Climate Change

Non-Technical Summary

5.1. The predicted future climatic baseline conditions are highly unlikely to affect the operation of the Proposed Development. The Proposed Development will have a positive effect on carbon savings, and a significant positive effect when considered cumulatively with UK-wide renewable energy deployment. No additional significant effects to those already identified within the EIA Report will occur as a result of climate change during the operational phase of the Proposed Development.

5.2. The Proposed Development will not significantly influence climate change and the Proposed Development will have a positive cumulative effect with regards to reduction in carbon emissions when considering the UK-wide electricity generation mix.

5.3. As such, the effect of the Proposed Development on climate change is not significant.

Introduction

5.4. This Chapter of the Environmental Impact Assessment Report (hereafter known as 'EIA Report') evaluates the effects of Lochluichart Wind Farm Extension II (hereafter known as 'the Proposed Development') on climate change and carbon balance. Climate Change Impact Assessment (CCIA) is a requirement of the European Commission (EC) Environmental Impact Assessment (EIA) Directive 2014/52/EU[i], as transposed into Scottish legislation through the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017[ii].

5.5. The following assessment areas are considered in terms of the Proposed Development:

- The vulnerability of the Proposed Development to climate change;
- The influence of the Proposed Development on climate change; and
- A summary of effects on environmental receptors sensitive to climate change.

5.6. The vulnerability of the Proposed Development to climate change considers effects on the Development as a receptor. In contrast, the other two assessments consider effects on environmental receptors as a result of the Proposed Development.

5.7. This Chapter is supported by the following Technical Appendices provided in **Volume 4** of this EIA Report:

- **Appendix 5A**: Carbon Calculator.

Legislation, Policy and Guidance

5.8. A substantial reduction in greenhouse gas emissions is imperative to avoid irreversible damage caused by the impacts of climate change. The Scottish Government has introduced a number of policies aimed at reducing greenhouse gas emissions and meeting renewable energy targets set at a UK, European and International level.

5.9. The Climate Change (Scotland) Act 2009[iii] established the context for Scottish government action and is currently undergoing an amendment process[iv]. A target reduction of 80% had been set for 2050 with an interim target of a 42% reduction in emissions by 2020. This Act requires local authorities to act in a way that contributes and helps deliver these emission targets. This interim target of a 42% reduction in emissions was met in 2014 and the Scottish Government has now outlined a new interim target to reduce greenhouse gas emissions by 66% by 2032 and 90% by 2050.

5.10. In February 2018, The Scottish Government published its Climate Change Plan (CCP)[v] setting out decarbonisation plans to 2032. The Plan provides the

framework for Scotland's transition to a low-carbon economy and sits alongside the Scottish Energy Strategy[vi]. The first monitoring report was published in October 2018[vii].

5.11. A Scottish Adaptation Programme addressed the risks identified for Scotland in the UK Climate Change Risk Assessment. It replaced the existing adaptation framework which already contributes to building resilience and capacity to adapt to climate change. In terms of planning, the Scottish Government addresses climate change through the National Planning Framework (NPF3)[viii]. This recognises that planning plays a key role in minimising vulnerability, providing resilience and managing the risks associated with climate change. NPF3 does not make specific reference to EIA's role in mitigating and adapting to climate change; however, it does recognise 'A Low Carbon Place' as a key planning outcome to help reduce Scotland's carbon emissions and adapt to climate change.

5.12. Currently only provisional guidelines exist to standardise the CCIA process in the UK. The Institute of Environmental Management and Assessment (IEMA) published 'Environmental Impact Assessment Guide to Climate Change Resilience and Adaption' in November 2015[ix], with the intention of providing an updated and finalised version when they EC Directive was transposed into UK law. In 2017 they published 'Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance'[x]. These documents provide the framework for the assessment reported in this chapter.

Assessment Methodology and Significance Criteria

5.13. Future climate projections are published by the Met Office through the UK Climate Projections website. The UK Climate Projections Report 2018 (UKCP18) is expected to be available end 2018; however, at the time of writing, the current projections are supplied from the Climate Change Projections Report 2009 (UKCP09)[xi], which remains the official source of information on how the climate of the UK may change over this century[xii]. For this assessment it is proposed that the UKCP09 medium emissions scenario (A1B) will be utilised as the future baseline. This scenario is based on a future of rapid economic growth and the rapid introduction of new, more efficient technologies with a balance of non-fossil fuel and fossil fuel intensive energy technologies. Projected climatic changes at the 50% probability level (central estimate) are also utilised in this CCIA assessment, unless otherwise indicated.

5.14. The following assessment areas are considered in terms of the Proposed Development:

- The vulnerability of the Proposed Development to climate change;
- The influence of the Proposed Development on climate change; and
- A summary of effects on environmental receptors sensitive to climate change.

5.15. The vulnerability of the Proposed Development to climate change considers effects on the Proposed Development as a receptor. In contrast, the other two assessments consider effects on environmental receptors as a result of the Proposed Development.

Vulnerability of the Proposed Development to Climate Change

5.16. This section of the CCIA identifies aspects of the Proposed Development which are potentially vulnerable to the effects of climate change. Where identified, these vulnerabilities can then be mitigated through embedded mitigation or the application of other measures.

5.17. Taking into account the nature and location of the Proposed Development, the following climate related parameters are considered to have the potential to impact upon the Proposed Development and the surrounding environment:

- Wind speed; and
- Precipitation.

Influence of the Proposed Development on Climate Change

5.18. This section of the CCIA seeks to quantify the effect of the Proposed Development on climate change. The methodology provides a balance of total carbon savings and carbon losses over the life of the wind farm. It estimates the carbon payback time for the wind farm based on the source of power being displaced (i.e. the time needed to generate carbon saving equivalent to the amount of carbon lost).

5.19. Applications submitted under Section 36 of the Electricity Act are required to undertake the carbon balance assessment using the Scottish Government's carbon calculator tool. This has been completed for the Proposed Development using the latest version of the calculator (C-CalcWebV1.5.0). The carbon assessment methodology used is consistent with that published by the Rural and Environment Research and Analysis Directorate of the Scottish Government entitled 'Calculating carbon savings from wind farms on Scottish peat lands – a new approach'. This publication sets out the approach and assumptions that should be used to estimate potential carbon losses and savings from wind farms on Scottish peatlands. The carbon balance assessment is included as **Appendix 5A**.

5.20. The carbon calculator determines the carbon emission savings and the carbon payback of wind farms and explores the potential implications under different scenarios of developments and assumptions about the site i.e. expected, best case and worse case scenarios. It provides the potential carbon savings and carbon costs associated with wind farms as follows:

- Carbon emission savings due to generation (based on emissions from different power sources);
- Loss of carbon from backup power generation;
- Loss of carbon-fixing potential of peatland;
- Loss and/or saving of carbon stored in peatland (by peat removal or changes in drainage);

- Carbon saving due to improvement of habitat;
- Loss and/or saving of carbon-fixing potential as a result of forestry clearance; and
- Carbon gains due to proposed habitat improvements such as bog restoration.

5.21. The calculation of the carbon balance of a proposed wind farm provides a mechanism by which the carbon costs of a wind farm development can be weighed against the carbon savings attributable to the wind farm during its lifetime. This calculation is summarised as the length of time (in years) it will take the carbon savings to amount to the carbon costs and is referred to as the 'payback period'. This information can then inform decision makers of the viability of a wind farm development in terms of overall carbon savings.

5.22. The data sources and assumptions used in the carbon balance assessment are detailed in **Appendix 5A**. The assessment was informed by data from Phase 1 peat probing in April 2018 and June 2018, as described in the Peat Slide Risk Assessment (Appendix 13.D) and the Outline Peat Management Plan (oPMP) (Appendix 13.C). The Outline PMP was produced in accordance with 'Guidance on the Assessment and includes a breakdown of excavated and reused peat and identifies suitable areas for temporary peat storage.

Effects on Environmental Receptors Sensitive to Climate Change

5.23. This section of the CCIA identifies where climate change has the potential to significantly impact the findings of assessments undertaken and reported elsewhere in this EIA Report. Reference is made to the specific assessment chapters, where the sensitivity of receptors is discussed, and assessments are not repeated here. Assessment Limitations

5.24. The climate change projections are based on global models for a range of greenhouse gas emissions scenarios and generally consider regional responses to climate change rather than local responses. Regional (e.g. Scotland wide) and national (e.g. UK wide) data has been used to inform the assessments of all climatic considerations. The lifetime of the Proposed Development is for a period of 25 years from date of commissioning. Future predictions for regional and national climatic changes are available for 2040 – 2099 which is towards the end of the projected lifespan of the Proposed Development.

Significance Criteria

5.25. The IEMA guidelines for CCIA state the following with regards to the assessment of significance:

"This guidance is not proposing changes to the significance criteria used in the EIA process. However, the susceptibility or resilience of the receptor to climate change must be considered as well as the value of the receptor.

Therefore, a high-value receptor that has very little resilience to changes in climatic conditions should be considered more likely to be significantly affected than a high-value receptor that is very resilient to changes in climatic conditions.

The uncertainty of the combined effect needs to be taken into account. If uncertainty about how a receptor will adapt to a changing climate is high, then it is recommended that a conservative threshold of significance is adopted within the evaluation".

5.26. To determine whether effects are significant under the EIA Regulations, it is appropriate to consider the sensitivity (value and resilience) of the receptor and the magnitude of the impact, taking into account uncertainty. This is based on the professional judgement of the assessor.

5.27. The categories of significance which effects are assessed as:

- Negligible – no detectable or material change to a location, environment, species or sensitive receptor;
- Minor – a detectable but non-material change to a location, environment, species or sensitive receptor;
- Moderate – a material, but non-fundamental change to a location, environmental, species or sensitive receptor; or
- Major – a fundamental change to location, environment, species or sensitive receptor.

5.28. Effects assessed can be both beneficial (positive) and adverse (negative) as a result of the Proposed Development. Sensitivity of climate change receptors is inherently linked to the magnitude of the impact. Whilst receptors may be considered "high-value", a non-material magnitude of the impact would result in any effect being considered not significant.

Scoping Responses and Consultation

5.29. Throughout the scoping exercise, and subsequently during the ongoing EIA process, relevant organisations were contacted with regards to the Proposed Development. **Table 5.1** outlines the consultation responses received in relation the climate change and carbon balance.

Table 5.1: Consultation Responses

Consultee	Details	Where Addressed in EIA Report
SEPA	Does not validate carbon balance assessments; this indicates that one is required	Carbon balance calculator in Appendix 5A

Baseline Conditions

Climate Projections

5.30. The UK Climate Projection Report: The Climate of the UK and Recent Trends[xiii] provides observed climate data for UK Regions. **Table 5.2** below indicates the observed changes in climatic variables between 1961 and 2006 (reported at

the 95% confidence level) for the North of Scotland where the Proposed Development is located.

Table 5.2: Observed Changes in Climate Variables for the North of Scotland (1961 – 2006)

Climate Variables	Annual Observed Change (1961 – 2006)
Daily mean temperature	+ 1.05 degrees Celsius (°C)
Daily maximum temperature	+ 1.18 °C
Daily minimum temperature	+ 0.97 °C
Change in days of air frost	- 24.6 days
Change in cooling degree days	+ 3.4 days
Change in heating degree days	- 11.5 days
Change (days) in days of rain > 1mm	+ 7.7 days
Percentage change in total precipitation	+ 23.0 %
Change in mean sea-level pressure (hectopascal (hPa))	- 0.6 hPa
Change in relative humidity	- 3.2 %

5.31. Whilst no change was observed, the annual average 10 m wind speed between 1971 and 2000 varied between 10 – 24 knots depending on the location in North Scotland.

5.32. The climate parameters considered most relevant to the assessments referenced within this chapter are wind speed, temperature and precipitation.

Wind Speed

5.33. The UK Climate Projections Science Report: Probabilistic Projections of Wind Speed[xiv] provides projections for summer and winter wind speeds for time periods 2040 - 2069 and 2070 - 2099. The lifetime of the Proposed Development is for a period of 25 years from date of commissioning and as such, the 2040 – 2069 period provides the closest projections to the operational phase and is used for the purpose of this assessment. For Scotland, projected summer wind speeds for 2040 – 2069, at the 50% probability level (under the medium emissions scenario), are slightly skewed towards a small reduction in wind speed, with changes predicted between – 0.2 m/s and 0 m/s which equates to around a reduction of 0.4 knots. This is a minimal change compared with the typical magnitude of summer mean wind speeds for Scotland which is between 7 – 14 knots.

5.34. Projected winter wind speeds for 2040 – 2069 in Scotland at the 50% probability level (under the medium emissions scenario) are between – 0.2 m/s to 0.1 m/s which equates to roughly 0.4 knots and is a relatively small change compared to the mean observed winter wind speed value of between 10 - 24 knots over Scotland.

5.35. These projections are in line with the findings by Pryor and Barthelmie (2010)[xv] who concluded that in the near-term (i.e. until the 2050's) there will be no detectable significant change in the wind resource of northern Europe.

Precipitation

5.36. During the 2040 – 2069 period, the annual mean precipitation percentage change in North Scotland is predicted at -2%, derived from a predicted winter increase of 10% precipitation and a summer decrease of 12% (based on 50% probability level and medium emissions scenario, considered to be the central estimate).

Temperature

5.37. Based on predictions included in the UK Climate Projections Science Report, temperature changes are assessed for regional areas including the North Scotland.

5.38. At 50% probability levels there is a change to the average daily mean temperature (ºC) of the winter (+2.5 ºC) and summer (+4 ºC) by the 2080s in North Scotland, under the medium emissions scenario[xvi].

Greenhouse Gas Emissions and Renewable Energy

5.39. Table 5.3 of the Digest of United Kingdom Energy Statistics (DUKES) 2018[xvii] provides details of the sources used in generation of electricity throughout 2017 by major power producers. Of a total of 52.79 million tonnes of oil equivalent generated in 2017 within the UK, 27.9 million tonnes of oil equivalent were generated by natural gas, oil and coal, and 7.7 million tonnes of oil equivalent were generated from renewable resources. These numbers demonstrate that fuels which emit high levels of carbon emissions are currently generating the majority of electricity within the UK.

5.40. As outlined in section 5.7, the Scottish Government has set ambitious targets for reductions in greenhouse gas emissions and renewable technologies generated the equivalent of 59.4% of Scotland's electricity requirements in 2015. This is compared to just over 10% in 2001 with the majority of this growth attributed to a substantial increase in onshore wind developments. With the continued development of onshore wind farms, in the planning and pre-construction phases, it is anticipated that onshore wind farms will continue to make a sizeable contribution to the energy generated from renewable energy technologies within Scotland.

Assessment of Potential Effects

Vulnerability of the Proposed Development to Climate Change

5.41. Wind turbines are designed to capture wind energy. Turbines are therefore built to withstand extreme climatic conditions, and are purposefully located in exposed locations. However, wind energy developments could potentially be sensitive to significant changes in climatic variables, including atmospheric circulation and land cover changes as well as changes in the frequency of extreme events (e.g. storms), which could damage wind turbines or alter their efficiency.

5.42. In the near-term (i.e. 2040 – 2069) there will be no detectable significant change in the wind resources of northern Europe. As a result, these minor predicted changes in summer and winter wind speeds between 2040 and 2069 are highly unlikely to affect the operation of the Proposed Development, which will be decommissioned in the early period of this timeframe. It is unlikely that the energy projections for the Proposed Development will be affected during its lifetime.

5.43. Given the limited magnitude of the impact and the negligible sensitivity of the Proposed Development as an environmental receptor, there is no significant effect in terms of the EIA Regulations predicted as a result of increased wind speeds during the operational phase of the Proposed Development.

Influences of the Proposed Development on Climate Change

Carbon Savings

5.44. Every unit of electricity produced by a wind farm development displaces a unit of electricity which would otherwise have been produced by a conventional (coal or gas) power station, and therefore presents carbon savings.

5.45. The potential annual carbon emission savings for the proposed wind farm are provided in **Table 5.3**. The minimum, maximum and expected number of turbines based on the final layout of 9 turbines was used for the carbon calculations. The Proposed Development (based on the candidate turbine described in Chapter 3) in the expected scenario has an anticipated installed capacity of 32.4 MW.

5.46. Based on the average capacity factor, it is expected the Proposed Development would result in the production of 96,500 MWh annually, equating to 2,412,500 MWh throughout the operational life of the Proposed Development. This equates to approximately 142,243 tonnes of coal generation equivalent CO_2 emissions throughout the operational life, which is a positive environmental effect. The projected change in wind speeds as a result of climate change over the operational phase of the Proposed Development is considered to be non-material.

5.47. The electricity produced from the wind farm is assumed to substitute energy production by entirely coal-fired generation, or a mix of fossil fuels, or the national grid mix of energy generation. A renewable energy development would have a maximum potential to save carbon emissions when substituting coal fired generation, but it is not appropriate to define the electricity source for which this renewable electricity project would substitute due to uncertainty in future grid mix. For this reason, carbon emission savings are calculated for each scenario in the carbon calculator (Appendix 5A).

Table 5.4: Carbon Savings for the Proposed Development (expected scenario)

Fuel Source	Estimated Minimum CO_2 saving (tCO_2yr^{-1})	Estimated Maximum Co_2 saving (tCO_2yr^{-1})
Coal fired electricity generation	85,982	91,193
Grid mix electricity generation	26,308	27,902
Fossil fuel mix electricity generation	43,084	45,696

Carbon Losses

5.48. The manufacturing, construction and installation of the wind turbines on site has an associated carbon cost, and carbon losses are also generated by the requirement for extra capacity to back up wind power generation. Carbon losses associated with reduced carbon fixing potential and loss of soil organic matter occurs through excavation of peat for construction and drainage effects. Carbon losses at this site may also be associated with felling of existing forestry.

5.49. Organic soils (peatlands) in Scotland act as carbon sinks, whereby they absorb carbon dioxide then they release it due to land use change including forestry. Wind farm developments on peatlands may result in a negative impact on these habitats if not appropriately considered during scheme design and development. Changes to the peatland habitat through development could result in a significant effect on its ability to store carbon, potentially resulting in reduced net carbon benefits of the development.

5.50. Onsite intrusive investigations established that peat deposits across the Proposed Development site were general thin, with deeper deposits of peat within localised areas of flatter ground (Figure 13.3, Appendix 13C). Within these areas of deeper peat, the maximum probed depth was 3.75 m.

5.51. The Proposed Development layout was determined through an iterative design process which involved careful consideration of the distribution of depth of peat across the site to minimise the disturbance of peat and peaty soils. Existing forest tracks are used where possible to minimise the disturbance to peat and peaty soils and cable trenches will follow the on-site access tracks. The Applicant is committed to providing appropriate compensatory planting, and there is no net loss of woodland associated with the Proposed Development.

5.52. Carbon losses for the expected scenario are summarised in **Table 5.5**.

Table 5.5: Carbon Losses for the Proposed Development (Expected Scenario)

Losses	t C02 Equivalent (total for wind farm lifetime)
Losses due to turbine life (e.g. manufacture, construction, decommissioning)	27,329
Losses due to back-up	16,320
Losses due to reduced carbon fixing potential	365
Losses from soil organic matter	30,029
Losses due to DOC and POC leaching	3
Losses due to felling forestry	1,350
TOTAL LOSSES	75,396

Payback Period

5.52.1. The carbon payback period is a measurement/indicator to help assess a proposal. The shorter the payback the greater benefit the wind farm will have in displacing emissions associated with electricity generated by burning fossil fuels.

5.52.2. The payback period is calculated taking the total carbon cost (carbon loses) associated with the wind farm and dividing by the annual carbon gains from displaced fossil fuel power generation and any site improvements.

5.52.3. The estimated payback period for the proposed development is 2.7 years compared to grid-mix electricity generation. In comparison to fossil fuel mix and coal-fired electricity generation the payback period of the wind farm reduces to 1.7 to 0.8 years respectively. **Table 5.6** below goes into further detail regarding the carbon payback period for the Proposed Development.

Table 5.6: Payback in years for each scenario used in the Carbon Calculator

Compared to…	Expected Scenario	Best Case Scenario	Worst Case Scenario
Coal fired electricity generation	0.8	0.8	0.9
Grid-mix electricity generation	2.7	2.6	3.0
Fossil fuel-mix of electricity generation	1.7	1.6	1.8

5.53. This is considered to be a negligible, positive environmental effect that is not significant under the EIA Regulations.

Effects of Future Climate Change Scenario on Environmental Receptors Sensitive to Climate Change

5.54. The potential for environmental receptors to be impacted by the Proposed Development is assessed in other Chapters of this EIA Report. The effect of climate change on the future baseline of receptors is assessed within each chapter.

5.55. As outlined above in the near-term (i.e. until the 2050's, based on 50% probability level and medium emissions scenario) there will be no significant change in the regional wind resource and therefore no noticeable change to the future baseline as a result of this parameter. Similarly, estimates of annual mean precipitation amounts show very little change everywhere at he 50% probability level.

5.56. Projected changes to the winter and summer seasonal mean temperature in North Scotland at the 50% probability levels are projected as +2.5% during winter and +4°C in summer by the 2080s (based on 50% probability level and medium emissions scenario). A summary of the effects of these changes on receptors are summarised in Table 5.7

Table 5.7: Climate Change Effects on Environmental Receptors

EIA Report Chapter	Receptor	Climate Change Effect	Effect on Receptor
11	Ecology – Habitats, Protected Species	Temperature – up to + 2.5ºC in winter & +4ºC in summer Precipitation - Slight decrease (-2%) overall with increased seasonal variation Negligible change in wind speeds	While a change in precipitation and temperature could affect the composition and growth rates of plant communities and invertebrates, and hence protected species and habitats, the uncertainties are high and it is not clear that the effect of the Development on those receptors would alter substantially as a result.
12	Ornithology	Temperature – up to + 2.5ºC in winter & +4ºC in summer Precipitation - Slight decrease (-2%) overall with increased seasonal variation Negligible change in wind speeds	A rise in temperature, and increased seasonal variation in precipitation have the potential to impact on habitats which in turn may affect the behaviour of bird interests. As noted above uncertainties are high and the type and significance of effects identified from the Development are not anticipated to alter as a result.

14	Hydrology and Hydrogeology	Precipitation - slight decrease (-2%) overall with increased seasonal variation	Increased precipitation in winter has the potential to lead to increases in flooding, but uncertainties are high. With the robust embedded design elements such as watercourse buffers CEMP, etc it is not anticipated that there will be additional effects not already identified or mitigated.

5.57. As summarised in **Table 5.2**, this EIA Report has considered the effects of climate change on sensitive environmental receptors, based on the future climate change projections detailed in Section 5.13 of the Chapter.

5.58. Given the relatively limited magnitude of change in climate parameters predicted over the period of the Proposed Development, negligible changes to the baseline for environmental receptors is anticipated during this period . This is incorporated into the assessments undertaken in other chapters of this EIA Report.

5.59. No significant effects will occur as a result of climate change during the operational phase of the Proposed Development.

Assessment of Cumulative Effects

5.60. The Scottish and UK Governments have set ambitious targets for reducing greenhouse gas emissions by 2050. The Proposed Development, in conjunction with other renewable energy developments, will contribute to Scotland and the UK's aims to reduce carbon emissions and achieve meet its ambitious greenhouse gas emissions targets.

5.61. Table 5.3 of DUKES 2018[xviii] details the sources used in generation of electricity throughout 2017 by major power producers. Renewable electricity represented 29.3% of total generation in 2017 with onshore wind having the highest share of renewable capacity and generation (at 31.7 per cent and 29 per cent respectively). In 2017, 10.2% of total energy consumption came from renewable sources, as detailed within Table 6.7 of DUKES 2018[xix]. The Proposed Development will contribute up to32.4 MW further installed capacity.

5.62. This is considered to be a significant, positive, cumulative environmental effect under the EIA Regulations and will contribute to the UK's legally binding emission reduction targets.

Assessment of Cumulative Effects

5.63. The Scottish and UK Governments have set ambitious targets for reducing greenhouse gas emissions by 2050. The Proposed Development, in conjunction with other renewable energy developments, will contribute to Scotland and the UK's aims to reduce carbon emissions and achieve meet its ambitious greenhouse gas emissions targets.

5.64. Table 5.3 of DUKES 2018 details the sources used in generation of electricity throughout 2017 by major power producers. Renewable electricity represented 29.3% of total generation in 2017 with onshore wind having the highest share of renewable capacity and generation (at 31.7 per cent and 29 per cent respectively). 10.2% of total energy consumption came from renewable sources, as detailed within Table 6.7 of DUKES 2018. The Proposed Development will contribute up to 32.4 MW further installed capacity.

5.65. The cumulative effect of the Development with other UK renewables generation is considered to be a fundamental change in the climate effects of UK energy supply, which is a major, positive, environmental effect that is significant under the EIA Regulations and will contribute to the UK's legally binding emission reduction targets

Mitigation Measures and Residual Effects

5.66. This Chapter identified that negative effects are of such limited and negligible nature that they are not significant and therefore no mitigation is required under the EIA Regulations or recommended as best practice. An iterative design approach was taken for the wind farm layout to avoid siting infrastructure in deep peat where possible to minimise disturbance of peat soils and associated carbon losses. Further micro-siting will be informed by detailed pre-construction ground investigations. An Outline PMP has been produced and is provided as **Appendix 13.C**. The Outline PMP calculates an excavated volume of 35,333 m^3 (>0.5 m depth) and 17,667 m^3 of peaty soils (<0.5 m depth), giving a total excavation volume of 53,000m^3. Proposed reuses of the excavated peat are in line with the Scottish Renewables and SEPA Guidance, and the Outline PMP demonstrates that all excavated peat will suitably be reused on-site. The proposed reuses include the reinstatement of access track verges, cut and fill embankment slopes, reinstatement of turbine hardstandings, reinstatement of borrow pits and general landscape fill. No additional treatment of the peat is anticipated to be required, although methods to encourage regeneration of vegetation cover are likely to be required in some areas due to use of catotelmic peat to provide the top layer of reinstatement where there is a deficit of acrotelmic peat.

5.67. Methods for handling and storing excavated peat have been described in the Outline PMP (Appendix 13.C) to ensure its reuse potential is maximised and any carbon losses are minimised. Monitoring of the reinstated areas will be carried out to ensure that the environmental objectives are realised.

5.68. The Outline PMP will be updated prior to construction once detailed site investigation data and detailed engineering designs are available. The temporary peat storage locations will be identified in the updated PMP and will be guided by a geotechnical engineer. The updated PMP will also include detailed method statements and phasing of works, and will be agreed with SEPA and the planning authority prior to construction commencing.

5.69. Other mitigation measures will include the management of wind turbines to maintain operational efficiency during their lifetime. Maintenance plans for wind turbines would be developed to maximise turbine output and efficiency. Key performance indicators to monitor and track operational efficiency would be developed.

Summary

5.70. The predicted future climatic baseline conditions are highly unlikely to affect the operation of the Proposed Development. The Proposed Development will have a positive effect on carbon savings and a significant positive effect when considered cumulatively with UK-wide renewable energy deployment. No additional significant effects to those already identified within the EIA Report will occur as a result of climate change during the operational phase of the Proposed Development.

5.71. The Proposed Development will not significantly influence climate change, and the Proposed Development will have a positive cumulative effect with regards to reduction in carbon emissions when considering the UK-wide electricity generation mix.

5.72. As such, the effect of the Proposed Development on climate change is not significant.

5.73. In regards to carbon balance, the Proposed Development layout has been designed to minimise disturbance to peat and carbon losses by avoiding deep peat where possible, and through the proposed construction approach, for example the use of floating tracks. Mitigation and management measures have been outlined in the Peat Slide Risk Assessment (Appendix 13.D) and outline PMP (Appendix 13.C) to minimise the potential effect of the proposed development on peat disturbance and loss, and subsequent effect on carbon emissions. These preventative and mitigation measures result in a short carbon payback period for the Proposed Development.

[i] European Commission (2014) Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment [Online] Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052&from=EN (Accessed 06/02/18)

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