



Kilgallioch Windfarm Extension

EIA Report
Non-Technical Summary

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Kilgallioch Windfarm Extension

1 Introduction

1. This document is the Non-Technical Summary of the Environmental Impact Assessment Report (EIA Report) that has been prepared to accompany the Section 36 application by ScottishPower Renewables (UK) Ltd (hereafter referred to as “SPR”) to construct and operate a proposed extension to the operational Kilgallioch Windfarm (the proposed extension is hereafter referred to as the “proposed Development”). The proposed Development is located approximately 6.8 km north east of New Luce, and 9.5 km north west of Kirkcovan in Dumfries and Galloway, as shown on **Figure 1**. The proposed Development would be known as the Kilgallioch Windfarm Extension and would also include co-located solar energy development.

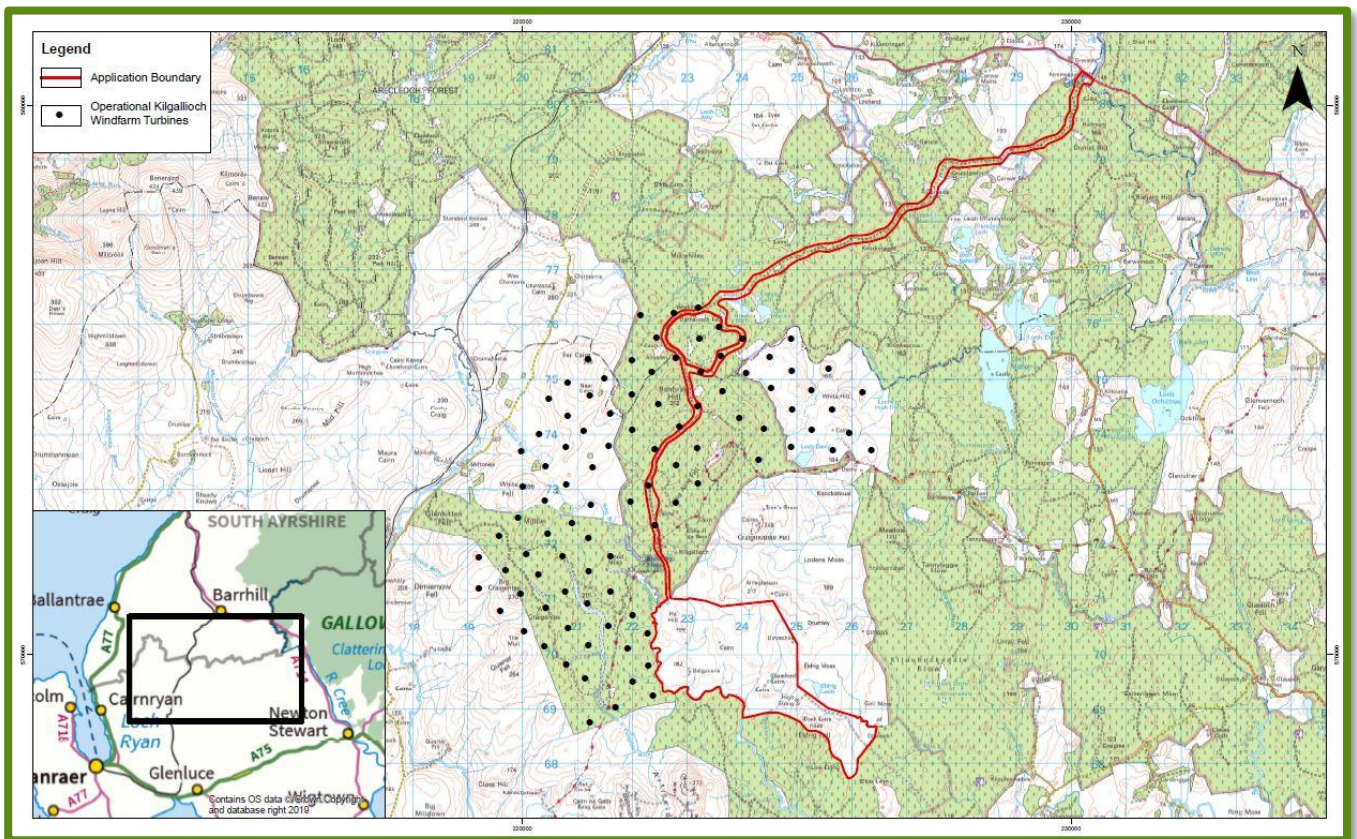


Figure 1 – Site Location Plan

1.1 Environmental Impact Assessment

2. Under the *Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017* (hereafter referred to as the “EIA Regulations”), the proposed Development is considered likely to have significant effects on the environment and must undergo the process of Environmental Impact Assessment (EIA) and an EIA Report must be submitted with the application.
3. The EIA process is reported in the EIA Report, which describes the methods used to assess the beneficial and adverse environmental impacts predicted to result from the construction and operation of the proposed Development. Where appropriate, it also sets out mitigation measures designed to prevent, reduce and, if possible, offset any significant adverse

environmental impacts. An assessment of residual effects, those expected to remain following implementation of mitigation measures, is also presented.

4. In accordance with the EIA Regulations, the assessment has also considered 'cumulative effects'. These are the cumulation of effects with other existing and/or approved developments. Cumulative effects cover the combined effect of individual impacts from the Proposed Development and combined impacts of several developments.
5. The EIA Report comprises the following:
 - Non-Technical Summary;
 - Volume 1 Written Statement;
 - Volume 2 Figures;
 - Volume 3 Technical Appendices: and
 - Volume 4 Visualisations of the proposed Development.

1.2 Availability of the Proposed Development EIA Report

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

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

Or by emailing: kilgalliochextension@scottishpower.com

7. Hard copies of the EIA Report may be purchased by arrangement from the above address for £1,000 per copy, or £15 per DVD/USB. The price of the hard copy reflects the cost of producing all of the Landscape and Visual photographs at the recommended size.
8. A copy of the Non-Technical Summary and EIA Report documents will be made available for download from the SPR corporate website at:
 - https://www.scottishpowerrenewables.com/pages/kilgallioch_windfarm_extension.aspx
9. A hardcopy of the EIA Report is available for viewing by the public during normal opening hours at the following locations:
 - Scottish Government Library, Victoria Quay, Edinburgh, EH6 6QQ
 - Dumfries and Galloway Council, Kirkbank House, English Street, Dumfries, DG1 2HS
 - South Ayrshire Council, Burns House, Burns Statue Square, Ayr, KA7 1UT
 - Kirkcowan Community Council Kirkcowan Post Office, 34 Main Street, Kirkcowan, Newton Stewart, Wigtownshire, DG8 0HG

1.3 Representations to the Application

10. Comments in relation to the application for consent should be made directly to the Scottish Government Energy Consents Unit as follows:

Energy Consents Unit

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

Email: representations@gov.scot

Web: www.energyconsents.scot/Register.aspx

1.4 The Applicant

11. The applicant, 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.
12. 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.
13. With over 40 operational windfarms, SPR manages all its sites through its world leading Control Centre at Whitelee Windfarm, near Glasgow. SPR has long been involved in south west Scotland and currently owns and operates five operational windfarms within the local area of the proposed Development; Kilgallioch, Arecleoch, Wether Hill, Harestanes and Ewe Hill.
14. The Scottish Government has committed to reducing greenhouse gas emissions and to generating 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 2009* has set targets of an 80% reduction by 2050 with an interim target for 2020 of at least a 42% reduction. More recently the Scottish Government has amended the 2009 Act through the provision of the *Climate Change (Emissions Reduction Targets) (Scotland) Act 2019* to change the target to net-zero by 2045: balancing the amount of emitted greenhouse gases with the equivalent emissions that are either offset or sequestered, thus underlining the need for more ambitious and timely action to address the climate crisis.
15. The proposed Development 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. It also maximises the grid infrastructure already in place for the operational Kilgallioch Windfarm. 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.

2 Site Selection and Design

2.1 Site Selection

16. The principles of the EIA process require that site selection and project design should be iterative and constraint-led, to ensure that potential negative environmental impacts, as a result of the proposed Development, are avoided or minimised, as far as reasonably possible. The main alternatives including design, turbine specification, location, size and scale have been considered for the proposed Development site.
17. The operational Kilgallioch Windfarm received consent in 2013 and been operational since 2017, with a capacity of up to 236 megawatts (MW) across 96 wind turbines.
18. The proposed Development application boundary is located across two local authorities - South Ayrshire Council and Dumfries and Galloway Council. The main development area, which is where all new infrastructure is proposed, is located solely within Dumfries and Galloway Council area.
19. A number of factors were considered when progressing the proposed Development site as an energy development. A predominant factor was the opportunity to maximise the use of the existing infrastructure which forms part of the operational Kilgallioch Windfarm. Factors in favour of progressing the proposed Development site include:

- use of the operational Kilgallioch Windfarm and access tracks to access the main development area of the proposed Development site with minimal upgrades;
- the potential for a direct connection to the operational Kilgallioch Windfarm substation and onto the wider electrical grid system;
- an operational development adjacent and initial onsite wind monitoring has demonstrated that there is likely to be a good wind resource at the proposed Development site for wind energy generation; and
- greater understanding and appreciation of the baseline conditions at the proposed Development site as a consequence of the construction and operation of Kilgallioch Windfarm.

20. Other factors include:

- there are no international or national statutory designations for landscape in, or within close proximity of, the main development area of the Site;
- there are no planning policies which, in principle, preclude wind energy development; ;
- it has good access from the public road network particularly for longer blades which allows consideration of larger turbines to make the best use of the expected wind resource; and
- the Site has no residential properties in close proximity.



Figure 2 – The existing operational Kilgallioch Windfarm, which has turbines up to 145.5 m to tip

2.2 Co-Located Technologies

21. SPR is looking at ways to incorporate a mix of renewable energy technologies into future developments as well as maximising the efficiency of operational sites through co-location of other renewable energy and storage technologies.
22. For the proposed Development a co-located technologies workshop was held for the project to explore the feasibility of co-locating other renewable generating or storage technologies at the site. The workshop considered five different renewable technologies: solar; hydro; biomass; hydrogen fuel cells; and energy storage technologies. The benefits of each technology

were outlined and their suitability to the proposed Development site discussed, supported by known environmental baseline information for the proposed Development site. As a result of the desk-based assessments and workshop, solar energy was considered an appropriate technology to include as part of the project proposals to maximise the efficiency and output of the site grid connection.

2.3 Design Iteration

23. A key benefit of the EIA process is the opportunity it gives to integrate environmental considerations into the careful, iterative design of a project. This allows potential environmental effects to be considered and minimised and ensures that the environment is considered in the proposed Development design from the earliest stage.

2.3.1 Environmental Constraints

24. The known environmental and technical constraints within the proposed Development site were identified as part of the early stage constraints mapping. It is important to note that the identification of a constraint did not necessarily result in the exclusion of that area from the potential development envelope; rather it meant that careful thought and attention was paid to the constraint and the design altered appropriately.

25. The key constraints which were considered during the design process included:

- topography;
- identified landscapes and visual constraints;
- presence of ornithology receptors;
- protected habitats and species;
- ground conditions (including peat);
- presence of watercourses;
- presence of cultural heritage features;
- location of residential properties – potential impacts on residential visual amenity, and proximity to noise sensitive receptors;
- aviation;
- telecommunications links;
- key recreational and tourist routes; and
- forestry.

26. Further surveys of peat and vegetation have provided a more detailed picture of hydrological connectivity with the Kirkcowan Flow Special Area of Conservation (SAC). Turbines and associated infrastructure have been purposefully designed to avoid areas and habitats with hydrological connectivity, eliminating the potential for effects on the Kirkcowan Flow SAC.

27. The identification of constraints continued throughout the design evolution process as more detailed surveys refined the development envelope.

28. As a consequence of this process, there have been nine main design iterations to the infrastructure layout of the proposed Development in order to avoid, reduce or offset the potential environmental effects associated with the proposed Development as well as maintaining a financially viable development proposal. In addition to these nine main design iterations there has been additional micro-siting to refine the design.

3 Proposed Development

29. The proposed Development will comprise 11 wind turbines of up to a maximum blade tip height of 180 m when vertical, giving a combined generating capacity of around 62 MW, as well as around 20 MW of installed solar photovoltaic arrays. A number of ancillary development components are also proposed, including:

- turbine foundations;
- crane hardstands;
- transformer/switchgear housings located adjacent to turbines and solar arrays;
- solar photovoltaic modules;

- access tracks (existing, upgraded or new as required);
- watercourse crossings (existing, upgraded or new as required);
- underground electrical cabling to the operational Kilgallioch Windfarm substation;
- permanent anemometer mast and Lidar compound;
- up to two temporary Power Performance Masts;
- closed-circuit television mast(s);
- communication mast(s);
- permanent operations building;
- up to two borrow pit search areas; and
- a temporary construction compound area.

30. The proposed infrastructure layout within the main development area is shown on **Figure 3**.

31. As an extension to the operational Kilgallioch Windfarm the proposed Development would re-use and share existing infrastructure from the operational Kilgallioch Windfarm where possible. This includes sharing much of the access track and connecting to the existing operational Kilgallioch Windfarm substation, thus maximising efficiency and reducing the cost to the consumer.

32. Based on a calculated capacity factor¹, the annual indicative total power output for the proposed Development site would be approximately 165.24 gigawatt (GW) hours per annum, indicating the proposed Development would generate enough electricity to power over 44,000 average UK households (based on average electricity consumption per household in the UK quoted by the *Department of Business, Energy and Industrial Strategy* (BEIS), of 3,729 kWh per year). The proposed Development would contribute towards international and national targets for the generation of renewable energy and reduction in greenhouse gas emissions.

3.1 Access to Site

33. Following the applicant's recent experience of constructing the operational Kilgallioch Windfarm, it is proposed that a dual port strategy is considered for the delivery of the wind turbine components. The wind turbines would be delivered to the King George V (KGV) Dock in Glasgow, but with the possibility of using the port of Cairnryan. The port of Cairnryan has some restrictions including limited water depth and port handling facilities/component storage and may limit the use of this port. The turbines would be moved from the port of entry to the proposed Development site under escort. Where the KGV Dock is used the wind turbine components would transit via the motorway (i.e. M8, M74) and then onto the A75 and finally the A714, before accessing the site. In the case of Cairnryan, turbine components would be moved south along the A77, A751, A75 and then the unclassified road past Newton Stewart and then north along the A714 to the site entrance.

¹ The load factor is calculated by RenewableUK as a rolling average of the past five years using data from the Digest of UK Energy Statistics published by the Department of Business, Energy and Industrial Strategy in July 2019.

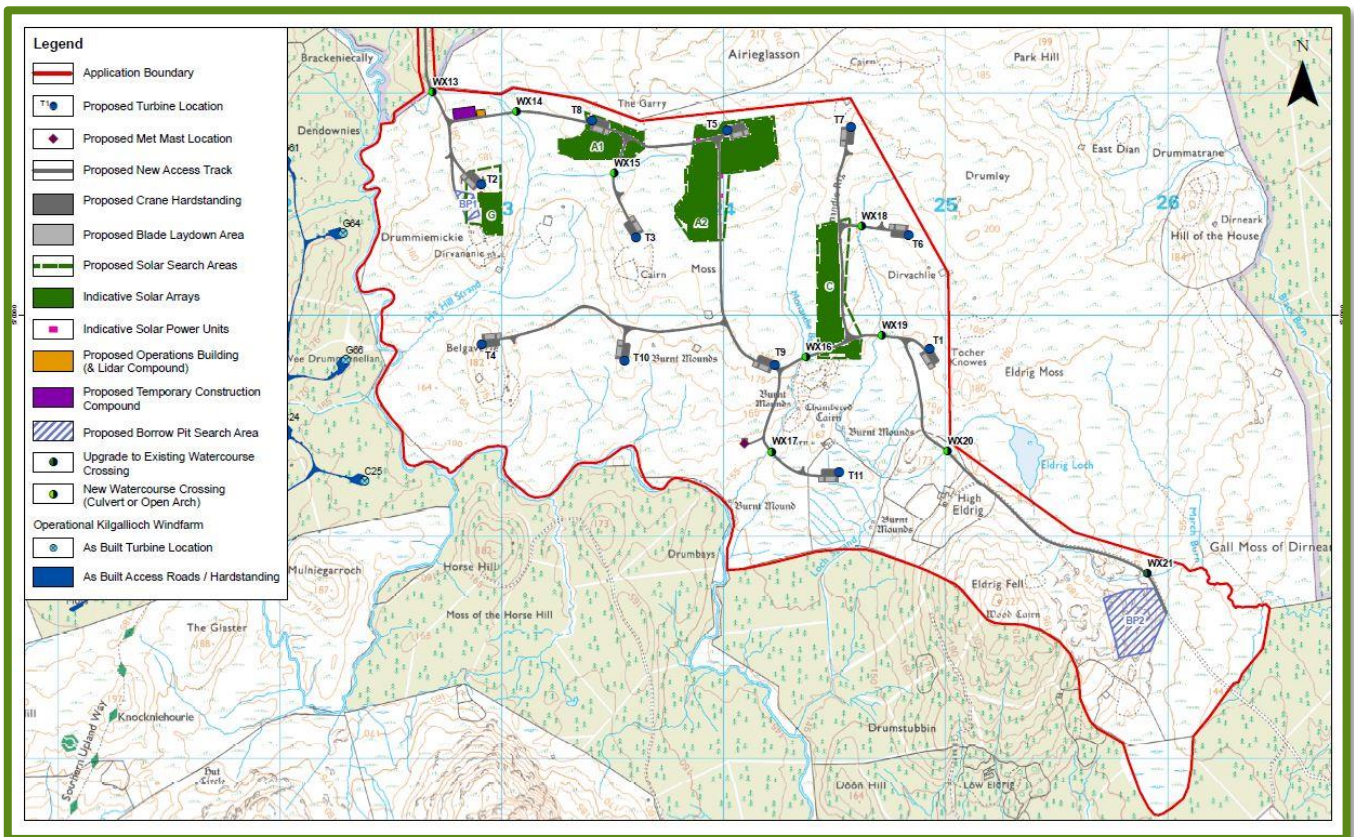


Figure 3 – Proposed Development Layout (main development area)

3.2 Construction

34. Almost two thirds of the access tracks for the proposed Development would use existing infrastructure, whether upgrading of existing farm tracks or tracks used within the operational Kilgallioch Windfarm. All new access tracks, which have been designed to avoid any sensitive environmental receptors, would be made of locally sourced stone from the onsite borrow pits and have a typical running width of approximately 5 m. Floating access tracks would be constructed over localised areas of deep peat to avoid excavation. This would require the placing of a geotextile membrane on existing topsoil and vegetation followed by aggregate layers.
35. To minimise the volume of imported material brought onto the site and any associated environmental impact, borrow pits located within the proposed Development site would be used to source aggregate for site construction. A borrow pit is an area where material has been excavated for use at another location. Two borrow pit search areas have been identified in order to provide a total of approximately 90,900 m³ of material required to construct the proposed Development.
36. To enable the construction of the turbines, a crane hardstanding area and turning circle at each turbine location would be required to accommodate assembly cranes and construction vehicles. This would comprise a crushed stone hardstanding area measuring approximately 80 m long by 30 m wide. Adjacent to the crane hardstanding would be laydown areas for the blades comprising a disturbance area of approximately 85 m long by 25 m wide. The hardstanding and laydown areas would remain in place during the lifetime of the proposed Development to facilitate maintenance works.
37. The proposed Development also comprises four areas identified for solar development, ranging from approximately 3.8 to 13.5 ha with the potential for an installed capacity of approximately 20 MW. Each module will be mounted upon a pre-fabricated alloy metal frame. The photovoltaic modules will be fixed to the frame. It is intended that the land would remain in agricultural use and that sheep would be able to graze between the panels to maintain the vegetation.
38. A 105 m lattice structure anemometer mast may be installed onsite. The purpose of this is to provide operations and performance monitoring data and the mast height would be dependent on the final turbine selection. Furthermore, a Lidar station would be located adjacent to the operations building, which would comprise a 3 m x 3 m fenced compound with a Lidar

on a raised 2 m platform. The Lidar station would provide operations and performance monitoring data alongside the anemometer mast.

- 39. An operations building would be constructed and comprise a single storey, built on a concrete base and would measure approximately 16 m x 12 m and 7 m high. The operations building would also host solar panels on the roof to reduce the carbon footprint of the building and would likely include other energy efficient measures such as rain water harvesting for flushing of toilets etc.
- 40. A construction compound would be required as the control centre for all site activities and to provide facilities for the day-to-day needs of the project and the workforce. The construction compound would be located on the main access track at the north western entrance to the main body of the proposed Development site. It would comprise an area of approximately 100 m long by 50 m wide.

3.3 Programme

- 41. The onsite construction period for the proposed Development is expected to be approximately 18 months (refer to **Table 1**). Normal construction hours would be between 07:00 and 19:00 Monday to Friday and 07:00 to 16:00 on weekends, or as agreed with the Environmental Health Officer (EHO). These times have been chosen to minimise disturbance to local residents. **Table 1** provides an indicative programme for the main items of work to be carried out.

Task	Month								
	2	4	6	8	10	12	14	16	18
Mobilisation									
Forest Felling									
Access & Site Tracks									
Foundations									
Crane Hardstands									
Onsite Cabling									
Turbine Delivery									
Turbine Erection									
Solar Installation									
Commissioning & Testing									
Site Reinstatement /Restoration									

Table 1: Indicative Construction Programme

- 42. As part of the construction contract, the Principal Contractor responsible for undertaking the construction works would adhere to a Construction Environmental Management Plan produced by SPR. The plan shall describe how the Principal Contractor would ensure suitable management of all environmental issues during construction of the proposed Development.
- 43. SPR will engage an Ecological Clerk of Works (ECoW) onsite during the construction phase. The services of other specialist advisors would be retained as appropriate, such as an Archaeological Advisor, to be called on as required to advise on specific environmental issues. The Principal Contractor would ensure construction activities are carried out in accordance with the mitigation measures outlined in this EIA Report and any planning conditions, and this would be monitored by SPR and the ECoW.

4 Consultation

- 44. The process of consultation is critical to the development of a comprehensive and balanced EIA Report. The purpose of pre-application consultation is to:

- ensure that statutory consultees and other bodies with a particular interest in the environment are informed of the proposal and provided with an opportunity to comment at an early stage in the EIA process;
- obtain baseline information regarding existing environmental site conditions;
- establish key environmental issues and identify potential effects to be considered during the EIA;
- identify those issues which are likely to require more detailed study and those which can be justifiably excluded from further assessment; and
- provide a means of confirming the most appropriate methods of assessment.

4.1 Statutory Consultation

45. A formal EIA Scoping Opinion was requested from the Scottish Ministers in April 2019 through the submission of an EIA Scoping Report. The EIA Scoping Report contained details of the site baseline, the proposed Development, proposed environmental impacts to be assessed in the EIA, and the assessment methodologies that would be used. The Scottish Ministers consulted with a variety of statutory and non-statutory consultees before providing an EIA Scoping Opinion in June 2019.

46. Direct consultation has also been undertaken with consultees, to confirm and agree the detailed approach to the technical surveys and assessments on a topic by topic basis. The Applicant met with the Scottish Government for an initial Gatecheck meeting after consideration of the Scoping responses to provide information on how the responses received would be addressed in the EIA Report.

47. Public consultation is a key element of the Environmental Impact Assessment process. A programme of pre-application community engagement has been undertaken by SPR and has included meetings, correspondence, Public Information Days and other discussions with members of the communities closest to the proposed Development site.



Figure 4 - Kilgallioch Windfarm Extension Public Information Day, Kirkcowan Village Hall

48. Two Public Information Days were held by SPR on 04 June 2019 and 28 August 2019 in the Kirkcowan Village Hall, Kirkcowan.

49. The Pre-Application Consultation Report which accompanies the submission details the findings of that work and illustrates the ways in which community engagement has helped identify potential issues arising from the emerging development proposal and, where appropriate, shape the final proposal which is now the subject of this application.

5 The Environmental Impact Assessment

50. The EIA considers the effects of the proposed Development during construction and operation on the following topics:

- landscape and visual (effects on the character of the landscape and views from agreed locations);
- hydrology, hydrogeology, geology and soils (the effects on surface water, groundwater, rocks and soils);
- ecology and biodiversity (the effects on protected habitats, flora and fauna, excluding birds);
- ornithology (the effects on birds and protected bird habitats);
- noise (effects on local properties from noise and vibration caused by the proposed Development);
- archaeology and cultural heritage (effects on the integrity and setting of historic sites);
- access, traffic and transportation (effects from traffic travelling to, and from, the proposed Development);
- socio-economics, tourism, and recreation (effects on the local and national economy, local tourism businesses, and recreation facilities); and
- other issues, such as aviation, telecommunications, glint and glare, land use and carbon balance;

51. A summary of the baseline conditions, the proposed mitigation, the resulting residual effects and the cumulative effects for each topic is provided below. Full details of the EIA for each of the topics are provided in Chapters 6 to 14 of the EIA Report.

6 Landscape and Visual

52. Chapter 6 of the EIA Report, landscape and visual impact assessment (LVIA), evaluates the effects of the proposed Development. The LVIA considers direct effects on the landscape, effects on how the landscape is perceived and the effect on visual amenity within the study area. Effects arising from the addition of the proposed Development to other windfarms in the area are also considered (cumulative effects). The LVIA has assessed the potential for significant landscape and visual effects over a 45 km study area focussing the detailed assessment within a 20 km area.

6.1 Baseline

53. The proposed Development is located on an upland landscape and the scale and characteristics of the upland landscape are considered suitable for windfarm development. The areas of forestry required to be removed in the construction of the proposed Development would be extremely limited and restricted to the proposed access tracks to the north of the proposed site area. The area of moorland to be removed in the construction and operation of the proposed Development is relatively limited in relation to the total area of moorland on the site and elsewhere within the surrounding area. The extent of moorland removal is not considered to constitute a redefinition of this landscape element as a component of the site area or the wider landscape. The physical landscape effects of the proposed Development on these landscape elements are considered to be not significant.

6.2 Assessment

54. The assessment of effects on views is informed by a series of 17 viewpoints that were selected, in agreement with Dumfries and Galloway Council, in line with comments received at the scoping stage from Scottish Natural Heritage (SNH), to represent visibility from a range of receptors and distances throughout the study area.

55. The visual effects of turbine lighting were considered from four agreed viewpoints. At night the turbines would not in themselves be visible during times of darkness. Nevertheless, the assessment of night time effects for the proposed Development has predicted significant effects where effects were assessed as not significant during the day. This is largely due to the appearance of lighting on an upland horizon which is currently far less affected by the effects of any other existing lighting and the particular view towards the proposed Development is a narrow focussed view along Glen Trool which draws the eye towards the location of the proposed Development.

6.3 Significance

56. The assessment has identified that the significant landscape and visual effects of the proposed Development would be contained within a very localised area around the proposed Development site when compared with other windfarm developments of this scale. Significant landscape character effects were assessed to occur within approximately 2-3 km from the nearest turbine with significant visual effects assessed to occur within approximately 3-4 km.

57. In landscape and visual terms, it is considered that there is scope for windfarm development within the large scale upland landscape. The proposed Development would appear set back into the core area of this broad upland plateau and would appear to sit within the large scale commercial forestry that often creates a forested skyline from many views in the surrounding area. The simple moorland and forestry land cover, along with existing wind turbine development, is extensive in the study area. From the surrounding landscape, the proposed Development would appear on the skyline, in a similar way to the operational Kilgallioch Windfarm development and would therefore relate to the same pattern of development and characteristic of the plateau landscape, creating a consistent image that limits visual confusion and reinforces the appropriateness of the location for windfarm development. It is considered that the landscape is capable of accommodating the proposed Development, and that significant effects on the existing landscape character or visual amenity are limited in number and extent.

6.3.1 Mitigation

58. To reduce the visibility of turbines at night, it is proposed that visibility sensors are installed on the proposed Development turbines so that where visibility is restricted to 5 km or less from all the turbines in the proposed Development, the lights would operate at 2000 candela. Where visibility is greater than 5 km from all the turbines, the nacelle obstruction lights would be dimmed to 200 candela.

59. The use of 'smart' aviation lighting (aviation obstruction lighting detection system) is also being explored for the proposed Development, whereby the lights would only be switched on when low altitude aircraft approach them.

7 Hydrology, Geology, Hydrogeology and Soils

60. Chapter 7 of the EIA Report considers matters relevant to hydrology, hydrogeology, geology and soils. The proposed Development has been assessed in relation to the potential impact it may have on these receptors during the construction and operational phases.

7.1 Desk and Field Studies

Baseline conditions were initially established primarily through desk-based research and review of survey data and information available from the original application for the operational Kilgallioch Windfarm. Following on from the desk study, a preliminary site visit was undertaken by an experienced geo-environmental specialist. Field notes were taken onsite, noting ground constraints and details of ground and surface water conditions not apparent on available mapping.

61. Peat depth probing was undertaken by a team of surveyors, to supplement available peat depth data from previous surveys and to provide a detailed record of peat depth at each proposed turbine and hardstanding location, along the route of proposed access tracks, and at proposed infrastructure locations. **Figure 5** shows the peat depth across the proposed Development site, from the data collected during the peat surveys. It highlights how peat was avoided during the design of the windfarm.

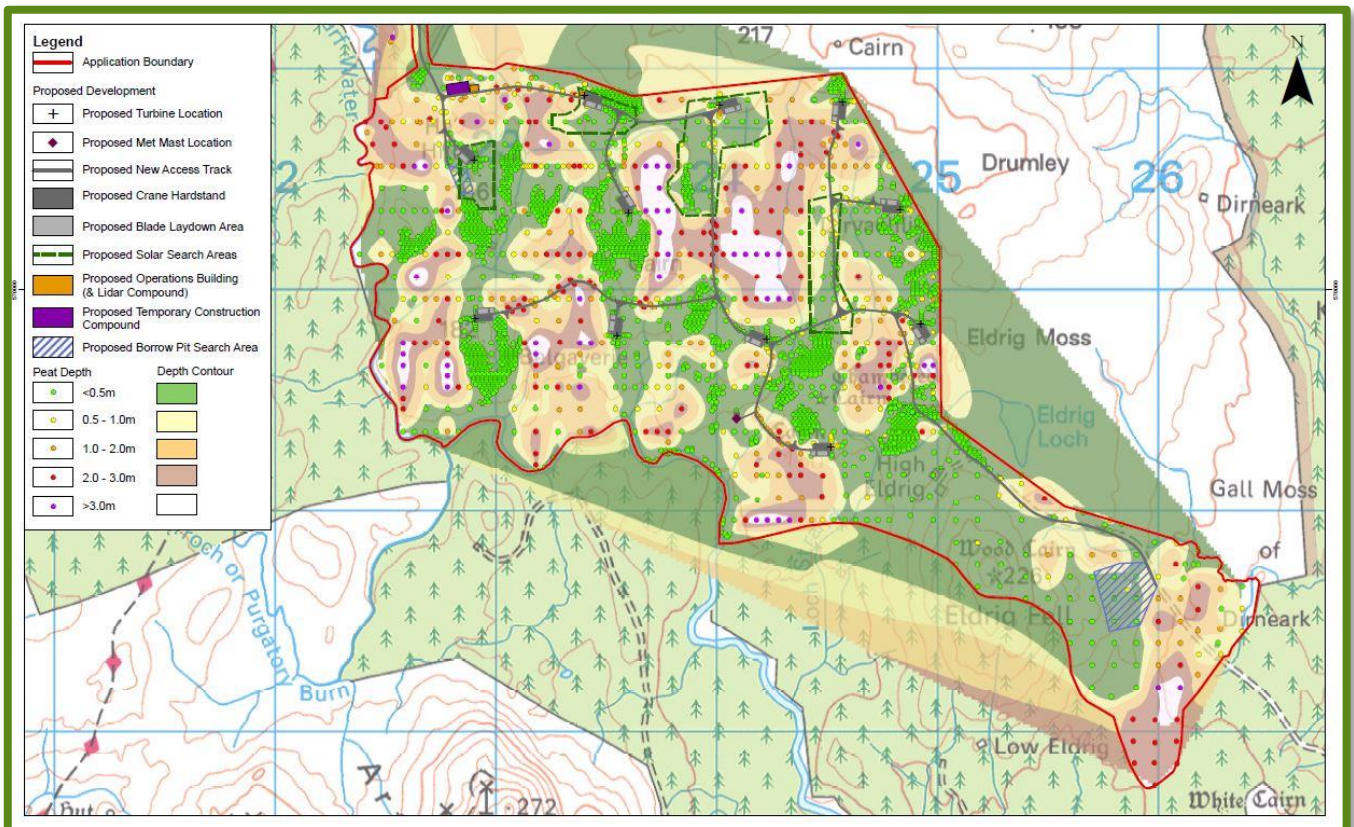


Figure 5 – Peat depth contour map

62. A National Vegetation Classification survey was undertaken to identify habitats which may be groundwater dependent, in accordance with SEPA guidance.

7.2 Baseline

63. The proposed Development is located within the catchment of the River Bladnoch, with drainage across the majority of the site being to the Tarf Water on the western and southern site boundary. The River Bladnoch is designated as a Special Area of Conservation, principally for Atlantic salmon, and the designation includes the Tarf Water adjacent to the site. The Tarf Water and the onsite watercourses draining into it were considered within the assessment to have good water quality.
64. The rock beneath the proposed Development site is sedimentary, forming a low productivity aquifer. Overlying soils comprise variable thicknesses of peat, with localised till (clay, silt, sand and gravel with cobbles and boulders) and in some areas rock at surface.
65. Habitats indicative of potential groundwater dependence have been identified across much of the proposed Development site. However, the nature of the site geology indicates a limited potential for substantial groundwater to be present near the surface, feeding the observed habitats. Furthermore, given the pattern of wetland habitats identified (along surface watercourses and drainage routes), it is clear that the habitats are likely to be mainly or entirely surface-water dependent. Water contained within the peat soils across the proposed Development site is considered to be rainwater fed.

7.3 Assessment

66. The peat depth survey has identified peat across much of the proposed Development area, locally over 3 m thick but often thinner and sometimes absent. Areas of deep peat are avoided by all proposed turbine locations and most infrastructure, although several short stretches of access track would need to cross deep peat.
67. A peat slide risk assessment has identified negligible or low risks across the proposed Development site with the exception of a very small number of localised points, more than 300 m from any proposed infrastructure.
68. Potential construction and operational effects include changes to the groundwater flow regime, excavation of and impact on peat deposits, the risk of siltation and pollution of watercourses resulting in adverse effects on water quality, effects on the integrity of watercourse banks, compaction of soils, long-term effects on fluvial geomorphology, and effect on onsite and downstream flood risk.
69. The iterative design process for the proposed Development has ensured embedded mitigation, including appropriate buffering of sensitive watercourses, minimising the need for new watercourse crossings, and avoidance of areas of deep peat or elevated peat slide risk in siting turbines. Standard good construction and design practice has also been considered as embedded mitigation, including detailed pre-construction site investigations, agreement and implementation of a Construction Environmental Management Plan, and appropriate design of watercourse crossings, regulated under the CAR licensing regime.

7.4 Significance

70. Potential effects on hydrological, geological and hydrogeological receptors, taking account of the above-noted embedded mitigation, have been assessed as negligible to minor, and not significant. However, some additional specific mitigation measures have been proposed to further reduce effects. These include: floating road construction for localised track segments, in order to avoid the requirement to excavate deep peat; appropriate management and re-use of peat onsite in accordance with a Peat Management Plan; minimising the requirement for dewatering; ensuring that working platforms are formed so that surface runoff drains away from watercourses; establishing and demarcating working areas and corridors; and implementing a Habitat Management Plan to facilitate re-wetting of peat in the vicinity of artificial drains across a specified area of the proposed Development site.
71. The significance of residual effects on hydrological, geological and hydrogeological receptors is considered to be minor or negligible and therefore not significant.

8 Ecology and Biodiversity



Figure 6 - A frog photographed within the bog habitat of the proposed Development site

72. Chapter 8 of the EIA Report has considered the potential effects on the ecological features within and surrounding the proposed Development (and cumulatively with other developments), associated with the construction and operation of the proposed Development. The assessment method followed the guidance detailed by the Chartered Institute for Ecology and Environmental Management (CIEEM, 2018).

8.1 Desk and Field Studies

73. An ecological desk study and subsequent field surveys were undertaken to confirm the presence of any statutory and non-statutory nature conservation sites, areas of ancient woodland and legally protected or otherwise notable species (i.e. those species of conservation concern).

74. Field surveys included habitat surveys (Phase 1 Habitat and National Vegetation Classification for wetland habitats), a protected mammal survey, bat surveys and fish surveys.

75. Bat surveys included site reconnaissance and habitat assessment, to determine site suitability for bats and potential for roosting. Static detector surveys were completed across three seasonal deployments.

76. Fish surveys were completed along the Tarf Water and contributing watercourses flowing from within the proposed Development site.

8.2 Assessment

77. The habitats considered to require detailed assessment included wet modified bog and blanket mire. Assessment of the extent of direct habitat losses during construction has been undertaken, taking account of embedded mitigation through design and good construction practices.

78. Indirect habitat losses as a result of drying peat are anticipated when drains are first installed during the construction phase and then considered likely to continue during the operation phase. No further negative impacts on wet modified bog and blanket mire are predicted during the operational phase. As such, a Habitat Management Plan (HMP) is proposed with an aim to improving areas of habitat to blanket mire and, as such, an overall improvement is predicted in the quality of this habitat during the operational phase. Signs of otter and water vole activity were identified during the protected mammal survey (with incidental signs for badger being found during subsequent survey) and appropriate mitigation is proposed in order to ensure no impacts are experienced by these species.

79. The habitat suitability for bats was assessed as low and any potential roost sites are not located within potential connective distance of proposed Development site infrastructure. Based on desk study and survey findings, it was considered that potential effects on *Nyctalus* species, Soprano pipistrelle and common pipistrelle species required detailed assessment.

80. Although the Tarf Water does support salmon, the watercourses within the proposed Development site were found to only support non-salmonid fish. Assessment of effects on fish populations was undertaken based on the findings of the desk study, consultations and surveys.

8.3 Significance

81. Following data analysis from the bat survey work, and species-specific risk assessments, no significant effects were expected on *Nyctalus* species, Soprano pipistrelle and common pipistrelle species.
82. In respect of fish, measures outlined within the Construction Environmental Management Plan, species protection plans, best practice, as well as pollution protection guidelines, would ensure water quality is maintained and that no impacts would occur on the fish populations present.
83. Cumulative impacts were considered against all receptors carried forwards through the impact assessment and no significant cumulative impacts are predicted. Residual effects were considered to be at worst, negligible and not significant.

9 Ornithology

84. Chapter 9 of the EIA Report considers the potential effects of the proposed Development on birds. It details the methods used to establish the bird species and populations present, together with the process used to determine their Nature Conservation Importance. The ways in which birds might be affected (directly or indirectly) by the construction and operation of the proposed Development are explained and an assessment is made with regards the significance of these effects.

9.1 Desk and Field Studies

85. Following a desk-based review of ornithological sensitivities, designations, and relevant records, a programme of ornithological surveys was conducted at the proposed Development and within its vicinity in order to describe and assess the bird assemblages and flight activity throughout the year. Survey effort of flight activity over the proposed Development was 219 hours of vantage point watches over two breeding seasons and 108 hours over one non-breeding season.
86. Vantage point surveys were undertaken from three points. Dedicated surveys of raptors and owls were made over two seasons with appropriately scaled buffers surrounding the proposed Development, and surveys for hen harrier winter roosts completed during the non-breeding season. Dedicated surveys for black grouse were made within a 1.5 km buffer of the proposed Development in two seasons. A four-visit survey of breeding birds of open ground within a 500 m buffer of the proposed Development was conducted, and walkover surveys were conducted during the non-breeding seasons to complement breeding season surveys.

9.2 Assessment

87. The bird assemblages of the proposed Development and its vicinity are typical of the region based on the habitats involved.
88. The proposed Development does not underlie any major aerial pathways for bird movements, either for migratory birds, for breeding birds commuting between nesting and feeding sites or for overwintering birds flying between roosting and feeding locations. Wildfowl make minimal use of the airspace above the proposed Development, likely because it is not located close to or between any important roosting or feeding sites of these species.
89. Overall only two species of nature conservation importance required assessment of potential adverse effects, because the records involved species that are insensitive to windfarm development. The key receptor species assessed were hen harrier and golden plover, classed as of high nature conservation importance. As observed in the vantage point surveys, small numbers of hen harrier use the main development area of the proposed Development for roosting during the winter months and also forage within it and the wider area but did not breed within the survey buffers. Small numbers of golden plover use the 500 m buffer of the proposed Development for roosting during the winter only.

9.3 Significance

90. The significance of the potential effects of the proposed Development on birds was determined by considering the nature conservation importance of each key receptor species, the potential magnitude of each effect spatially and temporally, taking account of bird species' behavioural sensitivity to potential effects. In making judgements on significance, consideration was given to the conservation status of, and trends within, regional populations and how the proposed Development may influence change in conservation status. Detectable changes in regional populations of receptor species are automatically considered to be significant effects under the EIA Regulations.

91. The total land-take by the proposed Development would result in the permanent loss of a very small proportion of the site's habitat. The magnitude of adverse effects on birds due to this relatively small loss is not considered to be significant for any species under the terms of the EIA Regulations.
92. Disturbance of birds during the construction phase of the proposed Development is predicted to have short-term adverse effects of negligible magnitude on bird populations. Similarly, disturbance due to the operation of the proposed Development, and mortality through collision with rotating blades, are predicted to have adverse effects of negligible magnitude. Overall, it is concluded that construction and operation of the proposed Development would not have a significant effect on birds under the terms of the EIA regulations. No mitigation would be necessary.
93. The contribution of adverse effects accrued by the proposed Development to regional populations would be undetectable and so cumulative effects of the proposed Development with other existing and planned windfarm developments in the region are judged unlikely to have a significant effect on existing bird populations.

10 Noise

94. Chapter 10 of the EIA Report presents an assessment of the potential construction and operational noise effects of the proposed Development on the residents of nearby dwellings. Noise would be emitted by equipment and vehicles used during construction of the proposed Development and by the turbines during operation. The level of noise emitted by the sources and the distance from those sources to the receiver locations are the main factors determining levels of noise at receptor locations.

10.1 Assessment

95. A noise assessment was carried out in order to determine whether the proposed Development meets planning requirements in respect of operational noise from wind turbines. The assessment takes in to account the methodologies set out within ETSU-R-97, *The Assessment and Rating of Noise from Wind Farms* (1996) and the Institute of Acoustic document, *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise*.
96. A noise limit of 30 dB L_{A90} was derived for the proposed Development which would ensure noise from the proposed Development does not add significantly to cumulative noise from other consented windfarms in the area, and to ensure that cumulative noise levels remain within relevant ETSU-R-97 noise limits.

10.2 Significance

97. The results of the operational noise assessment indicate that noise levels, when considering the proposed Development in isolation, meet the relevant noise limits and no specific mitigation is required. The noise effect is, therefore, determined to be not significant. The noise limit was derived to ensure that cumulative noise would also be within the relevant noise limits, and therefore cumulative noise from the proposed Development in conjunction with other windfarms is also determined to be not significant.
98. Construction noise levels at neighbouring dwellings are expected to meet typical requirements in this regard and no specific mitigation measures are considered to be required other than that deemed necessary under normal best practice.

11 Archaeology and Cultural Heritage

99. Chapter 11 of the EIA Report considers the likely significant effects on cultural heritage associated with the construction and operation of the proposed Development. The chapter describes the results of a desk-based assessment and field surveys and considers the view of the Local Community Councils in their Scoping Opinions. The assessment considers the potential direct effects on archaeological remains within the proposed Development site (Inner Study Area) and the indirect effects of the proposed Development on the settings of heritage assets in the wider landscape (Outer Study Area).



Figure 7 - A Cairn identified within the proposed Development site

11.1 Assessment and Mitigation

100. The layout of the proposed Development has been designed as far as possible to avoid direct effects on the identified heritage assets within the proposed Development site and all except one of the assets of high sensitivity have been avoided. Three assets of medium sensitivity would be directly affected by the proposed Development.

101. Mitigation measures have been set out that would avoid potential direct effects on three heritage assets where elements of the extensive former farmstead field systems lie in close proximity to the proposed Development infrastructure. A need for archaeological investigation mitigation has been identified in relation to three cairnfields and for one small structure likely to be directly affected by the proposed Development.

102. Where it is not possible to avoid identified heritage assets, either through the design mitigation already implemented or resulting from the need to microsite elements of the infrastructure for other environmental consideration or for engineering reasons, alternative mitigation may be required.

103. Watching briefs would be required in order to ensure that any archaeological remains encountered during ground-breaking works are identified, recorded and investigated and reported in accordance with standard good practice. If significant discoveries are made during the archaeological monitoring works and it is not possible to preserve the discovered site or features in situ, provision would be made for the excavation where necessary, of any archaeological remains encountered. The provision would include the consequent production of written reports, on the findings, with post-excavation analysis and publication of the results of the works, where appropriate.

104. Archaeological enhancement mitigation measures are set out that would benefit the archaeological record by providing a pre-development topographic Lidar survey of the archaeological landscape affected by the proposed Development. That survey would serve as a permanent archive record of the current baseline condition of the component parts of the historic landscape, facilitating future monitoring of the condition of the assets and providing a dataset for future archaeological research.

105. No monitoring measures are required in relation to predicted effects on cultural heritage.

11.2 Significance

106. A long-term significant effect is predicted on the historic landscape and on the setting of Scheduled Monument Wood Cairn within the proposed Development site. A significant cumulative effect is also predicted. No other significant effects have been identified, either directly on assets within the proposed Development site or indirectly on settings of assets in the wider area.

12 Access, Traffic and Transport

107. Chapter 12 of the EIA Report considers the likely significant effects on receptors along the transport routes resulting from vehicle movements associated with the construction and operation of the proposed Development.

12.1 Desk Study

108. The desk study included reviews and identification of relevant transport policy and accident data, as well as Ordnance Survey plans. The study also identified sensitive locations and receptors in the area, such as core paths, routes and communities. Potential origin locations of construction staff and supply locations for construction materials were used to inform the extent of local area roads network to be included in the assessment. The desk study also identified constraints to the movement of abnormal loads, through a route survey including swept path assessments.

12.2 Field Survey

109. Field surveys were also undertaken and comprised a site visit and a collection of traffic flow and speed data.

12.3 Assessment and Significance

110. The proposed Development would lead to increased traffic volumes on a number of roads in the vicinity of the proposed Development site during the construction phase. These would be temporary and short-term in duration.
111. An assessment of potential effects using guidelines from the Institute of Environmental Management and Assessment (IEMA) has been undertaken. This determined that prior to the implementation of mitigation, a moderate impact could be expected on road safety on the Newton Stewart bypass and A714 relating to the increase in heavy goods vehicle traffic operating on the route. All other indicators indicated a slight or not significant effect on receptors within the study area.
112. In order to mitigate effects, a Construction Traffic Management Plan would be prepared and agreed with the relevant Local Council and Transport Scotland prior to construction works commencing. Additionally, a police escort would be required to facilitate the delivery of the predicted loads. The police escort would be further supplemented by a civilian pilot car to assist with the escort duty. A Traffic Management Plan detailing the operation of the convoy management would also be prepared post consent.
113. With the implementation of appropriate mitigation, no significant residual effects are anticipated in respect of traffic and transport issues. The residual effects are all assessed to be slight or not significant and as they would occur during the construction phase only, they are temporary and reversible.

13 Socio-Economics, Tourism and Recreation

114. Chapter 13 of the EIA Report evaluates the effects of the proposed Development on socio-economics, tourism and recreation.
115. The largest sector of employment in the local area (shown on **Figure 8**) is wholesale and retail trade, though accommodation and food services also have a high share of employment. There is also significant employment in construction and manufacturing, and higher value sectors such as professional, scientific and technical activities are under-represented.
116. The tourism sector in Dumfries and Galloway and South Ayrshire is relatively important compared to the Scottish average. However, there are a small number of accommodation providers and tourist attractions near the proposed Development site, with the main regional tourist attractions located over 35 km away, with the exception of the Galloway Forest Park. This suggests that the area surrounding the proposed Development does not have a significant tourism presence.

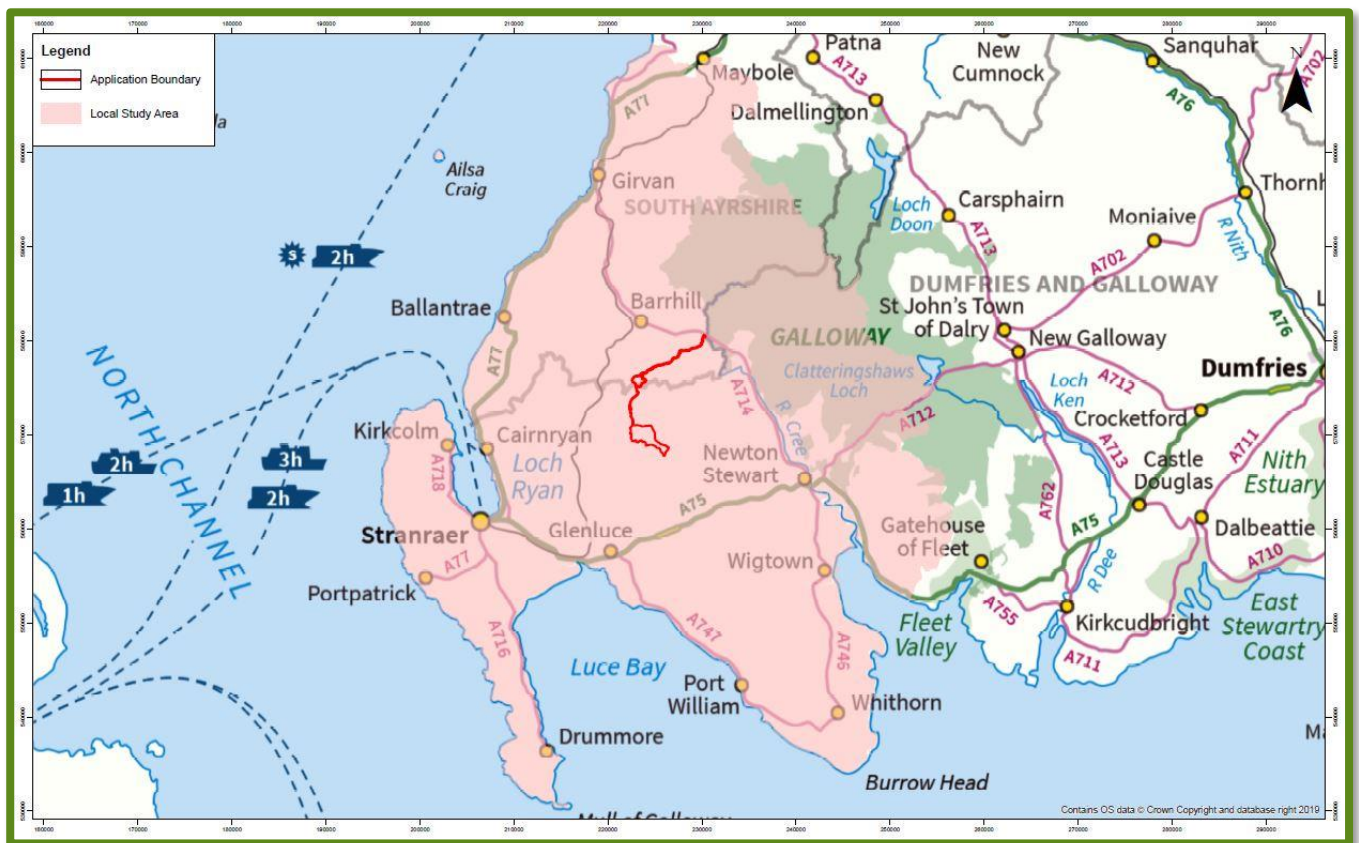


Figure 8 – Socio-economic local study area

13.1 Assessment

The assessment of economic effects was undertaken using a model to estimate the socio-economic effects of windfarm developments. These assessments were based on case studies of the local, regional and national socio-economic effects of windfarms that have been developed in the UK in recent years.

117. Based on an installed capacity of approximately 62 MW and 20 MW solar installation, the analysis found that during the construction and development phase, the windfarm component of the proposed Development could generate up to:
 - £4.7 million and 69 years of employment in Dumfries and Galloway and South Ayrshire; and
 - £21.7 million and 334 years of employment in Scotland.
118. During its operations, the windfarm component of the proposed Development could generate up to:
 - £0.5 million and 8 jobs in Dumfries and Galloway and South Ayrshire; and
 - £0.8 million and 12 jobs in Scotland.
119. The assessment also found that there would be a benefit associated with community benefit contributions, which would support the delivery of a wide variety of local community initiatives that can help to address issues such as the lack of employment opportunities. SPR is committed to sharing the benefits from its operational windfarms with local communities. This could include a community fund to deliver local initiatives/benefits in kind and the opportunity to invest in the operational proposed Development should the community choose to do so. Local communities would have the flexibility to choose how the money is spent and prioritise it on the things which matter most to them.
120. In addition, there would be benefit from the proposed Development to the public sector in the form of non-domestic rates. Given the rates paid by similar developments, the annual contribution resulting from the proposed development was estimated to be £0.7 million.

13.2 Significance

121. A review of existing evidence on the relationship between windfarm developments and the tourism economy found no evidence that negative effects should be expected. A specific assessment of the potential of the proposed Development on local tourism assets and accommodation providers also found that there were not expected to be any adverse impacts.
122. Overall, there are no significant adverse effects identified, and there are likely to be economic effects associated with the proposed Development, such as community benefit and construction expenditure, which could have positive, long-term benefits that assist the local area to overcome its economic challenges.

14 Other Issues

123. Chapter 14 of the EIA Report assesses the potential effects of the construction and operation of the proposed Development on the following matters.

14.1 Aviation

124. The installation of wind turbines has the potential to cause a variety of adverse effects on aviation interests during turbine operation, such as physical obstructions, generation of unwanted returns on radar systems, and adverse effects on overall performance of Communications, Navigation and Surveillance (CNS) equipment.
125. The closest National Air Traffic Services (NATS) radar is located at Lowther Hill, approximately 76 km north east of the proposed Development site. The nearest Ministry of Defence (MoD) facility is the range radar at the now disused West Freugh Airfield, approximately 20 km south west of the site, a further MoD facility is the Kirkcudbright Training Area, located approximately 53 km south east of the site. The proposed Development's turbines are located within a MoD "blue" low flying area, namely a relatively low concern area. The nearest licensed aerodrome is Glasgow Prestwick Airport (GPA) located approximately 57 km north east of the site.
126. A Radar Line of Sight Assessment was undertaken for the two Primary Surveillance Radar facilities at GPA. The Radar Line of Sight Assessment concluded that there is no line of sight between the two GPA Primary Surveillance Radar facilities and the proposed Development site. It is therefore highly unlikely that either facility will detect the proposed Development turbines.
127. As the proposed Development turbines would be in excess of 150 m to blade tip, they are required to be lit pursuant to *Article 222 of the UK Air Navigation Order (ANO) 2016*, with medium intensity steady red aviation warning lights, subject always to any special aeronautical study being accepted by CAA so as to reduce the amount of visible aviation lights required. It is proposed that visibility sensors are installed on the proposed Development turbines in line with the *2017 CAA Policy Statement* so that where visibility is restricted to 5 km or less from all the turbines in the proposed Development, the lights would operate at 2000 candela. Where visibility is greater than 5 km from all the turbines, the nacelle obstruction lights would be dimmed to 200 candela.
128. In summary, through both consultation and assessment, it is concluded that the proposed Development, would have no effect on aviation infrastructure, from either physical obstruction or radar interference.

14.2 Climate and Carbon Balance

129. Windfarms in upland areas tend to be sited on peatlands which hold stocks of carbon and so have the potential to release carbon into the atmosphere, in the form of CO₂ if the peat is disturbed.
130. In order to minimise the requirement for the extraction of peat, the proposed Development site design process has avoided areas of deeper peat (> 1m) where possible. Where areas of deep peat cannot be avoided floating tracks are proposed in order to avoid the requirement for excavation of deep peat.
131. The loss of carbon from the carbon fixing potential from plants and vegetation on peatland is small but is calculated for the area from which peat is removed and the area affected by drainage. The carbon stored in the peat itself represents a much larger potential source of carbon loss.

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132. To calculate the carbon emissions attributable to the removal or drainage of peat as a result of the proposed Development, emissions occurring if the soil had remained in situ and undisturbed are subtracted from the carbon emissions occurring after removal or development-related drainage.
133. This is calculated using the Scottish Government Carbon Calculator online tool. The purpose of the 'carbon calculator' is to assess, in a comprehensive and consistent way, the carbon impact of windfarm developments. This is undertaken by comparing the carbon costs of windfarm developments with the carbon savings attributable to the windfarm.
134. The calculations of total CO₂ emission savings and payback time for the proposed Development indicates the overall payback period of a windfarm with 11 turbines with an average (expected) installed capacity of 5.6 MW per turbine would be approximately 2.5 years, when compared to the fossil fuel mix (the existing energy mix within the UK) of electricity generation.
135. The proposed Development site would in effect be in a net gain situation following this time period and will contribute to national objectives of reducing greenhouse gas emissions and meeting the 'net zero' carbon targets by 2050, therefore the proposed Development is evaluated to have an overall beneficial effect on climate change mitigation.

14.3 Glint and Glare

136. This section sets out the effects of glint and glare arising from the indicative solar array areas within the proposed Development site. The assessment considers only the possible effects upon users of the Southern Upland Way as there are no other receptors in proximity.
137. For the purposes of the assessment the following definitions have been used:
- Glint - a momentary flash of bright light typically received by moving receptors or from moving reflectors.
 - Glare – a continuous source of bright light typically received by static receptors or from large reflective surfaces.
138. The term 'solar reflection' is used to refer to both reflection types, glint and glare.
139. The assessment has considered 10 locations along the Southern Upland Way with a receptor height of 1.8m (assumed average height of eye level of users of the Southern Upland Way).
140. A number of representative solar panel locations were selected from within the solar search areas to be assessed to ensure full coverage of the potential indicative solar arrays within the assessment. A 10 m resolution was used in the assessment, meaning that geometric calculations were undertaken for each receptor every 10 m from within the defined area.
141. The assessment concluded that solar reflection was geometrically possible towards the receptor locations. There were very limited times of day (less than 10 minutes per day, in the early morning period, before 7am) due to vegetation cover, when reflection was noted as a result of the indicative solar arrays. Therefore, there is no effect upon receptors as a result of the indicative solar arrays included within the proposed Development and as such, no mitigation is required.

14.4 Land Use and Forestry

142. A land use assessment was undertaken to determine the effects of a change in land use as a result of the proposed Development. The land use assessment is confined to the land within the proposed Development application boundary.
143. A desk study for the land use assessment was based on the relevant Ordnance Survey mapping and the Macaulay Institute Land Capability for Agriculture (LCA) map, which ranks the suitability of land in Scotland for agricultural use.
144. Site surveys have confirmed the land within the application boundary is used mainly for livestock grazing, with a small area of commercial forestry plantation and existing access tracks for the operational Kilgallioch Windfarm.
145. Approximately 5.8 ha of the Development Area is, or was recently, planted with commercial forestry, while the rest is agricultural grazing.
146. 3.4 ha of the forestry land was felled in 2019, with the remaining 2.4 ha due to be felled in 2030. Both areas are currently due to be replanted with commercial forestry following felling. Due to its current use as forestry plantation, this area of land is excluded from agricultural land loss.

147. The applicant will comply with the Scottish Government's 'Control of *Woodland Removal Policy*', and off-site compensatory planting will be provided to offset the area felled for the construction of a section of access track through commercial forestry plantation.
148. Construction and operation of the proposed Development is anticipated to have a negligible effect on forestry. This is reduced to no effect with the implementation of compensatory planting to offset the permanent forestry loss during operation of the proposed Development.
149. Land take from agricultural classes is anticipated for the construction and operation of the Development Area. However, this is anticipated to have no effect on agricultural land capacity within Dumfries and Galloway as a whole or the long-term land use of the proposed Development site.
150. Mitigation measures, including the correct storage of soils and reinstatement of agricultural land not required following construction, would ensure that the land not required can be returned to agricultural use.

14.5 Telecommunications

151. Wind turbines can potentially cause interference to telecommunication links resulting from the presence of obstructions (the turbines) and movement of the blades.
152. Telecommunications operators were consulted, and information requested for telecommunications links within close proximity of the site. Ofcom's online Wireless Telegraphy Register was also consulted for any fixed link or business radios within 2 km of the proposed Development main development area (Ofcom, 2019). The portal showed no fixed telecommunication links within 2 km of the main development area and three business radio transmitters, operated by SPR, located within the operational Kilgallioch Windfarm site.
153. In summary, through consultation, it is concluded that the proposed Development, would have no effect on any telecommunication interests.

15 Benefits of the Proposed Development

154. The proposed Development would deliver benefits within the development area and also the wider community.
155. Based on a calculated capacity factor², the annual indicative total power output for the proposed Development would be approximately 165.24 gigawatt (GW) hours per annum, indicating the proposed Development would generate enough electricity to power over 44,000 average UK households (based on average electricity consumption per household in the UK quoted by the Department of Business, Energy and Industrial Strategy (BEIS), of 3,729 kWh per year).
156. Existing land and infrastructure such as tracks and substation of the operational Kilgallioch Windfarm would be efficiently utilised.
157. The offering of a package of community benefits to local communities which would support the delivery of a wide variety of local community initiatives that could help to address local issues such as a lack of employment opportunities.

This could include the opportunity to invest in the operational windfarm, providing a long-term, flexible revenue which could be used to support community projects within Dumfries and Galloway and South Ayrshire.

² The load factor is calculated by RenewableUK as a rolling average of the past five years using data from the Digest of UK Energy Statistics published by the Department of Business, Energy and Industrial Strategy in July 2019.

158. Potential savings in CO₂ emissions due to the replacement of other electricity sources over the lifetime of the windfarm which are approximately:

- 132,000 tonnes of CO₂ per year over coal-fired electricity);
- 36,000 tonnes of CO₂ per year over grid-mix of electricity; or
- 65,000 tonnes of CO₂ per year over a fossil fuel mix of electricity.

159. Carbon-emitting generation will be displaced after 2.5 years.

160. Based on an installed capacity of approximately 62 MW, and up to 20 MW solar capacity, the proposed Development could generate during construction up to:



Figure 9 - Arnshean Park Opening Day, Barrhill

- £4.7 million GVA and 69 years of employment in Dumfries and Galloway and South Ayrshire;
- £21.7 million GVA and 334 years of employment in Scotland;
- Opportunities for suppliers of a wide range of goods and services within Dumfries and Galloway and South Ayrshire and Scotland as a whole; and
- Benefits to some local businesses, such as accommodation providers and shops, that supply goods and services to construction workers.

161. And during operation:

- £0.5 million GVA and 8 jobs in Dumfries and Galloway and South Ayrshire; and
- £0.8 million GVA and 12 jobs in Scotland.



Figure 10 – The proposed extension site showing the operational Kilgallioch Windfarm turbines

162. A Habitat Management Plan (HMP) will be implemented and monitored in order to ensure the delivery of positive land management for the benefit of landscape and nature conservation. The HMP would focus on restoration of wet modified bog through the blocking of drains in areas where historical drainage channels are most concentrated. The HMP identifies two separate areas for enhancement, both which consist of poor quality wet modified bog habitat as a result of historical land practices and would benefit from enhancement. Both areas are located within the Kirkcowan Flow SAC, adjacent to the Site. The HMP works and peatland restoration works undertaken as part of the proposed Development are expected to have a positive impact on the overall site condition of the SAC and SSSI, as well as benefits to ecology (including improvements to priority habitat) and ornithology.
163. A package of archaeological enhancement measures is proposed that would promote the archaeological interest of the proposed Development site to the wider public. The provision of a network of tracks would improve accessibility to this part of the Tarf Water landscape and to the historic landscape that is preserved within the proposed Development site. The Southern Upland Way (SUW) passes close by, to the west of the proposed Development site and it is proposed that the provision of publicity of the historic medieval/post-medieval farms would provide an opportunity for users of the SUW to avail themselves of the improved access provision to explore these well-preserved archaeological sites.
164. Additionally, an airborne Lidar survey of the moorland would be commissioned with the aim to provide an accurate and detailed topographical record of the surviving archaeological remains of the historic landscape within the study area. The Lidar survey would be undertaken to a standard and level of detail that would provide a baseline record of the surviving earthwork remains that would provide the Dumfries and Galloway Council Archaeology Service with a resource that could facilitate future management and monitoring of the cultural heritage resource of the historic farming landscape. The Lidar data would be available for public consultation and research.

16 Summary

165. Environmental constraints and considerations have been taken into account in the proposed Development site layout and windfarm design. This has enabled potentially significant effects to be avoided. Further measures to prevent or reduce any remaining significant environmental effects are described within each environmental discipline Chapter of the EIA Report.
166. Mitigation measures as detailed in the EIA Report have been identified to protect the environment prior to or during construction and operation of the proposed Development.
167. SPR and the Principal Contractor would oversee operations and ensure that mitigation measures are implemented, and activities carried out in such a manner as to minimise or prevent effects on the environment. The Principal Contractor would be supported by specialists such as an Ecological Clerk of Works to ensure that the mitigation measures are implemented effectively.
168. Throughout the design evolution of the proposed Development layout, a key driver was the consideration of potential landscape and visual effects on receptors and how the proposed Development would relate to the existing landscape character as well as existing windfarms in the landscape. In particular, regard was had to the scale and number of turbines proposed, cumulatively with existing windfarms in the area, in particular the adjacent operational Kilgallioch Windfarm. The landscape and visual effects potentially caused by the proposed Development have been considered extensively from key receptors. The resulting analysis has been an important input into the design evolution process of the proposed Development and in particular to the layout design of proposed turbines.
169. Provided that the proposed mitigation measures are successfully implemented, the residual effects related to most environmental disciplines would not be considered significant in the context of the EIA Regulations with the exception of landscape and visual and cultural heritage effects on and in close proximity to the site.
170. All onshore windfarm development is likely to give rise to some significant landscape and visual effects. In the case of the proposed Development, the significant effects on landscape character and visual amenity would be contained within a relatively close area around the site when compared with other windfarm developments of this scale. It is considered that the landscape is capable of accommodating the proposed Development, and that significant effects on the existing landscape character or visual amenity are relatively contained.
171. The layout of the proposed Development has been designed as far as possible to avoid direct effects on the identified heritage assets within the Site. Archaeological enhancement mitigation measures are set out that would benefit the archaeological record by providing a pre-development topographic Lidar survey of the archaeological landscape. That survey would serve as a permanent archive record of the current baseline condition of the component parts of the historic landscape, facilitating future monitoring of the condition of the assets and providing a dataset for future archaeological research.
172. The proposed Development would represent an important environmental benefit in that it involves the generation of electricity from a renewable energy source that would reduce or avoid the use of fossil fuels through the contribution of electricity generated from other sources of energy maximising the use of the Operational Kilgallioch Windfarm infrastructure. Global climate change is recognised as one of the greatest environmental, social and political challenges facing the world today. The proposed Development would make a swift and meaningful contribution to the Scottish Government's uncapped target of generating the equivalent of 100% of electricity demand from renewable sources beyond 2020..

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