Galileo 03 Ltd.

Mynydd Ty-talwyn Energy Park - Environmental Statement Volume II

Main Written Statement – Chapter 14: Climate

Project Reference: 663870

This chapter is summarised within the Non-Technical Summary in Volume I of this Environmental Statement. A Welsh translation of the Non-Technical Summary is also available as part of the application.

Crynhoir y bennod hon yng Nghrynodeb Annhechnegol y Datganiad Amgylcheddol hwn. Mae cyfieithiad Cymraeg o'r Crynodeb Annhechnegol hefyd ar gael fel rhan o'r cais.

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Volume III: Supporting Technical Appendices

14 CLIMATE CHANGE

14.1 Introduction

14.1.1 This chapter presents an assessment of likely significant effects arising from the construction, operation and decommissioning of the Proposed Development upon climate change.

14.1.2 This chapter is supported by the following appendices presented in **ES Volume III**:

- **Appendix 14.1: Carbon Assessment Tool.**

14.1.3 The impacts of climate change are widely recognised as being one of the greatest global economic, environmental, and social challenges facing the world today. A major cause of climate change is a rise in the concentration and volume of greenhouse gases in the atmosphere, a significant contributor to which, is the use of fossil fuels to generate electricity. No form of electricity generation is completely carbon free; for onshore wind farms and solar PV there will be emissions resulting from the manufacture of components (embodied emissions), as well as emissions from both construction and decommissioning activities and transport. However, the purpose of the Proposed Development is to generate electricity from a renewable source of energy, avoiding the need for electrical generation from the combustion of fossil fuels. Consequently, the electricity that will be produced by the Proposed Development will result in a saving in emissions of carbon dioxide (CO_2) with associated environmental benefit.

14.1.4 Renewable energy technologies provide an important mechanism for the reduction of CO_2, and other greenhouse gas (GHG) emissions into the atmosphere by reducing the consumption of fossil fuel generated electricity. However, during their manufacture, construction and decommissioning, such infrastructure can result in GHG emissions themselves, particularly in such instances as where natural carbon stores, such as peat, are present and potentially impacted by the Proposed Development.

14.1.5 For this reason, this chapter provides an estimation 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.

14.1.6 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 Proposed Development, all subsequent wind and solar-generated electricity

would displace a similar amount of conventionally generated electricity, thereby contributing to an overall GHG reduction.

14.1.7 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.

14.2 Consultation and Scope

Scoping Direction

14.2.1 The scope of this assessment has been established through an ongoing scoping process. This has involved the production of an EIA Scoping Report (provided in **ES Volume III, Appendix 1.1: EIA Scoping Report**), which was submitted to PEDW on 27 November 2023. Further information on the scoping process can be found in **ES Volume II, Chapter 4: Approach to the EIA**.

14.2.2 The Scoping Direction, a copy of which is included in **ES Volume IV, Appendix 1.2: Scoping Direction**, was received on 11 April 2024. **Table 14.1** summarises the key Scoping Direction comments related to this assessment, and sets out how these have been addressed by the Applicant.

Table 14.1 Summary of Scoping Direction Comments Relevant to this Climate Change Assessment

ID no.	Issue	Comment raised	Applicant response
6.3.8	Receptors / elements to be scoped into the assessment	The EIA Scoping Report proposes to scope out climate resilience. PEDW note that section 5.7.3 of the EIA Scoping Report states that the design of the development will consider the potential for adverse effects of climate change during the lifetime of the development (flooding, stormier weather etc.). PEDW note that a small area of the Site is within Development Advice Map Zone C2 and Flood Map for Planning Flood Zones 2 and 3 (rivers). Therefore, PEDW directs that climate resilience is scoped in to include a proportionate assessment of flood risk.	This matter pertains to the flood consequences assessment (FCA) which can be found in **ES Volume III: Technical Appendix 6.2 Flood Consequence Assessment and Surface Water Drainage Statement.** As noted in that document, an appropriate climate change allowance (30%) has been included in the assessment and incorporated into the drainage design.

Additional Consultation

14.2.3 Consultation relating to the scope of this climate assessment has been undertaken through the scoping process discussed above.

Pre-Application Consultation

14.2.4 No factor specific pre-application consultation responses were received in relation to the climate assessment.

Scope of the Assessment

14.2.5 The technical scope of this assessment has been established through an ongoing scoping process. As a result of this process, the technical scope of the assessment reported in this chapter comprises a Lifecycle Assessment (LCA) of the GHG emissions from the construction, operation, and decommissioning of the Proposed Development, including embodied emissions.

14.2.6 The matters discussed in **Table 14.2** are considered unlikely to result in likely significant effects, and therefore have been scoped out of the assessment, as agreed through the EIA scoping process.

Table 14.2 Receptor/Matters Scoped Out of Further Assessment

Receptor/ matter	Phase	Justification	Change since EIA Scoping?
Climate Change Risk	Construction, Operation & Decommissioning	In Wales, climate change is projected to result in warmer temperatures, decreased summer rainfall but increased winter rainfall and sea level rise. None of these trends are anticipated to impact upon the Proposed Development by virtue of its in-built resilience (with respect to temperature) and the elevated position of turbines (with respect to both rainfall and sea level rise). A further variable with respect to the changing climate is sea level pressure which contributes towards wind speed. Projections relating to sea level pressure show considerable uncertainty. As braking mechanisms on turbines allow for operation only under specific wind speeds, should severe windstorms be experienced, then the turbines would shut down. It is therefore	No. The Scoping Direction requested that climate resilience be assessed through a "*proportionate assessment of flood risk*." This assessment has been undertaken through the FCA in **ES, Volume III: Technical Appendix 6.2 Flood Consequence Assessment and Surface**

Receptor/ matter	Phase	Justification	Change since EIA Scoping?
		unlikely that significant effects upon the Proposed Development will arise as a result of climate change, and this topic can be scoped out of further assessment.	**Water Drainage Statement.**

14.2.7 IEMA's Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022) states *"activities that do not significantly change the result of the assessment can be excluded where expected emissions are less than 1% of total emissions, and where all such exclusions total a maximum of 5% of total emissions; all exclusions should be clearly stated".* The expected emissions from construction worker travel, and from general activities concerning the ongoing operation of the Proposed Development, are expected to be less than 1% of total emissions, and were therefore are not considered further.

14.3 Methodology

14.3.1 This assessment has been undertaken in accordance with the following legislation, and with regard to the following planning policy and guidance. It should be noted that this chapter does not assess the compliance of the Proposed Development against relevant planning policy. Such an assessment is presented in the standalone **Planning, Design and Access Statement**, which is submitted as part of the DNS Application. .

Legislation

- The Paris Agreement (UN, 2015);
- Climate Change Act 2008 (amended 2019) (UK gov., 2019);
- Environment (Wales) Act 2016 (UK gov., 2016); and
- Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (UK gov. , 2017).

National Planning Policy

- Future Wales – The National Plan 2040 (Welsh Government, 2020); and
- Planning Policy Wales 12 (Welsh Government Llywodraeth Cymru, 2024).

Local Planning Policy

- Bridgend Replacement Local Development Plan 2018-2033 (BCBC, 2024); and
- Port Talbot Replacement Local Development Plan (RLDP) 2023-2038 (NPTC, 2023).

Local Policy

- Bridgend County Council: In support of the declarations made by Welsh Government for the Public Sector to become carbon neutral by 2030, Bridgend County Council *have "committed to the Net Zero 2030 target as an organisation and recognises the leadership role to enable wider Net Zero for businesses and communities in the county."* (BCBC, 2020) The council declared a climate emergency in June 2020 and set up its Climate Emergency Response programme in response, as well as formalising their plans with a 2030 net zero strategy. The strategy provides an implementation and an action plan for achieving net zero by the 2030 deadline, with the action plan broken down into 6 key industries which will act as the main focus.
- Port Talbot County Borough Council: In response to the Welsh government's 2019 declaration of climate emergency, Neath Port Talbot Council made a commitment to the DARE (Decarbonisation and Renewable Energy) strategy (Neath Port Talbot Council, 2020). This strategy aims to reduce carbon emissions, promote renewable energy and carbon sequestration with three key categories: transport, building and spaces, and influencing behaviour. It specifies the Council's commitment to renewable energy project and low carbon technologies, including solar PV.

Guidance

- Good Practice During Wind Farm Construction, (SNA, 2024);
- Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA , 2022);
- PAS2080:2023 Carbon Management in Infrastructure (British Standards Institution, 2023); and
- Royal Institute of Chartered Surveyors (RICS) Whole life carbon assessment for the built environment (Royal Institution of Chartered Surveyors (RICS), 2023).

Baseline Characterisation

Extent of the Study Area

14.3.2 The sensitive receptor for GHG emissions is the global atmosphere, which is considered highly sensitive to GHG fluctuations. By proxy, the study area, or spatial scope of the assessment, is global.

Desk Study

14.3.3 The assessment has been based on the methodology stated below (**paragraphs 14.3.4 to 14.3.13**), with data inputs provided by the relevant disciplines as referenced in **ES Volume III, Appendix 14.1: Carbon Assessment Tool**, and the outputs of the calculations also displayed within that same appendix. As this assessment relies on a specific methodological approach and internally derived

data rather than external datasets or literature, confirmation of additional datasets is not applicable.

Field Study(s)

14.3.4 All baseline surveys and data collection were carried out by the respective discipline teams, for example the teams responsible for collecting data relating to peat soils. The data sources for the inputs for the carbon calculator are shown in **ES Volume III, Appendix 14.1: Carbon Assessment Tool**.

Assessment Methodology

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

- disturbance of peatland (if present); and
- lifecycle emissions from turbines, Solar PV, and other infrastructure.

14.3.6 Emissions were calculated using a lifecycle assessment of the Proposed Development, in line with the guidance established in (IEMA , 2022). **Figure 14.1** (below) presents the simplified presentation of the modular approach that can be used for boundary definition and the gathering and reporting of information associated with the assessment.

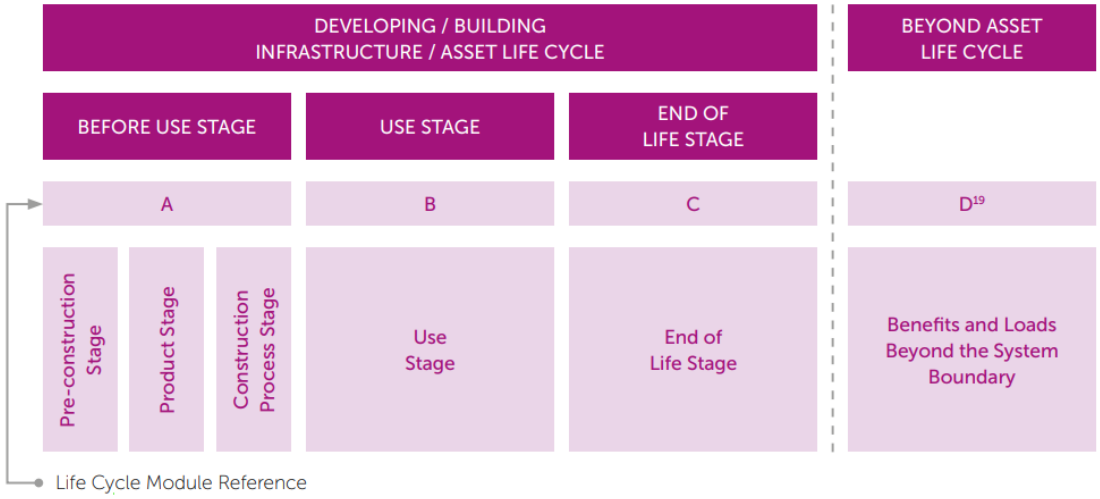

Figure 14.1: IEMA's Modular approach of life cycle stages and modules for EIA GHG emissions assessment (IEMA , 2022)

14.3.7 The GHG assessment of the wind turbines has been undertaken using version 2.14.1 of the Scottish Government's Carbon Assessment Tool, which is the standard way of assessing GHG emissions and savings from onshore windfarm developments. The latest online version of the Scottish Government Carbon Calculator Tool (V1.8.1) was unavailable during the course of this assessment, owing to maintenance and a server upgrade. Version 2.14.1 of the Calculator was provided (as an Excel spreadsheet calculator) by the Scottish Government's Energy Consents Unit as a suitable alternative. Despite the numbering convention, Version 2.14.1 is an older version of the tool, as the numbering

scheme reset once the tool was moved online. As there is no Welsh tool, while the tool is distributed by the Scottish Government, it is an industry recognised approach to determine the carbon emissions associated with wind farm developments. The EIA Scoping Report (**ES Volume III, Appendix 1.1: EIA Scoping Report**) identified that this assessment would be undertaken using this tool and no comments about the suitability of this approach have been raised by consultees through the EIA scoping process.

14.3.8 A detailed explanation of the Scottish Government's Carbon Assessment Tool methodology is found within **ES Volume III, Appendix 14.1: Carbon Assessment Tool**. In brief, the calculator uses project-specific data from the construction of the Proposed Development (**ES Volume II, Chapter 2: Proposed Development Description**) and the receiving environment (**ES Volume II, Chapters 5 to 13**). This allows GHG emissions and avoidance to be quantified across the project lifecycle stages (construction, operation, and decommissioning/site restoration). Specific information concerning the embodied emissions of materials, which would account for turbine manufacture and delivery, is assumed directly through the Carbon Assessment Tool.

14.3.9 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.

14.3.10 The Scottish Government's Carbon Assessment Tool includes embodied emissions from turbines and their foundations, but not for Solar PV. As such, a supplementary life cycle analysis Solar PV has been conducted and integrated within the calculator outputs.

14.3.11 To calculate emissions from Solar PV, data sourced from One Click LCA (an LCA modelling software) and publicly available emission factors ((University of Bath, 2019) and (DESNZ, 2024)) were used. A total of 97,368 Solar PV modules were assumed over the lifespan of the Proposed Development, with aluminium frames and steel foundations. It was assumed that the modules, frames and foundations were all sourced from China, with a 30-year service life for the modules and frames, and a 25-year service life for the foundations, and a 3% wastage rate during construction. Therefore, the replacement of all solar infrastructure has been included within the assessment, and these emissions are reported under energy park manufacture and construction (**Table 14.5**).

14.3.12 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. Any inconsistencies in totals versus individual values are due to rounding and should not be viewed as erroneous.

14.3.13 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 (IEMA , 2022).

Assessment Criteria

Significance of Effect

14.3.14 Given the international urgency of climate change, the sensitivity of the receptor (i.e. global climate) to fluctuations in GHG emissions is considered 'Very High'. The magnitude of the impact is linked to the volume of GHG emissions emitted or avoided. However, in accordance with the IEMA Guidance (IEMA , 2022), it is not considered necessary to determine the sensitivity of the receptor or the magnitude of the impact in order to assess the significance of the effects of GHG emissions. Therefore, no further reference to receptor sensitivity or impact magnitude has been made in this ES chapter and the level of the effect, and whether or not it is significant, has been determined through consideration of the quantity, and timing, of GHG emissions and the likelihood of avoiding severe climate change. **Table 14.3** presents the significance criteria used for the assessment.

14.3.15 Aligned with IEMA's Guidance to Assessing GHG Significance (2022), any project that causes GHG 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.

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.

Significance	Level	Criteria
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.

14.4 Baseline Conditions

Existing Baseline

14.4.1 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 and Forestry

14.4.2 Current information suggests minimal amounts of peat soil and carbon rich organic soils are located throughout the Site. For further information on the peatland habitat within the Site, refer to **ES Volume II, Chapter 5: Land, Soils and Groundwater**.

14.4.3 Small areas of woodland are located within the Site. For further information on the on-site habitats is discussed in **ES Volume II, Chapter 11: Terrestrial Ecology**.

Sensitive Receptors

14.4.4 As set out earlier in this chapter, the only sensitive receptor for this assessment is the global atmosphere, which is considered highly sensitive to GHG fluctuations.

Future Baseline in the Absence of the Proposed Development

14.4.5 No change is expected for the future baseline when compared to the current baseline. It is unlikely that under a future 'business-as-usual' scenario there would be any substantial changes to the amount of GHG emissions from the Site, either positive or negative.

14.5 Mitigation Embedded into the Design

14.5.1 This assessment has been based on the principle that measures have been 'embedded' into the design of the Proposed Development to remove potential significant effects as far as practicable, for example by the considered placement of infrastructure. The embedded mitigation relevant to this assessment is detailed in **Table 14.4**.

Table 14.4 Embedded Mitigation

Embedded mitigation measure relevant to climate	Function
Turbines and other infrastructure have been sited in areas that cause minimal peat or forestry disturbance.	This reduces any associated GHG emissions from land use change.

14.6 Assessment of Likely Effects (Without Additional Mitigation)

14.6.1 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 **Volume III, Appendix 14.1: Carbon Assessment Tool**, alongside the detailed methodology of the calculator.

Construction and Decommissioning

14.6.2 **Table 14.5** presents the results of the GHG balance assessment for the manufacture, construction, and decommissioning stages of the Proposed Development. The lack of substantial peat soils within the Site results in minimal predicted GHG emissions from soil organic matter, as there will be no disturbance to peat soils. Total projected emissions are 166,780 tCO_2e..

Table 14.5 Predicted GHG Emissions from Energy Park Manufacture, Construction, And Decommissioning

Source of GHG Emissions/Savings	GHG Emissions (tCO_2e)	% of Total Emissions
Losses due to turbine manufacture, construction, and decommissioning	33,182	20
Losses due to back-up power generation	33,428	20
Losses due to reduced carbon fixing potential	0	0
Losses from soil organic matter	9,747	6
Losses due to Dissolved Oxygen Content and Portable Oxygen Content	0	0
Losses due to forestry felling	0	0
Losses due to Solar manufacture, construction, and decommissioning	90,422	54
Total	**166,780**	**100**

14.6.3 **Table 14.6** shows that the total CO_2 gains due to Site improvement during post-decommissioning are nil.

Table 14.6 Total CO_2 Savings Due to Improvement of the Site (tCO_2e)

Improvement	GHG Emissions (tCO_2e)	% of total
Change in emissions due to improvement of degraded bogs	0	0
Change in emissions due to improvement of felled forestry	0	0
Change in emissions due to restoration of peat from borrow pits	0	0
Change in emissions due to removal of drainage from foundations and hardstanding	0	0
Total change in emissions due to improvements	**0**	**0**

14.6.4 Taking into account the predicted GHG emissions from the manufacture, construction and decommissioning of the Proposed Development, alongside those savings from the improvement of the Site (nil), the total net GHG emissions from the Proposed Development are expected to be 166,780 tCO_2e **(Table 14.7).**

Table 14.7 Total Net GHG Emissions from the Proposed Development

	GHG emissions (tCO_2e)	GHG Savings (tCO_2e)
Predicted GHG emissions from manufacture, construction, and decommissioning of the Proposed Development	166,780	-
Total CO_2 gains/savings due to improvement of the Site	-	0
Total net GHG emissions from manufacture, construction, and decommissioning of the Proposed Development and improvement of Site	**166,780**	**-**

Operation

14.6.5 The operational phase of the Proposed Development (50 years) has the greatest potential for GHG savings. At this stage, GHG emissions from construction activities would have ceased and operation of the Proposed Development would generate zero-carbon electricity for the remainder of its lifespan.

14.6.6 Due to the inherent variability of electricity generated from renewable energy sources, it is recognised that conventional generation facilities are required to stabilise supply. Nayak *et al.* (2008) refers to 'backup power generation' and identifies that the balancing capacity required is estimated as 5% of the rated capacity of the wind farm.

14.6.7 **Table 14.8** presents projected annual emissions savings as measured against the fossil fuel-mix (electricity that is sourced through the combustion of fossil fuels alone) and grid-mix (electricity from the National Grid; this could include be sourced from fossil fuels, renewable energy, nuclear, etc) of electricity.

Table 14.8 Annual Emissions Savings Against Grid-Mix Electricity Generation and Fossil Fuel Mix Electricity Generation

GHG savings*	GHG savings (tCO_2e)		
	Expected value	Minimum value	Maximum value
Grid mix electricity generation			
GHG savings per year	37,239	33,516	40,963
Lifetime GHG savings*	1,695,193	1,493,637	1,894,717
Fossil fuel mix electricity generation			
GHG savings per year	76,278	68,650	83,906
Lifetime GHG savings*	3,647,115	3,250,368	4,041,832
*GHG savings based over a lifetime of 50 years, and taking into account those emissions caused by the Proposed Development			

Emissions Payback Period

14.6.8 The emissions payback time can be calculated by dividing the total expected emissions caused by the Proposed Development for the manufacture, construction and decommissioning stages (166,780 tCO_2e**: Table 14.7**) by expected annual savings from operation (**Table 14.8**). This gives a predicted emissions payback of 4.5 years against a grid-mix, and 2.2 years against a fossil-fuel mix electricity generation.

Table 14.9 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	4.5	3.7	5.4
Fossil fuel mix electricity generation	2.2	1.8	2.7

14.7 Additional mitigation measures

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

14.7.2 Relevant guidance includes:

- Designing for Renewable Energy in Wales, Design Commission for Wales (2023);
- Good Practice During Wind Farm Construction, NatureScot et al. (2019); and
- Life Extension and Decommissioning of Onshore Windfarms, SEPA (2016).

14.7.3 Further, it is assumed that mitigation outlined in the other technical chapters of the ES (**Chapters 5 to 15**) would be implemented to reduce environmental impacts, including GHG emissions, and improve effectiveness of restoration works.

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

14.8 Assessment of Residual Effects (With Additional Mitigation)

Net GHG Effect

14.8.1 Given the Proposed Development's projected operational life of 50 years, its total GHG savings are expected to be 3,647,115 tCO_2e against a fossil fuel mix of electricity, inclusive of construction, operation, and decommissioning, and 1,695,193tCO_2e against a grid mix of electricity. This is assessed as a **significant** and **beneficial** effect, which is a **long-term, direct** and **permanent** effect**.**

14.9 Opportunities for Environmental Enhancement

14.9.1 The Proposed Development is expected to have a net beneficial impact on the climate, in that it would reduce GHG emissions associated with electricity consumption on a national scale. Opportunities exist to further increase the environmental benefit of the Proposed Development by ensuring that emissions associated with the construction and decommissioning process are kept to a minimum. This can be ensured by the adoption of various mitigation measures as detailed in **ES Volume II, Chapters 5 to 13** and summarised in **ES Volume II, Chapter 16: Summary of Effects**.

14.10 Difficulties and Uncertainties

14.10.1 The accuracy of a GHG assessment depends on the quality of the data provided. Primary data should always be used where available. Where it has not been possible to collect this data, in view of the fact that this assessment represents a forecast of emissions and some information may not yet be known, secondary data (such as estimates, extrapolations, benchmarks and proxy data such as distance travelled) have been used. Assessments based largely on secondary data should only be viewed as an estimate of GHG emissions impact, and actual emissions may vary. Where secondary data has been used, it has been clearly set out **ES Volume III, Appendix 14.1: Carbon Assessment Tool.**

14.10.2 The presence Solar PV necessitated manual modification to the outputs of the Scottish Government Carbon Assessment Tool to account for the associated embodied emissions. These have been clearly marked within **ES Volume III, Appendix 14.1: Carbon Assessment Tool.**

14.10.3 The inputs to the Scottish Government Carbon Assessment Tool were obtained from the relevant topic specialists. Any uncertainties concerning the data used within the calculations (**ES Volume III, Appendix 14.1: Carbon Assessment Tool**), have been expanded upon in their respective chapter.

14.11 Inter-Project Cumulative Effects

14.11.1 GHG emissions are inherently cumulative, as all emissions have the same per-unit impact on the same ultimate receptor. The impact is climate change, or global warming, caused by the radiative forcing effects of GHGs in the atmosphere, and the affected receptor is the global climate and all the ecosystems and biomes that depend on it.

14.11.2 The Proposed Development would achieve emissions savings by reducing the consumption of fossil fuel generated mains electricity. These savings would outweigh the necessary GHG emissions resulting from manufacturing, constructing, and decommissioning of the Proposed Development. Once emissions from these sources are offset by the Development, then each subsequent unit of wind or solar generated electricity would displace a unit of conventionally generated electricity, thereby contributing to the overall reduction in emissions into the atmosphere.

14.11.3 In accordance with the IEMA Guidance (IEMA , 2022), *“All global cumulative GHG sources are relevant to the effect on climate change, and this should be taken into account in defining the receptor (the atmospheric concentration of GHGs) as being of ‘high’ sensitivity to further emissions. Effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed, as there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other.”* Therefore, a detailed cumulative assessment has not been undertaken.

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