Vale of Leven Wind Farm Limited

Vale of Leven Wind Farm

Environmental Impact Assessment Report (Volume 1)

Chapter 14 – Other Issues

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14 OTHER ISSUES

14.1 Introduction

14.1.1 Within this chapter, the potential effects of the construction and operation of the Proposed Development on Telecommunications, Infrastructure, Shadow Flicker, Forestry and Climate Change are described and assessed.

14.1.2 Issues scoped out based on professional judgement and the response to scoping consultation are described in Section 14.6.

14.2 Telecommunications

Introduction

14.2.1 This Section of the chapter describes the existing environment and assesses the potential impacts with respect to wireless transmission infrastructure e.g., telecommunications, telemetry, microwave, broadcast, etc. For ease of reference, in this chapter all wireless transmission infrastructure is referred to as Telecommunications.

14.2.2 During operation, wind farms have the potential to cause an impact on telecommunications infrastructure by introducing new physical structures into an area that can block and/or reflect radio signals.

Legislation, Policies and Guidance

- International Telecommunications Union (1992), Assessment of impairment caused to television reception by a wind turbine, Recommendation ITU-R BT805;
- Scottish Government. 2001. Planning Advice Note 62: Radio telecommunications. Available at: https://www.gov.scot/publications/pan-62-radio-telecommunications/
- International Telecommunications Union (2010), ITU-R BT.2142-1;
- Bacon (2002), A proposed method for establishing an exclusion zone around a terrestrial fixed radio link outside of which a wind turbine will cause negligible degradation of the radio link performance; and
- Joint Radio Company (2014): Calculation of Wind Turbine clearance zones for JRC UHF (460MHz) Telemetry Systems when turbine sizes and locations are accurately known – Issue 4.2

Consultation

14.2.3 Consultation was undertaken at EIA scoping stage with the relevant telecommunication link operators to inform the telecommunication links within the vicinity of the Proposed Development and to advise their position with respect to the Proposed Development. A summary of the consultation is provided in **Table 14.14.1**.

14.2.4

Table 14.14.1: Link Operator Responses

Link Operator	Consultation Summary	Comment / Action Taken
Atkins Limited	The application has been examined in relation to UHF Radio Scanning Telemetry communications used by our Client in that region, and we are happy to inform you that we have NO OBJECTION to your proposal.	No further action required.
Arqiva	We have considered whether this development is likely to have an adverse effect on our operations and have concluded that we have no objection.	No further action required.
British Telecom (BT)	The Proposed Development should not cause interference to BT's current and presently planned radio network.	No further action required.
Joint Radio Company (JRC)	Proposal has no radio link infrastructure operated by Scottish Hydro and Scotia Gas Networks, therefore, JRC does not foresee any potential problems based on known interference scenarios and the data provided at Scoping.	No further action required.

Existing Environment

14.2.5 Telecommunications link infrastructure in the vicinity of the Proposed Development was identified through consultation with the relevant telecommunications stakeholders. The search radius was, therefore, informed by the safeguarding criteria applied by each stakeholder.

14.2.6 Through the consultation process and stakeholder responses, it was identified that no telecommunication links overlap the application boundary.

Predicted Impacts

14.2.7 From the consultation responses received, there is no indication that the Proposed Development would interfere with telecommunications links. No impacts on any identified telecommunications assets are predicted.

Mitigation

14.2.8 No impacts on any identified telecommunications assets are predicted. Therefore, no mitigation is required.

14.3 Shadow Flicker

Introduction

14.3.1 This section of the chapter considers the potential effects of shadow flicker on receptors arising from the Proposed Development.

14.3.2 Shadow flicker may occur under certain combinations of geographical position and time of day when the sun passes behind the rotors of a wind turbine and casts a shadow over neighbouring properties. Rotating wind turbine blades can cause brightness levels to vary periodically at locations where they obstruct the sun's rays. As the blades rotate, the shadow flicks on and off, an effect known as shadow flicker. The effect is most likely to be an issue inside buildings, where the flicker appears through a window opening. This can result in a nuisance when the shadow is cast over the windows of residential properties. Shadow flicker can be a cause of annoyance at residences in the vicinity of wind turbines if it occurs for a significant period during the year.

Legislation, Policies and Guidance

14.3.3 The Shadow Flicker assessment has been carried out in accordance with the principles contained within the following publications:

- Renewable and low carbon energy. Paragraph: 020 Reference ID: 5-020-20140306. Revision date: 06 03 2014;
- Parsons Brinckerhoff, 2011 – Update of UK Shadow Flicker Evidence Base, Department for Communities and Local Government, July 2013, Planning practice guidance for renewable and low carbon energy; and •
- Department for Communities & Local Government (July 2013): Planning practice guidance for renewable and low carbon energy

Consultation

14.3.4 In their scoping response, WDC welcomed the proposed approach to shadow flicker which involved undertaking a detailed assessment if there were any receptors within 10 rotor diameters.

Scope and Methodology

14.3.5 The magnitude of the shadow flicker effect varies both spatially and temporally and depends on several environmental conditions coinciding at any particular point in time, including, the position and height of the sun, wind speed and direction, cloudiness, and proximity of the turbine to a sensitive receptor. To undertake a shadow flicker assessment, information on the Proposed Development, the location of potential residential receptors and other parameters are included in a computer model in order to predict and quantify the impact shadow flicker may have on receptors within the vicinity of the Proposed Development.

14.3.6 It is common practice to use a multiplier of the equivalent of 10 rotor diameters as a maximum separation distance between a turbine and an affected residence[1], within which

[1] Update of UK Shadow Flicker Evidence Base. Available at:: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48052/1416-update-uk-shadow-flicker-evidence-base.pdf.

shadow flicker effects can occur. However, in line with 50 metre micrositting allowance applied for the Proposed Development, a multiplier of the equivalent of 10 rotor diameters plus 50 metres from each proposed wind turbine has been established as the shadow flicker study area.

14.3.7 The shadow flicker study area (1,750m buffer distance from each proposed turbine) that was taken into consideration in the assessment is illustrated on **Figure 14.1**.

Existing Environment

14.3.8 Whilst examining the established study area in relation to potential shadow flicker receptors within the vicinity of the Site, it has been identified that no residential dwellings fall within the shadow flicker study area. This is confirmed by **Figure 14.1** which illustrates the shadow flicker study area in relation to residential dwellings within the vicinity of the Proposed Development. Therefore, no shadow flicker impact or effect on any residential receptors is predicted.

Predicted Impacts

14.3.9 Since no shadow flicker effects are expected to occur as a result of the Proposed Development, no impacts are predicted.

Mitigation

14.3.10 No impacts on any identified residential dwellings are predicted. Therefore, no mitigation is required.

14.4 Trees and Woodland

Introduction

14.4.1 This section of the chapter describes the impacts of the Proposed Development on woodland and forestry located within the application boundary.

14.4.2 The impact on forestry and woodland has been assessed in full in **Technical Appendix 14.1**.

Legislation, Policies and Guidance

14.4.3 The following legislation, policy and guidance have been considered in the assessment and are detailed further in **Technical Appendix 14.1**:

- Scottish Forestry Strategy 2019 – 2029.
- The Land Use Strategy for Scotland 2016 – 2021.
- Town and Country Planning (Scotland) Act 1997 (as amended).
- National Planning Framework 4. Policy 6.
- Forestry and Land Management (Scotland) 2018.
- Forestry and Land Management (Scotland) Act 2018 – felling.
- Forestry (Environmental Impact Assessment) (Scotland) Regulations 2017 – compensatory planting.
- Policy on the Control of Woodland Removal.

Scope and Methodology

14.4.4 A site visit was undertaken on 30th June 2023 to assess the extent and condition of woodland that may be affected from the Proposed Development. During the site visit, asmall area (approximately 0.06 ha) of woodland which is likely to be affected by the construction of the access track for the Proposed Development was assessed with species, height, and diameter at breast height (DBH) being recorded in the Tree Schedule within **Technical Appendix 14.1**.

Consultation

14.4.5 The relevant forestry stakeholders were consulted regarding the potential effects of the proposed Development as part of the scoping process. A summary of consultation is provided in in **Table 14.2**.

Table 14.2: Summary of Scoping Responses

Consultee	Date	Comment	Action
Scoping Response			
Scottish Forestry	16th May 2022	*'In summary, the applicant is to be commended on their proposals to assess and, where necessary, mitigate any impact on the forestry and woodland resources within and adjacent to the site.'*	Full details of compensatory planting scheme are provided in **Technical Appendix 14.1** and **Technical Appendix 6.6**
Kilmaronock Community Council	23rd May 2022	Do consultees consider woodland translocation as a suitable proposal for compensatory planting? *'If it works. Compensatory planting should be considered as an additional measure anyway.'* Do consultees agree that a 15 m root protection zone is a suitable buffer from AWI for ancillary development? *'No objection.'* Do consultees agree that impacts on the unnamed AWI can be scoped out? *'No objection.'*	Full details of compensatory planting scheme are provided in **Technical Appendix 14.1** and **Technical Appendix 6.6**
Nature Scot	26th May 2022	*'We note that the applicant proposes that woodland loss to the south of the site will be minimised as far as practicable, by the design of the access route. Where it is not practicable to avoid woodland removal by layout of the access route, woodland translocation is proposed as a compensatory*	Full details of forestry loss and compensatory planting scheme are provided in **Technical Appendix 14.1** and **Technical Appendix 6.6**

Consultee	Date	Comment	Action
Scoping Response			
		measure. The applicant should refer to The Scottish Government's Policy on Control of Woodland Removal, and should discuss proposals for woodland translocation or compensatory planting with Scottish Forestry.'	
West Dunbartonshire Council (WDC)	10th June 2022	*'In regard to the translocation of ancient woodland, all published work (including translocation Best Guidance and the JNCC Translocation Policy for Britain) state that translocation of ancient woodland is only ever an option of last resort. LDP policy ENV4 states that development that involve the loss or fragmentation of long established woodland or high conservation value woodland or those covered by a tree preservation, will only be supported where any significant adverse effects are clearly outweighed by significant social or economic benefits and where:* *Measures can be taken to conserve the nature conservation interest through planning conditions; and/or The conservation interest loss can be compensated for by habitat creation or site enhancement elsewhere by planning agreements or conditions.'*	Full details of compensatory planting scheme are provided in **Technical Appendix 14.1** and **Technical Appendix 6.6**

Statutory and Planning Context

14.4.6 Policy 6 of the new National Planning Framework 4 (NPF4) is a material consideration and states that *"development proposals will not be supported where they will result in any loss of ancient woodlands, ancient and veteran trees, or adverse impact on their ecological condition"*.

14.4.7 When considered in its entirety, Policy 6 does state that *"development proposals that enhance, expand, and improve woodland and tree cover will be supported"* and that *"development proposals involving woodland removal will only be supported where they will achieve significant and clearly defined additional public benefits in accordance with relevant Scottish Government policy on woodland removal. Where woodland is removed, compensatory planting will most likely be expected to be delivered".*

14.4.8 The Proposed Development, through the construction of the proposed access track, will result in the removal of a small area of woodland, and therefore must be assessed against

the requirements of the Scottish Governments Control of Woodland Removal Policy (2009) (CoWRP).

14.4.9 There is a strong presumption against woodland removal within the CoWRP and Policy 6 of NPF4 for woodland recorded on the Ancient Woodland Inventory (AWI) including Long-Established Woodland of Plantation Origin 2b (LEPO 2b) if they have a significant biodiversity interest or well established semi-natural priority woodland sites.

14.4.10 Removal of such woodland should only be permitted where it would achieve significant and clearly defined additional public benefits.

Existing Environment

14.4.11 The Native Woodland Survey of Scotland (NWSS) identifies the area of Barr Wood to be impacted by the Proposed Development as native woodland with Upland Oakwood being the dominant habitat.

14.4.12 Barr Wood extends to approximately 3.1 ha and is located at an elevation of approximately 90 m - 120 m on the west facing slopes of Auchenreoch Muir above Murroch Farm approximately 2.5 km northeast of Dumbarton.

14.4.13 The area of Barr Wood that would be impacted should the proposed development be consented is a shelterbelt type woodland running for approximately 600 m in a north to south direction between the Murroch Glen woodlands and mixed broadleaved/conifer woodlands to the south.

14.4.14 The shelterbelt varies from 20 m - 30 m in width and is bounded by deep drainage ditches and mostly mature beech trees on either side. The beech trees are not native to Scotland and are thought to have been managed as a hedge in the past.

14.4.15 The woodland between the two overgrown hedges is considerably sparse with a few semi-mature Downy Birch, Scots Pine, and Willow present but for much of its extent, tree cover is absent and there are no young/immature trees.

14.4.16 Within the NWSS, Barr Wood has been included within the adjacent and more extensive Murroch Glen woodland which has a far more diverse woodland structure and species composition compared to Barr Wood, which has few semi-natural characteristics and is representative of a woodland in decline.

14.4.17 This lack of significant biodiversity interest indicates more flexibility for woodland removal within the CoWRP and with appropriate compensatory planting it is considered that the proposed removal would be acceptable within the requirements of the policy.

Predicted Impacts

14.4.18 None of the proposed turbine locations are within woodland, but the proposed access route will pass through Barr Wood, part of the Vale of Leven (East) Tree Preservation Order (TPO No DCC 2) and recorded on the Ancient Woodland Inventory (AWI) as Long-Established Woodland of Plantation Origin 2b (LEPO 2b).

14.4.19 The area of Barr Wood to be impacted by the access route is close to its northern extent and approximately 45 m from where it meets the adjacent Murroch Glen Woodlands. It is comparatively well stocked with Downy Birch growing between the overgrown Beech and

was chosen in consultation with the landowner to avoid negative impacts on a key silage field.

14.4.20 Assuming a construction corridor of 20 m in width, the access track for the Proposed Development will impact upon a small area (approximately 0.06 ha) of woodland resulting in the felling of a maximum number of 28 mature/semi-mature beech hedgerow trees and 3 mature Downy Birch to facilitate construction of the track, some of which are already partially windblown and/or suffering from extensive decay.

14.4.21 The trees to be removed range in height from 4.5 – 17.3 m and have a wide range of diameters including several multi stem specimens, several windblown trees and, in the case of T1 & T2 (Appendix 1, **Technical Appendix 14.1**), trees with evidence of significant basal decay.

Mitigation

14.4.22 Micro-siting of the access track will be used to minimise the impact on trees with a competent Woodland Manager/Arboriculturist advising at the time of marking out the track. This will help to minimise the final number of trees to be felled.

14.4.23 Cut and fill road construction methods should be avoided or minimised, the use of "no-dig" geogrid root protection materials should be used to protect roots from damage caused by compaction of soil arising from vehicular traffic.

14.4.24 Compensatory planting will be secured by a condition of planning consent and a Compensatory Planting Plan (CPP) will be developed as part of the Outline Biodiversity Enhancement Management Plan (OBEMP) in accordance with the UK Forestry Standard for approval by Scottish Forestry with works being implemented in accordance with good forestry practice.

14.4.25 The OBEMP has identified up to 111ha of potential new native woodland (Search Area B) all within the same land ownership as that of the wind farm. This considerably exceeds the minimum requirement for compensatory planting and would deliver significant public benefits far outweighing the adverse impacts arising upon trees and woodland from the proposed development. See **Technical Appendix 6.6.**

14.4.26 Significant areas of Barr Wood are devoid of trees and more representative of grassland than of a woodland habitat. These areas offer opportunities for enrichment planting to increase species composition and structural diversity within the woodland whilst strengthening what is a declining woodland habitat.

14.4.27 There are approximately 1 ha of open areas at Barr Wood which should be planted with a range of native tree species suited to the site.

14.4.28 In addition to the compensatory planting, the loss of woodland and the veteran trees should be compensated for by the creation of new deadwood habitats nearby to allow those invertebrates and fungi resident within the trees the opportunity to relocate.

14.4.29 To achieve this, the intact trunks of veteran trees should be relocated in an upright state near other nearby veteran trees within the woodland and the trunks of the other felled trees should be relocated into the same areas in both an upright and felled state.

Summary of Residual Effects

14.4.30 In summary, if the Proposed Development were to proceed this would result in the removal of 0.06 ha of woodland including the felling of up to 31 trees to facilitate the access route to the site.

14.4.31 The woodland to be removed is identified as LEPO 2b on the AWI. However, semi-natural woodland characteristics are rare or absent, and therefore residual effects on woodland recorded on the AWI will not be significant.

14.4.32 The proposed works outlined in the OBEMP to be secured through a planning condition will significantly expand the native woodland resource locally whilst also creating new and enhancing existing forest habitat networks.

14.4.33 The wide-ranging benefits arising from woodland mitigation works will far outweigh the adverse impacts on 0.06 ha of woodland.

14.4.34 Having considered the conditions of woodland that will be affected by the construction of the access track, and the proposed native woodland planting that will outweigh compensatory planting requirements, no negative effects are anticipated from the Proposed Development.

14.5 Carbon Balance

Introduction

14.5.1 Wind turbines and battery energy storage systems (BESS) provide an important mechanism for the reduction of carbon dioxide (CO_2), and other greenhouse gas (GHG) emissions into the atmosphere by reducing the consumption of fossil fuel generated mains electricity. However, during their manufacture, construction and decommissioning, wind farms can themselves result in GHG emissions, particularly in such instances as where natural carbon stores, such as peat, are present and potentially impacted by the development.

14.5.2 For this reason, this chapter section provides a sense of:

- the GHG emissions associated with the manufacture, construction and decommissioning of the Proposed Development; and
- the contribution which the Proposed Development would make towards the reduction of emissions, which would otherwise be produced by fossil fuel power generation.

14.5.3 Taken together, these two elements indicate the whole-life “carbon balance” of the Proposed Development, together with an understanding of the “emissions payback” period. Once emissions resulting from the manufacture, construction and decommissioning of the Proposed Development have been “paid back” (offset) by the wind farm, all subsequent wind-generated electricity would displace a similar amount of conventionally generated electricity, thereby contributing to an overall GHG reduction.

14.5.4 Although often colloquially termed “carbon balance”, the assessment includes all GHGs, not just carbon dioxide. The results are presented in tonnes of carbon dioxide equivalent (tCO_2e), where equivalence means having the same warming effect as CO_2 over 100 years.

Scope and Methodology

14.5.5 Whilst the Proposed Development is expected to deliver GHG savings over its lifetime, it could also cause GHG emissions through:

- disturbance of peatland;
- felling of forestry; and
- lifecycle emissions in turbines, BESS and other infrastructure.

14.5.6 The GHG assessment of the Proposed Development has been undertaken using the latest version (V1.7.0) of the Scottish Government's Carbon Calculator Tool, which is the standard way of assessing GHG emissions and savings from onshore windfarm developments. A detailed explanation of the Scottish Government's Carbon Calculator Tool methodology is found within **Technical Appendix 14.2**. In brief, the calculator uses project-specific data from the construction of the Proposed Development (**Chapter 2: Proposed Development**) and the receiving environment **(Chapters 8 – 14**), particularly with regards to peat disturbance and the felling of forestry. This allows GHG emissions and avoidance to be quantified across the project lifecycle stages (construction, operation and decommissioning/site restoration).

14.5.7 Calculations are provided for minimum, maximum and expected scenarios, whereby the minimum scenario assumes the lowest energy output and the lowest carbon losses from the Proposed Development, and the maximum assumes highest energy output and highest carbon losses. The expected scenario is based on 10 turbines with an anticipated installed capacity of 7.0 MW and capacity factor of 25.3%.

14.5.8 The Scottish Government's Carbon Calculator Tool includes embodied emissions from turbines and their foundations, but not for BESS. As such, a supplementary life cycle analysis of BESS has been conducted and integrated within the calculator outputs. Overall, LCA studies on BESS have found that the manufacturing stage has the greatest impact in terms of embodied GHG emissions. Lithium-ion batteries are the most common choice of battery technology, with several examples of Lithium-ion BESS supporting wind and solar farms in the UK. A study undertaken by Romare and Dahllöf (2017) indicates that the cradle to grave emissions of a lithium-ion battery is in the region of 150-200 kg CO_2e/kWh. Although this assessment was undertaken for batteries for light-duty vehicles, Lait and Walker (2022) suggest that there is a near-linear scale of GHG emissions when battery size increases. A BESS with 40 MWh energy storage capacity is proposed as part of the Proposed Development

14.5.9 The GHG emissions and savings are combined to establish the overall (net) GHG effect of the Proposed Development, as well as its carbon payback period.

14.5.10 Results from this assessment are reported below in accordance with IEMA's *Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance* (2022).

Significance

14.5.11 Given the international urgency of climate change, the sensitivity of the receptor (i.e. the global climate) to fluctuations in GHG emissions is considered 'Very High'. Thus, the level of the significance of effects is determined by the magnitude, and timing, of GHG emissions and the likelihood of avoiding severe climate change. As this Development will

contribute significantly to the avoidance of GHG emissions in the short term, it will be greatly beneficial towards the Scottish Government's 2030 renewable energy targets.

14.5.12 Aligned with IEMA's Guidance to Assessing GHG Significance (2022), any project that causes GHG emissions to be avoided or removed from the atmosphere has a beneficial effect that is always significant. In such a scenario, the project substantially exceeds the national net zero requirements and is thus aligned with the goal of the Paris Agreement to limit temperature rise to well below 2°C, aiming for 1.5°C. The Scottish Government's legally binding net zero targets are also aligned with the Paris Agreement.

Table 14.3: IEMA's Guidance to Assessing GHG Significance (2022) Framework for assessment of significant effects

Significance	Level	Criteria
Significant	Major adverse	Project adopts a business-as-usual approach, not compatible with the national Net Zero trajectory, or aligned with the goals of the Paris Agreement (i.e., a science-based 1.5°C trajectory). GHG impacts are not mitigated or reduced in line with local or national policy for projects of this type.
	Moderate adverse	Project's GHG impacts are partially mitigated, and may partially meet up-to-date policy; however emissions are still not compatible with the national Net Zero trajectory, or aligned with the goals of the Paris Agreement.
Not significant	Minor adverse	Project may have residual emissions, but the project is compatible with the goals of the Paris Agreement, complying with up-to-date policy and good practice.
	Negligible	Project has minimal residual emissions and goes substantially beyond the goals of the Paris Agreement, complying with up-to-date policy and best practice.
Significant	Beneficial	Project causes GHG emissions to be avoided or removed from the atmosphere, substantially exceeding the goals of the Paris Agreement with a positive climate impact.

Legislation, Policies and Guidance

The carbon balance assessment has been carried out in accordance with the principles contained within the following publications:

- IEMA (2022) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance.
- Lait and Walker (2022) Longer Duration Energy Storage. Available at : https://post.parliament.uk/research-briefings/post-pn-0688/
- NatureScot et al. (2019) Good Practice during Wind Farm Construction, Fourth Edition; A joint publication by Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency, Forestry Commission Scotland, and Historic Environment Scotland. Available at https://www.nature.scot/doc/guidance-good-practice-during-wind-farm-construction

- Romare, M., and L. Dahllöf (2017) The Life Cycle Energy Consumption and Greenhouse Gas Emissions from Lithium-Ion Batteries, A Study with Focus on Current Technology and Batteries for light-duty vehicles. IVL Swedish Environmental Research Institute Ltd. C 243
- Scottish Government Carbon Calculator Tool (2023) https://informatics.sepa.org.uk/CarbonCalculator/index.jsp
- Scottish Government (2022), National Planning Framework 4. Available at National Planning Framework 4: revised draft - gov.scot (www.gov.scot)
- Scottish Planning Policy (SPP: 2014) Scottish Planning Policy. Available at: https://www.gov.scot/publications/scottish-planning-policy/pages/3/
- SEPA Guidance regarding Life Extension and Decommissioning of Onshore Windfarms; 2016. Available at: https://www.sepa.org.uk/media/219689/sepa-guidance-regarding-life-extension-and-decommissioning-of-onshore-windfarms.pdf
- United Nations Framework Convention on Climate Change (2015) Adoption of the Paris Agreement, 21st Conference of the Parties, Paris: United Nations. Available at: https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement
- The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019. Available at: https://www.legislation.gov.uk/asp/2019/15/contents
- Scottish Climate Change Plan (SCCP: 2018) Climate Change Plan: third report on proposals and policies 2018-2032 (RPP3). Available at: https://www.gov.scot/publications/scottish-governments-climate-change-plan-third-report-proposals-policies-2018/pages/3/
- West Dunbartonshire County Council (2021) Climate Change Action Plan. Available at: Climate Change Action Plan (west-dunbarton.gov.uk)

Consultation

14.5.13 No consultation has been undertaken in relation to climate change mitigation issues beyond the scoping process. Scoping responses which referenced carbon emissions and climate change mitigation are shown in **Table 14.4**.

Table 14.4: Carbon balance scoping consultation responses

Consultee	Date	Comment	Action
Scoping Response			
John Muir Trust	24th May 2022	*'We did note with disappointment that nine of the proposed turbines would be sited on peat (2 turbines on class 1 peatland and 7 on class 2 peatland) and that peatland covers about a third of the site. We would welcome a thorough assessment of the peatland impacts of the proposed development with a peatland management plan that includes habitat restoration plans. We would also welcome an accurate estimate of the whole lifecycle carbon emissions*	Geology, Hydrology, and Peat matters, including mitigation measures are covered in detail in **Chapter 8** and relevant technical appendices. Peatland restoration opportunities are also detailed in **Technical Appendix 6.6.** An accurate estimate of the whole lifecycle carbon emissions from

Consultee	Date	Comment	Action
Scoping Response			
		from the proposed development. As a site within the Kilpatrick Hills we also noted that for people living in Dunbarton this could be a valued local wild place and so we would welcome assessment of any potential lost recreational opportunity for local people.'	the proposed development is available as a carbon calculator, presented in **Technical Appendix 14.2.**

Statutory and Planning Context

14.5.14 Planning and energy policy and legislation, including national and local policy objectives and legal requirements in relation to climate change, are summarised in Chapter 4: Planning Policy Context and in a standalone Planning Statement submitted with the EIAR as part of the section 36 application. Both national and local policy recognise that planning should consider the contributions a proposed development makes towards achieving the climate change targets. Guidance and legislation relating specifically to carbon and GHG emissions are listed below.

Scottish Planning Policy (2014)

14.5.15 The Scottish Planning Policy (SPP, 2014) states that "where peat and other carbon-rich soils are present, applicants should assess the likely effects of development on carbon dioxide (CO_2) emissions. Where peatland is drained or otherwise disturbed, there is liable to be a release of CO_2 into the atmosphere. Developments should aim to minimise this release".

Good Practice During Wind Farm Construction, NatureScot et al. (2019)

14.5.16 The SNH, now NatureScot, 'Good Practice During Wind Farm Construction' guidance recognises that one of the key aims of wind farm development is to reduce carbon emissions. However, wind farm developments, through the materials used, during the construction processes employed and the potential emissions from disturbed soils and habitats, do result in carbon emissions.

14.5.17 The guidance recognises that, in some circumstances, the carbon payback of wind farm developments could be significantly affected by the construction methods used and the degree of restoration of the site. The guidance, therefore, seeks to ensure that good practice is adopted to reduce the carbon emissions associated with wind farm development.

West Dunbartonshire Climate Change Action Plan (2021)

West Dunbartonshire Council launched a new Climate Change Strategy in January 2021 setting a long term target for West Dunbartonshire becoming net zero by 2045, following a similar trajectory to the national target set for Scotland as a whole. Part of the strategy included the development and implementation of a renewable energy strategy, providing a supportive framework for the growth of the renewable sector.

Existing Environment

14.5.18 Baseline environmental conditions in relation to potential climate change impacts from the Proposed Development include existing carbon stored in the site (such as peat and forestry) that could be impacted by the Proposed Development resulting in CO_2 and other GHG emissions.

Peat

14.5.19 Peat depth and condition surveys were undertaken in November 2022 for areas of proposed infrastructure. The peat depth surveys and reconnaissance survey confirm that peat deposits are shown within the northern and eastern extent of the Proposed Development whilst glacial till deposits are found to the west and south. For further information on the peatland habitat within the site, consult **Chapter 8: Geology, Hydrogeology, Hydrology and Peat**.

Forestry

14.5.20 None of the proposed turbine locations are directly within woodland, but the proposed access route will pass through Barr Wood, thus requiring felling to take place.

Design Considerations

14.5.21 Peat disturbance has been considered during the design process, which has sought to avoid areas of deep peat. The felling requirement has also been minimised by design. The site design process is described in **Chapter 2: Project Description** whilst specific details relating to peat depth (**Chapter 8: Geology, Hydrogeology, Hydrology and Peat**) and forestry (**Chapter 14: Other Issues**) are included in elsewhere in the EIAR.

Predicted Impacts

14.5.0 The results of the carbon balance assessment carried out for the Proposed Development are presented below for each project stage. The project-specific input and output data is contained within **Technical Appendix 14.2**, alongside the detailed methodology of the calculator.

Construction and Decommissioning

14.5.0 **Table 14.5** presents the results of the GHG balance assessment for the manufacture, construction, and decommissioning stages of the Proposed Development. Significant GHG emissions are predicted from soil organic matter, as well as some emissions from the felling of forestry. Total projected emissions are 104,842 tCO_2e.

Table 14.5: Predicted GHG emissions from wind farm manufacture, construction and decommissioning

Source of GHG Emissions/Savings	Estimated GHG emissions (tCO_2e)	% of total
Losses due to turbine manufacture, construction and decommissioning	64,851	61.9

Source of GHG Emissions/Savings	Estimated GHG emissions (tCO_2e)	% of total
Losses due to BESS manufacture, construction and decommissioning	8,000	7.6
Losses due to back-up power generation	0	0
Losses due to reduced carbon fixing potential	1,890	1.8
Losses from soil organic matter	29,990	28.6
Losses due to Dissolved Oxygen Content and Portable Oxygen Content	59	< 0.1
Losses due to forestry felling	53	< 0.1
Total	**104,842**	**100**

14.5.1 Any post-decommissioning site restoration and enhancement work, such as blocking drainage ditches to promote re-wetting, would be aligned with the Outline Biodiversity Enhancement Outline Management Plan (see **Technical Appendix 6.6**). Such activities can incur GHG savings by promoting growth of peat or other natural carbon stores. Other management options may occur during the biodiversity enhancement stage.

14.5.2 Table 14.6 shows the total CO_2 gains due to site improvement during post-decommissioning (tCO_2e).

Table 14.6: Estimated CO_2 savings due to enhancement of the Site (tCO_2e)

Improvement	GHG Emissions (tCO_2e)	% of total
Change in emissions due to improvement of degraded bogs	- 7,123	97.9
Change in emissions due to enhancement measures in forestry felling area	- 4	< 0.1
Change in emissions due to restoration of peat from borrow pits	- 149	2.0
Total change in emissions due to improvements	**- 7,276**	**100**

14.5.0 Taking into account the predicted GHG emissions from wind turbine manufacture, construction and decommissioning alongside those savings from the improvement of the site, the total net GHG emissions from the Proposed Development are expected to be 97,566 tCO_2e (**Table** 14.7)

Table 14.7: Total estimated net GHG emissions from the Proposed Development

	GHG savings (tCO_2e)	GHG emissions (tCO_2e)
Predicted GHG emissions from wind turbine manufacture, construction and decommissioning	-	104,842
Total CO_2 gains/savings due to enhancement of the Site	7,276	-
Total net GHG emissions from wind turbine manufacture, construction, decommissioning and improvement of site	-	97,566

Operation

14.5.1 The operational stage of the Proposed Development has the greatest potential for GHG savings. At this stage, GHG emissions from construction activities will have ceased and operation of the turbines would generate zero-carbon electricity for the remainder of their lifespan.

14.5.2 **Table 14.8** presents projected annual emissions savings as measured against the fossil fuel-mix and grid-mix of electricity.

Table 14.8: Estimated annual emissions savings against fossil fuel electricity generation mix

GHG savings*	GHG savings (tCO_2e)		
	Expected value	Minimum value	Maximum value
Grid mix electricity generation			
GHG savings per year	30,001	24,301	36,301
Lifetime GHG savings*	1,200,040	972,040	1,452,040
Fossil fuel mix electricity generation			
GHG savings per year	67,020	54,286	81,095
Lifetime GHG savings*	2,680,800	2,171,440	3,242,800
***Operational GHG savings based over a lifetime of 40 years**			

Emissions Payback Period

14.1.3 The emissions payback time can be calculated by dividing the total expected emissions caused by the Proposed Development (97,566 tCO2e: **Table 14 4**). by expected annual savings from operation (30,001 tCO2e: **Table 14 5**). This gives a predicted emissions payback of 3.3 years against a representative grid mix, and 1.5 years against a fossil-fuel mix electricity generation.

Table 14.9: Estimated carbon payback period of the proposed development for a range of capacity factors

	Carbon payback time (years)		
	Expected value	Minimum value	Maximum value
Grid mix electricity generation	3.3	1.5	5.4
Fossil fuel mix electricity generation	1.5	0.7	2.4

Assessment of Effects

Net GHG Effect

14.5.3 Given the Proposed Development's projected operational life of 40 years, its total GHG savings are expected to be 1,102,474 tCO_2e, inclusive of construction, operation and decommissioning emissions.

Cumulative Effects

14.5.4 Due to the Proposed Construction expected to be pre-2030, the Proposed Development makes an important contribution to securing the quick deployment required by Scottish Governments net zero ambitions for 2045. The Proposed Development also assists in meeting the Scottish Government's target of securing an overall ambition of 20 GW of installed onshore wind capacity in Scotland by 2030 as set out in the Onshore Wind Policy Statement (2022).

14.5.5 Any other wind-based energy generation projects in West Dunbartonshire Council and Scotland would be highly likely to result in total emissions savings by offsetting fossil fuel contributions to grid electricity. The GHG savings would thus outweigh total losses and the cumulative effects from these existing and potential wind farm developments would be Significantly Beneficial, contributing towards climate change mitigation.

Mitigation

14.5.6 It has been assumed that all activities during construction and operation would be conducted in accordance with good practice guidance.

14.5.7 Relevant guidance include; 'Good Practice During Wind Farm Construction, NatureScot et al. (2019)'.

14.5.8 Further, it is assumed that mitigation outlined in **Chapter 15: Schedule of Environmental Commitments** would be implemented to reduce environmental impacts, including GHG emissions, and improve effectiveness of restoration works.

14.5.9 As no adverse effects are predicted, no additional mitigation measures are proposed.

Summary of Residual Effects

14.5.10 GHG emissions will arise from the manufacture, construction and decommissioning activities, including the loss of peat and forestry, from the construction of turbines and associated infrastructure.

14.5.11 These emissions are projected to be offset 1.5 years after the Proposed Development becomes operational against a fossil fuel mix of electricity, or 3.3 years against a grid-mix of electricity. The Proposed Development is predicted to deliver total emissions savings of 1,102,474 tCO_2e over its 40-year operational lifetime.

14.5.12 The overall impact is considered to represent a **Significant Positive effect,** and contribute to long-term climate change mitigation. Consequently, the Proposed Development contributes towards Scotland's emissions reduction targets as set out in the Climate Change (Emissions Reductions Targets) (Scotland) Act 2019, together with its renewable energy obligations as set out in the Scottish Climate Change Plan.

14.6 Issued Scoped Out

14.6.1 The Scoping Opinion, issued by the ECU, stated that they were content with the proposed Scope of the Environmental Impact Assessment (EIA) in relation to the topic areas subject of this chapter, as set out in the Scoping Report. Therefore, in addition to the Scoping Opinion and further design mitigation, the following environmental factors have been scoped out of the EIA because of the limited potential for environmental effects to arise

- Air Quality;
- Population and Human Health; and
- Vulnerability of the development to risks of major accidents and/or disasters (including climate change).

Air Quality

14.6.2 The main source of impact on air quality would be increased traffic flows on local roads and emissions from construction activities, including exhaust fumes and dust generated from quarrying activities associated with borrow pits and unmade ground from borrow pits and access tracks in dry conditions.

14.6.3 In the case of the construction, operation and decommissioning of the Proposed Development, it is considered that the emissions associated with these activities would be transient, localised and highly unlikely to have a significant effect upon local air quality.

14.6.4 In addition, there are well established best practice measures applied to construction that would form an integral part of the development process (e.g., speed control, optimising deliveries to site, dust control, restrictions on idling plant/vehicles, etc.). These controls and measures would be detailed as part of the Construction Environmental Management Plan (CEMP) for the Proposed Development. They are also detailed in **Chapter 15: Schedule of Environmental Commitments**.

Population and Human Health

14.6.5 Potential impacts on population and human health during construction would be minimised with adherence to the Construction Design and Management (CDM) Regulations and the implementation of a construction environmental management plan and construction traffic management plan. Once operational, properly designed and maintained wind turbines are a safe technology and the site design and in-built buffers from sensitive receptors would minimise any risk to human health. No adverse or

significant effects are anticipated. Therefore, population and human health was scoped out of further assessment in the EIA.

Vulnerability of the Development to Risks of Major Accidents and/or Disasters (including Climate Change)

14.6.6 The vulnerability of the development to risks of major accidents and disasters are defined in IEMA guidance as man-made or natural events with the potential to endanger human health or the environment (such as lightning strike and structural failures). In this case, this risk would be minimised through proper design of the Proposed Development and compliance with relevant legislation and best practice. In addition, given the elevated location of the Site, flooding would not pose a material risk to the operation of the wind farm.

14.6.7 Other effects which could be deemed to trigger a major accident or disaster, such as peat slide risk and increased traffic movements, have been assessed elsewhere in this EIAR.

14.6.8 None of the following climate trends identified in UKCP18[2] would affect the Proposed Development with the exception of increased windstorms:

- increased temperature;
- wildfire;
- 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 windstorms; and
- sea level rise.

14.6.9 Braking mechanisms installed on turbines allow their operation only under specific wind speeds and should severe windstorms be experienced, turbines would be shut down.

14.6.10 It is predicted that no significant effects would arise as a result of the Proposed Development in this regard. Thus, the topic was scoped out of the EIA.

[2] Met Office (2019), UKCP18 Science Overview Report.