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VALE OF GLAMORGAN COUNCIL

RENEWABLE ENERGY ASSESSMENT

RENEWABLE ENERGY FEASIBILITY STUDY

JULY 2023

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JULY 2023

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EXECUTIVE SUMMARY

Wardell Armstrong (WA) have been commissioned by the Vale of Glamorgan Council to conduct a renewable energy assessment of the Vale of Glamorgan to support the evidence base for their Replacement Local Development Plan. This was designed to aid the understanding of the resource available and where that resource is located so that planning policy can be focussed on the most appropriate technologies and places. The study involved assessing the area for viable sites and identifying potential resource for these generators. The study was undertaken with a focus on both wind and solar photovoltaics (PV) developments and includes what are justified to be challenging but achievable targets for renewable energy production.

Solar

It is found that the Vale has a number of small existing solar farms. This is set to change as more large-scale solar developments have been granted approval. These developments are focused around the south and southeast of the Vale. There are large expanses of land suitable for solar photovoltaics (PV) to the west of the Vale with little to no existing development. WA finds that the western area of the Vale is most suitable for solar PV. While these sites meet the criteria used in this study, they will each have to be considered separately to assess their impacts on the environmental and historical setting. In addition, this report has not explicitly identified grid constraints due to limitations in publicly available data and this is likely to be the single largest impediment to sites being brought forward.

Wind

The Vale is found to have a very attractive wind resource due to the exposure to the prevailing winds from the southwest. Lots of potentially suitable sites have been identified however the airports to the south of the Vale will limit the deployment of wind projects with large turbines. Saying this, the sites identified which are not in the direct flightpath of aircraft may still be deliverable, but this will have to be confirmed in the detailed design phase in correspondence with the Civil Aviation Authority.

It is found that in general terms solar development is more suitable than wind within the Vale. However, due to developers favouring larger scale sites, grid constraints are likely to be a serious constraint to sites coming forwards.

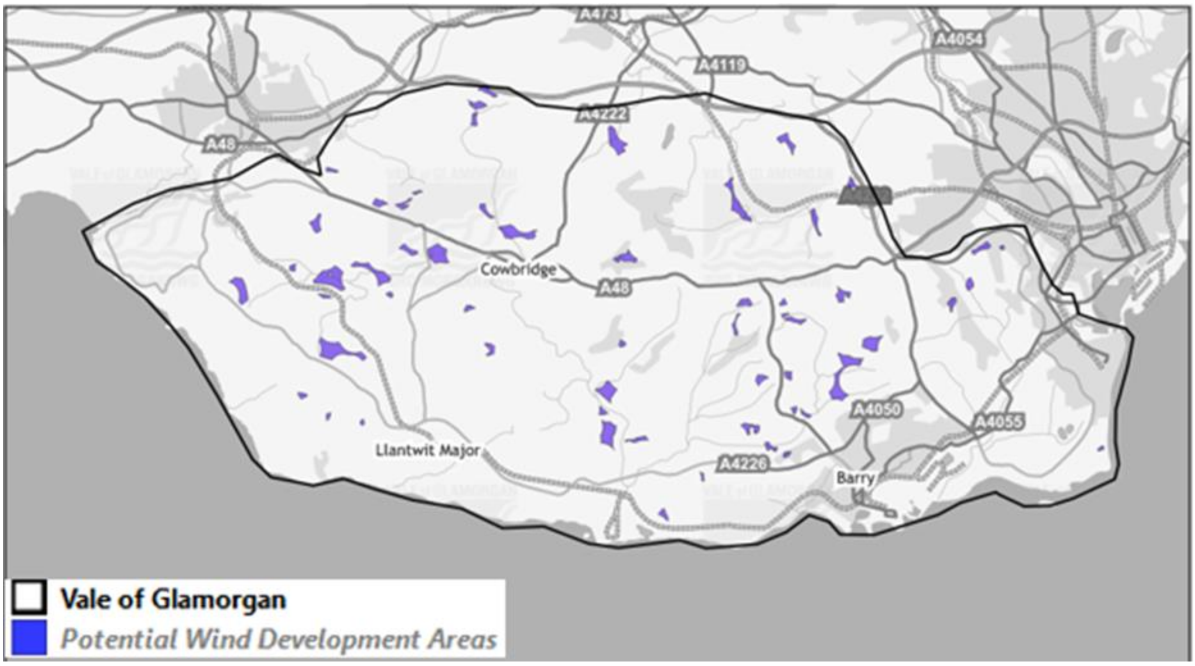
The installed capacities for the 20 largest sites of each study are calculated and shown in the tables below.

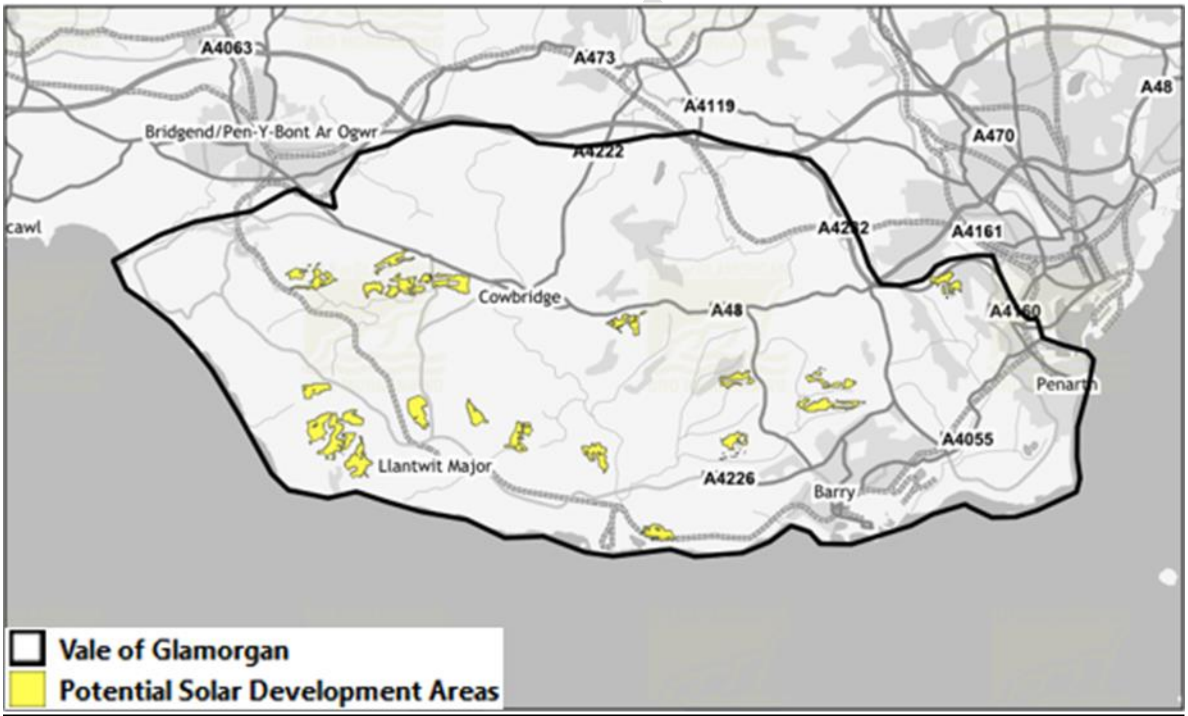
Solar

Largest potentially feasible solar areas - Grade 3B-5						
Site Number	Area (m2)	Area (Hectares)	Installed Capacity (MW) - 2.4:1	Installed Capacity (MW) - 1:1	Annual Energy Generation (GWh) at Installed Capacity (MW) - 2.4:1	**Annual Energy Generation (GWh) at Installed Capacity (MW) - 1:1**
1	897641	89.8	37.4	89.8	34.7	83.4
2	521004	52.1	21.7	52.1	20.2	48.4
3	503501	50.4	21.0	50.4	19.5	46.8
4	469591	47.0	19.6	47.0	18.2	43.6
5	457208	45.7	19.1	45.7	17.7	42.5
6	445611	44.6	18.6	44.6	17.2	41.4
7	444630	44.5	18.5	44.5	17.2	41.3
8	422107	42.2	17.6	42.2	16.3	39.2
9	407548	40.8	17.0	40.8	15.8	37.8
10	383298	38.3	16.0	38.3	14.8	35.6
11	345795	34.6	14.4	34.6	13.4	32.1
12	328540	32.9	13.7	32.9	12.7	30.5
13	321794	32.2	13.4	32.2	12.5	29.9
14	302558	30.3	12.6	30.3	11.7	28.1
15	293344	29.3	12.2	29.3	11.3	27.2
16	266146	26.6	11.1	26.6	10.3	24.7
17	258229	25.8	10.8	25.8	10.0	24.0
18	254920	25.5	10.6	25.5	9.9	23.7
19	253599	25.4	10.6	25.4	9.8	23.5
20	252871	25.3	10.5	25.3	9.8	23.5
Total	**7829935**	**783**	**326**	**783**	**303**	**727**

Wind

Site	Area (m^2)	Area (Ha)	Area (km^2)	Number of Small Turbines	Number of Large Turbines	Installed Capacity Small Turbines (MW)	Installed Capacity Large Turbines (MW)	Annual Energy Generation Small Turbines (GWh)	Annual Energy Generation Large Turbines (GWh)
1	453000	45.3	0.45	3	2	6	9	14.2	21.3
2	426000	42.6	0.43	3	2	6	9	14.2	21.3
3	426000	42.6	0.43	3	2	6	9	14.2	21.3
4	282000	28.2	0.28	2	1	4	4.5	9.5	10.6
5	278000	27.8	0.28	2	1	4	4.5	9.5	10.6
6	268000	26.8	0.27	2	1	4	4.5	9.5	10.6
7	257000	25.7	0.26	2	1	4	4.5	9.5	10.6
8	255000	25.5	0.26	2	1	4	4.5	9.5	10.6
9	238000	23.8	0.24	2	1	4	4.5	9.5	10.6
10	232000	23.2	0.23	2	1	4	4.5	9.5	10.6
11	213000	21.3	0.21	2	1	4	4.5	9.5	10.6
12	196000	19.6	0.20	1	1	2	4.5	4.7	10.6
13	138000	13.8	0.14	1	1	2	4.5	4.7	10.6
14	126000	12.6	0.13	1	1	2	4.5	4.7	10.6
15	123000	12.3	0.12	1	1	2	4.5	4.7	10.6
16	114000	11.4	0.11	1	1	2	4.5	4.7	10.6
17	107000	10.7	0.11	1	1	2	4.5	4.7	10.6
18	98700	9.9	0.10	1	1	2	4.5	4.7	10.6
19	94200	9.4	0.09	1	1	2	4.5	4.7	10.6
20	87500	8.8	0.09	1	1	2	4.5	4.7	10.6
Total	**4412400**	**441**	**4**	**34**	**23**	**68**	**104**	**161**	**245**


A473
A4054
A4119
A4222
A48
Cowbridge
A48
A4050
A4055
Llantwit Major
A4226
Barry
Vale of Glamorgan
Potential Wind Development Areas


A4063
A473
A4119
A48
Bridgend/Pen-Y-Bont Ar Ogwr
A470
A4222
A4161
Cowbridge
A48
Penarth
A4055
Llantwit Major
A4226
Barry
Vale of Glamorgan
Potential Solar Development Areas

1 INTRODUCTION

1.1 Background

1.1.1 Wardell Armstrong (WA) have been commissioned by the Vale of Glamorgan Council (from here on referred to as VOGC) to conduct a Renewable Energy Assessment. This study will identify the most suitable regions within the Vale for renewable energy development. The VOGC boundary is shown in Figure 1.1. This assessment will inform the evidence base for the VOGC's Replacement Local Development Plan 2021-2036 in respect of renewable energy.

1.1.2 The VOGC's Project Zero Climate Change Challenge Plan aims to reduce the Council's emissions to net zero by 2030, whilst encouraging other businesses to do this. Heating and electricity produced from carbon intensive energy sources is a major cause of Greenhouse Gas (GHG) emissions. For this reason, low carbon technologies are being assessed to help achieve this goal.

1.1.3 Within the Local Development Plan (LDP) (Adopted 2017), Policy MD19 seeks to *"favour low carbon and renewable energy schemes, where appropriate."* The aim of this is to promote renewable energy generation within the Vale. Planning permission can only be granted if there is extensive evidence that these developments will not negatively impact the environment and historic setting.

1.1.4 The aim of this report is to outline the areas of potential renewable development, and to use these to inform targets for renewable energy production, to help VOGC develop future planning policy concerning renewable energy development within the Vale.

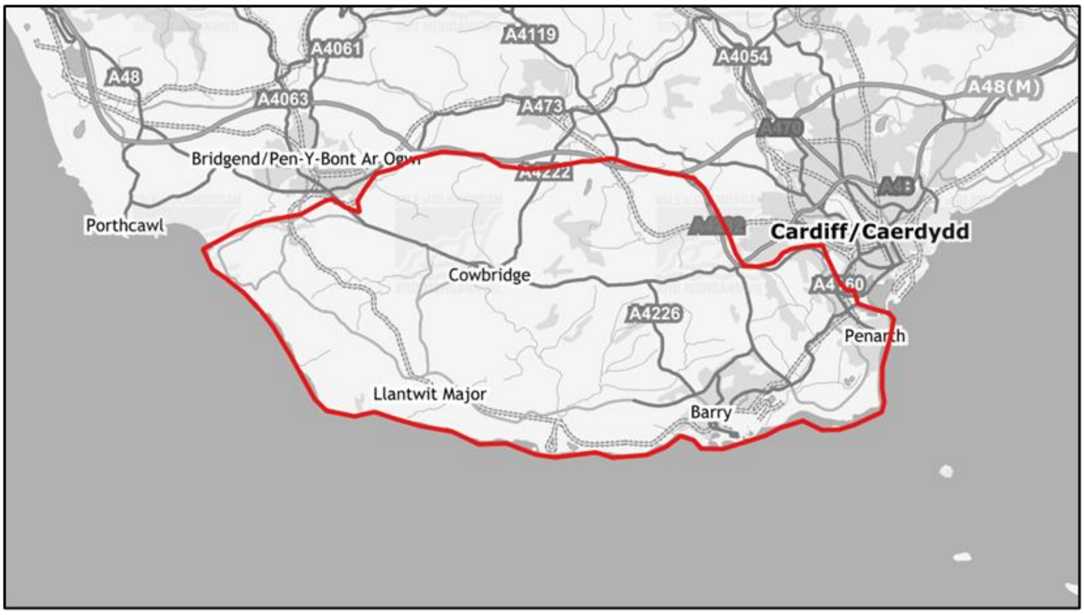


Figure 1.1: Vale of Glamorgan Administrative Boundary

2 POLICY CONTEXT

2.1 International Policies and Legislation

2.1.1 The Intergovernmental Panel on Climate Change (IPCC) was formed in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme. It is now the globally recognised United Nations body for assessing the science related to climate change. The IPCC aims to provide policymakers with regular scientific assessments on climate change, its implications and potential future risks, as well as to put forward realistic adaptation and mitigation options. The IPCC does not conduct its own research but allows for open and transparent review by experts and governments around the world.

2.1.2 The IPCC Fifth Assessment Report (AR5, 2014)[1] indicated that global GHG emissions will need to drop by half by 2030 and reach net-zero around mid-century to avoid the worst climate impacts. The Sixth Assessment Report (AR6), which is the latest IPCC report published in August 2021[2], highlights how human-induced climate change is already affecting many weather and climate extremes in every region across the world. Evidence of observed changes in extremes such as heatwaves, heavy precipitation, droughts, and tropical storms has strengthened since AR5.

2.1.3 AR6 states that:

"Global surface temperature will continue to increase until at least the mid-century under all emissions scenarios considered. Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in carbon dioxide (CO2) and other greenhouse gas emissions occur in the coming decades."

The Paris Agreement

2.1.4 The United Nations Climate Change Conference of Parties (COP) has 197 member countries which have been meeting annually since 1995. The 21st meeting (COP21) was held in Paris in 2015. This made global history with the first legally binding international treaty on climate change, commonly referred to as The Paris Agreement. The treaty sets out a global framework which aims to strengthen the global response

[1] IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

[2] IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [MassonDelmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M.Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.

to the threat of dangerous climate change, by limiting global warming to well below 2 degrees Celsius (°C) above pre-industrial levels, and pursuing efforts to limit the temperature increase this century to 1.5 °C.

2.1.5 The Paris Agreement has now been adopted by 191 countries, including the UK. All member countries are required to prepare, communicate, and maintain successive nationally determined contributions (NDCs) that it intends to achieve. NDCs should represent a progression from the previous NDC and reflect the country's highest possible ambition. This includes a requirement to report regularly on emissions and on mitigation implementation efforts. The collective progress towards achieving the purpose of the Paris Agreement will be assessed every five years in a global stocktake of progress. The latest updated NDCs for the UK were published in December 2020, committing the UK to reduce economy-wide GHG emissions by at least 68% by 2030, compared to 1990 levels[3].

2.1.6 According to a recent article published by the World Resources Institute (WRI)[4], the European Union (EU) and 19 other countries have adopted net-zero carbon targets, and more than 100 others are considering doing so within the coming years. A rapidly growing number of national governments, local governments, and business leaders are now making commitments to reach net-zero emissions in an effort to recognise the urgency of reducing global GHG emissions and tackle climate change.

2.1.7 At a regional level, within the UK, over 300 Local Authorities have declared Climate Emergencies. A third of these have developed strategies and action plans to deliver ambitious emission reduction targets by 2030 and achieve Net Zero by 2050. Out of 22 Local Authorities in Wales, 20 have action plans outlining how they will tackle climate-related challenges and support the Welsh Government's ambition for a carbon neutral Public Sector by 2030. To date, only 16 Welsh Local Authorities have made formal Climate Emergency declarations which includes The VOGC[5].

[3] UK Government (2020) 'United Kingdom of Great Britain and Northern Ireland's Nationally Determined Contribution' Crown copyright, London.

[4] World Resources Institute (2020). 'Designing and Communicating Net-Zero Targets.' https://www.wri.org/research/designing-and-communicating-net-zero-targets [Accessed August 2022].

[5] Environmental Law Foundation (ELF) (October 2021) 'Local urgency on the Climate Emergency? A review of local authority Climate Emergency Declarations and supporting action across the UK.' Available online at: https://elflaw.org/news/local-urgency-on-the-climate-emergency/ [Accessed November 2022].

The Glasgow Climate Pact

2.1.8 The Glasgow Climate Pact was agreed by almost 200 countries at COP26 in November 2021, and recognised the need for accelerated action to limit global warming to 1.5°C above pre-industrial temperatures. It called for all countries to:

"revisit and strengthen the 2030 targets in their Nationally Determined Contributions (NDCs) as necessary to align with the Paris Agreement temperature goal by the end of 2022, taking into account different national circumstances."

2.1.9 In response to the Glasgow Climate Pact, the UK has revisited its 2030 NDC which was announced in December 2020. It was decided that the target remains a fair and ambitious contribution to global action on climate change and was submitted to the UNFCCC as the UK's updated NDC in September 2022[6].

2.2 UK and Welsh Government Policies and Legislation

Climate Change Act 2008 (2050 Target Amendment) Order 2019

2.2.1 The Climate Change Act 2008 establishes the framework for the UK to set and deliver GHG emission reduction targets; mainly through the establishment of the Climate Change Committee (CCC) which ensures targets are evidence-based and independently assessed. The CCC advises the UK and devolved governments on preparing for climate change through adaptation and mitigation.

2.2.2 An amendment to The Act in 2019 commits the UK Government to reduce GHG emissions to a minimum of 100% below 1990 baseline levels by 2050 – Net Zero. This includes reducing emissions from the devolved administrations of Scotland, Wales, and Northern Ireland. The CCC describes how the Devolved Nations currently account for about 20% of the UK's total GHG emissions.

The Climate Change and Sustainable Energy Act (2006)

2.2.3 The Act makes provision about the reduction of emissions of greenhouse gases, the reduction of fuel poverty, the support of microgeneration and the use of heat produced from renewable sources. It makes provision for compliance with building regulations relating to GHGs and use of power and fuel, the renewables obligation relating to the generation and supply of electricity and the adjustment of transmission charges for electricity and for connected purposes.

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[6] HM Government (September 2022) 'United Kingdom of Great Britain and Northern Ireland's Nationally Determined Contribution' Crown copyright, London.

The Planning and Energy Act (2008)

2.2.4 The Planning and Energy Act enables Local Planning Authorities (LPAs) to set requirements for energy use and energy efficiency in Local Plans.

British Energy Security Strategy (2022)

2.2.5 The British Energy Security Strategy[7] is applicable to Wales, England and Scotland. It aims to bring about secure, clean, and affordable British energy for the long term. The strategy sets out a Ten Point Plan to achieve this aim and includes:

1. Advancing offshore wind
2. Driving the growth of low carbon hydrogen
3. Delivering new and advanced nuclear power
4. Accelerating the shift to zero emission vehicles
5. Green public transport, cycling and walking
6. Jet zero and green ships
7. Greener buildings
8. Investing in CCUS
9. Protecting our natural environment
10. Green finance and innovation

Energy Act (2016)

2.2.6 The Energy Act makes provision about the Oil and Gas Authority and its functions, to make provision about rights to use upstream petroleum infrastructure; to make provision about the abandonment of offshore installations, submarine pipelines and upstream petroleum infrastructure; to extend Part 1A of the Petroleum Act 1998 to Northern Ireland; to make provision about the disclosure of information for the purposes of international agreements; to make provision about fees in respect of activities relating to oil, gas, carbon dioxide and pipelines; to make provision about wind power; and for connected purposes[8].

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[7] HM Government (2022) Policy paper: British energy security strategy' https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy [Accessed July 2023]

[8] UK Government (2023) Energy Act 2016. Available from https://www.legislation.gov.uk/ukpga/2016/20/introduction/enacted [Accessed 03 February 2023].

Environment (Wales) Act 2016 (Amendment of 2050 Emissions Target) Regulations 2021

2.2.7 As well as being covered by the Climate Change Act, the Devolved Nations have separate climate change policies. In Wales, the Environment (Wales) Act 2016 sets out the approach for the sustainable management of natural resources in Wales to mitigate for, and adapt to, the impacts of climate change. The Act established an 80% emissions reduction target for 2050, with either 1990 or 1995 as the baseline year depending on the greenhouse gas being monitored.

2.2.8 Welsh Ministers declared a climate emergency in 2019 and committed to strengthening Wales' emission reduction targets in the coming years. In March 2021, Senedd Cymru approved a Net Zero (100%) emissions reduction target for 2050. The Welsh Government measures progress against these targets and sets the carbon budgets in line with CCC advice and recommendations for action.

Carbon Budgets for Wales

2.2.9 *Prosperity for all: A Low Carbon Wales*[9] published by the Welsh Government in March 2019 set out how Wales aims to meet its carbon targets, including covering Wales' first carbon budget for the period 2016-2020. This plan included proposals to address the adoption of electric vehicles and the required charging infrastructure.

2.2.10 Following on from this, *Net Zero Wales* (NZW)[10] was published in 2021. This is the plan for the second carbon budget (2021-2025) which is for a 37% emissions reduction against the baseline, and the third carbon budget (2026-2030) which is for a 58% emissions reduction against the baseline.

Climate Change (Wales) Regulations 2018

2.2.11 The Climate Change (Wales) Regulations 2018 is the collective term covering several legislative amendments including:

- The Climate Change (Interim Emissions Targets) (Wales) Regulations 2018;
- The Climate Change (Carbon Budgets) (Wales) Regulations 2018;
- The Climate Change (International Aviation and International Shipping) (Wales) Regulations 2018;

[9] Welsh Government (2019) Prosperity for All: A Low Carbon Wales. https://www.gov.wales/sites/default/files/publications/2019-06/low-carbon-delivery-plan_1.pdf

[10] Welsh Government (2021) Net Zero Wales Carbon Budget 2 (2021-25). https://www.gov.wales/sites/default/files/publications/2021-10/net-zero-wales-carbon-budget-2-2021-25.pdf

- The Climate Change (Credit Limit) (Wales) Regulations 2018; and
- The Carbon Accounting (Wales) Regulations 2018.

2.2.12 The Climate Change (Wales) Regulations 2018 established a system of interim emission reduction targets and uses a carbon budgeting approach to ensure the overarching 2050 target can be achieved[11].

Planning Policy Wales, Edition 11 (2021)

2.2.13 *Planning Policy Wales*[12] (PPW) sets out the Welsh Government's broad framework and context for Local Development Plan (LDP) policies, ensuring sustainable development and making progress on climate change mitigation and adaptation are at the core of planning policy. It outlines how energy demand can be reduced and the opportunities for renewable and low carbon forms of energy. The framework also recognises the special characteristics and particular environmental qualities of places within Wales.

2.2.14 The Local and Regional Energy Planning section suggests using Local Area Energy Plans (LAEP), or other development plan evidence to identify challenging, but achievable targets for renewable energy in local plans. The target should be expressed as an absolute energy installed capacity figure. They advise that this figure should be calculated from the available local resource potential and not relate to the local need for energy.

2.2.15 The policy suggests local authorities should consider the renewable energy resource available when formulating their renewable energy target, informed by an appropriate evidence base and using the full range of policy options available. Targets should not be seen as maximum limits but to be used as a tool to maximise the available resource.

Future Wales – The National Plan 2040

2.2.16 *Future Wales – The National Plan 2040*[13] sets out the national development framework, setting the direction for development in Wales to 2040. A number of Welsh Government strategies and policies have informed the development of Future Wales, including the Welsh National Marine Plan, the Transport Strategy, Prosperity for All: Economic Action Plan, Natural Resources Policy, and the Low Carbon Wales

[11] National Assembly for Wales: Climate Change, Environment and Rural Affairs Committee (2018) Report on The Climate Change (Wales) Regulations 2018 https://senedd.wales/laid%20documents/cr-ld11925-r/cr-ld11925-r-e.pdf

[12] Welsh Government (2021) https://www.gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf

[13] Welsh Government, (2021) 'FUTURE WALES The National Plan 2040' Crown copyright, 2021.

Plan. The specific purpose of Future Wales is to ensure the planning system at all levels is consistent with, and supports the delivery of, Welsh Government strategic aims and policies.

2.2.17 In particular, generating renewable energy is a key part of the Welsh Government's commitment to decarbonisation and tackling the climate emergency. Policy 17 and Policy 18 set out the following ambitious targets for the generation of renewable energy in Wales:

- For 70% of electricity consumption to be generated from renewable energy by 2030.
- For one gigawatt of renewable energy capacity to be locally owned by 2030.
- For new renewable energy projects to have at least an element of local ownership from 2020.

2.2.18 Future Wales states that: *"decarbonisation and responding to the threats of the climate emergency should be central to all regional planning"*. Future Wales Policies 33 to 36 specifically apply to the South East region which includes The VOGC.

2.2.19 The Welsh Climate Change Minister has proposed on 'ambitious but credible' targets for Wales to meet all of its electricity needs by renewable sources by 2035[14].

Planning for Renewable and Low Carbon Energy – A Toolkit for Planners (2015)

2.2.20 The Toolkit[15] was provided primarily to support local authority planning officers in Wales to prepare policies which guide appropriate renewable and low carbon energy development through their Local Development Plans (LDP) in Wales. The Toolkit provides an evidence base for the potential for renewable, and low carbon energy generation, at different scales and different levels of detail.

Well-being of Future Generations Act (2015)

2.2.21 The *Well-being of Future Generations Act (2015)* requires public bodies in Wales to consider the social, cultural, economic, and environmental impacts of their decisions. Positive and negative effects over both the short and long-term should be considered, with a focus on how these decisions can improve communities and prevent problems

[14] Welsh Government (2023) Wales aims to meet 100% of its electricity needs from renewable sources by 2035. Available https://www.futuregenerations.wales/about-us/future-generations-act/ [Accessed December 2022].
[15] Welsh Government (2015) Practice Guidance. Planning for Renewable and Low Carbon Energy - A Toolkit for Planners. Crown Copyright 2015.

such as poverty, health inequalities, and climate change[16]. There are seven connected well-being goals for Wales as demonstrated in Figure 2.1.

Figure 2.1: Well-being of Future Generations Act goals

2.3 Local Policies

Vale of Glamorgan Local Development Plan 2011-2026 (Adopted 2017)

2.3.1 The *Vale of Glamorgan Local Development Plan (LDP) 2011-2026*[17] provides the local planning policy framework for The Vale. It was adopted by the Council in June 2017.

2.3.2 Principles of sustainability and climate change are core to the LDP. The policies relevant to climate change and GHG emissions are summarised below:

- Policy MD2 – Design of New Development

  "In order to create high quality, healthy, sustainable and locally distinct places development proposals should: …

[16] Future Generations Commissioner for Wales (2022) Well-being of Future Generations (Wales) Act 2015. Available from: https://www.futuregenerations.wales/about-us/future-generations-act/ [Accessed December 2022].
[17] https://www.valeofglamorgan.gov.uk/Documents/Living/Planning/Policy/LDP/LDP-Adoption/Adopted-LDP-Written-Statement-June-2017-final-interactive-web-version.pdf

… 12. Mitigate the causes of climate change by minimising carbon and other greenhouse gas emissions associated with their design, construction, use and eventual demolition, and include features that provide effective adaptation to, and resilience against, the current and predicted future effects of climate change".

- Policy MD19 – Low Carbon and Renewable Energy Generation

  "Policy MD19 seeks to favour low carbon and renewable energy schemes, where appropriate. These technologies include onshore wind, landfill gas, energy crops, efficient energy from waste processes, anaerobic digestion, sewage gas, hydropower, biomass, solar energy, combined heat and power, and buildings with integrated renewable sources e.g. solar power".

  …

  "The Council's Renewable Energy Assessment (REA) (2016) has assessed the potential renewable energy capacity within the Vale of Glamorgan. This identified significant opportunities for a range of renewable energy proposals, particularly from standalone solar photovoltaic developments, small clusters of wind energy potential, biomass, and from micro generation schemes including Building Integrated Renewables [BIR]. For wind energy potential these generally relate to schemes within the 'micro' (up to 50kw) and up to the 'sub local authority' (up to 5MW) scales defined under national planning policy. For solar energy, potential has been identified for schemes within the 'local authority-wide' scale (i.e. for schemes up to 50MW). Accordingly, Local Search Areas for solar energy have been identified on the Proposals Map as identified in policy MG30".

Renewable Energy Supplementary Planning Guidance (March 2019)

2.3.3 The *Renewable Energy Supplementary Planning Guidance*[18] (SPG) supplements the policies in the LDP and provides guidance to developers for schemes up to 10MW, which is the maximum capacity that the Council has the capability to consent. An update to the Renewable Energy Assessment (REA (2016) was carried out in 2018 and this has fed into the 2019 SPD. This 2019 SPD is intended to provide clear and precise guidance to assist homeowners, landowners, developers, and other interested parties involved in the planning process on how to fully consider renewable energy in development proposals.

18 https://www.valeofglamorgan.gov.uk/Documents/Living/Planning/Policy/SPG/Renewable-Energy-SPG-March-2019.pdf

2.4 Other Relevant Guidance and Development Strategies

Vale of Glamorgan Council Climate Change Challenge Plan 2021-2030

2.4.1 Having declared a climate emergency in 2019, The *Climate Change Challenge Plan 2021-2030*[19] outlines the eighteen challenges that VOGC think need to be met as part of an effective response to the climate emergency and that are being addressed through Project Zero.

2.4.2 A target of the Plan is to ensure planning policies and regeneration activities support work to adapt to and mitigate the effects of climate change and reduce negative impact on the environment. One of the steps within this target is to work with Cardiff Capital Region (CCR) to explore opportunities to promote and develop clean growth hubs capitalising on Barry as a dock and maximising renewable energy potential.

2.4.3 Another target is to reduce the amount of energy used in The Vale and lead by example - sourcing energy from clean and renewable sources and working across all sectors to bring new technology, innovation and investment to The Vale.

Cardiff Capital Region Energy Strategy (2021)

2.4.4 The CCR has a vision *"to create the conditions for a transition to a carbon neutral economy and society in CCR, using low carbon energy as an enabler of economic regeneration, growing our region income whilst maintaining guardianship of our environment through a laser-focus on clean growth."*

2.4.5 Their priorities for achieving the vision are:

1. Energy efficiency and heat
2. Electricity and flexibility
3. Decarbonise transport
4. Grow business and jobs
5. Coordination, planning, regional support and ownership of the plan

2.4.6 The energy vision sets out key targets to meet Welsh Government targets for decarbonisation, including the need to reduce emissions from its energy system by 55% by 2035[20].

[19] Available online at: https://participate.valeofglamorgan.gov.uk/plans [Accessed July 2023]
[20] Cardiff Capital Region (2021) Cardiff Capital Region Energy Strategy. Welsh Government.

3 METHODOLOGY

3.1 A Toolkit for Planners

3.1.1 The methodology used to carry out this assessment mostly follows *"Planning for Renewable and Low Carbon Energy - A Toolkit for Planners, AECOM (2015)"* (hereafter referred to as 'The Toolkit'). This has been used to identify the relevant constraints and methodology. The Toolkit methodology has been superseded in some areas, as best practice and technology have moved on considerably in the eight years since it was developed. This is particularly true with regards to large scale solar photovoltaics (PV) which was a technology still in its infancy in 2015 in the UK. Where the assessment has deviated from the advice in the Toolkit, this has been clearly identified in the report.

3.1.2 The Toolkit includes methodologies for the following technologies:

- Wind Energy
- Biomass
- Energy from Waste
- Hydropower
- Solar Photovoltaics

3.1.3 Of the technologies listed above, only Wind Energy and Solar Photovoltaics (Solar PV) are being taken forward for further consideration. Energy generated from Biomass is no longer favoured as a low carbon technology due to competing demands from food crops and other land uses. This has led to a shortage of Biomass for fuel in the UK, with many generators importing fuel from abroad which can lead to issues relating to Provenance and also erodes the carbon benefits of using Biomass as a fuel. Similarly, Energy from Waste has an important role to play in the circular economy transition but is no longer considered a renewable energy source in its own right. The composition of the waste used in the plant affects the emissions generated by this energy source.

3.1.4 With regards to Hydropower, an initial sieving exercise indicated that only very small scale hydropower schemes would be suitable in the Vale, and as such it would make sense to allow any such schemes to be brought forward on their merit and assessed individually during the planning process.

3.1.5 The Toolkit also provides a methodology for identifying the uptake of building integrated renewables and heat opportunities mapping. Due to changes in building regulations proposed in Wales the former will likely soon be compulsory, particularly in relation to heat generation. Heat opportunities mapping for The Vale has been undertaken by Greenfield Group[21], who completed a feasibility study investigating the implementation of a heat network in the town of Barry in 2019.

3.1.6 In April 2023, WA considered if there were any new opportunities for a District Heat Network (DHN) in Barry and this was presented as separate report to support VOGC's evidence base for the emerging Local Development Plan (LDP). The Greenfield Report investigated the possibility of a high temperature DHN. However, it recognised designing the network as a low temperature scheme could deliver significant benefits. The flexibility, higher efficiency, and reduced costs from a low temperature network might make this option more feasible. Although the economic case will likely remain unattractive.

3.1.7 The Toolkit suggests that the following steps are undertaken in the following order when assessing Wind and Solar PV technologies:

Wind

- Step 1: Decide on typology of wind turbine to use for the assessment
- Step 2: Map average annual wind speeds
- Step 3: Map environmental and heritage constraints
- Step 4: Map transport infrastructure constraints
- Step 5: Map existing dwellings and a noise buffer
- Step 6: Map existing aviation and radar constraints
- Step 7: Prioritise available wind resource
- Step 8: Assess potential installed capacity and energy output
- Step 9: Assess cumulative visual and landscape impact issues and reduce resource accordingly

Solar

- Step 1: Map locations of built-up areas and infrastructure

[21] Greenfield Group (June 2019) 'Barry Heat Network Masterplanning: Draft Report'. Electric Works, Shefield.

- Step 2: Map further environmental and heritage constraints
- Step 3: Map areas of suitable slope and topology
- Step 4: Address cumulative impact
- Step 5: Assess potential installed capacity and energy output
- Step 6: Map locations of suitable Agricultural Land Classification and apply further constraints as necessary

3.1.8 These steps have all been considered unless explicitly stated otherwise.

3.1.9 Further details on the data used and the exact methodology used to achieve the steps above are given below.

3.2 Wind Energy

Step 1 – Define Turbine Typology

3.2.1 The Toolkit recommends that a turbine with the following generic characteristics is used for the assessment:

- 80m Hub Height
- 80m Rotor Diameter
- 120m Tip height

3.2.2 These turbines by modern standards are relatively small, with an installed capacity of 2MW. In comparison, current onshore wind turbines are rated at up to around 4.5MW and are considerably bigger.

3.2.3 These larger turbines can range in sizes with rotor diameters up to around 136m with varying hub heights in the range of 82m – 166m, which are dependent on the quality of wind experienced. These larger turbines have been used when identifying sites and buffering constraints as they are the current preference for wind developers. The results of the assessment have been given for both 4.5MW and 2MW turbines, this is due to the presence of significant aviation constraints in the Vale which are likely to lead to smaller turbines being deployed in many areas. This is discussed further below.

Step 2 – Map Annual Average Wind Speeds

3.2.4 The wind speed experienced at the site is the most important factor that dictates the energy generation of a wind turbine. The NOABL windspeed database uses a grid to display the average wind speed experienced at several heights above ground level. Figure 3.1 shows the annual average wind speeds experienced at 45m above ground level. In line with The Toolkit, windspeeds greater than 6.5 m/s are classified as high. Modern turbines are capable of generating significant yields at lower speeds, however as Figure 3.1 shows, much of the Vale has average wind speeds higher than 6.5m/s and so this value has been retained.

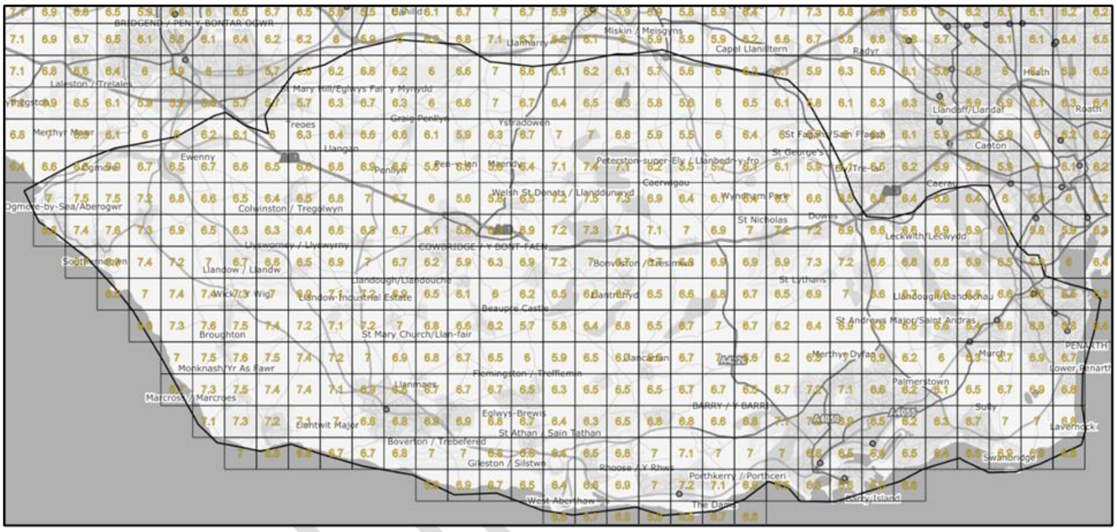

Figure 3.1: Wind Speeds in The Vale (Source: NOABL Windspeed Database)

Step 3 – Map Environmental and Heritage Constraints

3.2.5 For a potential site to receive planning permission, it will be imperative not to significantly impact the historical setting, or harm any surrounding historical designations or sites. Furthermore, any development must not pose a threat to the biodiversity and in particular protected species.

3.2.6 The following designations were mapped in GIS to aid the selection of appropriate sites:

<u>*Heritage and Nature Conservation Constraints*</u>

- Heritage Coast
- Country Parks
- Special Areas of Conservation

- Special Protection Areas
- RAMSAR Sites
- Sites of Special Scientific Interest (SSSI)
- Ancient Woodland
- Local Nature Reserves
- National Nature Reserves
- National Forest Inventory
- Special Landscape Areas

Historical Environment Constraints

- Listed Buildings
- Scheduled Ancient Monuments
- Registered Historic Parks and Gardens
- Historic Setting

3.2.7 For the purposes of this study these locations are removed from the area being assessed and are not considered suitable for renewable energy development of any kind, with the exception of the Special Landscape Areas (SLAs). These SLAs are excluded as other solar farms within this designation have recently been approved. However, consideration and a Landscape and Visual Impact Assessment (LVIA) will still be required prior to consent. As a result, these sites are technically feasible, but will carry a greater risk than the sites not found to be in any designation.

Step 4 – Map Transport Infrastructure Constraints

3.2.8 Due to the different impacts each technology poses on local infrastructure, there are different buffering measures in place. In general, wind buffers are greater, this is due to the height and their visibility within the landscape. The accepted buffers for each of the technologies is outlined in The Toolkit, whilst being supplemented by WA's experience from previous jobs. As a rule, solar developments are much less intrusive due to their lower profiles, hence why smaller buffers are considered. As a result of this, wind sites tend to have smaller potential installed capacities in comparison to solar due to the limited applicable space.

Roads

3.2.9 The topple distance can be defined as the height from the base to the tip with an additional 50m. Roads have been buffered to topple distance plus 10% to provide a margin of safety. The same buffer has been applied to railways.

Grid

3.2.10 As per The Toolkit, no grid infrastructure has been buffered or excluded from the available land as part of this assessment. This is in part due to a lack of available digital data.

Step 4.5 – Map Topographical Constraints

3.2.11 Wind turbines can theoretically be installed anywhere, as long as there is enough area to construct a flat crane pad. Regrading of the land can be costly but is generally not a limiting factor unless large areas need flattening. In most cases, the transport of the components is the limiting constraint. Turbine transport vehicles will struggle to transport the equipment on slopes greater than 10%. For this reason, wind sites are only considered suitable in locations where the gradient is shallow enough for tracks to be installed. As such, steep slopes are excluded from land available and are not considered suitable for wind energy sites. This step is not included in The Toolkit methodology but has been added here to improve the results.

Step 5 – Map Existing Dwellings and a Noise Buffer

3.2.12 Due to strict noise limits, wind turbines cannot be installed within close proximity to residential housing. For this reason, an indicative 500m buffer has been applied to residential properties. The properties have been identified using the Ordnance Survey AddressBase product which provides a mapped point for every postal address in the UK.

3.2.13 It should be noted that the 500m noise buffer is approximated and will change in specific cases due to a number of factors. These would normally be elevated background noise or the use of a quieter turbine. For reference the noise limits for operational wind turbines from the curtilage of a residential dwelling are as follows:

- Day time – 35db-40db
- Night time – 43db
- Financial Involvement – 45db

Step 6 – Map Existing Aviation and Radar Constraints

3.2.14 There are two airfields within the search area: Cardiff Airport and MOD St Athan. According to the Civil Aviation Authority (CAA), both runways, which exceed 1800m, are classified as code 4. Because of this there is a safeguarding ‘surface’ of 15km from the runways. The safeguarding surface has a 150m ceiling in place which is relative to the hight of the runway. Therefore, objects much shorter than 150m could breach the surface if they are located on a hill. The converse is also true for land lower than the runway in question. It is possible in some circumstances to breach the protected surface. This would require consultation with the relevant authority, to ensure that any development is mapped on obstacle avoidance mapping and is deemed to not negatively impact aircraft on take-off and approach.

3.2.15 The CAP 738 document for Safeguarding of Aerodromes, published by the CAA[22], provides guidance on the development of tall, permanent, and temporary structures within the protected surface. Consideration of this will be a requirement to ensure no adverse impacts on either airport are experienced.

3.2.16 A viewshed has been generated to represent the visibility of the radar at Cardiff Airport (Figure 3.2). The lighter the location, the taller the turbine that could be sited at that location without being visible to the radar. The radar data itself is indicative and has been generated to inform the choice of sites for development. The land that is displayed as black has radar coverage at ground level. Whereas the brighter the colour, the higher the radar ceiling is and therefore it is more likely that a turbine will not be visible to radar.

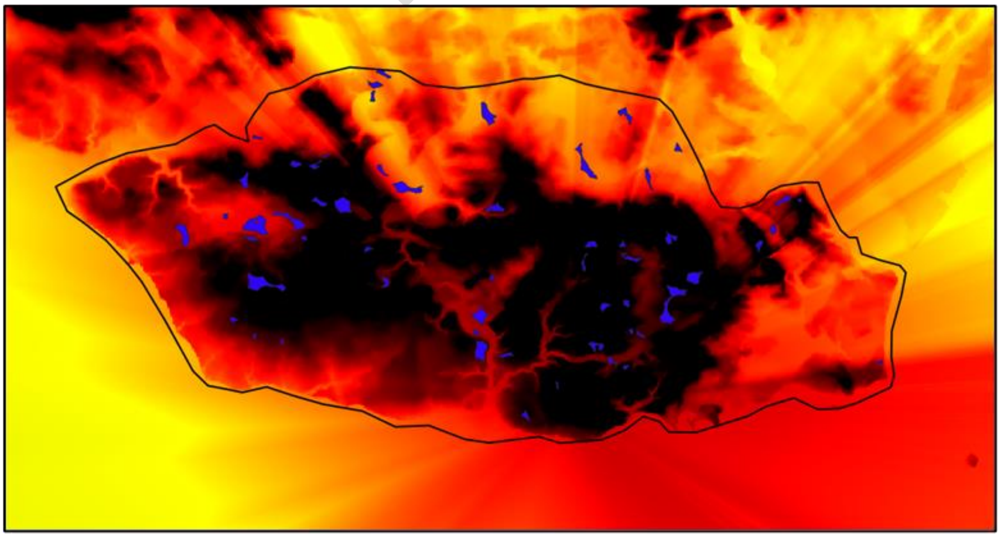

Figure 3.2: Cardiff Airport Radar Coverage

[22] Civil Aviation Authority (CAA) (Third Edition, 2020) Safeguarding of Aerodromes CAP 738. CAA, West Sussex.

Step 7 – Prioritise Available Wind Resource

3.2.17 Prioritisation has been carried out in a similar manner to that proposed by The Toolkit but with a focus on radar and obstacle constraints rather than NATS radars as these are the primary aviation constraints in the Vale.

Steps 8 – Assess Potential Capacity and Energy Output

3.2.18 The potential capacity of each site has been calculated for the smaller 2MW turbines proposed in The Toolkit and modern 4.5MW wind turbines. Appropriate Weibull functions have then been calculated and suitable example power curves have been applied.

Step 9 – Assess Cumulative Visual and Landscape Impact Issues and Reduce Resource Accordingly

3.2.19 For this step we have diverted from The Toolkit methodology, in part due to a limited number of sites being identified and also because there are other constraints at play which may mean that it is prudent to accept a level of cumulative effect if it is deemed important to encourage a number of projects through planning policy. This is discussed further under the results section.

3.3 Solar

Step 1 – Map Locations of Built-Up Areas and Infrastructure

3.3.1 Built up areas, roads, rivers and railways were mapped and excluded from the area considered suitable for development. Unlike with wind energy, no buffers were applied to these zones.

Step 2 – Map Further Environmental and Heritage Constraints

3.3.2 As with the wind energy study, the following constraints were mapped in GIS ahead of the site finding exercise:

Heritage and Nature Conservation Constraints

- Heritage Coast
- Country Parks
- Special Areas of Conservation
- Special Protection Areas
- RAMSAR Sites
- Sites of Special Scientific Interest (SSSI)
- Ancient Woodland
- Local Nature Reserves
- National Nature Reserves
- National Forest Inventory
- Special Landscape Areas

Historical Environment Constraints

- Listed Buildings
- Scheduled Ancient Monuments
- Registered Historic Parks and Gardens
- Historic Setting

3.3.3 For the purposes of this study these locations are removed from the area being assessed and are not considered suitable for renewable energy development of any kind. Again, except for Special Landscape Areas, since solar developments are underway within this designation, it is deemed appropriate to be included in this study. Sites within an SLA need to be assessed on an individual basis if brought forward for future solar development.

Step 3 – Map Areas of Suitable Topography

3.3.4 Solar technology is inherently dependant on exposure to sunlight. For this reason, in the northern hemisphere, south-facing panels are preferred.

3.3.5 An efficient solar array will generally be found on land that is relatively flat and south facing. This means that optimum panel spacing can be achieved, which maximises the energy yield per kilowatt peak (KWp) of solar PV installed. On the other hand, a steep south facing will have reduced panel spacing but will have dramatically reduced generation when the sun is behind the arrays (this occurs to varying degrees for the six months between the Spring and Autumn equinoxes).

3.3.6 A shallower slope is also beneficial for installation purposes, as additional measures are required when installing the array on larger gradients. All land with slopes ranging from 0-3° can be deemed acceptable. Whilst for slopes in the range of 3-15°, only southwest to southeast facing slopes are considered suitable. Finally, slopes greater than 15° are deemed to be too expensive to develop in a cost-effective manner. Areas of land that fall outside of these parameters are eliminated from the assessment and considered unsuitable for the technology.

Step 4 – Address Cumulative Impact

3.3.7 As with the wind energy study the approach to cumulative assessment has been considered differently to the methodology proposed in The Toolkit. This is because there are other factors, such as grid access, that are not explicitly included in the study but will nonetheless affect the density of any development. This is discussed in more detail as part of the results section.

Step 5 – Map Locations of Suitable Agricultural Land Classification and Other Constraints

3.3.8 Solar PV arrays generally require significant areas of land on which to be developed. This is often considered to be in competition with land that is utilised for food production, however, with the development of Agri-voltaics this does not necessarily have to be the case. Current best practice, and the approach recommended by The Toolkit, is to avoid land considered 'Best and Most Versatile (BMV)'. For these purposes this is land with grades from 1 to 3a, leaving only grade 3b and grade 4 land as being suitable for solar PV arrays. Within this assessment, all BMV land has been excluded from the areas considered suitable for solar PV.

3.3.9 Wind Energy, with its much smaller footprint on the ground, is not constrained in the same way and as such all grades of land have been treated as suitable for wind energy.

Step 6 – Assess Potential Installed Capacity and Energy Output

3.3.10 Energy generation calculations for solar technology have been calculated in a software called PV Sol. PV Sol uses historic solar irradiance data along with site information, which includes the number of panels, to calculate energy production. The number of panels is calculated using GIS in the following way:

- A 10m x 10m grid is used to represent a 40-panel section with a panel pitch of 25 degrees and accounts for the required row spacing at that pitch.
- The number of grid squares can then be identified and scaled to give the panel number of each site.
- The installed capacity can then be calculated by multiplying the number of panels by 340 (the wattage of an average solar panel).

3.3.11 This assessment has been carried out on each individually identified site so that slight variations in solar resource are captured. This method is not discussed in The Toolkit but has been used in previous WA projects and is proven to be accurate.

3.3.12 Risk of flooding has also been considered as part of the solar capacity assessment. Figure 3.3, below, shows the areas likely to be flooded once every 100 years (categorised as Flood Zone 3 by Natural Resources Wales). While these areas are relatively sparse, any development in such locations will require a greater amount of design detail to sufficiently endure such a flood. For this reason, sites located in or near these flooding zones will not be removed as they can feasibly be delivered. It should be caveated that due to climate change these 'rare' weather phenomena are becoming more common, so in future, this extent of flooding may increase in frequency.

3.3.13 It is also worth noting that developers can design the technologies to withstand the effect of flooding, particularly if a site within a flood zone is being targeted. This will naturally incur additional project fees. However, this is unlikely to occur within the Vale due to the presence of other more suitable sites.

Figure 3.3: Flood Zone 3 (Rivers + Coastal) in The Vale

4 EXISTING RENEWABLE ENERGY DEPLOYMENT IN THE VALE

4.1 Energy Baseline

Existing Sources of Energy

4.1.1 This section summarises The Vale's existing electricity and heat generation in the baseline year 2019, using data obtained from StatsWales[23] and the Welsh Government's Energy Generation in Wales 2019 report[24].

4.1.2 The total installed generating capacity in The Vale in 2019 was 1,807.3 MW, comprising of fossil fuel electricity capacity and renewable electricity and heat generation capacity. As demonstrated by Figure 4.1 below, fossil fuel generated electricity represented the vast majority of installed capacity, at 1,701.3 MW. This was largely due to the coal powered Aberthaw Power Station which represented 1,586 MW of the total. In 2019, renewable energy sources in The Vale contributed 94.5 MW electrical capacity (MWe), which represented only 5.2% of the total electricity capacity from renewable sources. In addition, the renewable sources also provided 11.5 MW thermal capacity (MWth) for heat supply in the region.

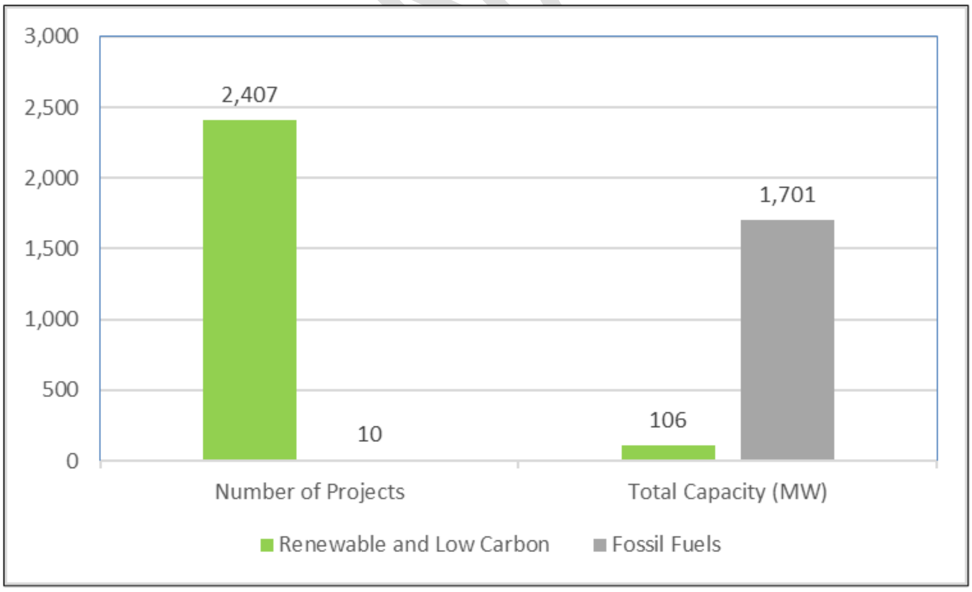

Figure 4.1: The Vale's Renewable and Low Carbon Heat and Electricity (Green) against Fossil Fuel Electricity (Grey) [Source: Energy from Wales 2019 report]

4.1.3 In 2019, there were 2,387 renewable energy projects in The Vale. In this context, a 'project' refers to an individual low carbon or renewable energy initiative, which can

[23] https://statswales.gov.wales/Catalogue/Environment-and-Countryside/Energy/lowcarbonenergygeneration-by-technology

[24] Welsh Government (2019) Energy Generation in Wales. Written and produced by Regen for the Welsh Government, October 2020, version 1.

vary in scale from small installations, like residential solar panels, to larger generators, like wind farms. Of these projects, 2,064 generated electricity, and 323 produced heat.

4.2 Solar

4.2.1 The most common renewable technology in use within the Vale is solar PV. There are roughly 16 existing solar farms sporadically distributed throughout the Vale, with more proposed. The expanse of grade 3b soil and above average solar resource within the Vale makes it an interesting target for PV developers. All of the existing sites are relatively small by current standards. In recent years solar developers have tended to favour larger scale projects due to the increased economic benefits and the high cost of achieving grid connections.

4.2.2 The Renewable Energy Planning Database[25] (REPD) provided by Gov.UK provides quarterly updates for the renewable developments across the UK, including within the Vale. This database provides information on the stage of development and the installed capacity of each site. The current total installed capacity of the solar developments within the Vale at the time of writing is 82.41 MW. This accounts for the existing projects and those under construction. This is set to greatly increase as planning permission is granted and construction is completed on existing developments. Figure 4.2 shows the locations of these developments, many of which are located within the geographic centre of the Vale.

[25] https://www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract

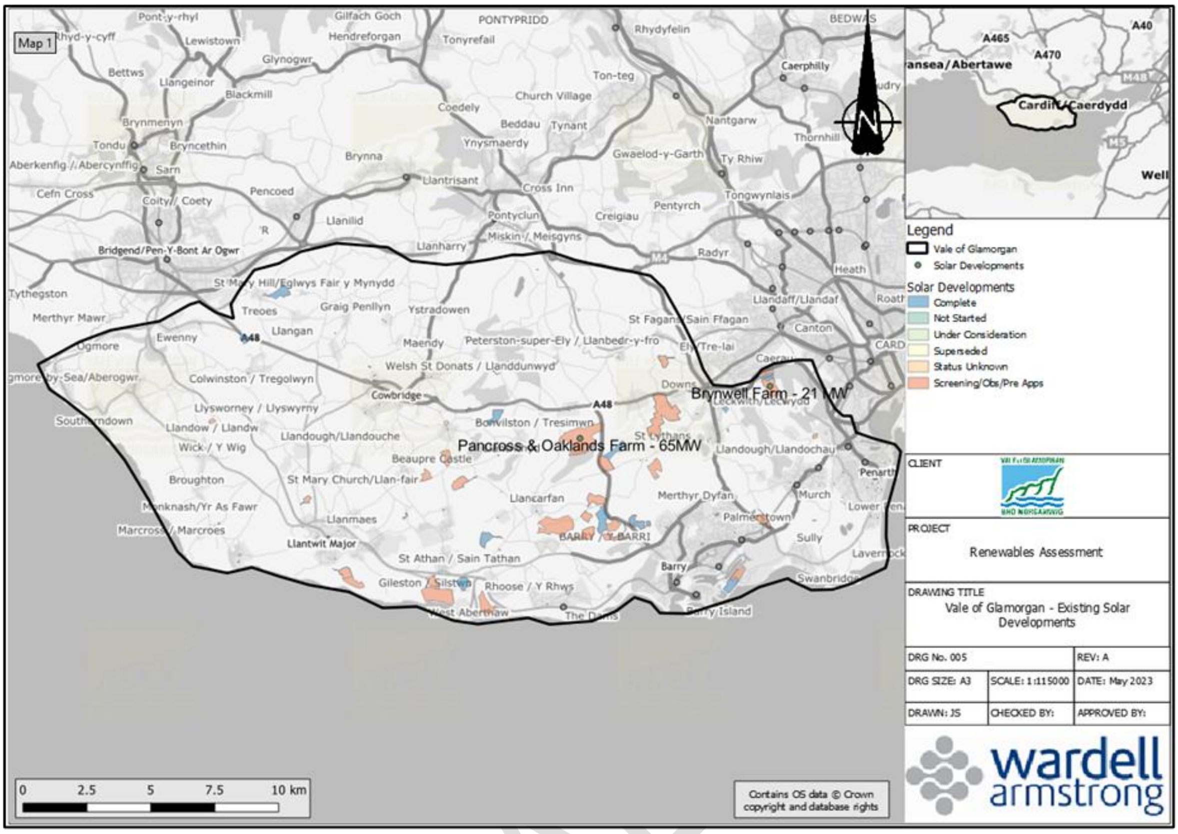

Figure 4.2: Solar Developments (Consented)

4.2.3 The largest pending development is a 65MW solar PV development with integrated battery storage near Bonvilston, and there is also another large-scale solar development in the planning phase for East Aberthaw. A DNS planning application has recently been approved by Welsh Government for a 21 MW site at Brynwell Farm in the eastern Vale.

4.3 Wind

4.3.1 There were six small-scale onshore wind projects in The Vale in 2019, with a capacity of 1 MWe, generating an estimated 2,520MWhe per year. This represents 1.8% of the total renewable electricity generation currently installed in The Vale. Large scale wind farms are completely absent in the Vale. There are a number of wind farms in the adjoining local authority of Rhondda Cynon Taff to the north.

4.4 Other Energy Sources

4.4.1 Aberthaw power station, which operated as a coal fired power plant and a co-fired biomass plant, was recently decommissioned. However, this plant has recently been purchased by the Cardiff Capital Region with the aim of repurposing the site. The immediate plan is to build a nearby solar farm and to start extracting minerals from the ash mound, produced by the coal plant while in use. The long-term goal of the site is to create a Green Energy Hub[26].

4.4.2 There is also an advanced conversion technologies site located within Barry, near the docks. This has an installed capacity of 10 MW. While these gasification and pyrolysis technologies are not renewable, they can be classified as low carbon as this method is in essence a form of recycling. Burning the fuel does, however, emit greenhouse gasses such as methane, carbon dioxide, and other hydrocarbons.

4.5 District Heating

4.5.1 Using the UK CHP development Maps[27], two heat sources are identified within the Vale in relatively close proximity to Barry. It is important that the source of heat in a district heat network needs to be relatively near to the site where the heat is required. This is due to the large cost of insulating long distances of pipework. This system will require a cost/benefit analysis to determine whether the network is feasible.

4.5.2 One heat source is the closed Aberthaw power station which had an installed capacity of 1685MWe. The Aberthaw site has been purchased with the aim of repurposing the site to facilitate various green energy projects. However, the ultimate use of this site has not been decided.

4.5.3 In addition to this, the AVIVA biomass plant situated in Barry has been forced to close due to breaches in planning. AVIVA are in the process of appealing this decision. The success of a district heating plan relies on the longevity of a reliable heat source. As there is some uncertainty around the future of AVIVA Biomass, this adds considerable risk to using the plant as a source waste heat. Any DHN would need to include a reliable source of waste heat for the lifespan of the network.

4.5.4 WA considered opportunities for a District Heat Network in Barry in a separate report which was submitted to VOGC in April 2023. District heating is not considered further in this assessment.

[26] https://www.bbc.co.uk/news/uk-wales-60507847
[27] UK CHP Development Map - Department for Business, Energy and Industrial Strategy (decc.gov.uk)

5 RESULTS

5.1 Interim Results

Agricultural Land Classification Grade

5.1.1 Figure 5.1 shows the land that that is potentially suitable for solar PV development on the basis of agricultural land classification (ALC) grade.

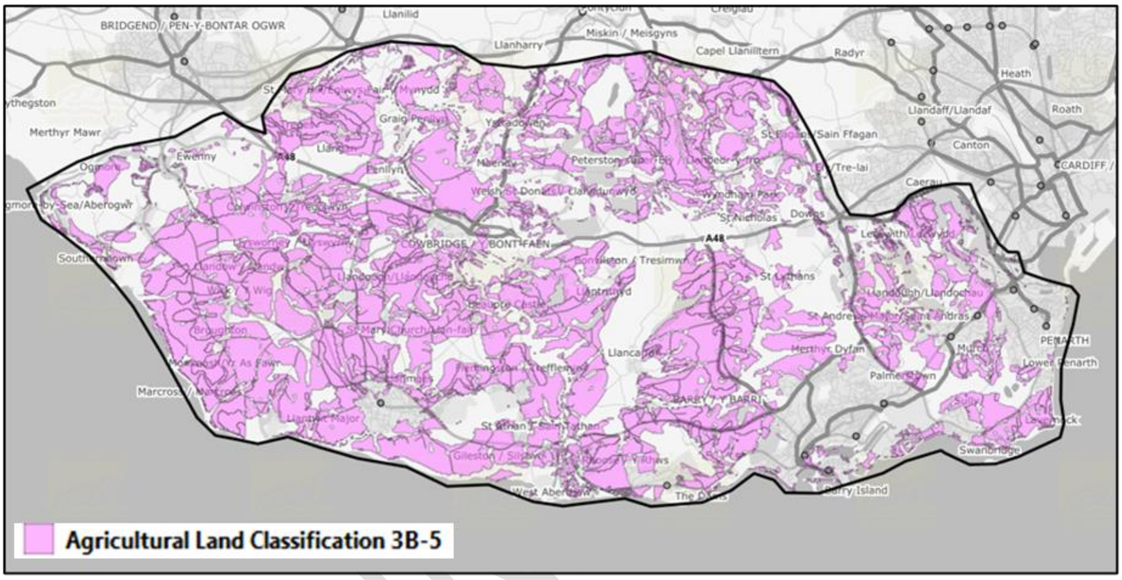

Figure 5.1: ALC Grade - Land Potentially Suitable for Solar Development

5.1.2 As shown by Figure 5.1, a large expanse of the search area is suitable for solar installation based upon ALC grade. ALC grades 1, 2, 3a and urban have been deemed unsuitable. This still leaves a great deal of the search area classified as potentially suitable for solar PV. For this reason, if possible, the worst performing soils (grade 3b and below) should be preferentially targeted to retain the more arable soils for farming. Agri-voltaics could also be encouraged in The Vale which allows the simultaneous use of areas of land for both solar photovoltaic power generation and agricultural purposes.

Heritage Conservation Constraints

5.1.3 Heritage Conservation Constraints include Scheduled Ancient Monuments, Registered Historic Parks and Gardens, and Historic Settings. The mapped heritage conservation constraints are shown below in Figure 5.2, these areas have been excluded within both the wind and solar PV assessments.

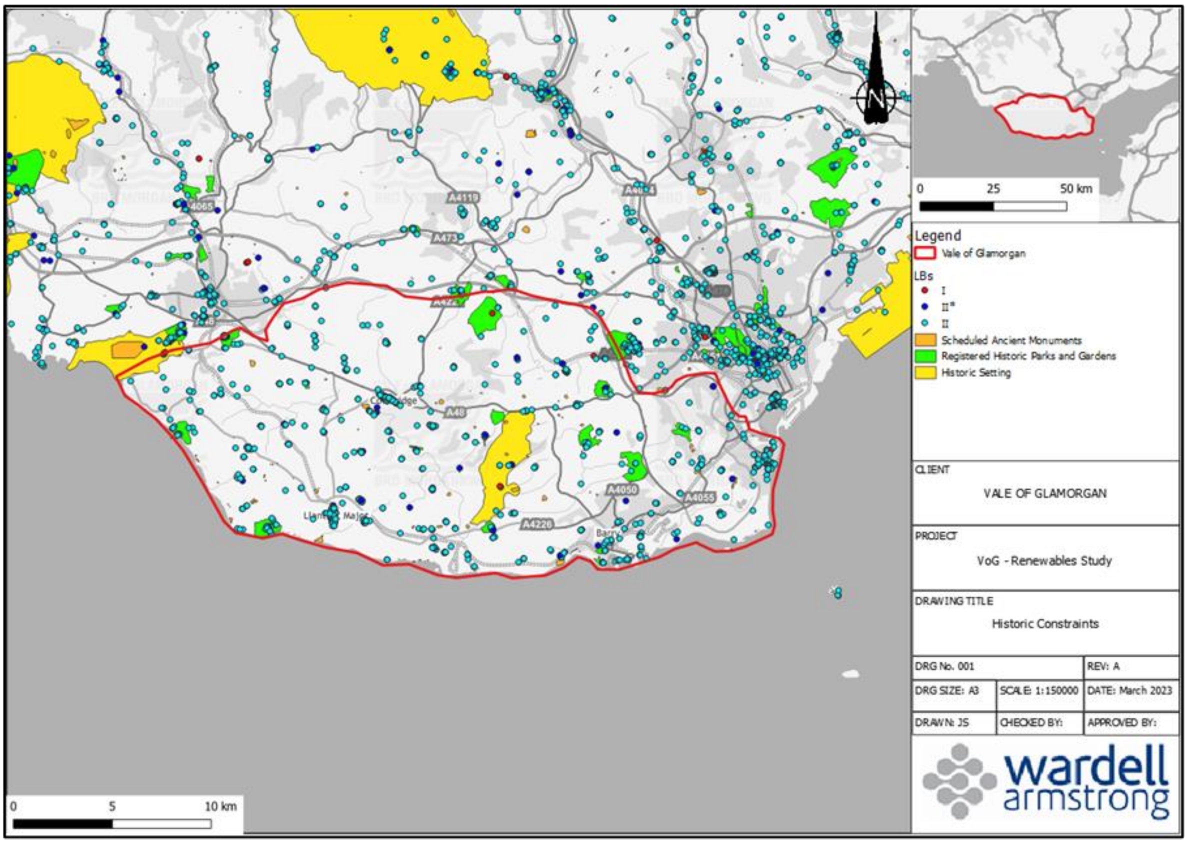

Figure 5.2: Heritage Conservation Constraints

Nature Conservation Constraints

5.1.4 Natural Constraints include areas such as County Parks, Special Areas of Conservation, Special Protection Areas, RAMSAR Sites, Sites of Special Scientific Interest, Ancient Woodland, Local Nature Reserves, National Nature Reserves, the National Forest Inventory, and the Heritage Coastline. Figure 5.3 shows the location of the mapped conservation designations throughout the Vale. Areas that fall within one of these designated areas are not considered suitable for development. Broadly speaking the East of the Vale is less constrained since there is a greater absence of designations.

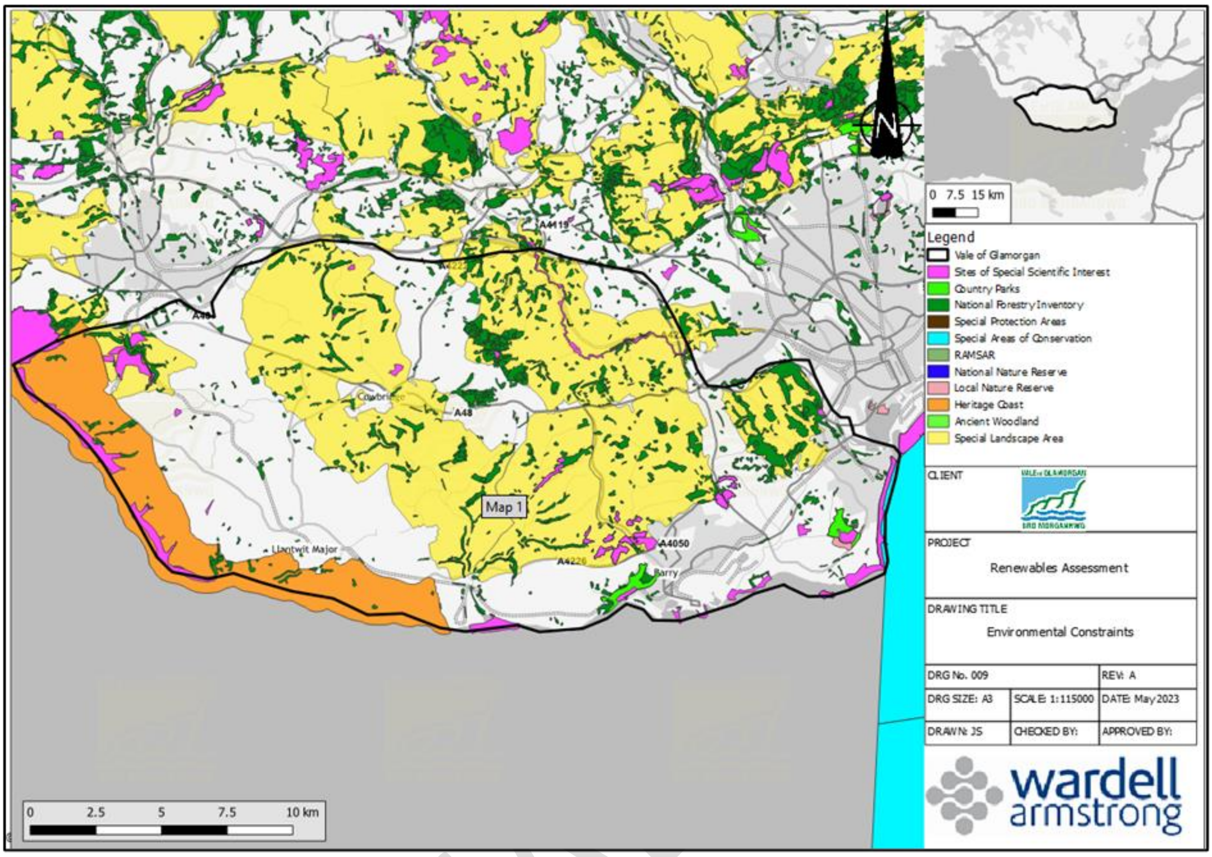

Figure 5.3: Nature Conservation Constraints

5.2 Wind Energy

5.2.1 Figure 5.4 below shows the composite wind constraints map developed through applying the methodology detailed above. Figure 5.5 shows the areas that are potentially suitable for wind development without the constraints marked on the map, for ease of reference and visual clarity.

5.2.2 These maps do not show the airport protected surfaces (although the extent of these is shown in Figure 5.6) or the radar ceilings as described in the methodology as these are not hard constraints, meaning that with appropriate turbine selection and consultation with the CAA/MOD the sites may be developable. The sites are ranked against aviation constraints in the analysis below, and these areas should be used as a guide only.

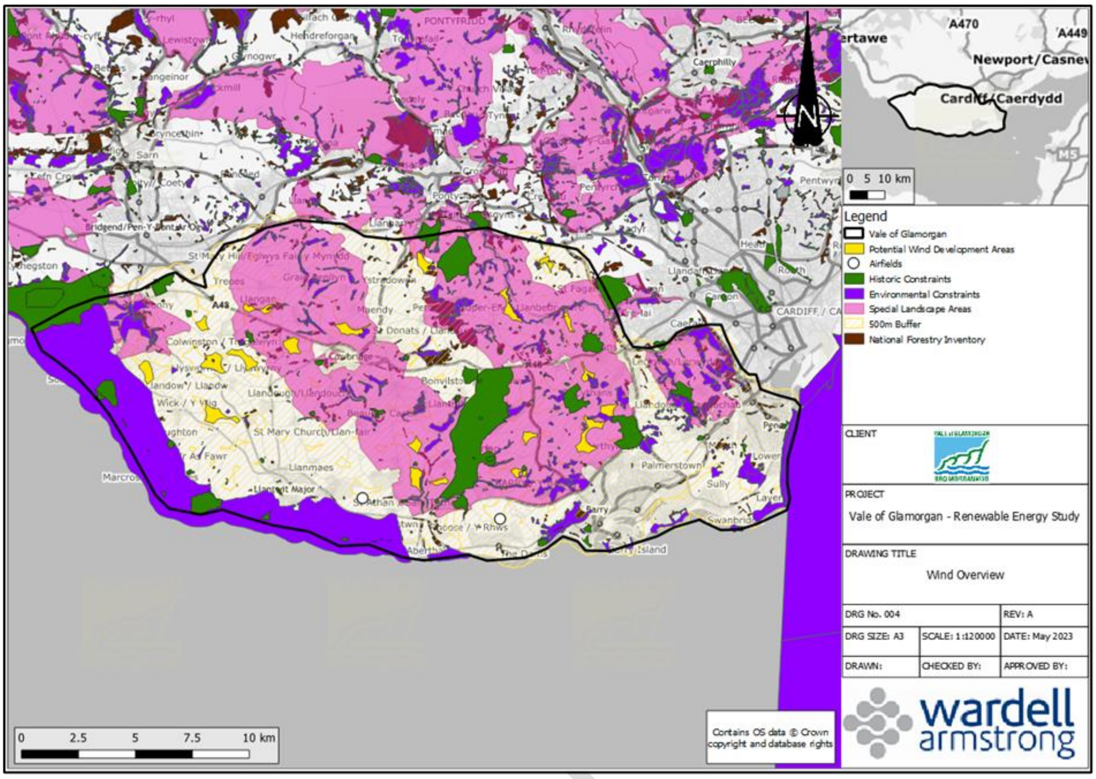

Figure 5.4: Wind Constraints Map

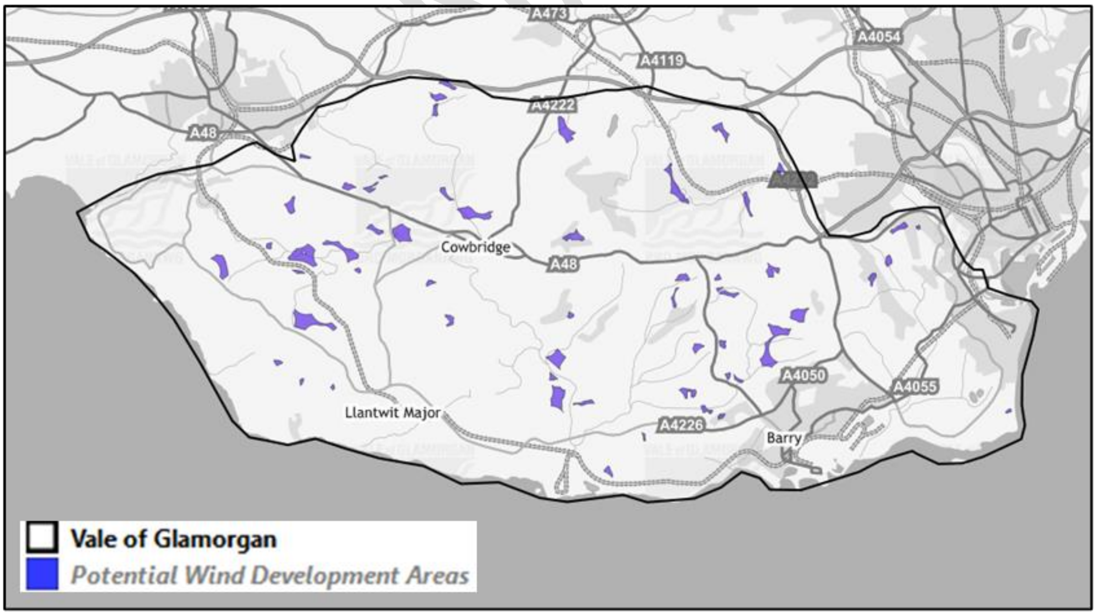

Figure 5.5: Unconstrained Wind Areas

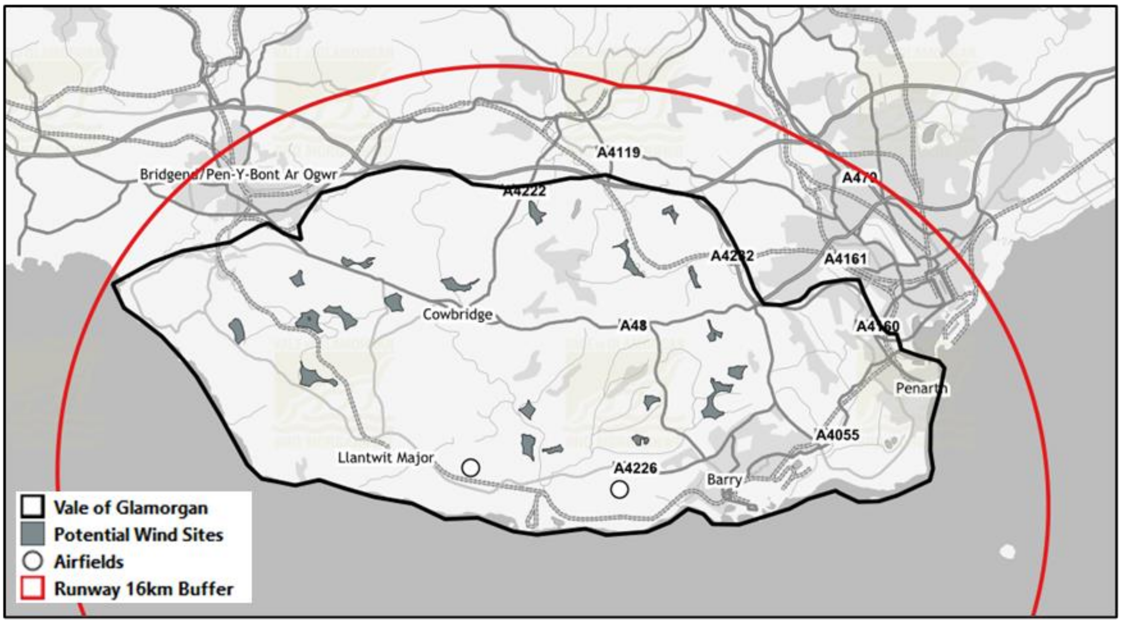

Figure 5.6: Wind Sites proximity to Cardiff Airport and MOD St Athan

Site Analysis

5.2.3 The 20 largest potential development areas have been identified and are shown in Figure 5.7. The Toolkit outlines that a 1km²:10MW relationship is appropriate in estimating potential capacity. With the larger turbines the ratio used was 1km²:13.5MW.

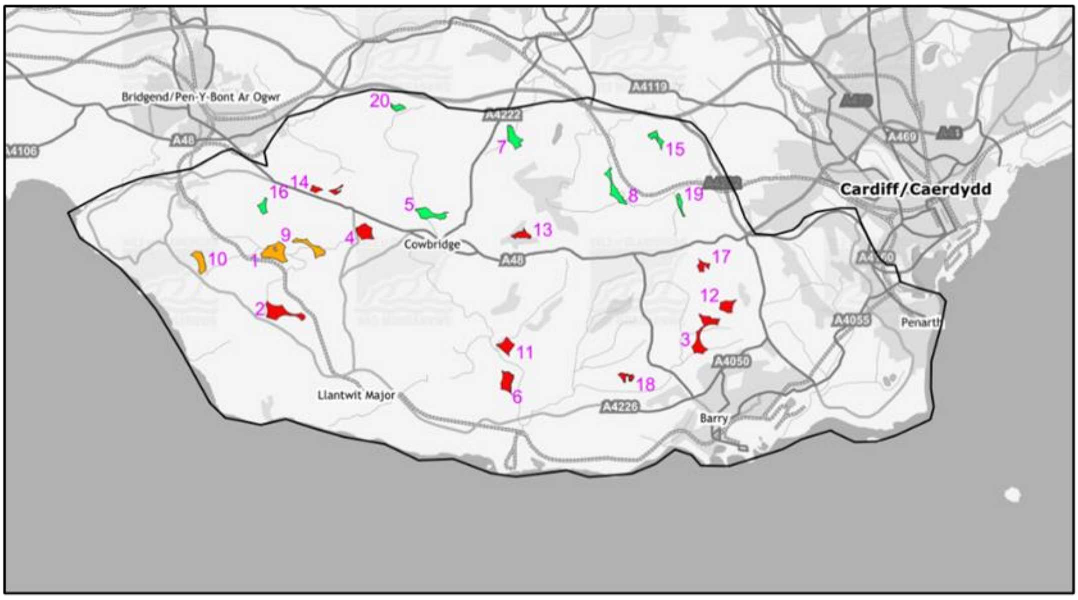

Figure 5.7: Priority Sites for Wind Developments

5.2.4 When determining the priority status of each site, the wind speed and proximity to NATS radar is observed. In this case, the NATS radar does not affect any of the identified sites. The 20 largest sites have been assigned priority by using wind speed:

- >6.5 – High
- 5.5<x<6.5 – Moderate
- >5.5 – Low

Table 5.1: Wind Sites Prioritised

Identified Area	Wind Speed (m/s)	Priority	Identified Area	Wind Speed (m/s)	Priority
1	6.3	Moderate	11	5.9	Moderate
2	7.4	High	12	7	High
3	6.4	Moderate	13	7.6	High
4	6.9	High	14	6.9	High
5	5.8	Moderate	15	6.5	Moderate
6	6.3	Moderate	16	6.5	Moderate
7	6.5	Moderate	17	7.3	High
8	5.7	Moderate	18	6.7	High
9	6.5	Moderate	19	6.7	High
10	7.2	High	20	6	Moderate

5.2.5 These prioritised sites have then been assessed in relation to the airport radar and proximity to the flightpaths of approaching aircraft. This will give the most viable sites in the Vale. Within Table 5.1 above, the following codes indicate:

- Red – Location covered by radar and within protected surface.
- Orange – Location within protected surface but not covered by radar.
- Green – Not impacted by radar or within protected surface.

Energy Generation

5.2.6 Using The Toolkit as an outline, the potential installed capacities and therefore annual energy generation can be estimated for each site. This is done by using the area of each site to help estimate the number of turbines that can be installed. This then gives the potential installed capacity of the site, which can be used alongside an assumed capacity factor of 0.27, as given by The Toolkit, to estimate annual energy generation from each site. This figure is undoubtedly too low for modern turbines and the wind speeds identified in the Vale but has been kept here as a conservative figure. Actual yields would likely be significantly greater.

5.2.7 Table 5.2shows the energy generation estimates for the 20 largest wind sites within the Vale.

Table 5.2: Wind - Installed Capacities and Energy Generation Estimates

Site	Area (m^2)	Area (Ha)	Area (km^2)	Number of Small Turbines	Number of Large Turbines	Installed Capacity Small Turbines (MW)	Installed Capacity Large Turbines (MW)	Annual Energy Generation Small Turbines (GWh)	Annual Energy Generation Large Turbines (GWh)
1	453000	45.3	0.45	3	2	6	9	14.2	21.3
2	426000	42.6	0.43	3	2	6	9	14.2	21.3
3	426000	42.6	0.43	3	2	6	9	14.2	21.3
4	282000	28.2	0.28	2	1	4	4.5	9.5	10.6
5	278000	27.8	0.28	2	1	4	4.5	9.5	10.6
6	268000	26.8	0.27	2	1	4	4.5	9.5	10.6
7	257000	25.7	0.26	2	1	4	4.5	9.5	10.6
8	255000	25.5	0.26	2	1	4	4.5	9.5	10.6
9	238000	23.8	0.24	2	1	4	4.5	9.5	10.6
10	232000	23.2	0.23	2	1	4	4.5	9.5	10.6
11	213000	21.3	0.21	2	1	4	4.5	9.5	10.6
12	196000	19.6	0.20	1	1	2	4.5	4.7	10.6

Site	Area (m^2)	Area (Ha)	Area (km^2)	Number of Small Turbines	Number of Large Turbines	Installed Capacity Small Turbines (MW)	Installed Capacity Large Turbines (MW)	Annual Energy Generation Small Turbines (GWh)	Annual Energy Generation Large Turbines (GWh)
13	138000	13.8	0.14	1	1	2	4.5	4.7	10.6
14	126000	12.6	0.13	1	1	2	4.5	4.7	10.6
15	123000	12.3	0.12	1	1	2	4.5	4.7	10.6
16	114000	11.4	0.11	1	1	2	4.5	4.7	10.6
17	107000	10.7	0.11	1	1	2	4.5	4.7	10.6
18	98700	9.9	0.10	1	1	2	4.5	4.7	10.6
19	94200	9.4	0.09	1	1	2	4.5	4.7	10.6
20	87500	8.8	0.09	1	1	2	4.5	4.7	10.6
Total	**4412400**	**441**	**4**	**34**	**23**	**68**	**104**	**161**	**245**

5.3 Solar

5.3.1 Once the methodology had been applied a large number of sites were identified, some of which were far too small to host an economically viable solar farm. As such, the sites were further filtered to remove the smaller areas. Figure 5.8 shows the remaining areas which each have a minimum potential installed capacity of 0.5MW. These sites can be further iterated by marking the sites consisting of grade 4 and 5 soil. As recommended in the toolkit, grade 3B soil is removed for the purposes of prioritising sites in order to preserve higher quality agricultural land.

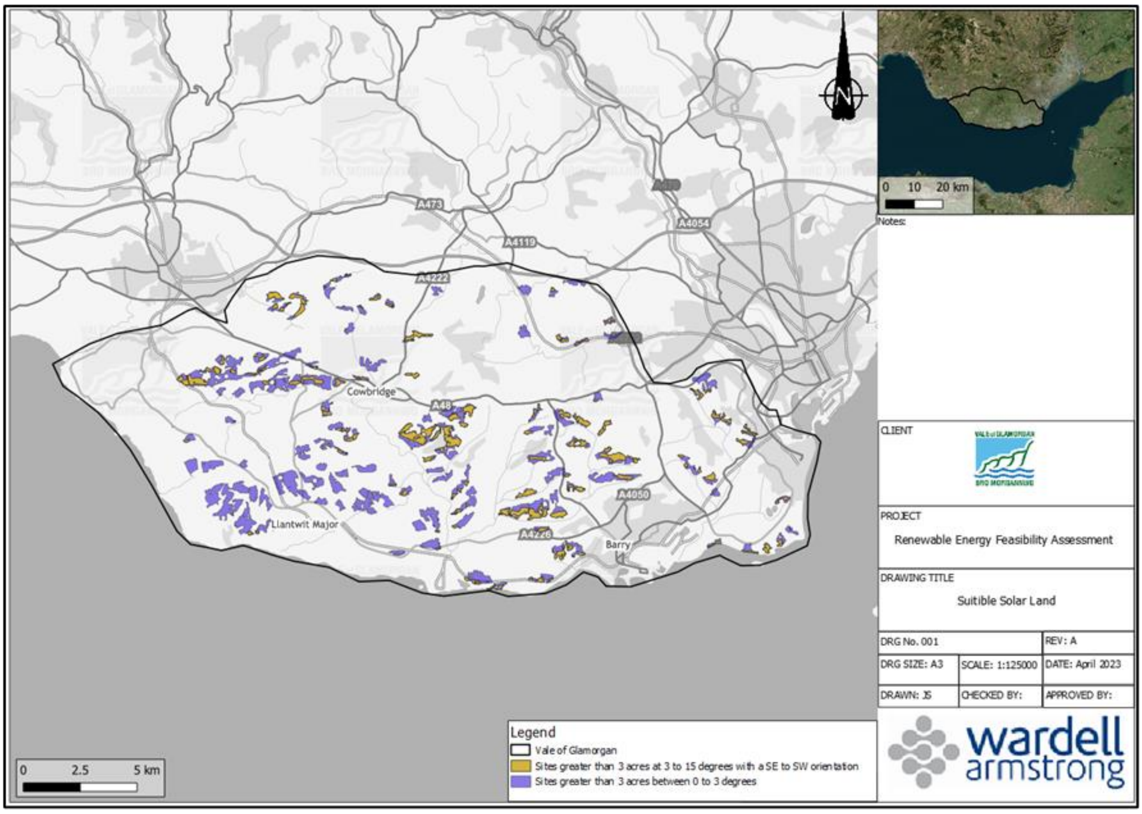

Figure 5.8: Potential Solar Sites

5.3.2 Figure 5.9, below, shows these prioritised sites with best and most versatile land removed.

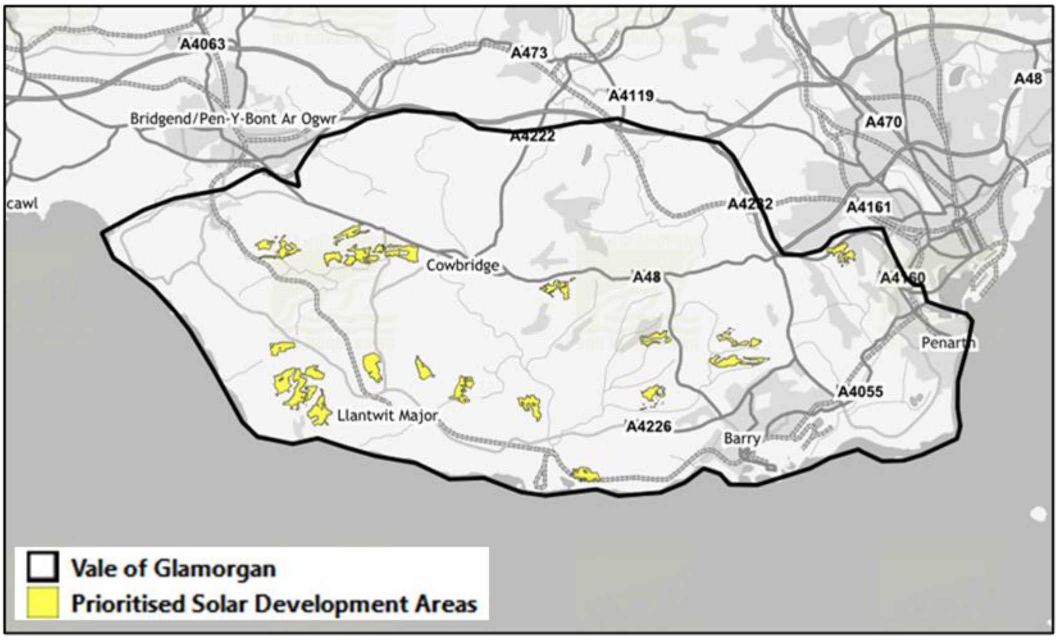

Figure 5.9: Prioritised Solar Development Sites

5.3.3 Of these, the 20 largest sites have been identified in line with The Toolkit to determine the greatest solar resource within the area. These sites are shown in Figure 5.10 accompanied by the other constraints.

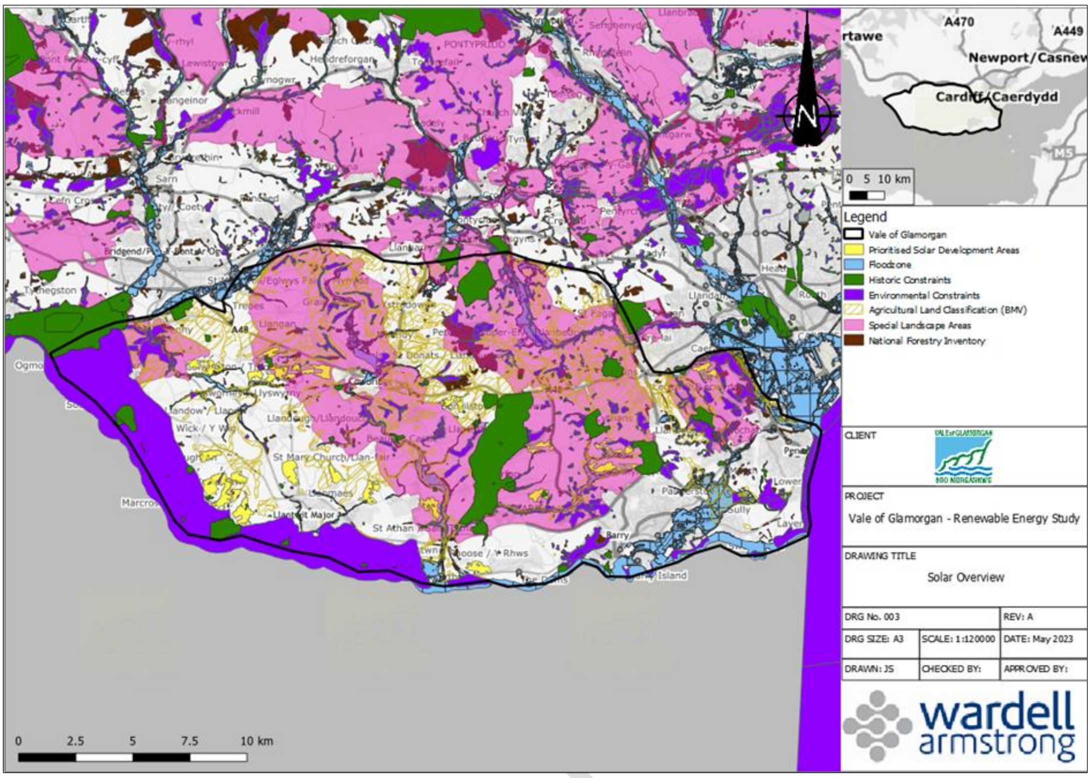

Figure 5.10: Solar Constraints Map

5.3.4 The 20 largest sites within this study have been identified, as this theoretically identifies the sites with largest potential installed capacities. These are shown in Table 5.3.

Table 5.3: Largest Feasible Solar Areas

Largest feasible solar areas – Agricultural Land Classification Grade 3b-5						
Site Number	Area (m2)	Area (Hectares)	Installed Capacity (MW) - 2.4:1	Installed Capacity (MW) - 1:1	Annual Energy Generation (GWh) at Installed Capacity (MW) - 2.4:1	Annual Energy Generation (GWh) at Installed Capacity (MW) - 1:1
1	897641	89.8	37.4	89.8	34.7	83.4
2	521004	52.1	21.7	52.1	20.2	48.4
3	503501	50.4	21.0	50.4	19.5	46.8
4	469591	47.0	19.6	47.0	18.2	43.6

Largest feasible solar areas – Agricultural Land Classification Grade 3b-5						
Site Number	Area (m2)	Area (Hectares)	Installed Capacity (MW) - 2.4:1	Installed Capacity (MW) - 1:1	Annual Energy Generation (GWh) at Installed Capacity (MW) - 2.4:1	Annual Energy Generation (GWh) at Installed Capacity (MW) - 1:1
5	457208	45.7	19.1	45.7	17.7	42.5
6	445611	44.6	18.6	44.6	17.2	41.4
7	444630	44.5	18.5	44.5	17.2	41.3
8	422107	42.2	17.6	42.2	16.3	39.2
9	407548	40.8	17.0	40.8	15.8	37.8
10	383298	38.3	16.0	38.3	14.8	35.6
11	345795	34.6	14.4	34.6	13.4	32.1
12	328540	32.9	13.7	32.9	12.7	30.5
13	321794	32.2	13.4	32.2	12.5	29.9
14	302558	30.3	12.6	30.3	11.7	28.1
15	293344	29.3	12.2	29.3	11.3	27.2
16	266146	26.6	11.1	26.6	10.3	24.7
17	258229	25.8	10.8	25.8	10.0	24.0
18	254920	25.5	10.6	25.5	9.9	23.7
19	253599	25.4	10.6	25.4	9.8	23.5
20	252871	25.3	10.5	25.3	9.8	23.5
Total	**7829935**	**783**	**326**	**783**	**303**	**727**

5.3.5 The Toolkit estimates that 2.4 Ha of viable land can host a 1 MW array. Due to technological improvements this is estimated to be nearer 1HA:1MW of installed capacity. There are a variety of reasons that are causing improvements in solar panel efficiency. The major reason for this is an increase in the density of PV arrays which has been achieved by reducing the angle to the horizontal to below optimal. This allows as much as twice the amount of panels to be installed with a nominal reduction in output per panel. In addition, the use of monocrystalline cells over polycrystalline cells can increase array performance. The monocrystalline cells produce a greater wattage per unit area than the polycrystalline cells. The total installed capacity for both options are shown for clarity.

5.4 Cumulative Effects and Other Constraints

5.4.1 The Toolkit recommends that a filter is applied to the identified sites to prevent significant cumulative effects. We have chosen not to implement this due to restrictions on grid access to export generated power.

5.4.2 The Distribution Network Operator (DNO) responsible for the substations considered in this study is National Grid, formerly Western Power Distribution. In some cases, and considerably more now than when The Toolkit was developed, access to the grid can act as a barrier to any renewable energy development.

5.4.3 The proximity of the site to substations is of great importance when determining how financially viable a site is. Another consideration is the strain that the local substation is under and if extensive reinforcement works are required. The extent of reinforcement to the grid to sustain such a connection can derail a project due to the high capital costs and long timeframes associated with connection. These two factors often combine and can make a project economically unviable. The substations have been mapped and display export capacities in Figure 5.11.

Figure 5.11: Export Capacities

5.4.4 It is worth noting these values are approximations and subject to change. Figure 5.11 shows that there are several substations surrounding the extremity of the Vale, with very few substations situated in the central search area. The numbers displayed at each substation shows the available export capacity at the associated substation. These numbers do fluctuate, so may be subject to change.

5.4.5 The connection voltage is also a key consideration that dictates the grid connection costs. For smaller generators a 11kV or 33kV connection is appropriate, however larger generators will require a connection voltage of 132kV and up. These high voltage connections can prove very costly for connection as these systems are particularly strained nationwide.

5.4.6 For this reason, it is expected that developers will target sites in areas with grid capacity and that development will be brought forward in clusters around these access points. This will be particularly the case for the small cluster of substations surrounding the Aberthaw site now that the old power station is no longer exporting and some capacity is available. However, it is currently unknown whether existing connections have been made for the future and whether there will be any remaining export capacity. The numbers shown in Figure 5.11 represent the available export capacity at each substation and are represented in MVA. These numbers are largely indicative as these export capacities change regularly, as new connections are reserved.

5.4.7 Given the above, a policy constraint restricting cumulative development may unintentionally restrict development for the whole of the Vale.

5.4.8 Developers may also target private wire agreements as a way to get around grid constraints. In this scenario, the generated energy would be used to directly power high energy consuming businesses and sites. A high-level study has identified the following locations as possible suitable for private wire connections subject to the appropriate commercial agreements.

Dow Chemicals

5.4.9 A potential offtake has been identified within Barry, where Dow Chemicals have a Silicon production facility. The intensive energy requirements for this facility could benefit from a local renewable generating facility with a private wire to the site. The key issue with this is the lack of large and feasible sites in proximity to this site.

Waterton Industrial Estate

5.4.10 The Waterton industrial estate is on the western edge of the Vale, it has a large number of occupants from a variety of disciplines. Due to the estate's large energy requirements, there are several opportunities to provide private wire connections to these businesses.

Hospitals

5.4.11 There are two hospitals located within the Vale. Barry Hospital and University Hospital Llandough are both situated to the East of the Vale. These hospitals will require an extensive supply of electricity for lighting and medical instruments. The heat requirements are also high to ensure the comfort of patients. As there are no existing major geothermal heat sources within the Vale, use of existing heat is not particularly feasible at either location. The exact heat and electricity loads are unknown.

5.5 Renewable Energy Capacity

Future Sources of Renewable Energy Generation

5.5.1 The future additional installed capacity potential is projected to be 887 MW. This includes the increased solar capacity of 783 MW from the potentially viable 20 largest solar sites listed in Table 5.3, and the increased wind capacity of 104 MW from the 20 largest potentially feasible wind sites listed in Table 5.2. This figure considers the higher 1HA:1MW electricity generation estimate for solar to account for known technological improvements.

5.5.2 When combined with the existing renewable energy installed capacity in The Vale, which is 106 MW, this provides a potential renewable energy installed capacity of 993 MW.

Carbon Reduction

5.5.3 Total annual carbon savings from the combined wind and solar electricity generation is calculated to be 187.937 ktCO_2e if large turbines were chosen. This drops to 171.700 ktCO_2e with small turbines. The carbon factor used was from the 2022 Defra Conversion Factor for UK Electricity and therefore the projected emissions savings consider the current carbon intensity of the grid. It also considers the higher 1HA:1MW electricity generation estimate for solar.

5.5.4 The calculation considers if all the renewable energy generated is consumed and therefore offsets electricity consumption which would otherwise have been taken from the national electricity grid. In Table 5.4 and Table 5.5 the Solar electricity generation potential and Carbon Savings from Solar remain the same. Only the wind electricity generation and Carbon Savings from Wind change to demonstrate the effects of different turbine sizes.

Table 5.4: Electricity Generation Potential and Carbon Savings with Large Turbines

Wind electricity generation (kWh)	***Solar electricity generation (kWh)***	***Carbon Factor (tCO_2e per kWh)***

244,798,200	727,056,444	0.00019338
Carbon Savings from Wind (tCO_2e)	***Carbon Savings from Solar (tCO_2e)***	***Total Savings Emissions (tCO_2e)***
47,339	140,598	187,937

Table 5.5: Electricity Generation Potential and Carbon Savings with Small Turbines

Wind electricity generation (kWh)	***Solar electricity generation (kWh)***	***Carbon Factor (tCO2e per kWh)***
160,833,600	727,056,444	0.00019338
Carbon Savings from Wind (tCO_2e)	***Carbon Savings from Solar (tCO_2e)***	***Total Savings Emissions (tCO_2e)***
31,102	140,598	171,700

5.6 Risk Register

5.6.1 A risk register is included within Appendix 001. This has been produced to help identify any risks that may occur in the development process. The risks that remain high probability after mitigation measures have been considered relate to grid access and cost of connection. The true extent of grid strain should be determined with National Grid and early communication should be promoted between developers and National Grid. If current connections cannot be made and reinforcement works are required, it is recommended that developers secure a connection with the DNO for the future or look into private wire options.

5.7 Renewable Energy Targets Stakeholder Engagement

5.7.1 On 24th May 2023, WA and VOGC met virtually with a range of stakeholders to discuss the findings from this Renewable Energy Assessment. Representatives from the following organisations and council departments attended the stakeholder workshop:

- Wardell Armstrong (WA)
- VOGC Planning
- VOGC Ecology
- VOGC Property
- VOGC Energy & Decarbonisation
- VOGC Landscapes
- VOGC Energy
- VOGC Project Zero

- Pegasus
- National Resources Wales (NRW)
- Cardiff Airport
- National Grid
- Cardiff Capital Region
- Stantec

Stakeholder Feedback on Study Findings

5.7.2 The key feedback is provided in Table 5.6 below, using the name of the organisation or department being represented. The main points that affect the target setting have been highlighted.

Table 5.6: Stakeholder Engagement Workshop Feedback

Organisations or Department	Comment or Question	Response
Natural Resources Wales	Interested if crops growth to support renewable energy generation was considered in the study	It was not considered as part of the approved methodology.
VOGC Ecology	Interested if offshore assessments were considered.	Offshore assessments were managed separately.
VOGC Ecology	Asked if SINCs were considered when assessing suitable sites.	Yes, all national and local designations were considered.
VOGC Ecology	Mentioned Wales Biodiversity Partnership carried out an exercise to identify important arable areas and species which should be a consideration when choosing sites. Mentioned a Section 7 Species Map: https://www.biodiversitywales.org.uk/Section-7	Requested for the information to be shared with WA.
VOGC Ecology	Interested what impact a change in government and funding for renewables have, especially in terms of domestic renewables.	Yes, that would have an impact, domestic developments are mostly permitted development, the prevalence of which would have a huge impact on grid demand.
Pegasus	Asked if battery storage projects were considered for the target setting.	No, it hasn't been as it does not necessarily help towards the national target.
Pegasus	Requested a positively worded policy for battery storage	N/A
Pegasus	Mentioned as well as cumulative impacts, each site does need to be considered as a stand alone, in terms of what could be mitigated	This is the nature of planning policy, rather than a blanket ban there are a list of considerations which must all be weighed up.
National Grid	How does this work tie in with LAEP?	LAEP has not been considered yet.

Organisations or Department	Comment or Question	Response
National Grid	What targets are you looking at and are they based on what you consider the demand to be or is it more for export?	No, this is more of a land use capacity approach, so it's the maximum that could be physically accommodated rather than demand.
Stantec	Are you intending to establish an allocation within the LDP?	We're intending to have a numerical target rather than a land parcel allocation. Marcus from VOGC responded to say in the current LDP they have identified local energy search areas which are where the greatest yield could take place, which they would be looking to replicate in terms of directing development.
Stantec	Would we be indicating where the substations and grid connections are located?	WA has mapped the current national grid connections, but this map doesn't consider the transmission network upgrades which will be a problem going forward with a longer timescale plan.
VOGC Landscapes	As it's such a high level at the moment, it's difficult to comment on the landscapes at the moment, it will likely come down to individual sites. I don't know if you've considered wind turbines impact on the landscapes, or the cumulative impact of the solar developments.	Realistically, it is unlikely we will see more than 6 wind sites come forwards, and these will only have 2 or 3 turbines, so shouldn't have a significant impact on the landscape.
VOGC Energy	The Welsh Government toolkit does not consider land ownership, is it possible that the land identified has multiple owners?	Absolutely, this needs to be treated as a guide of the areas that would be suitable for development, not the actual sites that will be developed.
VOG Project Zero	How might local ownership impact planning and public acceptability? It will be important to link this work with the LAEP.	We are seeing a changing policy approach to local ownership, which we can consider, it will just need to have the backing behind it.

Stakeholder Feedback after the Workshop

5.7.3 Geoff Hobbs from Natural Resources Wales wrote back with '*I'm not sure I can speak on behalf of NRW but I think they would support maximum targets of energy generation that work around the constraints discussed. This would be in line with our corporate plan priorities in particular Communities are resilient to climate change. This means taking urgent action to reduce greenhouse gas emissions and accelerate action to adapt to climate change.*

In principle NRW supports the development of sustainable offshore and onshore renewable energy and also seeks to stimulate development of sustainable renewable energy schemes on the land in our care.'

5.7.4 Colin Cheeseman who works in the ecology department at VOGC and has shared the Arable Priority Areas map of The Vale designated by the Wales Biodiversity Partnership. This map has been included as Appendix 002 for reference purposes only. The priority areas identified in the REA are to be used as a guide only and any future development would need to be considered on a site-by-site basis to ensure species priority areas are not affected.

5.7.5 A further meeting with Cardiff Airport was held on 12th June 2023. The airport did not approve of any sites impacted by radar or within protected surface. Any sites brought forward for future development would still need to undergo a Technical and Operations Assessment (TOA) by Cardiff Airport to determine suitability.

6 RENEWABLE ENERGY TARGET SETTING

6.1 Contribution to National Targets

6.1.1 The Future Wales: The National Plan 2040 renewable energy targets are outlined below:

1. For 70% of electricity consumption to be generated from renewable energy by 2030.
2. For one gigawatt of renewable energy capacity to be locally owned by 2030.
3. For new renewable energy projects to have at least an element of local ownership from 2020.

6.1.2 These targets were used to understand what could be considered a fair contribution from The Vale to these National targets, presented as per capita targets and land apportionment targets. The total Welsh electricity consumption was 13.1 TWh in 2019[28]. This would give the following targets for The Vale:

Per Capita

6.1.3 The Vale has 4.26% of the population of Wales. Therefore the 70% renewable energy target for The Vale would equate to 390.642 GWh by 2030. The second target would require 42.6 MW renewable energy capacity to be locally owned by 2030.

Proportionate to Land Area

6.1.4 The Vale has 1.58% of the total land in The Vale. The 70% target for The Vale would be 144.886 GWh by 2030. The second target would require 15.8 MW renewable energy capacity to be locally owned by 2030.

6.2 Existing Renewable Energy Capacity in Planning

6.2.1 In 2019, renewable energy sources in The Vale contributed 94.5 MW electrical capacity[29]. In addition, the renewable sources also provided 11.5 MW thermal capacity for heat generation in the region. This provides a total of 106 MW of renewable energy installed capacity.

6.2.2 The largest pending development is a 65MW solar PV development at Pancross and Oaklands Farm. A DNS planning application has recently been approved by Welsh Government for a 21 MW site at Brynwell Farm in the eastern Vale.

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[28] Welsh Government (2022) Energy Use in Wales: Second Edition. Produced by Regen, May 2022, version 1.
[29] https://statswales.gov.wales/Catalogue/Environment-and-Countryside/Energy/lowcarbonenergygeneration-by-technology

6.2.3 Once these projects are complete there will be 192 MW of installed renewable energy capacity in The Vale. 180.5 MW of this will be renewable electricity.

6.3 Increase in Demand for Electricity

6.3.1 The Climate Change Committee predict an increase of 50% in demand for electricity in 2035, based on 2020 consumption levels, to account for the electrification of heat and transport[30]. In order to calculate the projected increase in electricity demand, the 2019 Welsh consumption of 13.1 TWh has been multiplied by 1.5 to give 19.65 TWh.

6.4 Target Recommendations

6.4.1 We recommend that VOGC sets a target of at least 70% of their per capita electricity demand, to be in line with The National Plan 2040 target. We predict the per capita electricity demand for The Vale would be 837.09 GWh in 2036, based on the Welsh total presented above. Therefore, a suitable renewable energy target would be 585.936 GWh of installed capacity by 2036, which is the end of the Replacement Local Development Plan Period.

6.4.2 If it is assumed that all 180.5 MW of the existing (or in planning) renewable electricity is solar, this will be generating 127.605 GWh (with a solar capacity factor of 10.6%). The target recommendation is therefore for 458.358 GWh of additional renewable generation by 2036.

6.4.3 As solar and wind are both variable, it would be practical to prioritise wind to add diversity into the energy mix as the existing renewable energy installed generation capacity is dominated by solar. If the capacity of all green wind sites (refer to Figure 5.7 and Table 5.1) were included in the target, with large turbines it would provide 74.5 GWh of electricity. The eight highest generating solar sites would provide 386.4 GWh of electricity. Combined, these would exceed the target of 458 GWh at 461 GWh.

[30] Climate Change Committee (2020) The Sixth Carbon Budget: Electricity generation. Available at: https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-Electricity-generation.pdf

7 CONCLUSION

7.1 Solar

7.1.1 There is plenty of available unconstrained land to install solar technology within the Vale. As is shown with the current deployment of solar PV in the Vale, it is expected for developers to cluster sites around areas with access to the grid or where private wire agreements are possible, and every effort should be made to support development in these locations. The assessment found a capacity of 783 MW from the 20 largest potentially feasible solar sites.

7.2 Wind

7.2.1 The presence of the airports within the Vale makes it challenging to deliver large scale wind turbines. However, some smaller wind farms will be possible where aviation risks are lower and there is some grid access. Overall, we do not expect any wind farms over a large area to be developed on the Vale with the focus being on smaller, two or three, turbine sites. The assessment found a capacity of 104 MW from the 20 largest potentially feasible wind sites.

7.3 Heat Opportunities

7.3.1 The opportunities for district heating outside of Barry is relatively scarce. There are very few heat loads situated throughout the Vale. One potential option as a source of waste heat is Barry Biomass. The success of a district heating plan relies on the longevity of a reliable heat source. As there is some uncertainty around the future of Barry Biomass, this adds considerable risk to using the plant as a source waste heat. Any district heat network would need to include a reliable source of waste heat for the lifespan of the network.

7.4 Target Setting

7.4.1 The target of 458 GWh by 2036 could be achieved if all green wind sites were prioritised with large turbines. This could provide 74.5 GWh of electricity. Additionally, the four highest generating solar sites could provide 386.4 GWh of electricity. Combined, these could achieve 461 GWh of renewable electricity.

APPENDICES

Appendix 001 – Project Risk Register

Project Risk Register				
Risk	**Cause**	**Index (IxP) PRE**	**Mitigation**	**Index (IxP) POST**
Grid access/Cost	Existing strain on grid throughout UK, particularly the low export capacity on local 11kV and 33kV substations. Leading to necessary major reinforcement works.	16	Determining the true extent of grid strain with National grid and promote early communication between developer and National Grid.	10
Grid access/Cost	Investors deterred by potential timescale of works	16	Determining true extent of grid strain with National grid and promote early communication between developer and National Grid.	8
Grid access/Cost	Timescale of works	12	If current connections can't be made and reinforcement works are required, recommend that developers secure a connection with the DNO for the future, or look into private wire options.	10
Export cost fluctuations	As electricity costs readjust post pandemic, it is likely export costs will drop accordingly making projects less desirable	12	The developer must comprehensive discounted cash flow with appropriate sensitivity measures in place will produce forecasts to aid final decisions.	8
Lack of generation	More frequently occurring extreme weather events may produce low amounts of energy.	10	A variety of energy generation methods are required, and alternative options should be considered where possible, theoretically acting as a failsafe.	5
Pushback from historical and environmental committees.	Objections from these organisations is likely to cause problems receiving planning for developers.	12	Ensure community engagement occurs early within the project lifetime and require proof that developments will not significantly impact the surrounding historical or environmental designations.	8

Project Risk Register

Risk	Cause	Index (IxP) PRE	Mitigation	Index (IxP) POST
Adverse impacts on surrounding amenities.	Wind technology - Noise, Visual intrusion and Shadow flicker	16	Ensure relevant buffer distances are laid out and all relevant studies must be undertaken to receive planning permission	6
Adverse impacts on surrounding amenities.	Solar Technology – Glint & Glare, Visual Intrusion and loss of land.	16	Ensure relevant buffer distances are laid out and all relevant studies must be undertaken to receive planning permission	6
Impact on air traffic	Glint from solar panels and obstruction from wind turbines.	16	Ensure developments are in line with CAA policy	8
Impact on EMI	Wind turbines can directly interfere with a microwave link crossing a site, the diffraction or interference of radio waves and in some rare cases direct effect associated with magnetic resonance.	8	Ensure that this is mapped in the planning phase and require that a set buffer distance is to be upheld.	4
Public animosity	Public disapproval may lead to issues regarding development, particularly where wind is concerned	10	Ensure community engagement occurs early within project lifetime by mandatory policy.	8
Developer Uncertainty	Long Project Timescales may deter developers smaller scale developers from pursuing projects.	6	Accelerate the permitting process without compromising the quality of the required assessments.	4
ALC Grade	Developers targeting larger sites will likely encroach on sites with better soil quality.	8	Ensure action is taken to ensure work is taken on preferentially poor farmland.	4

Project Risk Register				
Risk	**Cause**	**Index (IxP) PRE**	**Mitigation**	**Index (IxP) POST**
Catastrophic failure of the facility	Structural or electronic issues may cause harm (Collapse of a turbine)	10	Ensure correct regulations are followed by developer and that contingency measures are established. The toolkit provides a detailed methodology on how to determine the best sites while maintaining safe operation.	4
Visual Impacts	Mass development starts to negatively impact on the local historic or environmental setting.	16	Promote early engagement with LPA / input from planning consultant. Target sites furthest from constraints. Developing policies concerning how close sites may be to one another.	8
Visual Impacts	Developments of the same type start to dominate the landscape.	12	Promote developers to target different locations to ensure one type of development doesn't become too common.	6
Visual Impacts	Shadow Flicker - the moving shadows can be unpleasant particularly when experienced while driving it can cause distraction.	8	Ensure that turbines are situated far enough from all roads in particular trunk roads.	6
Loss of valuable land	Developers may pursue sites that are located on valuable land	6	Require proof of an alternative site assessment to confirm the site would not be better suited elsewhere within the vale.	4
Potential Environmental Harm	Both types of technology can negatively impact the biodiversity	8	Ensure that comprehensive ecological studies are undertaken, with particular emphasis on endangered species.	4

Appendix 002 – Arable Priority Areas 2012

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