Parc Ynni Calon y Gwynt

ENVIRONMENTAL STATEMENT

Appendix 2A: Carbon Balance Assessment

62282400_APP2A_002
JULY 2026

PUBLIC

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ANNEX 2A 1

CARBON BALANCE CALCULATION ASSUMPTIONS

1 INTRODUCTION

1.1 BACKGROUND

1.1.1. The Proposed Development constitutes a Development of National Significance (DNS)[1] under the Town and Country Planning Act 1990[2]. The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017[3] apply as the relevant EIA instrument, and Schedule 4 to those Regulations requires the Environmental Statement accompanying the application to include a description of the likely significant effects of the Proposed Development on climate (for example, the nature and magnitude of greenhouse gas (GHG) emissions associated with its construction, operation and decommissioning, (generically referred to as carbon emissions) and the vulnerability of the Proposed Development to climate change (considered in terms of overall climate change resilience (CCR)).

1.1.2. In the case of the Proposed Development, which includes renewable energy generation, the assessment of impact on the climate accounts for the net benefit that the generation can bring over its lifetime (construction, operation and decommissioning) in displacing more carbon intensive forms of energy generation. This net benefit is then contextualised within the wider net zero targets and associated national carbon budgets set out by UK and devolved governments. Specifically in this case, the context are carbon budgets and targets for Wales and the United Kingdom (UK), aligned to a trajectory compatible with limiting the increase in global average temperature below 1.5°C in accordance with the Paris Agreement.[4]

1.1.3. The Excel-based Scottish Government Carbon Calculator Tool[5] has been used for the carbon balance calculation. The Tool is designed for assessing the net carbon benefit from the construction and operation of onshore wind farms located where peat is present. The Proposed Development layout, design and construction methodology has been refined to avoid peat excavation from tracks and turbine infrastructure, but it has not been possible to eliminate peat disturbance entirely. An Outline Soil and Peat Management Plan (OSPMP) has been prepared (**Appendix 10D**), which sets out how peat can be reinstated across the Site following construction.

1.2 RENEWABLE ENERGY POLICY CONTEXT

1.2.1. Provided below are the applicable renewable energy policy and strategies in regard to informing the requirement of this carbon balance assessment. This includes the relevant UK wide and Welsh legislative and policy framework for the development of renewable energy schemes.

- **Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 -** requires the assessment of likely significant environmental effects of development,

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1 Welsh Government (no date) Developments of national significance (DNS): applications. Available at: https://www.gov.wales/developments-national-significance-dns-applications
2 Town and Country Planning Act 1990 (as amended by the Planning (Wales) Act 2015). Available at: https://www.legislation.gov.uk/ukpga/1990/8
3 The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (as amended). Available at: https://www.legislation.gov.uk/wsi/2017/567
4 UNFCC (2015). Paris Agreement. Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf
5 Scottish Government (Energy Consents Unit), 2022. Carbon calculator for wind farms on Scottish peatlands. Details available at: https://www.gov.scot/publications/carbon-calculator-for-wind-farms-on-scottish-peatlands-factsheet/

including those relating to climate and greenhouse gas emissions, establishing a statutory basis for the assessment carbon emissions.[6];

- **Environment (Wales) Act 2016 -** establishes Welsh-specific emissions reduction targets and a carbon budgeting framework reinforcing the importance of assessing greenhouse gas emissions at a project level to support delivery of Wales' statutory climate ambitions.[7];
- **Climate Change Act 2008 (2050 Target Amendment) Order 2019 -** sets a legally binding target for the UK to achieve net zero greenhouse gas emissions by 2050. It underpins the need to quantify and assess project emissions to understand their contribution to, or alignment with, this national target.[8]; and
- **Carbon Budgets Orders (Carbon Budgets Order 2026) -** sets legally binding limits on UK greenhouse gas emissions over successive five-year periods and provides a framework against which the carbon performance of developments can be considered.[9]

1.2.2. The approach taken by the UK and Wales to addressing climate change has been shaped and informed by a range of international agreements and climate change obligations including the Kyoto protocol[10], the Paris Agreement[4] and the 2021 Glasgow Climate Compact[11] reflecting the UK's role as a signatory to the United Nations Framework Convention on Climate Change (UNFCCC).

1.2.3. The UK Government has set a net zero target which requires the UK to reduce GHG emissions by 100% below 1990 levels by 2050[8], this being the UK position in terms of meeting international obligations to reduce carbon emissions. The UK carbon budgets[9] require the UK to continually reduce emissions in line with the net zero target. Wales is committed to achieving net zero greenhouse gas emissions by 2050, with interim targets set for 2030 and 2040, supported by a series of legally binding five-year carbon budgets.[7]

1.3 SCOPE AND RECEPTORS

1.3.1. The scope of the assessment of GHG emissions associated with the Proposed Development includes GHG emissions from all activities within the Site, arising from the construction, operation, maintenance and decommissioning phases, as well as the GHG emissions associated with material processing and transportation of materials and labour from outside of the Site.

1.3.2. GHG emissions have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The global climate is the only receptor for the climate change assessment.

1.3.3. Given the global impacts of climate change and the globally recognised requirement to limit GHG emissions to maintain global average temperature increase below 1.5 °C, as laid out in the Paris Agreement**Error! Bookmark not defined.**, the receptor is considered highly sensitive to GHG emissions.

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6 UK Government. (2017) The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017. Available at: https://www.legislation.gov.uk/wsi/2017/567/contents

7 UK Government. (2016) Environment (Wales) Act 2016. Available at: https://www.legislation.gov.uk/anaw/2016/3/contents

8 UK Government. (2019) The Climate Change Act 2008 (2050 Target Amendment) Order 2019. Available at: https://www.legislation.gov.uk/uksi/2019/1056/contents/made

9 UK Government. (2026) The Carbon Budget Order 2026. Available at: https://www.legislation.gov.uk/uksi/2026/695/made/data.html

10 UNFCC (1998). Kyoto Protocol. Available at: https://unfccc.int/resource/docs/convkp/kpeng.pdf

11 UNFCC (2021). Glasgow Climate Pact [online]. Available at: https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf

2 POTENTIAL CONTRIBUTION OF THE PROPOSED DEVELOPMENT TO GOVERNMENT OJBJECTIVES

2.1 ENERGY YIELD

2.1.1. The installed capacity of a wind turbine is a measure of its maximum rated output, which in the context of the Proposed Development is an estimated 80 MW (assuming 11 x 7.2 MW machines). Calculation of the forecast output electricity generation of the turbines are dependent on the 'capacity factor', which determines the actual output of the generator over a period of time (typically annually) as a proportion of what would be generated if in constant operation at its maximum installed capacity[12]

2.1.2. On the basis of an installed capacity of 80 MW the amount of electricity produced by the Proposed Development is estimated to be 280 GWh per year, using the site specific capacity factor of 40%[13].

2.1.3. This 40% capacity factor has been used to calculate potential annual energy yield for the Proposed Development, shown in **Table 2A 1.**

2.2 CARBON DIOXIDE SAVINGS AND ELECTRICITY GENERATION

2.2.1. It is widely accepted that electricity produced from wind energy has a positive benefit in reducing GHG (CO_2e) emissions.

2.2.2. In estimating the actual saving it is important to consider the mix of alternative sources of electricity generation, for example, oil and gas powered assets. Renewable UK recommend the use of a static figure of 448 g of CO_2 saved for every kWh generated.[14] A figure of 448 tonnes of CO_2 for every GWh has therefore been assumed for the purposes of this assessment.

2.2.3. The Department for Energy Security and Net Zero (DESNZ) produces a range of statistics detailing electricity consumption across Great Britain. The average domestic consumption in Wales, based on sales per household, was 3,155 kWh in 2024 (compared to the average figure for Great Britain of 3,323 kWh in 2024).[15] This average domestic consumption figure is used as a means of describing the forecast output of the Proposed Development in terms of 'Homes Equivalent' (**Table 2A 1**).

[12] The net capacity factor of a wind farm is the ratio of its actual energy output (after energy losses within the wind farm have been accounted for) over a defined period of time (typically a year) to its energy output, had it operated at maximum power output continuously, over the same period of time.

[13] Renewable UK. (2025) Renewable electricity – standard load factors by region 2009 - 2024. Available at: https://assets.publishing.service.gov.uk/media/68da7713dadf7616351e4b78/Regional_spreadsheets__2009-2024__-_Std_LFs.xlsx

[14] RenewableUK (2026) UK wind energy database. Available at: https://www.renewableuk.com/energypulse/ukwed/

[15] DESNZ (2025). Regional and local authority electricity consumption statistics. Available at: https://www.gov.uk/government/statistics/regional-and-local-authority-electricity-consumption-statistics

Table 2A 1 – Potential electricity generation and CO_2 savings (Proposed Development)

Capacity Factor (%)	Electricity Generation (MWh per year)[16]	Homes Equivalent (based on average consumption)[15,17]	Carbon dioxide savings (Tonnes of CO_2 per year) based on Renewable UK savings figure
40%	280,320	88,849	125,583

[16] Figures are derived as follows: 80 MW (11 × 7.2MW turbine) × 8,760 hours/year × 0.4 (capacity factor) = 280,320 MWh.

[17] This is calculated using the most recent statistics from the DESNZ showing that annual average domestic household consumption for Wales 3,155 kWh

3 CARBON BALANCE OF THE PROPOSED DEVELOPMENT

3.1 OVERVIEW

3.1.1. The following sections outline the specific values for the carbon losses and carbon gains associated with the Proposed Development. For each input parameter (as outlined below in **Annex 2A 1**), an expected, minimum and maximum value is used to determine a carbon payback range. The 'expected' case presents the best estimate of the project's carbon balance based on the most likely values for the inputs at the time of assessment, the Minimum and Maximum cases provide the range of uncertainty in the results. The 'carbon losses' are the CO_2 emissions produced by the development and 'carbon gains' any savings made through emission reduction measures.

3.1.2. For this application, version 2.15.0 of the offline, Microsoft Excel, Scottish Government Carbon Calculator Tool was used.[18] The tool is not provided in this document but where appropriate, can be shared separately to relevant consultees, upon request.

3.1.3. The values for each scenario and the justification for the values used for the carbon balance calculations can be found in **Annex 2A 1**.

3.2 CARBON LOSSES

3.2.1. The manufacturing, construction and installation (including concrete) of the wind turbines has an associated carbon cost. Using figures from the online calculator, the expected case carbon emission losses associated with the manufacture, construction and decommissioning of the 80 MW installed capacity, is 72,539 tCO_2 equivalent (t CO_2e), which equates to approximately 99.0% of total CO_2e losses.

3.2.2. Due to efforts to avoid peat, carbon losses associated with CO_2 released from soil organic matter for the expected case amount to 686t CO_2e, equating to approximately 0.8% of total CO_2e losses. These small remaining losses result from peat and or organic soil removal and drainage effects following excavation for items of infrastructure where is has not be feasible to avoid entirely. It is worth noting that this figure assumes 100% loss of CO_2 from removed/disturbed peat or organic soils, as this is the default value within the carbon model. This constitutes a worst case scenario assessment.

3.2.3. Small carbon losses are generated by the reduction of carbon fixing potential which occurs due to the loss of bog plants as a result of wind farm construction. For the expected case, this is 66t CO_2e, which equates to 0.1% of total CO_2e losses [22]

3.2.4. There are only minor losses of forestry as a result of the Proposed Development as such carbon losses due to forestry felling are expected to be negligible at 2t CO_2e.

3.2.5. Total CO_2e losses due to the Proposed Development are 73,286 t CO_2e.

[18] The tool has been provided directly by the Energy Consents Unit (ECU) whilst downtime and ongoing maintenance occur on the online platform. The online tool and direction to the ECU is available at: https://www.gov.scot/publications/carbon-calculator-for-wind-farms-on-scottish-peatlands-factsheet/

Table2A 2 – Summary of total carbon losses

CO2 Losses	Losses due to turbine life (manufacture, construction, decommissioning)	Losses due to reduced carbon fixing potential	Losses from soil organic matter	Losses due to felling forestry
t CO2 eq.	72,539	101	557	2

3.3 CARBON GAINS

3.3.1. The carbon calculator indicates that the proposed peatland restoration and site improvement measures are expected to generate a carbon benefit of approximately 10,882 tCO_2e over the assessment period. These gains arise from improvements in peatland condition as outlined in **Appendix 5P** – Outline Habitat Management Plan. The final HMP will be agreed with consultees and secured via a suitably worded planning condition. These improvements result in reduced greenhouse gas emissions from degraded peat and enhanced long-term carbon sequestration. The restoration measures therefore partially offset carbon losses associated with the construction and operation of the Proposed Development and contribute positively to the overall carbon balance of the scheme.[19]

4 CARBON PAYBACK OF THE PROPOSED DEVELOPMENT

4.1.1. To calculate the carbon payback period, the assessment uses two appropriate fossil fuel displacement scenarios, which are updated automatically using data from the Digest of United Kingdom Energy Statistics (DUKES):

- Grid mix, the mix of electricity sources supplying the UK as a whole; and
- Fossil fuel mix, for fossil fuel sourced electricity generation alone.

4.1.2. The grid mix scenario has been selected as the most appropriate basis for calculating carbon payback time (the counterfactual).[20] As the grid decarbonises, the continued phasing out of fossil fuels will proportionately reduce the carbon benefit of the scheme. Therefore, the grid mix scenario provides the most appropriate basis for comparing predicted payback. Based on this scenario, the payback for the Proposed Development is predicted to be 1.3 years. However, the payback period could be as low as 0.7 years for the minimum scenario, increasing to 1.6 years for the maximum scenario for grid mix.

4.1.3. The fossil fuel mix scenario has been included for reference as a conservative comparator. The carbon payback time for each scenario is shown in **Table2A 3.**

Table2A 3 – Payback in years for each Scenario used in the Carbon Calculator

Fuel Source	Carbon Payback Time (years) Expected Value	Carbon Payback Time (Years) Minimum value	Carbon Payback Time (Years) Maximum Value
Fossil Fuel Mix	0.5	0.3	0.6
Grid Mix	1.3	0.7	1.6

[20] Note on limitations: wind power will not replace all forms of conventional generation equally, so the true carbon emissions displacement will be dependent on a combination of factors e.g. the types of power generation being replaced, any decrease in efficiency of conventional plant operating at part load, and the impact of any increase in frequency of start-up and shut-down of conventional plant.

5 SUMMARY

5.1.1. Given potential annual CO_2 savings of 125,583 tonnes/year (based on a figure of 448 tonnes of CO_2 savings per GWh[14] and a capacity factor of 40%), the Proposed Development could result in a total carbon saving of approximately 4.4 million tonnes over a 40-year operational life, generating electricity to annually supply the equivalent of approximately 89,000 homes (at 2024 average domestic consumption levels).[15]

5.1.2. It is predicted that the carbon loss in developing the Proposed Development would be paid back in ~1.3 years (approximately 3.3% of the proposed 40-year life span) based upon the expected outcome under the grid mix scenario. Even considering the maximum scenario against the grid mix, the Proposed Development would have achieved the carbon balance within ~1.6 years approximately 4% of the proposed 40-year life span).[22]

5.1.3. It is concluded that the GHG impact of the Proposed Development would have a beneficial effect. The Proposed Development causes an indirect reduction in atmospheric GHG emissions which has a positive impact on achievement of carbon budgets and targets for Wales and the UK.

Annex 2A 1

CARBON BALANCE CALCULATION ASSUMPTIONS

For this application, version 2.15.0 of the offline, Microsoft Excel, Scottish Government Carbon Calculator Tool was used to complete the assessment, the tool is not provided in this document but where appropriate, can be shared separately to relevant consultees, upon request. A table containing the values for each scenario and the justification for the values used for the carbon balance calculations is found below.

Table 01-1 - Carbon Balance Calculation Assumptions

Input data	Parc Ynni Calon y Gwynt			Comments/Assumptions
	Expected	Minimum	Maximum	
Wind Farm Characteristics				
Dimensions				
No. of turbines	11	11	11	Information taken from - Chapter 4 Proposed Development
Lifetime of wind farm (years)	40	40	40	Information taken from - Chapter 4 Proposed Development
Power rating of turbines	7.2	7.2	7.2	Information taken from - Chapter 4 Proposed Development Indicative output capacity of 80MW Output capacity / No. of turbines = turbine power rating (80/11 =7.3)"
Capacity factor	40%	38%	42%	Capacity Factor provided by the Applicant (min, max = +/- 10%)
Extra capacity required for back up	0%	0%	0%	An additional backup capacity of 0% has been assumed due to the inclusion of BESS within the proposed development.
Additional emissions due to thermal inefficiency of back up generation (%)	10%	10%	10%	Extra emissions due to reduced thermal efficiency of the reserve power generation = 10% (Dale et al 2004)[21].

[21] Royal Academy of Engineering 2014 Wind Energy, implications of large-scale deployment on the GB electricity system, available at: http://www.raeng.org.uk/publications/reports/wind-energy-implications-of-large-scale-deployment

Input data	Parc Ynni Calon y Gwynt			Comments/Assumptions
	Expected	Minimum	Maximum	
Carbon dioxide emissions from turbines' life	Calculate w.r.t installed capacity			Total CO_2 emission calculated using installed capacity (default equation provided by carbon calculator).
Peatland Characteristics before wind development				
Type of peatland	Acid bog	Acid bog	Acid bog	An 'acid bog' is fed primarily by rainwater and often inhabited by sphagnum moss, thus making it acidic. See Stoneman & Brooks (1997)
Average annual air temperature at site (°C)	8.8	1.3	17.3	Average annual temperature taken for Lake Vyrnwy No 2, 1991-2020 (approximately 23km away from Calon Y Gwynt). Expected value calculated using average annual temperature. Maximum and minimum calculated using maximum summer temperatures and minimum winter temperatures.
Average peat depth at site (m)	0.5	0.20	0.80	Information taken from - CYG Calculations oSPMP.
Content of dry peat % by weight	55	49	62	Scottish Government Excel Tool Calculator figures
Average extent of drainage around drainage features at site (m)	7.5	5	10	No site-specific measurements available, precautionary values used.
Average water table depth at site (m)	0.3	0.2	0.4	No site-specific measurements available, precautionary values used.
Dry soil bulk density (gcm^{-3})	0.25	0.2	0.3	No site-specific values available. Values taken from a similar upland site with underlying peat.
Characteristics of bog plants				

Input data	Parc Ynni Calon y Gwynt			Comments/Assumptions
	Expected	Minimum	Maximum	
Time required for regeneration of bog plants after restoration (years)	3	2	5	Regeneration time directly depends on the present species and their pace of establishment, and also the restoration methods used and hydrology maintenance. Precautionary values, based on best judgement have been provided.
Carbon accumulation due to C fixation by bog plants in undrained peat (tC ha^{-1} yr^{-1})	0.25	0.12	0.31	Default values provided by Turunen et al., 2001[22]; Botch et al., 1995[23].
Forestry Plantation Characteristics				
Method: Enter simple data				
Area of forestry plantation to be felled (ha)	0.05	0.05	0.06	Assumed no felling of forestry required. (min, max = +/- 10%)
Average rate of carbon sequestration in timber	3.6	3.4	3.8	Figures from Cannell, 1999[24]. min and max entered as a range.
Counterfactual emission factors				
Coal-fired plant emission factor tCO_2MWh^{-1}	0.919	0.919	0.919	Provided within carbon calculator tool.
Grid mix emission factor tCO_2MWh^{-1}	0.177	0.177	0.177	Provided within carbon calculator tool.
Fossil fuel mix emission factor tCO_2MWh^{-1}	0.448	0.448	0.448	Provided within carbon calculator tool.
Borrow Pits				

[22] Turunen J., Tahvanainen T., Tolonen K. and Pitkänen A. 2001 Carbon accumulation in West Siberian mires, Russia. Global Biogeochemical Cycles 15: 285-296.
[23] Botch M.S., Kobak K.I. Vinson T.S. and Kolchugina T.P. 1995 carbon pools and accumulation in peatlands of the former Soviet Union. Global Biogeochemical Cycles 9: 37-46
[24] Cannell, M.G.R. (1999) Growing trees to sequester carbon in the UK: answers to some common questions. Forestry, 72, 238–247

Input data	Parc Ynni Calon y Gwynt			Comments/Assumptions
	Expected	Minimum	Maximum	
Number of Areas	0	0	0	Information taken from - Chapter 4 Proposed Development. No borrow pits assumed at this stage. Initial borrow pit appraisal work is underway but currently not included as part of the draft ES. Assumptions and details will form part of the Final ES.
Average length of area (m)	n/a	n/a	n/a	
Average width of areas (m)	n/a	n/a	n/a	
Average depth of peat removed from area (m)	n/a	n/a	n/a	
Access tracks				
Total length of access tracks (m)	8,740	7,866	9,614	Access track data extracted from CYG Calculation SPMP accounting for main wind farm site. (min, max = +/- 10%)
Existing tracks length (m)	0	0	0	All existing access track requires upgrade however, due to the constraints of the calculation tool, with no option to represent this, the existing access track is represented as new access track to account for upgrades. Although an over estimation of extract peat/soils it presents a reasonable worst case scenario in line with EIA guidance.
Length of access tracks that is floating road (m)	410	369	451	Access track data extracted from CYG Calculation SPMP (min, max = +/- 10%)

Input data	Parc Ynni Calon y Gwynt			Comments/Assumptions
	Expected	Minimum	Maximum	
Floating road width (m)	5.5	4.95	6.05	Information taken from - Chapter 4 Proposed Development (min, max = +/- 10%)
Floating road depth (m)	0.5	0.45	0.55	Information taken from - Chapter 4 Proposed Development (min, max = +/- 10%)
Length of floating road that is drained (m)	0	0	0	Assumed no drains would be used alongside a floating road.
Average depth of drains associated with floating roads (m)	0	0	0	Assumed no drains would be used alongside a floating road.
Length of access track that is excavated road (m)	925	878.75	971.3	Access track data only accounting areas of access track located on peat or peaty soil. Extracted from CYG Calculation SPMP accounting for main windfarm site. (min, max = +/- 10%)
Excavated road width (m)	5.5	4.95	6.05	Information taken from - Chapter 4 Proposed Development (min, max = +/- 10%)
Average depth of peat excavated from road (m)	0.31	0.29	0.33	Access track data extracted from CYG Calculation SPMP. No peat excavation is expected however, the carbon calculator tool accounts for peaty soil as well as true peat which is represented here. (min, max = +/- 10%)
Length of access track that is rock filled road (m)	0	0	0	Information taken from - Chapter 4 Proposed Development Assumed that road on peat depth <1m is peat

Input data	Parc Ynni Calon y Gwynt			Comments/Assumptions
	Expected	Minimum	Maximum	
				excavated and hence there is no rock filled road.
Rock filled road width (m)	n/a	n/a	n/a	No Rock filled road
Rock filled road depth (m)	n/a	n/a	n/a	No Rock filled road
Length of rock filled road that is drained (m)	n/a	n/a	n/a	No Rock filled road
Average depth of drains associated with rock filled roads (m)	n/a	n/a	n/a	No Rock filled road
Cable Trenches				
Length of any cable trench on peat that does not follow access track and is lined with a permeable material (m)	0	0	0	Information taken from - Chapter 4 Proposed Development. Assume full length of cable route to follow access track.
Depth of cable trench (m)	0.31	0.29	0.33	Information taken from - CYG Calculation SPMP, average peat/s soil depth for site has been used to represent losses. No peat excavation is expected however, the carbon calculator tool accounts for peaty soil as well as true peat which is represented here. (min, max = +/- 10%)
Additional peat excavated (not accounted for above)				
Volume of additional peat excavated (m^3)	0	0	0	Information taken from - CYG Calculation SPMP. Assumed no removal of additional peat.
Area of additional peat excavated (m^2)	0	0	0	Information taken from - CYG Calculation SPMP. Assumed no removal of additional peat.

Input data	Parc Ynni Calon y Gwynt			Comments/Assumptions
	Expected	Minimum	Maximum	
Peat Landslide hazard				
Peat landslide hazard risk assessment	Negligible	Negligible	Negligible	Fixed value.
Improvement of C sequestration at site by blocking drains, restoration of habitat etc.				
Improvement of degraded bog				
Area of degraded bog to be improved (ha)	139.2	130	145	Information taken from oHMP inclusive of high sensitivity soils, blanket bog and marshy grassland. (min, max = +/- 10%)
Water table depth in degraded bog before improvement (m)	0.3	0.1	0.5	No site-specific values available, precautionary values and professional judgement used as proxy.
Water table depth in degraded bog after improvement (m)	0.1	0.05	0.3	No site-specific values available, precautionary values and professional judgement used as proxy.
Time required for hydrology and habitat of bog to return to its previous state on restoration (years)	5	2	10	No site-specific values available, precautionary values and professional judgement used as proxy.
Period of time when effectiveness of the improvement in degraded bog can be guaranteed (years)	15	10	20	No site-specific values available, precautionary values and professional judgement used as proxy.
Improvement of felled plantation				
Area of felled plantation to be improved (ha)	0	0	0	Assumed no felling of forestry required thus no proposed plans for improvement to felled plantation.
Water table depth in felled area before improvement (m)	N/A	N/A	N/A	N/A

Input data	Parc Ynni Calon y Gwynt			Comments/Assumptions
	Expected	Minimum	Maximum	
Water table depth in felled area after improvement (m)	N/A	N/A	N/A	N/A
Time required for hydrology and habitat of felled plantation to return to its previous state on restoration (years)	N/A	N/A	N/A	N/A
Period of time when effectiveness of the improvement in felled plantation can be guaranteed (years)	N/A	N/A	N/A	N/A
Restoration of peat removed from borrow pits				
Area of borrow pits to be restored (ha)	n/a	n/a	n/a	No borrow pits assumed at this stage. Initial borrow pit appraisal work is underway but currently not included as part of the draft ES. Assumptions and details will form part of the Final ES.
Depth of water table in borrow pit before restoration with respect to the restored surface (m)	n/a	n/a	n/a	No borrow pits assumed at this stage. Initial borrow pit appraisal work is underway but currently not included as part of the draft ES. Assumptions and details will form part of the Final ES.
Depth of water table in borrow pit after restoration with respect to the restored surface (m)	n/a	n/a	n/a	No borrow pits assumed at this stage. Initial borrow pit appraisal work is underway but currently not included as part of the draft ES. Assumptions and details will form part of the Final ES.
Time required for hydrology and habitat of borrow pit to return	n/a	n/a	n/a	No borrow pits assumed at this stage. Initial borrow pit appraisal work is underway

Input data	Parc Ynni Calon y Gwynt			Comments/Assumptions
	Expected	Minimum	Maximum	
to its previous state on restoration (years)				but currently not included as part of the draft ES. Assumptions and details will form part of the Final ES.
Period of time when effectiveness of the restoration of peat removed from borrow pits can be guaranteed (years)	n/a	n/a	n/a	No borrow pits assumed at this stage. Initial borrow pit appraisal work is underway but currently not included as part of the draft ES. Assumptions and details will form part of the Final ES.
Removal of drainage from foundations and hardstanding				
Water table depth around foundations and hardstanding before restoration	0	0	0	Assume no removal of drainage.
Water table depth around foundations and hardstanding after restoration	0	0	0	Assume no removal of drainage.
Time to completion of backfilling, removal of any surface drains and full restoration of the hydrology (years)	0	0	0	Assume no removal of drainage.
Restoration of site after decommissioning				
Will you attempt to block any gullies that have formed due to the wind farm?	Yes	Yes	No	Assumes that any gullies caused by construction of the wind farm would be blocked to maintain habitats except worst case scenario (maximum column).
Will you attempt to block all artificial ditches and facilitate rewetting?	No	No	No	
Will the habitat of the site be restored on decommissioning				

Input data	Parc Ynni Calon y Gwynt			Comments/Assumptions
	Expected	Minimum	Maximum	
Will you control grazing on degraded areas?	Yes	Yes	Yes	If required.
Will you manage areas to favour reintroduction of species	No	No	No	
Construction Input Data				
Area 1 - Construction Input Data for turbines in organic matter <0.5m deep				
Number of turbines in this area	1	1	1	Information taken from - CYG Calculation SPMP, accounting for only turbines located on peat or peaty soils.
Turbine foundations				
Depth of hole dug when constructing foundations	0.22	0.20	0.24	Information taken from - CYG Calculation SPMP. Average Depth for Turbine & Permanent Hardstand No peat excavation is expected however, the carbon calculator tool accounts for peaty soil as well as true peat which is represented here. (min, max = +/- 10%)
Approximate geometric shape of hole dug when constructing foundations	Rectangular	Rectangular	Rectangular	Note – the Excel carbon tool does not provide a “Circular” option. Actual turbine foundation dimensions is 25m diameter circle equating to an area of approximately 490.87m^2 A rectangle of equal area has been used in substitute for this assessment. (Approximate Length 22.16 and Approximate width of 22.16)

Input data	Parc Ynni Calon y Gwynt			Comments/Assumptions
	Expected	Minimum	Maximum	
Length at surface (m)	22.16	22.16	22.16	Information taken from - CYG Calculation SPMP Note – the Excel carbon tool does not provide a "Circular" option. Actual turbine foundation dimensions is 25m diameter circle equating to an area of approximately 490.87m^2 A rectangle of equal area has been used in substitute for this assessment. (Approximate Length 22.16 and Approximate width of 22.16)
Width at surface (m)	22.16	22.16	22.16	Information taken from - CYG Calculation SPMP. Note – the Excel carbon tool does not provide a "Circular" option. Actual turbine foundation dimensions is 25m diameter circle equating to an area of approximately 490.87m^2 A rectangle of equal area has been used in substitute for this assessment. (Approximate Length 22.16 and Approximate width of 22.16)
Length at bottom (m)	22.16	22.16	22.16	Information taken from - CYG Calculation SPMP. Note – the Excel carbon tool does not provide a "Circular" option. Actual turbine foundation dimensions is 25m diameter circle equating to an area of approximately 490.87m^2

Input data	Parc Ynni Calon y Gwynt			Comments/Assumptions
	Expected	Minimum	Maximum	
				A rectangle of equal area has been used in substitute for this assessment. (Approximate Length 22.16 and Approximate width of 22.16)
Width at bottom (m)	22.16	22.16	22.16	Information taken from - CYG Calculation SPMP Note – the Excel carbon tool does not provide a "Circular" option. Actual turbine foundation dimensions is 25m diameter circle equating to an area of approximately 490.87m^2 A rectangle of equal area has been used in substitute for this assessment. (Approximate Length 22.16 and Approximate width of 22.16)
Volume of concrete used in the entire area (m^3)	11,649	10,485	12,815	Design information. Expected concrete amount 1000 m^3 per foundation +10% to account for other infrastructure, met mast etc as a worst case scenario. Concrete volumes for all 11 turbines has been included for all turbines (Those not located on peat or peaty soils). (Minimum and Maximum +/- 10%)
Hardstanding				
Depth of hole dug when constructing hardstanding	0.22	0.20	0.24	Information taken from - CYG Calculation SPMP. Average Depth for Turbine & Permanent Hardstand No peat excavation is expected however, the

Input data	Parc Ynni Calon y Gwynt			Comments/Assumptions
	Expected	Minimum	Maximum	
				carbon calculator tool accounts for peaty soil as well as true peat which is represented here. (min, max = +/- 10%)
Approximate geometric shape of hole dug when constructing hardstanding	Rectangular	Rectangular	Rectangular	Information taken from – Chapter 4 Proposed Development
Length at surface (m)	55	55	55	Information taken from - Chapter 4 Proposed Development
Width at surface (m)	30	30	30	Information taken from - Chapter 4 Proposed Development
Length at bottom (m)	55	55	55	Information taken from Chapter 4 Proposed Development
Width at bottom (m)	30	30	30	Information taken from - Chapter 4 Proposed Development
Is piling used?	No	No	No	Piling not likely to be used

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