km from the Site Boundary); and
- Three properties at Polbae, c. 4 km to the north-east (c. 4 km from the Site Boundary).

310. No dwellings are financially involved in the Development and, therefore, the 45 dB, LA90,10min noise limits will not be applied to the Development.

311. It is a key principle of ETSU-R-97 that noise from operational wind turbines should not be regarded as a component of background noise. An initial cumulative search has shown that baseline noise levels may be affected by the Operational Kilgallioch Windfarm, operational developments including Balmurrie Fell (3 km south-west), Artfield Fell (2 km south-west) and Airies Wind Farm.

312. The GPG provides advice on how appropriate background noise measurements can be made in the presence of existing wind turbines by the following methods:

1. Switching off the existing wind turbines during the background noise survey;
2. Accounting for the contribution of the existing wind turbines in the measurement data by directional filtering or subtracting a prediction of noise from the existing windfarms;
3. Utilising an agreed proxy location removed from the area acoustically affected by the existing wind turbines; or
4. Utilising background noise data presented with the Environmental Statements / Reports for the existing wind turbines (the suitability of the background noise level data should be established).

313. Baseline measurements previously made as part of the application for neighbouring windfarms, such as the Operational Kilgallioch Windfarm and Gass Wind Farm, will be assessed to determine whether the background noise data can be utilised. It is likely that baseline (without windfarm) data will be available for Low Airies, Artfield, Kilmacfadzean and Balminnoch.
314. As some of the wind turbines contributing to existing noise levels are not in the control of SPR, switching off the existing wind turbines is not possible. Identification of a proxy location with an acoustic environment representative of nearby receptors in the absence of wind turbine noise is unlikely to be practicable due to the site-specific nature of the background noise environment.
315. Due to the location of the existing wind turbines relative to the Development, directional filtering has the disadvantage that it would exclude measurements made under wind directions that are most relevant to the assessment, i.e. those from the location of the Development toward the receptors.
316. This therefore leaves subtraction of predicted noise levels due to the existing turbines as the most suitable methodology. This approach is likely to be conservative, as windfarm noise prediction methods recommended in the GPG are designed to produce typical worst-case results.
317. The resulting baseline noise measurements will then be analysed in accordance with the ETSU-R-97 and the GPG, including corrections for the effects of operating wind turbines, to derive representative prevailing background noise curves relative to 10 m standardised wind speed for each monitoring location. The appropriate daytime fixed lower noise limit will be determined taking into account the three factors discussed in ETSU R 97 and the GPG (the number of affected properties, the effects on the amount of energy generated and the magnitude and duration of exposure), and appropriate noise limits defined.

11.3.2 Construction Noise

318. Due to the large separation distances from the Development site to the nearest noise-sensitive receptors, significant construction noise effects are not anticipated and a detailed assessment of construction noise effects is scoped out of the EIA.
319. Notwithstanding this, the EIA Report will provide a summary of relevant guidance and best practice construction methods, along with a commitment to adhere to Best Practice means of controlling noise from construction activities, as advocated by BS 5228.

11.3.3 Operational Noise

320. The operational noise assessment is limited to the effects on human receptors at residential properties or other noise sensitive locations. Each receptor is considered to be of equal value.
321. Mitigation of operational noise would be achieved through the design of the project, such that the relevant ETSU-R-97 noise limits can be achieved at the surrounding properties with commercially available wind turbines, taking into account the noise emissions from cumulative windfarms in the area.
322. Arcus has extensive experience predicting and assessing the effect of noise from solar developments upon nearby residential receptors. Given the distance to the nearest receptor, there will be no noise effects from the solar element of the Development on receptors, and as such this has been scoped out of the assessment.

11.3.3.1 Amplitude Modulation of Aerodynamic Noise (AM)

323. In its simplest form, Amplitude Modulation (AM), by definition, is the variation in noise level of a given source. This variation (the modulation) occurs at a specific frequency in the case of wind turbines, which is defined by the rotational speed of the blades.
324. The Institute of Acoustics (IOA) has proposed a measurement technique³⁷ to quantify the level of AM present in any particular sample of windfarm noise. This technique is supported by the Department of Business, Energy & Industrial

³⁷ A Method for Rating Amplitude Modulation in Wind Turbine Noise, Institute of Acoustics, August 2016

Strategy (BEIS, formerly DECC) who have published guidance³⁸, which follows on from the conclusions of the IOA study in order to define an assessment method for AM, including a penalty scheme and an outline planning condition. Notwithstanding this, the suggested outline planning condition is as yet unvalidated, remains in a draft form and would require site-specific legal advice on its appropriateness to a specific development. Section 7.2.1 of the GPG therefore remains current, stating: “*The evidence in relation to ‘Excess’ or ‘Other’ Amplitude Modulation (AM) is still developing. At the time of writing, current best practice is not to assign a planning condition to deal with AM.*” On this basis, AM is proposed to be scoped out of further assessment; however, further supporting information on this subject will be provided in the EIA Report.

11.3.3.2 Low Frequency Noise

325. A study³⁹, published in 2006 by acoustic consultants Hayes McKenzie on the behalf of the DTI, investigated low frequency noise from windfarms. This study concluded that there is no evidence of health effects arising from infrasound or low frequency noise generated by wind turbines, but that complaints attributed to low frequency noise were in fact, possibly due to AM.
326. In February 2013, the Environmental Protection Authority of South Australia published the results of a study into infrasound levels near windfarms⁴⁰. This study measured infrasound levels at urban locations, rural locations with wind turbines close by, and rural locations with no wind turbines in the vicinity. It found that infrasound levels near windfarms are comparable to levels away from windfarms in both urban and rural locations.
327. Infrasound levels were also measured during organised shut-downs of the windfarms; the results showed that there was no noticeable difference in infrasound levels whether the turbines were active or inactive.
328. Bowdler et al. (2009)⁹¹ concludes that: “...there is no robust evidence that low frequency noise (including ‘infrasound’) or ground-borne vibration from wind farms generally has adverse effects on wind farm neighbours”.
329. It is therefore not considered necessary to carry out specific assessments of low frequency noise or infrasound and on this basis, they can be scoped out of further assessment. However, further supporting information on these subjects will be provided in the EIA Report.

11.3.4 Cumulative Noise

330. A cumulative assessment will be undertaken incorporating windfarms identified in the screening exercise, taking account of any relevant planning conditions, installed turbines, available headroom, controlling properties and the effects of wind direction as described in the GPG.
331. A number of cumulative developments are likely to require assessment, in particular the Operational Kilgallioch Windfarm, operational developments including Balmurrie Fell (3 km south-west), Artfield Fell (2 km south-west) and Airies Wind Farm and the consented Gass Wind Farm (1km south).

11.4 Summary of Scoped in and Out Surveys and Effects

332. **Table 11.1** shows a summary of aspects scoped in and out of the EIA process.

Table 11.1: Summary of Scope

Aspect	Scoped In	Scoped Out
Survey	If required, subject to the suitability of existing data to describe the baseline.	Background noise survey – not possible due to the level of cumulative windfarm activity nearby.

³⁸ Review of the evidence on the response to amplitude modulation from wind turbines, BEIS, October 2016

³⁹ Hayes McKenzie (2006). ‘The measurement of low frequency noise at three UK wind farms’, Hayes Mckenzie, The Department for Trade and Industry, URN 06/1412, 2006.

⁴⁰ Environment Protection Authority (2013). ‘Infrasound levels near wind farms and in other environments’. [Online] Available at: http://www.epa.sa.gov.au/xstd_files/Noise/Report/infrasound.pdf (Accessed 18/02/2019)

Construction Noise	Setting out best practice measures.	All assessment.
Operational Noise	Residential properties identified as requiring assessment.	Noise from solar element of Development
AM		All assessment.
Low Frequency Noise		All assessment.
Cumulative Noise	Windfarms identified as part of the cumulative screening process.	

11.5 Key Questions for Consultees

333. The above scope is based on the requirement for EIA to consider the likely significant effects. Effects that are not likely significant do not require assessing under the EIA Regulations.
334. Key questions for consultees are:
- Do consultees agree with the aspects proposed to be scoped out of the EIA?
 - Do consultees agree with the proposed method of operational assessment?

12 Traffic and Transport

12.1 Introduction

335. The Access, Traffic and Transport chapter of the EIA Report will consider the effects of vehicle movements to and from the Development. Vehicle movements to the Development will consist of abnormal load vehicles (ALVs), heavy goods vehicles (HGVs), light goods vehicles (LGVs) and cars.
336. The EIA will identify potential effects from increased road traffic arising from the construction and operation of the Development. The significance of these effects will be assessed against recognised guidelines. Where required, appropriate mitigation measures will be proposed to reduce these effects. The access and traffic aspects of the EIA will consider the effects of the Development on the road network and traffic volumes.
337. The Development is located approximately 12 km north-west of Kirkcowan. Access for construction could either be taken along the A75 and the unclassified C22W road from near Kirkcowan, the same route that was used for the construction of the Airies Wind Farm, or taken along the Operational Kilgallioch Windfarm route to the north of the Site. The proposed access routes are detailed in **Figure 12.1**. Both routes would be inspected and may require upgrading to be suitable for the Development's construction traffic.
338. At this stage, delivery ports for the turbine components have not yet been established. This information will be presented in the EIA Report and the associated Abnormal Load Route Assessment.
339. Access during operation would be taken through the Operational Kilgallioch Windfarm site.

12.2 Proposed Assessment Methodology

340. The method of assessing potential effects will include the following steps:
- Define the most suitable route of turbine delivery and other construction traffic to the Site and site access point;
 - Consultation with the relevant highways authorities and emergency services (the Council, Transport Scotland, Police, etc.) to identify constraints;
 - Procure existing traffic data, determine whether additional traffic survey data is required;
 - Undertake route inspections including detailed observations at each community potentially affected by the Development within the study area. We would provide general effects statements for major roads however, the detailed and numeric assessment would be limited to the roads in closer proximity to the site;

- Based on the route inspections, sensitive receptors would be identified;
 - In consultation with the Applicant and the relevant highway authorities, route options would be explored;
 - An initial assessment of traffic generation from the Development, assignment of traffic to the network and an initial assessment of effects would be undertaken. This would be based on professional judgement rather than transportation network modelling;
 - Obtain refined project needs, refine traffic generation, and re-assess effects, using obtained / gathered baseline traffic data; and
 - Identify and assess the potential for cumulative effects based on other known developments.
341. Assessment methodology will follow the 'Guidelines for the Environmental Impact of Road Traffic'⁴¹. A screening process using two broad rules outlined in the aforementioned guidelines is used to identify the appropriate extent of the assessment area. These are:
- Include highway links where traffic will increase by more than 30% (or where the number of Heavy Goods Vehicles will increase more than 30%); and
 - Include any other specifically sensitive areas where traffic flows have increased by 10% or more.
342. Where the predicted increase in traffic flows is lower than the thresholds, the guidelines suggest the significance of effects can be stated to be low or not significant and further detailed assessments are not warranted. Peak traffic flows will be identified to assess a worst case scenario. Assessment of driver distraction will be undertaken as appropriate.
343. Predictions of traffic movements on the public roads resulting from construction and operation will be based on the assessed Development design. Traffic generation will take into account the import of construction materials and the export of surplus materials; and the movement of equipment, construction plant and labour required during each phases.
344. Peak traffic flows will be identified to assess a worst case scenario. An assessment of effects on road safety, driver delay, pedestrian amenity, severance, noise and vibration will be undertaken as appropriate.
345. In addition to the aforementioned guidance this chapter will take into account the following statutory guidance documents published by the Scottish Government:
- SPP;
 - PAN 75 – Planning for Transport⁴²; and
 - Scottish Government Planning Specific Advice Sheet for Onshore Wind Turbines (last updated December 2013).
346. The EIA Report chapter will have a Technical Appendix comprising an Abnormal Load Route Assessment. This will consider the route to be taken by turbine components when travelling from an assumed port of entry to the Site. It will set out the path taken by the wheels of delivery vehicles, and the land over-swept by the turbine component itself. Where necessary, mitigation of potential pinch points will be outlined, and any required highway alterations will be identified.

12.2.1 Previous Surveys

347. The proposed construction route was assessed in 2009 for the application for the Operational Kilgallioch Windfarm, and more recently for the operational Airies Wind Farm.
348. Baseline traffic flow surveys were carried out on the construction access route in 2009.

12.3 Potential Effects, Baseline Conditions and Proposed Surveys

349. The main potential effects are considered to be during construction as a result of:

⁴¹ Institute of Environmental Assessment (1993) Guidelines for the Environmental Assessment of Road Traffic, IEA.

⁴² Scottish Executive (2005) Planning Advice Note: PAN 75 – Planning for Transport , Scottish Executive

- Temporary increase in HGV traffic on the whole construction access route;
 - Delay related to the movement of abnormal loads on the whole construction access route;
 - Abnormal road wear and tear, principally on the C22W unclassified road;
 - Effects on sensitive receptors, principally residents on the C22W unclassified road; and
 - Road widening/improvements to accommodate abnormal loads.
350. For the trunk road network, the 2009 baseline traffic count data will be superseded by more recent Department for Transport (DfT) or Highways Scotland data. For the C22W unclassified road, traffic is expected to have changed little since 2009, and it is proposed to re-use the data from 2009.
351. The Abnormal Load Route Assessment undertaken in 2009 was on the basis of the longest turbine component being 46.5 m. The Development is currently anticipated to have turbine blades up to 75 m in length, so a new Abnormal Load Route Assessment will be produced for the larger turbine.
352. During the operational phase, volumes of traffic are very limited with occasional peaks resulting from specific major maintenance activities. Since the number of vehicles required to operate and maintain the Development, following its construction, will be low, traffic effects associated with the operational phase will be scoped out of the EIA.

12.4 Summary of Scoped in and Out Surveys and Effects

353. **Table 12.1** shows a summary of aspects scoped in and out of the EIA process.

Table 12.1: Summary of Scope

Aspect	Scoped In	Scoped Out
Residents along the C22W	Construction phase traffic.	Operation phase traffic.
Road users on the abnormal loads route	Construction phase traffic.	Operation phase traffic.
Abnormal Loads Requirements	Updated Abnormal Load Route Assessment.	
Surveys		Traffic Count Surveys

12.5 Key Questions for Consultees

354. The above scope is based on the requirement for EIA to consider the likely significant effects. Effects that are not likely significant do not require assessing under the EIA Regulations.
355. Key questions for consultees are:
- Are consultees content with the proposed methodology and scope of the traffic and transport assessment?
 - Are the Council/ Statutory Consultees aware of any specific access restrictions or limitations on the proposed abnormal loads route?
 - Are consultees content that operational traffic will not have significant effects and can be scoped out of the EIA?

13 Socio-Economics, Recreation and Tourism and Land-Use

356. The socio-economics, tourism, recreation and land-use chapter of the EIA Report will bring together these related assessments of the likely socio-economic impact of the Development upon the population, economy and use of the land within and around the Development. This Section sets out the proposed approach that will be taken in the assessments, together with a summary of information that is currently available.

13.1 Proposed Assessment Methodology

357. There is no specific legislation or guidance available on the methods that should be used to assess the socio-economic impacts of a proposed renewable energy development. The proposed method has however, been based on established best practice, including that used in the UK Government and industry reports on the sector. In particular, this assessment will draw on two studies by BiGGAR Economics on the UK onshore wind energy sector, a report published by RenewableUK and DECC in 2012 on the direct and wider economic benefits of the onshore wind sector to the UK Economy⁴³ and a subsequent update to this report published by RenewableUK in 2015⁴⁴. A desktop socio-economic assessment will consider the potential direct and indirect effects of the Development. An estimate of economic benefits will be provided in the EIA Report.

358. There is also no formal legislation or guidance on the methods that should be used to assess the effects that renewable energy development may have on tourism and leisure interests. The proposed method would consider individual attractions and tourism facilities to assess if there could be any effects from the Development. Public perception surveys and literature considering the views of tourists visiting areas containing windfarms and local communities living near to windfarms will also be reviewed as part of this assessment.

359. It is also important that the socio-economic, recreation and tourism and land-use chapter takes into account the relevant local and national policy objectives. The most relevant objectives for this are expected to be included in the following strategies:

- Scotland's Economic Strategy⁴⁵;
- Dumfries and Galloway Local Development Plan 2 (LDP2)⁴⁶ (expected to be in place by September 2019); and
- Dumfries and Galloway Regional Tourism Strategy 2016 -2010⁴⁷.

13.2 Potential Effects and Baseline Conditions

13.2.1 Socio-Economics

360. The Development is located approximately 12 km north-west of Kirkcowan in the administrative area of Dumfries and Galloway, as shown in **Figure 1.1**. Dumfries and Galloway has a total population of around 149,000 (as at July

⁴³ RenewableUK (2012) Onshore Wind Direct and Wider Economic Impacts [Online] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48359/5229-onshore-wind-direct--wider-economic-impacts.pdf (Accessed 20/02/2019)

⁴⁴ RenewableUK (2015) Onshore Wind: Economic Impacts in 2014 [Online] https://c.ymcdn.com/sites/www.renewableuk.com/resource/resmgr/publications/reports/onshore_economic_benefits_re.pdf (Accessed 20/02/2018)

⁴⁵ Scottish Government (2015) Scotland's Economic Strategy [Online] Available at: <https://www.gov.scot/publications/scotlands-economic-strategy/> (Accessed 20/02/2019)

⁴⁶ Dumfries and Galloway Council (2018) Local Development Plan 2 – Proposed Plan [Online] Available at: https://www.dumgal.gov.uk/media/19739/LDP2-Proposed-Plan/pdf/PROPOSED_PLAN_JAN_2018.pdf?m=636564441676770000 (Accessed 18/02/2019)

⁴⁷ Dumfries and Galloway Council (2016) Regional Tourism Strategy 2016-2010 [Online] Available at: https://www.dumgal.gov.uk/media/19228/Regional-Tourism-Strategy-2016-20/pdf/Dumfries_Galloway_Regional_Tourism_Strategy_2016-2020.pdf?m=636592281054800000 (Accessed 20/02/2019)

2017)⁴⁸, a figure that has largely remained unchanged according to mid-year evaluations in 2018. The main settlements include:

- Dumfries (approximately 31,600 residents);
- Stranraer (approximately 10,800 residents); and
- Annan (approximately 8,300 residents).

361. Dumfries and Galloway has a higher population of retired people than any other council area in Scotland. National Records of Scotland projections⁴⁹ signal that the gap between older and younger populations is expected to expand further over time. The pensionable age (over 65) population is projected to increase by 2% from 2016-2026. In contrast, the working age population (16-64 years) is projected to decrease by 2% between 2016 and 2026. Therefore, the dependency ratio (ratio of people under 16, or over pensionable age) will also increase, thus, causing economic development implications for the area.
362. Despite its aging population, Dumfries and Galloway has a higher employment rate to Scottish averages. The employment rate as of 2017 in Dumfries in Galloway was 76.8% compared to the national average of 74.3%.
363. **Table 13.1** shows the latest available figures for the size of the economy in Dumfries and Galloway and Scotland as a whole, as measured by Gross Value Added (GVA) and employment.

Table 13.1: Economy Size

	GVA (£ million) (% comparison)	Employment (% comparison)
Dumfries and Galloway	£2,941 ⁵⁰ (2.19%)	73,300 (2.82%)
Scotland	£ 134,000 ⁵¹	2,600,000 ⁵²

364. Sectors including accommodation & food services, as well as arts, entertainment, recreation and other services are considered tourism related sectors, and combined make up 13.2% of total employment in Dumfries and Galloway, compared to 12.3% across Scotland. Visit Scotland in the paper 'Tourism Employment in Scotland' (2018)⁵³ state that tourism employment within Dumfries and Galloway is 9%, which is slightly above the Scotland average of 8%.
365. The UK Renewables Industry plays a central role in the economy by producing, transforming and supplying energy in its various forms to all sectors. UK Government statistics released on the 31st January 2018 show turnover from renewable energy activity in Scotland was £5,458 million in 2016, with individual sectors showing employment increases of up to 300% between 2015 and 2016⁵⁴. Scottish onshore wind projects, which support 8,000 jobs, delivered almost half (45.8%) of the UK's turnover from onshore wind in 2016, the latest year for which figures are

⁴⁸ National Records of Scotland (2017) Dumfries and Galloway Council Area Profile. [Online] Available at: <https://www.nrscotland.gov.uk/files/statistics/council-area-data-sheets/dumfries-and-galloway-council-profile.html> (Accessed 19/02/2019)

⁴⁹ National Records of Scotland (2018) Population Projections for Scottish Areas (2016-based) [Online] Available at: <https://www.nrscotland.gov.uk/files/statistics/population-projections/sub-national-pp-16/pop-proj-principal-2016-tab-publication.pdf> (Accessed 20/02/2019)

⁵⁰ Skills Development Scotland (2018) Dumfries and Galloway [Online] Available at: <https://www.skillsdevelopmentscotland.co.uk/media/44995/dumfries-and-galloway.pdf> (Accessed 20/02/2019)

⁵¹ The Scottish Parliament (2018) A Guide to Gross Value Added (GVA) in Scotland [Online] Available at: <https://digitalpublications.parliament.scot/ResearchBriefings/Report/2018/2/23/A-Guide-to-Gross-Value-Added--GVA--in-Scotland#> (Accessed 20/02/2019)

⁵² The Scottish Parliament (2017) Scotland's Employment by Industry and Geography [Online] Available at: <https://digitalpublications.parliament.scot/ResearchBriefings/Report/2017/10/13/Scotland-s-Employment-by-Industry-and-Geography> (Accessed 20/02/2019)

⁵³ Visit Scotland – Tourism Employment in Scotland December 2018 <https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers-2/insights-topic-paper---tourism-employment-2018-table-6-updated-jan-2019.pdf> [Accessed 21/02/2019]

⁵⁴ Scottish Renewables (2018) Scots renewable energy industry turnover £5.5 billion, new UK Government stats show [Online] Available at: <http://www.scottishrenewables.com/news/scots-renewable-energy-industry-turnover/> (Accessed 20/02/2019)

available. Scotland's turnover from onshore wind activities totalled £1.5 billion in 2016 and achieving 'world leader' status for renewables in 2017⁵⁵.

366. The Development will, subject to procurement processes, result in contract opportunities for local and regional contractors both for construction activities themselves and throughout the supply chain. The investment in the Development has the potential to generate a range of economic and social effects and opportunities for local businesses, most notably employment opportunities and local spending.
367. SPR has made substantial investment in south-west Scotland and currently owns and operates four windfarms in the D&GC region (Wether Hill, Harestanes, Ewe Hill and Kilgallioch Windfarms). Through their established presence in Dumfries and Galloway, they have to-date, contributed over £5,000,000 in community benefits, with in the region of £30,000,000 committed during the operational lifetime of these existing assets. These funds contribute to a variety of groups and organisations to assist them in delivering projects which they have identified as having benefit to those living, working or visiting the surrounding area. It is expected that the Development would establish a community benefit arrangement with local communities which may include an opportunity for the community to invest in the operational windfarm.
368. Socio-economic effects were assessed in the Operational Kilgallioch Windfarm application; however, due to the age of the data, an updated baseline assessment will be required.
369. Settlements within a 30 km study area will be considered as part of the assessment. The assessment will consider effects arising from the Development such as job creation and use of local services during the construction and operational phases.
370. Potential economic effects can be divided into:
- Direct effects: for example, employment opportunities in the construction, operation and maintenance of the Development. The nature and scale of the economic effects would depend on the total cost and the sources of the materials and labour. Other direct effects include a community benefit fund and the payment of business rates payable to the local authority throughout the operational phase of the Development;
 - Indirect effects: such as employment opportunities created down the supply chain by those companies providing services to the Development during construction and operation; and
 - Induced effects: for instance, employment created by the additional spend of wages into the local economy and the purchasing of basic materials, equipment and office space for staff.
371. Cumulative effects will also be considered as part of the assessment. Local socio-economic effects have been defined as acting at the scale of Dumfries and Galloway. A number of windfarms are planned in Dumfries and Galloway, as shown in **Figure 6.2b**.

13.2.2 Recreation and Tourism

372. This Section will consider the likely effects on recreational and tourism receptors that could result from the construction and operation of the Development.
373. Tourism is a key element in the socio-economic, environmental and cultural welfare of Scotland. In 2017, around 11 million overnight trips were taken in Scotland, for which visitor expenditure totalled around £3 billion and provided over 207,000 jobs⁵⁶. With regard to Dumfries and Galloway, the tourism sector is valued at £302 million to the local economy, supporting around 7,000 jobs⁵⁷.

⁵⁵ WWF (2017) Scotland a 'World Leader' for renewables in 2017 [Online] <https://www.wwf.org.uk/updates/scotland-world-leader-renewables-2017> (Accessed 20/02/2019)

⁵⁶ Scottish Government (2018) Tourism in Scotland: the economic contribution of the sector (Online) Available at: <https://www.gov.scot/publications/tourism-scotland-economic-contribution-sector/pages/4/> (Accessed 15/01/2019)

⁵⁷ Dumfries and Galloway Council (2016) Dumfries and Galloway Tourism Strategy [Online] Available at: <http://scottishtourismalliance.co.uk/uploads/Destinations/Dumfries%20and%20Galloway%20Regional%20Tourism%20Strategy%202016-2020%20-%20Final.pdf> (Accessed 08/11/2018)

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374. The Site is located within a relatively remote setting with recreation opportunity based around the natural environment such as hills, wildlife, lochs and rivers, with few formally recognised tourist attractions within the Study Area (20 km).
375. There are no public rights of way within the Site. However, there is a key public right of way, the Southern Upland Way (SUW), which passes along the western boundary of the Site and is recognised as one of Scotland's Great trails, stretching 344 km from Portpatrick on the south-west to Cocksburnpath on the east coast.
376. There are few informal tourism and recreational opportunities within the Site. However, there are several cultural heritage features within the and in the vicinity of the Site. Previous assessment undertaken as part of the Operational Kilgallioch Windfarm identified that the number of visitors making specific excursions to these features is understood to be low.
377. Potential tourism effects of the Development can be categorised as:
- Direct physical effects: for example, construction activities interfering with rights of access; and
 - Indirect effects: such as the effects of noise and changes in view on tourists and recreational land users. Indirect effects will largely be assessed in the relevant chapters of the final EIA Report. Where appropriate, these assessments will be drawn from to inform the socio-economic and tourism assessment.
378. The only potential direct effects arise from the construction of a new access track to link with the Operational Kilgallioch Windfarm site. This track will cross the SUW.
379. The Development may affect the recreational amenity value of the SUW and related other recreational and tourism resources in the area. An assessment of the potential for the Development to affect recreational receptors and change the recreational use of the Development site and surrounding area will therefore be undertaken. This will utilise the findings of the LVIA (**Section 6** of this document) and will also consider cumulative effects resulting from the Development in conjunction with other windfarms.
380. Effects on all tourist receptors except the SUW as a result of the Development will be negligible, and are scoped out of the EIA.
381. For assessing significance, consideration is given to the sensitivity (taking into account the national, regional and local importance) of the receptor and its sensitivity to change. The significance of the effect in terms of the EIA Regulations is determined in proportion to the magnitude of effect and the sensitivity of each receptor. This is informed by the desk based research and consultation and is a qualitative assessment based on professional judgement.
382. It is important to note that the likely effects of the Development on tourism and recreation are closely related to public attitudes towards windfarm development in the landscape, and information on this, where available will be included as part of the assessment, as discussed in **Section 13.1**.

13.2.3 Land-Use

383. This Section will consider the likely effects on land-use that could be result from the construction and operation of the Development.
384. The Site predominantly comprises bog and grassland, reflecting the patchy distribution of peat soils across the Site. Anthropological land-use is limited to low-density sheep grazing. The Site extends approximately 550 ha across, with an elevation ranging from approximately 227 a.s.l in the south-eastern area of the Site, to approximately 150 m a.s.l in the south-west.
385. There are no residential properties located within the Site and none located within 1 km. Previous assessment and current OS mapping and aerial photography show the closest residential property is 2 km to the south of the Turbine Developable Area and 1.5 km from the Site Boundary.

386. The Development will result in a change of the dominant land-use within the Development, from its current rural grassland land with limited areas of agricultural grazing, to that of energy generating using wind development.
387. The Development will result in a loss of land, however, the overall land-take of the Development is expected to be minimal.
388. An assessment on the effects of the Development on land-use within the Site and wider area will be considered within the EIA.
389. In regards to cumulative effects, given the amount of grassland in Dumfries and Galloway, windfarms and solar developments generally have a very small footprint. The cumulative effects of windfarms and solar development during construction and operation are limited, and on this basis, cumulative effects on land-use are proposed to be scoped out of further assessment.

13.3 Summary of Scoped in and Out Surveys and Effects

390. **Table 13.2** shows a summary of aspects scoped in and out of the EIA process.

Table 13.2: Summary of Scope

Aspect	Scoped In	Scoped Out
Socio-Economic		
Direct effects	Desk based assessment	
Indirect effects	Desk based assessment	
Cumulative effects	Cumulative assessment within 5 km	
Recreational and Tourism		
Direct physical effects	Desk based assessment of effects on the SUW only	Effects on all tourism receptors except the SUW
Indirect effects	Desk based assessment of effects on the SUW only	Effects on all tourism receptors except the SUW
Cumulative effects	Desk based assessment, drawing on the findings of the landscape and visual assessment.	
Land-Use		
Construction and operational effects	Desk based assessment	
Cumulative effects		All assessment

13.4 Key Questions for Consultees

391. The above scope is based on the requirement for EIA to consider the likely significant effects. Effects that are not likely significant do not require assessing under the EIA Regulations.
392. Key questions for consultees are:
- Do consultees agree with the proposed scope of assessment?
 - Are consultees aware of any additional sensitive economic activities in the area that would not be covered in the proposed method of assessment and that might be relevant to likely significant effects?
 - Are consultees aware of any key sensitive receptors that might be relevant to likely significant effects? and
 - Are consultees aware of any additional relevant consultees?

14 Climate Change and Carbon Balance

14.1 Introduction

- ^{393.} The aim of the Climate Change Impact Assessment (CCIA) section is to determine how the Development is likely to interact with a changing climate and whether any significant effects could arise. CCIA is a relatively new form of environmental assessment required by the amended EC Directive 2014/52/EU⁵⁸, as transposed into UK law by the EIA Regulations.
- ^{394.} This Section of the document sets out the proposed approach to the assessment of potential effects of the Development on climate change and carbon balance as a result of the construction and operation of the Development.

14.2 Proposed Assessment Methodology

- ^{395.} As CCIA is a new category of assessment, currently only provisional guidelines exist to standardise the process in the UK. In 2015, IEMA published the 'Environmental Impact Assessment Guide to Climate Change and Resilience and Adaption'⁵⁹ which was then complemented by 'Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance'⁶⁰ in 2017. Accordingly, the proposed CCIA methodology was developed in line with the 2015 and 2017 IEMA guidance, in order to establish a comprehensive assessment methodology. The methodology focusses on the following elements:
- Assessment of the Development's effects on climate change (calculation of carbon footprint based on best practice guidelines, i.e., Scottish Government Carbon Calculator Tool⁶¹) to include calculation of greenhouse gas emissions relating to construction and operation and the production of electricity;
 - Assessment of the Development's vulnerabilities and resilience in the context of climate change by identifying appropriate climate change projects and climate change effects; and
 - Assessment of the Development's effects upon identified environmental receptors in the context of the emerging baseline.
- ^{396.} The input values to the Scottish Government Carbon Calculator Tool will be set out and justified. The pages from the Tool itself will be provided as an appendix to the EIA Report.

14.3 Previous Assessments

- ^{397.} A carbon assessment was carried out for the Operational Kilgallioch Windfarm; however, as the assessment methods and the layout and size of the windfarm being assessed have since changed, a new assessment will be required.

14.4 Potential Effects, Baseline Conditions and Proposed Surveys

- ^{398.} The most recent climate change projection iteration, UKCP18 has identified the following climatic trends as a result of climate change:
- Increased temperature;
 - Changes in the frequency, intensity and distribution of rainfall events (e.g. an increase in the contribution to winter rainfall from heavy precipitation events and decreases in summer rainfall);
 - Increased wind storms; and
 - Sea level rise.

⁵⁸ European Commission (2014) Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0052>

⁵⁹ IEMA (2015) Environmental Impact Assessment Guide to Climate Change Resilience and Adaption [Online] Available at: [https://www.iema.net/assets/templates/documents/iema_guidance_documents_eia_climate_change_resilience_and_adaptation%20\(1\).pdf](https://www.iema.net/assets/templates/documents/iema_guidance_documents_eia_climate_change_resilience_and_adaptation%20(1).pdf) (Accessed 19/02/2019)

⁶⁰ IEMA (2017) Assessing Greenhouse Gas Emissions and Evaluating their Significance [Online] Available at: https://www.iaia.org/pdf/wab/EIA%20Guide_GHG%20Assessment%20and%20Significance_IEMA_16May17.pdf (Accessed 19/02/2019)

⁶¹ Scottish Government (2018) Carbon Calculator Tool v1.4.0. [Online] Available at: <https://informatics.sepa.org.uk/CarbonCalculator/index.jsp> (Accessed 19/02/2019)

399. Potential effects include:

- Effects of the Development on climate change;
- Effects of climate change on the Development; and
- Effects of climate change on assessments made in other topics of the EIA.

400. The Development will be inherently designed to reduce adverse climate change effects by offsetting the production of carbon dioxide through use of renewable sources for generating electricity. The current baseline with respect to greenhouse gas emissions from existing methods of electricity generation will be identified using existing data from the Government, operational sites, and experience of other similar developments. This information will provide the baseline information against which to assess the contribution of the Development to reducing greenhouse gas emissions and potential for significant effects. The effects of the Development on climate change are scoped into the EIA, therefore.

401. It is proposed that the Development's vulnerabilities and resilience to climate change can be scoped out of the EIA. None of the identified climate change trends listed above could affect the Development with the exception of increased wind storms. Braking mechanisms installed on turbines allow them to be operated only under specific wind speeds and should severe wind storms be experienced then the turbines would be shut down. In regards to the solar potential for the Site, solar PV arrays are built to withstand extreme climatic conditions and through careful design, the susceptibility of the Development to climatic variables will be significantly decreased. Therefore, climate change is not expected to have a significant effect on the Development, and this topic can be scoped out.

402. Given the likely presence of peat on site and its potential excavation as part of the construction process, there is the potential for carbon releases as a result of the degradation. Throughout the design process, areas of deep peat will be avoided as a priority in order to minimise peat disturbance. The application will therefore be supported by the Scottish Government Windfarm Carbon Assessment Tool, which will be appended to the EIA Report. This tool provides a method based on good practice to calculate carbon emission savings associated with renewable energy developments on Scottish peatlands.

403. The EIA Report chapter will summarise, for each EIA topic, the potential for the various parameters subject to climate change to alter the assessment of effects, so this aspect is scoped into the EIA.

14.5 Summary of Scoped In and Out Surveys and Effects

404. **Table 14.1** shows a summary of aspects scoped in and out of the EIA process.

Table 14.1: Summary of Scope

Aspect	Scoped In	Scoped Out
How the Development affects Climate Change.	Updated Carbon Calculator Tool.	
The Development's vulnerability and resilience to climate change.		All assessment.
Effect of climate change on assessed effects in other EIA topics.	Each EIA topic will be considered in a future climate scenario.	

14.6 Key Questions for Consultees

405. The above scope is based on the requirement for EIA to consider the likely significant effects. Effects that are not likely significant do not require assessing under the EIA Regulations.

406. Key questions for consultees are:

- Are consultees content to scope out the Development's vulnerabilities and resilience to climate change?
- Are consultees content with the proposed method of assessment?

15 Other Issues

15.1 Introduction

407. An Other Issues chapter in the EIA Report will assess the likely impact of the Development upon receptors surrounding the Site which are not covered in other technical disciplines.
408. This Section of the document sets out the proposed approach in respect to additional assessments that are required in order to provide a comprehensive assessment of the likely environmental impacts of the Development, together with a summary of the baseline based on information that is currently available.

15.2 Aviation

409. The development of wind turbines has the potential to cause a variety of adverse effects on aviation during turbine operation. These include but are not limited to:
- Physical obstructions;
 - Generation of unwanted returns on Primary Surveillance Radar (PSR); and
 - Adverse effects on overall performance of Communications, Navigation and Surveillance (CNS) equipment.
410. Since many issues must be considered when assessing the potential effect of the Development, the local Air Navigation Service Providers and airspace users (collectively aviation stakeholders) are best placed to provide expert interpretation of what those effects might be and how they might affect safety, efficiency and flexibility of their operations. A well-established regulatory and policy framework that has been in force for a number of years, and subject to constant amendments and updating; this, in addition to guidance documents, has been taken into account when preparing the assessment methodology to ensure compliance.
411. Where line of sight exists between turbines and air traffic control radars it is possible that the turbines may be detected by the radar, dependant on atmospheric conditions, and appear as clutter on the controllers' screens; such clutter may have an adverse impact on air traffic control operations.

15.2.1 Proposed Assessment Methodology

412. The general approach to windfarm development is to avoid adverse effects on aviation infrastructure, where possible, or, where adverse effects have been identified and substantiated by aviation stakeholders, work to identify and implement appropriate operational or technical mitigation solutions.
413. Consultation with relevant aviation stakeholders is a routine part of windfarm development and the consultation process that is required to be undertaken is also laid down in Civil Aviation Publication (CAP) 764⁶² (for civil aviation issues) and the Wind Energy and Aviation Interests Interim Guidelines⁶³ (for both civil and military consultation). In relation to the Development the following consultees have been identified:
- Ministry of Defence (Defence Infrastructure Organisation);
 - Glasgow Prestwick Airport;
 - NATS En-Route; and
 - Civil Aviation Authority (CAA).

15.2.2 Potential Effects and Baseline Conditions

414. The nearest licensed aerodrome is Glasgow Prestwick Airport (GPA), located approximately 56 km north of the Site. The Site is outside GPA's radar safeguarding zone, so no impact is anticipated on GPA's operations.

⁶² Civil Aviation Authority (2016) CAP 766 Policy and Guidelines on Wind Turbines [Online] Available at: <https://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=5609> (Accessed 21/02/2019)

⁶³ Wind Energy, Defence and Civil Aviation Interests Working Group (2002) Wind Energy and Aviation Interests Interim Guidelines [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48101/file17828.pdf (Accessed 21/02/2019)

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415. The nearest MoD facility is the range radar at the now disused West Freugh Airfield, approximately 20 km south-west of the Site. While part of the Site is in radar line of sight of West Freugh radar (at 180 m, according to MoD safeguarding mapping), the Site lies outside the Luce Bay Danger Area complex for which the West Freugh Range Radar provides services; consequently, it is not anticipated that the Site's turbines will have any adverse effect on MoD operations at West Freugh. It is also noted that some of the Operational Kilgallioch turbines are in radar line of sight of West Freugh radar and no MoD objection was received.
416. A further MoD facility is the Kirkcudbright Training Area, located approximately 53 km south-east of the Site. Given the nature of the facility (exclusively field training), this would not conflict with the Development.
417. Finally, with regard to MoD receptors, the Site is located in a blue low flying area (namely areas where the MoD anticipates the construction of wind turbines is less likely to result in a concern due to their likely effect on the UK low flying system). No MoD low flying objection was received with regard to the Operational Kilgallioch Windfarm and it is not anticipated that the Development will cause MoD any low flying concerns.
418. The closest NATS radar is located at Lowther Hill, approximately 76 km north-east of the Site. The NATS online self-assessment maps indicate that the Site is not within an area where turbines are likely to interfere with NATS En-Route Limited (NERL) primary surveillance radar. No objection from NERL is anticipated.
419. The UK statutory requirements for the lighting of en-route obstacles (i.e. those away from the vicinity of a licensed aerodrome) are set out in Article 222 of the UK Air Navigation Order 2016. Article 222 requires, as a general rule, all obstacles over 150 m to be lit with medium intensity (2000 candela) steady red aviation warning lights. In June 2017, the CAA issued a policy statement clarifying the requirements for lighting onshore wind turbines over 150 m in height, namely that the CAA interprets 'as close as possible to the top of the obstacle' as the fitting of lights on the top of the nacelle rather than the blade tips; the nacelle light is to be 2000 candela steady red light with the option where the horizontal meteorological visibility in all directions from every wind turbine generator in a group is more than 5km for the intensity of the nacelle light to be reduced to not less than 10% of the minimum peak intensity; and at least three low intensity steady red (32 candela) intermediate lights (to provide 360 degree cover) to be installed on the tower at half the nacelle height. The CAA is currently working with the wind industry to identify the parameters which would apply to radar activated lighting systems in the UK. Radar activated lighting systems ensure that the aviation warning lights are only illuminated when aircraft are in the immediate lateral and vertical vicinity of the turbines in hours of darkness. It is anticipated that this additional CAA policy will be published over summer 2019.
420. An aviation lighting specification for the turbines will be required in accordance with Article 222 and the 2017 Policy statement,. Following this, and based on the above, there will be no significant effects on aviation interests, and it is proposed to scope aviation assessment out of the EIA.

15.3 Telecommunications

421. Windfarms have the potential to interfere with electro-magnetic signals and utilities passing above ground and physically with existing infrastructure below ground. This can therefore potentially affect television reception, fixed telecommunication links and other utilities.
422. Since the introduction of digital television signals, effects on television reception have substantially reduced. Given the absence of residential properties in close proximity to the Site (see **Section 4**), effects on television reception are considered extremely unlikely, and are scoped out of the EIA.
423. To identify any existing infrastructure constraints, both consultation and a desk based study will be conducted. Consultation with relevant telecommunication and utilities providers is a routine part of windfarm development and consultees will include:
- Spectrum Licensing (Ofcom);
 - Telecommunications providers;
 - Water, gas and electricity utilities providers; and
 - Other additional information obtained from consultation will be used to inform the future layout iterations.

424. Consultation was undertaken with relevant consultees for the Operational Kilgallioch Windfarm in 2009. Ofcom identified six fixed links within the vicinity of the Development; however, further consultation with the appropriate link operators provided clearance distances from the turbines and iterative design allowed each link to be avoided.
425. An updated consultation exercise will be completed in order to determine whether any new telecommunication links and utilities have been established since the original assessment and to establish whether an updated telecommunications baseline is required to inform the assessment.

15.4 Turbine Blade Reflectivity

426. Reflectivity is the potential for the sun to 'glint' off structures which, in the case of wind turbines, can be an intermittent glint when the turbines are rotating. This effect can be minimised by selecting a matt coating for the wind turbines, designed to reduce the potential for reflection. On this basis, this aspect is usually scoped out of windfarm EIAs. In this instance, given the large (more than 2 km) separation between turbines and residential properties, it is proposed to be scoped out.

15.5 Shadow Flicker

427. Under certain combinations of geographical position and time of day, the sun may pass behind the rotors of a wind turbine and cast a shadow over neighbouring properties. Shadow flicker is an effect that can occur when the shadow of a blade passes over a small opening (such as a window), briefly reducing the intensity of light within the room, and causing a flickering to be perceived. Shadow flicker effects can only occur inside buildings when the blade casts a shadow across an entire window opening.
428. Properties with the potential to be affected by shadow flicker as a result of the Development have been identified using Geographical Information Systems (GIS).
429. Given the Scottish Government Online Guidance refers to 10 rotor diameters as the distance above which shadow flicker should not be a problem, any properties within this area are assumed to be most at risk of shadow flicker effects.
430. The turbine dimensions set out in **Section 4** of this report note a maximum tip height of 180 m, and hence the rotor diameter is highly unlikely to be greater than 150 m. 10 rotor diameters is therefore up to c. 1,500 m.
431. There are no properties within 1,500 m of the Turbine Developable Area (as indicated on **Figure 1.2**) and therefore, shadow flicker is proposed to be scoped out of the EIA.

15.6 Glint and Glare

15.6.1 Introduction

432. A glint and glare assessment will be undertaken to assess the likely effect of solar reflection on receptors within the Development's surrounding environment.
433. Glint and glare in this context is the effect of reflected sunlight causing harm or discomfort to a sensitive receptor. A glint can be defined as a momentary receipt of a bright light and a glare can be defined as the receipt of a bright light over an extended or continuous period of time⁶⁴.

15.6.2 Proposed Assessment Methodology

434. Glint and glare assessments are sometimes required to accompany planning applications for solar developments, depending on the determining authority's judgement of their need.
435. Sensitive receptors considered for the Development include the following:
- Residential receptors;
 - Local path users;

⁶⁴ BRE (2015) Planning Guidance for the Development of Large Scale Ground mounted Solar PV Systems. [Online] Available at: http://www.bre.co.uk/filelibrary/pdf/other_pdfs/KN5524_Planning_Guidance_reduced.pdf (Accessed 20/02/2019)

- Road users; and
 - Aviation receptors.
436. There are no solar PV modules in the local area currently, and therefore no glint or glare effects associated with them. Other reflection effects occur from windows, glasshouses, car windscreens and waterbodies,
437. Glint and glare effects are not predicted on any residential or road receptors due to the distance of the Development from residential dwellings and public roads. On this basis, these receptors are proposed to be scoped out of further assessment.
438. As the SUW is located just beyond the western boundary of the Site, glint and glare effect on SUW users will require assessment.
439. A geometric assessment will be undertaken to identify the potential for solar reflections to affect the SUW. The proposed assessment methodology will adhere to the following:
- Choose appropriate receptor locations along the route;
 - Define the proposed solar farm area and choose an appropriate assessment resolution;
 - Undertaken geometric calculations to determine whether a solar reflection may occur and if so, when it will occur;
 - If a reflection can occur, determine whether the reflecting panels will be visible from the identified receptor locations. If the panels are not visible from the receptor then no reflection can occur;
 - If it is calculated that a reflection will occur, consider the location of the solar reflection with respect to the location of the sun in the sky, its angle above the horizontal and the time of day at which a reflection could occur;
 - Consider both the solar reflection from the proposed solar farm and the location of the direct sun light with respect to the receptor's position;
 - Consider the solar reflection with respect to the published studies; and
 - Determine whether the solar reflection is likely to be significant effect or hazard to safety;
 - Propose mitigation, where practicable, in the event that a significant effect is identified.
440. As described in **Section 15.2.2**, the area is not of particular aviation interest, and is not close to airports or aerodromes. On this basis, effects of glint and glare on aviation receptors will not be significant and are proposed to be scoped out of the EIA.

15.7 Air Quality

441. The only appreciable emission to air caused by the Development would be emissions from construction traffic. Given the rural nature of the routes to be used, the levels of pollution in the background air quality are low, and the Development will not lead to sufficient traffic levels as to have the potential to lead to air pollution levels approaching any relevant limit values. On this basis, air quality will be scoped out of the EIA, as is usually the case for windfarm and solar farm EIAs.

15.8 Human Health Impact Assessment

442. Limited Interactions with human health are possible, and consideration will be given to the findings of the following assessments:
- Traffic and Transportation;
 - Noise;
 - Visual effects;
 - Shadow Flicker;
 - Glint and Glare; and
 - Construction Health and Safety.
443. Properly designed and maintained wind turbines, solar panels and associated infrastructure are safe technologies. The site location, design and inbuilt buffers from sensitive receptors will minimise the risk to humans from the operation of the turbines. Risks associated with ice build-up, lightning strike and structural failure are removed or reduced through inbuilt turbine mechanisms in modern machines.

444. The absence of substantial direct effects on recreational receptors (one crossing point of the SUW) combined with best practice construction health and safety, which will be proposed, will minimise the potential for direct health effects, and these will be not significant.
445. The distance from residential receptors and the use of a construction traffic route that has already been used for windfarm construction limits indirect effects to an extent that significant human health effects are extremely unlikely.
446. Given the absence of likely significant effects, all assessment of effects on human health are proposed to be scoped out of the EIA.

15.9 Interrelationships Between Types of Effect

447. The assessments described above will consider certain types of effects on certain types of receptor, and will consider the cumulative effect of multiple windfarms or other development types in addition to the Development. It is possible that multiple types of effect, whether direct or indirect, could be received by a single receptor, however, such as a residential receptor receiving noise and shadow flicker effects, where the individual effects are not significant, but the in-combination effect could be significant. This will be considered in a dedicated section that uses a matrix approach for each non-negligible effect assessed in one chapter, to understand if it could affect receptors receiving non-negligible effects assessed in other chapters. For such receptors, where the in-combination effects have not been fully assessed in one of the chapters, specific consideration will be given, to assess the significance of in combination effects.

15.10 Summary of Scoped In and Out Surveys and Effects

448. **Table 15.1** shows a summary of aspects scoped in and out in the EIA process.

Table 15.1: Summary of Scope

Aspect	Scoped In	Scoped Out
Aviation		
Operational Effects	Consultation with relevant aviation consultees to gather updated baseline	
Telecommunications		
Operational Effects	Consultation with relevant telecommunication consultees to gather updated baseline	Effects on television reception
Turbine Blade Reflectivity		All Assessment
Shadow Flicker		All Assessment
Glint and Glare	Assessment of effects on users of the SUW	All other assessment/ receptors
Effects on residential receptors		All Assessment
Effects on aviation receptors		All Assessment
Effects on road users		All Assessment
Effects on the SUW	Geometric assessment	
Air quality		All Assessment
Human Health		All Assessment
Interrelationship Effects	All non-negligible effects	Negligible effects

15.11 Key Questions for Consultees

449. The above scope is based on the requirement for EIA to consider the likely significant effects. Effects that are not likely significant do not require assessing under the EIA Regulations.
450. Key questions for consultees are:

- Are consultees aware of any additional aviation stakeholders that should be taken into account?
- Are consultees content with the proposed methodology?
- Are consultees content that effects associated with turbine reflectivity, shadow flicker, air quality and human health can be scoped out?
- Subject to agreement with consultees of an aviation lighting specification in line with Article 222 of the UK Air Navigation Order 2016 and the June 2017 CAA policy statement clarifying the requirements for lighting onshore wind turbines over 150 m in height; are consultees content that an aviation assessment is scoped out of the EIA?

Appendix 1.1 – Figures

1. This Appendix contains the following figures:
 - Figure 1.1: Site Location;
 - Figure 1.2: Turbine Developable Area;
 - Figure 6.1: Study Area;
 - Figure 6.2a: Blade Tip ZTV and Viewpoints;
 - Figure 6.2b: Blade Tip ZTV and Viewpoints and Cumulative Windfarms;
 - Figure 6.3: Blade Tip ZTV with Landscape Planning Designations;
 - Figure 6.4: Blade Tip ZTV with Wild Land Areas;
 - Figure 6.5: Blade Tip ZTV with Landscape Character;
 - Figure 6.6: Blade Tip ZTV with Visual Receptors;
 - Figure 6.7: Comparative ZTV Kilgallioch and Extension
 - Figure 6.8: Cumulative Wirelines A&B (Merrick, and Mochrum Loch)
 - Figure 6.8: Cumulative Wirelines C&D (A75 Point Nets, and A77 by Cairnpat)
 - Figure 6.8: Cumulative Wireline E (A714 north of Newton Stewart)
 - Figure 7.1: On-Site Cultural Heritage Features
 - Figure 7.2: Cultural Heritage Designations
 - Figure 8.1: Ecological Designations
 - Figure 12.1: Proposed Access Routes

Appendix 7.1 – Original Application for Kilgallioch Windfarm - Archaeological DBA

Appendix 7.2 – Original Application for Kilgallioch Windfarm - Cultural Heritage Chapter, Figures and Wirelines of Environmental Statement

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