

From: [Capell Aris](#)
To: [NDE](#)
Subject: Response to NDF consultation
Date: 22 October 2019 09:16:45
Attachments: [Objections to the Wales National Development Framework Policy 10 Initiative.pdf](#)
[draft-national-development-framework-response-form_0 \(2\).doc](#)
[Solar Farm Development and Great Crested Newt Conservation in Anglesey.pdf](#)


Response to the NDF consultation attached.

Capell Aris

Ph.D., B.Sc., MBA



Consultation Response Form

Your name	Dr Capell Aris
Your address	
Preferred contact details (email/phone/post)	
<u>Organisation (if applicable)</u>	

1. NDF Outcomes (chapter 3)

The NDF has proposed 11 Outcomes as an ambition of where we want to be in 20 years' time.

- Overall, to what extent do you agree or disagree the 11 Outcomes are a realistic vision for the NDF?

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	<i>Don't know</i>	<i>No opinion</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- To what extent do you agree with the 11 Outcomes as ambitions for the NDF?

Agree with all of them	Agree with most of them	Agree with some of them	Agree with none of them	<i>Don't know</i>	<i>No opinion</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- If you disagree with any of the 11 Outcomes, please tell us why:

Outcome 2 will not be delivered on Anglesey if Priority Area 1 goes ahead.

2. Spatial Strategy (policies 1 - 4)

The NDF **spatial strategy** is a guiding framework for where large-scale change and nationally important developments will be focused over the next 20 years.

- To what extent do you agree or disagree with the spatial strategy and key principles for development in...

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	<i>Don't know</i>	<i>No opinion</i>
Urban areas (Policies 1, 2 & 3)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Rural areas (Policy 4)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- If you have any comments on the spatial strategy or key principles for development in urban and rural areas, please tell us:

Nothing for north west Wales, as usual.

3. Affordable Housing (policy 5)

The NDF sets out the approach for providing affordable housing, encouraging local authorities, social landlords, and small and medium-sized construction and building enterprises to build more homes.

- To what extent do you agree or disagree with the approach to increasing affordable housing?

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	<i>Don't know</i>	<i>No opinion</i>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- If you disagree, in what other ways can the NDF approach the delivery of affordable housing?

If you go ahead with Priority Area 1 on Anglesey, houses will be as cheap as chips.

4. Mobile Action Zones (policy 6)

- To what extent do you agree or disagree the identification of mobile action zones will be effective in encouraging better mobile coverage?

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	<i>Don't know</i>	<i>No opinion</i>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- If you disagree, in what other ways can the NDF improve mobile phone coverage in the areas which currently have limited access?

5. Low Emission Vehicles (policy 7)

- To what extent do you agree or disagree that policy 7 will enable and encourage the roll-out of charging infrastructure for ultra-low emission vehicles?

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	<i>Don't know</i>	<i>No opinion</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- If you disagree, in what other ways can the NDF enable and encourage the roll-out of charging infrastructure for ultra-low emission vehicles?

I talked to my Peugeot dealer on Anglesey and he says he hasn't sold a single EV to date. How do you expect people on Anglesey to afford these cars?

6. Green Infrastructure (policies 8 & 9)

- To what extent do you agree or disagree with the approach to maintaining and enhancing biodiversity and ecological networks?

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	<i>Don't know</i>	<i>No opinion</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. Renewable Energy and District Heat Networks (policies 10-15)

- To what extent do you agree or disagree with the NDF's policies to lower carbon emissions in Wales using...

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	<i>Don't know</i>	<i>No opinion</i>
Large scale wind and solar developments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
District heat networks	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- If you disagree with the NDF's approaches to green infrastructure, renewable energy or district heat networks, what alternative approaches should we consider to help Wales to enhance its biodiversity and transition to a low carbon economy?

With respect to the whole of Wales:

1. The Priority Areas are far too large. They cover 4,164 square kilometres of Wales, 22 % of the land area of Wales. Much smaller areas are needed to deliver Wales' renewable generation aims:
 - a. The 2030 renewable generation target is assumed to be 11.8 TWh. By 2030, with TAN8 project completion, renewable generation will reach 5.7 TWh, leaving 6.1 TWh of new capacity required; 250 square kilometres (wind) or 78 square kilometres (solar) would suffice.
 - b. If the TAN8 areas were left in place and allowed to achieve 50 % renewables coverage, only 3.7 TWh would be needed, with an NDF requirement of 150 square kilometres (wind) or 47 square kilometres (solar).
 - c. If Wales applies the Re-energising Wales initiative described in *The Economic Costs and Benefits of Renewable Energy Transition in Wales* then 29 square kilometres (wind) and 33 square kilometres (solar) would be required.
2. The NDF ignores any expansion of generation using offshore wind or small modular nuclear reactors. These technologies enjoy support from the UK government, which is not the case for onshore wind and solar generation.
 - a. If an extension of the Gwynt y Môr offshore wind farm goes ahead this could add up to 1.9 TWh to Wales' annual renewable generation, 16 % of the renewable target of Policy 10
 - b. If Wales successfully completes a small modular reactor of 300 MW, perhaps at Trawsfynydd, operating at load factor of 85 %, this would deliver 2.24 TWh per annum, 19 % of the 2030 Policy 10 renewable generation target, and would match the production from 1 GW of onshore wind or 2.3 GW of solar.
3. An increased deployment of renewable energy will increase the cost of energy for industries such as steel.
4. House prices will fall in the Priority areas; the larger the area, the larger the reduction in consumer confidence, the lower economic growth and the higher the risk of recession.
5. The development process for the Priority Areas uses discretionary application of many usual planning constraints described in Local Development Plans.
6. The NDF developers acknowledge this will increase the likelihood of objection.
7. Application of ALL planning constraints developed within LDPs for wind and solar generation would result in more than enough renewable development area to meet both the Priority 10 target of 70 % electrical energy to be from renewables by 2030 and the Re-energising Wales initiative by 2035.
8. Section 6 of Planning Policy Wales, Edition 10 (PPW10)(18) pp 118-35 attaches great importance to the protection of Listed Buildings, Conservation Areas, Historic Assets of special local interest, Historic Parks and Gardens, Historic Landscapes, World Heritage Sites, and Archaeological Remains. The casual attitude to the LDP constraints employed in the NDF process runs counter to PPW10.
9. Solar generation is a very poor choice for energy production

- a. The energy returned for the energy expended ratio is below 1.
- b. Daily solar production is badly matched to the demand curve.
- c. There is little production in winter months.
- d. National Grid have raised concerns about grid stability caused by solar production during times of light loading of the grid.

With respect to the island of Anglesey

1. NDF PRIORITY AREA 1 SHOULD BE REMOVED
2. Priority Area 1 covers 26 % of the island's land area.
3. Faulty application of the LDP constraints shows an opportunity for solar opportunity on the flood plain of the River Cefni.
4. Stage 2 of the NDF development process makes use of the LANDMAP 'resource'. The Geological LANDMAP for Anglesey shows, in the main, a HIGH rather than an OUSTANDING grading. The developers of LANDMAP should be made aware that:
 - a. Under the name GeoMôn , in recognition of its extraordinary geological heritage, the entire island gained membership of the European Geoparks Network in spring 2009.
 - b. In 2015 UNESCO placed Global Geoparks alongside its World Heritage Sites in status - giving the island's geology the same status as Edward I's Welsh castles.
 - c. Anglesey now enjoys the title GeoMôn UNESCO Global Geopark..
 - d. Parys Mountain Copper Mine is an anchor point on the European Route of Industrial Heritage. This would be in the middle of Priority Area 1. What sort of signal would this send to the island's tourists?
 - e. Edward Greenly's discoveries on Holy Island and the Skerries get a lukewarm HIGH grade.
 - f. The island is used for both geology field trips and for geology tourism
5. The habitat LANDMAP perhaps needs revision in the light of NRW's published spatial survey of great crested newts on Anglesey.
6. The NDF development process excluded an assessment of the visual impact of large solar farms upon observers within the AONB as too difficult to study. The PPRW10 obligation to assess the impact of a development upon a designated area has not been discharged. In view of that failing a generous contingency buffer zone around the AONB should constrain solar development.
7. An intervisibility assessment for building 150 m high wind turbines *anywhere* on the island showed they would be visible within the AONB (as are the existing 129 70 m high turbines). For much of the island, these wind turbines would also be visible from the Snowdonia National Park, and parts of the Lleyn Peninsula AONB. But the NDF developers diminish this assessment:

‘Anglesey AONB surrounding [the interior of Anglesey] is important due to the views outwards across the sea rather than into the priority area. On this basis, we have given the intervisibility analysis less weight. Nevertheless, the Priority Area for Wind and Solar Energy has been refined to include a buffer area around the AONB.’ (A reasonable buffer zone of 10 km would remove Priority Area 1 – author's note)

This judgement is ludicrous and obviously biased in favour of a larger Priority Area. How on earth

can this judgement be applied in the light of PPW10's statements on AONBs?:

6.3.7 In AONBs, planning authorities should give GREAT weight to conserving and enhancing the natural beauty of AONBs, and should have regard to the wildlife, cultural heritage and social and economic well-being of the areas.

6.3.8 National Parks and AONBs are of equal status in terms of landscape and scenic beauty, and must both be afforded the HIGHEST status of protection from inappropriate developments. *(author's capitals).*

8. Tourism is one of the Island's largest industries, tourism currently [2016] brings 1.6m visitors to the Island each year; supports more than 4,000 jobs and is worth around £280m to the local economy. The island's Destination Management Planning is 'about all of us working together to make our Island the best destination to visit, work and play. With this approach, we aim to attract more visitors and ensure they have positive experiences whilst on Anglesey.' And they don't want to see windmills and solar panels.

See attached documents for quantitative assessment.

8. The Regions (policy 16)

- To what extent do you agree or disagree with the principle of developing Strategic Development Plans prepared at a regional scale?

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	<i>Don't know</i>	<i>No opinion</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The NDF identifies three overall regions of Wales, each with their own distinct opportunities and challenges. These are North Wales, Mid and South West Wales, and South East Wales.

9. North Wales (policies 17-22)

We have identified Wrexham and Deeside as the main focus of development in North Wales. A new green belt will be created to manage the form of growth. A number of coastal towns are identified as having key regional roles, while we support growth and development at Holyhead Port. We will support improved transport infrastructure in the region, including a North Wales Metro, and support better

connectivity with England. North West Wales is recognised as having potential to supply low-carbon energy on a strategic scale.

- To what extent do you agree or disagree with the proposed policies and approach for the North Region?

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	<i>Don't know</i>	<i>No opinion</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. Mid and South West Wales (policies 23-26)

Swansea Bay and Llanelli is the main urban area within the region and is our preferred location for growth. We also identify a number of rural and market towns, and the four Haven Towns in Pembrokeshire, as being regionally important. The haven Waterway is nationally important and its development is supported. We support proposals for a Swansea Bay Metro.

- To what extent do you agree or disagree with the proposed policies and approach for the Mid and South West Region?

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	<i>Don't know</i>	<i>No opinion</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

11. South East Wales (policies 27-33)

In South East Wales we are proposing to enhance Cardiff's role as the capital and secure more sustainable growth in Newport and the Valleys. A green belt around Newport and eastern parts of the region will support the spatial strategy and focus development on existing cities and towns. Transport Orientated Development, using locations benefitting from mainline railway and Metro stations, will shape the approach to development across the region. There is support for the growth and development of Cardiff Airport.

- To what extent do you agree or disagree with the proposed policies and approach for the South East Region?

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	<i>Don't know</i>	<i>No opinion</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If you have any comments about the NDF's approach or policies to the three regions, please tell us. If you have any alternatives, please explain them and tell us why you think they would be better.

Why have questions 9 and 10 not been provided with a comments box?
For question 9, why does Anglesey continue to be burdened with Energy Island status? Anglesey is delivering nearly 50 % of consumption from renewables, well ahead of most Welsh counties. It has 129 wind turbines, mostly visible from the AONB. It has three solar farms totalling nearly 50 MW, another approved NEXT to the AONB. Tourism contributes £280 million to the economy, nearly £9,000 per household in an area that has the lowest household income in the whole of the UK. How much local prosperity does the Energy Island bring to Anglesey?

12. Integrated Sustainability Appraisal

As part of the consultation process, an Integrated Sustainability Appraisal (ISA) was conducted to assess the social, economic and environmental impacts of a plan. The report identified a number of monitoring indicators, including health, equalities, Welsh language, the impact on rural communities, children's rights, climate change and economic development.

- Do you have any comments on the findings of the Integrated Sustainability Appraisal Report? Please outline any further alternative monitoring indicators you consider would strengthen the ISA.

How can Wales assess the impacts of Wales' plans on climate change when Wales' energy consumption is 0.04 % (1 part in 2,500) of global consumption.

13. Habitats Regulations Assessment

As part of the development of the NDF, a Habitats Regulations Assessment (HRA) was undertaken. The purpose of the HRA process is to identify, assess and address any 'significant effects' of the plan on sites such as Special Areas of Conservation and Special Protection Areas for birds.

- Do you have any comments on the Habitats Regulations Assessment report?

No mention WHATSOEVER of great crested newts anywhere in the NDF document, despite all the work NRW has done on this subject. Document attached to remind us of the importance of this work.

14. Welsh Language

We would like to know your views on the effects that the NDF would have on the Welsh language, specifically on opportunities for people to use Welsh and on treating the Welsh language no less favourably than English.

- What effects do you think there would be? How could positive effects be increased, or negative effects be mitigated?

Is this not in place already?

Please also explain how you believe the proposed NDF could be formulated or changed so as to have:

- I. positive effects or increased positive effects on opportunities for people to use the Welsh language and on treating the Welsh language no less favourably than the English language, and
- II. no adverse effects on opportunities for people to use the Welsh language and on treating the Welsh language no less favourably than the English language.

15. Further comments

- Are there any further comments that you would like to make on the NDF, or any alternative proposals you feel we should consider?

16. Are you...?

Providing your own personal response	<input checked="" type="checkbox"/>
Submitting a response on behalf of an organisation	<input type="checkbox"/>

Responses to the consultation will be shared with the National Assembly for Wales and are likely to be made public, on the internet or in a report. If you would prefer your response to remain anonymous, please tick here	<input type="checkbox"/>
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**Objections to the
Wales National Development Framework
Policy 10 Initiative
with particular reference to Anglesey**

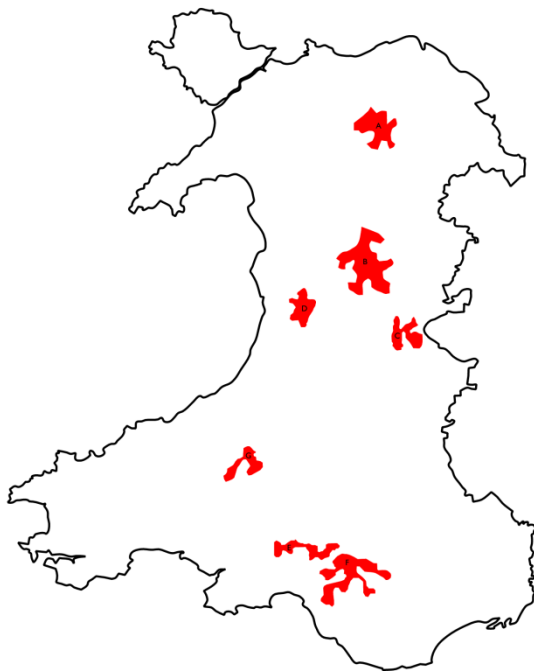


Capell Aris
2019

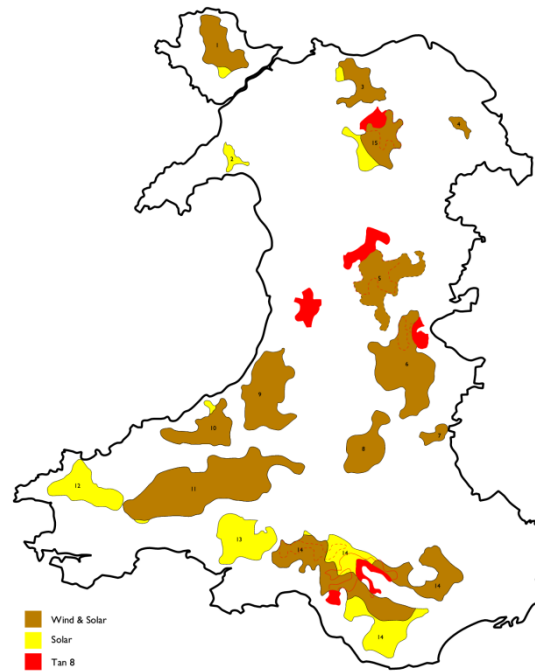
Quantitative assessment of the National Development Framework

The Draft National Development Framework (NDF) (1) sets a target of **70 per cent of electricity consumption [in Wales] to be generated from renewable energy by 2030**. All onshore wind developments greater than 10 MW, and other renewable energy developments between 10 and 350 MW are to be decided by Welsh Ministers. The existing 7 TAN8 Strategic Search Areas (Figure 1) are superseded by 15 Priority Areas (Figure 2).

Wales Tan 8 Areas



Wales NDF Renewable Priority Areas



Figures 1 and 2: Renewable generation areas old and new, Tan8 SSAs and NDF Priority Areas

Policy 10 of the NDF states:

The Welsh Government supports large scale on-shore wind and solar energy development in the identified Priority Areas for Solar and Wind Energy. There is a presumption in favour of development for these schemes and an associated acceptance of landscape change.

When determining planning applications for large scale on-shore wind and solar energy development in Priority Areas, significant weight will be given to the proposal's contribution to reducing Wales' greenhouse gas emissions and meeting our decarbonisation and renewable energy targets.

Planning applications must demonstrate how local social, economic and environmental benefits have been maximised and the following adverse impacts have been minimised:

- landscape and visual impacts;
- cumulative impacts;
- the setting of National Parks and Areas of Outstanding Natural Beauty;
- visual dominance, shadow flicker, reflected light or noise impacts;
- electromagnetic disturbance to existing communications systems; and
- the following identified protected assets:
 - archaeological, architectural or historic assets;
 - nature conservation sites and species;
 - natural resources or reserves.

Suitable access to the site for construction and maintenance purposes must be provided.

Plans must also be in place for the end of the development's lifetime, including the removal of all infrastructure as soon as their use ceases and the appropriate after-use of the site.

Response Summary

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1 NDF Policy 10 energy target for 2030

The Draft National Development Framework (NDF) (1) sets a target of

70 per cent of electricity consumption [in Wales] to be generated from renewable energy by 2030.

The 2017 review Energy Generation in Wales (2) has the following information

- Annual Total Energy Consumption 89 TWh
- Annual Electricity Consumption 14.6 TWh
- Annual Electricity Generation 32.5 TWh
- Present Generation From Renewables 3.2 TWh

If we assume that energy consumption in 2030 has risen by 15 % to 16.8 TWh, to allow for consumption in new electric vehicles, heat pumps, etc. then the target for renewable generation in 2030 is **11.75 TWh**.

2 The Re-energising Wales Initiative

The targets stated in The Economic Costs and Benefits of Renewable Energy Transition in Wales (15) would require sufficient area for annual generation of 2.6 TWh of solar generation and 5.3 TWh of onshore wind generation by 2035.

3 Present and future renewable generation from the TAN8 Strategic Search Areas

The Technical Advice Note (TAN) 8 Database 2018 (3) notes that onshore wind delivered 2.16 TWh per annum and by 2030 should be delivering 4.62 TWh, an increase of 2.46 TWh, see Table 1. So, if we do nothing but allow consented onshore wind farms to be completed, generation from renewables in 2030 will have reached 5.66 TWh (if we include other renewable generation such as offshore wind), **leaving 6.09 TWh to find from the new NDF areas**.

Onshore wind generation in Wales						
Area	Area km ²	Capacity MW			Annual Production GWh	
		Planning or Consented	Operational 2018	Operational 2030	2018	2030
A	110	204	31	235	66	565
B	208	198	107	304	232	733
C	67	216	46	262	100	632
D	65	0	0	0	0	0
E	66	48	73	121	157	290
F	154	63	347	410	753	986
G	56	36	80	116	175	280
Outside TAN8		209	313	522	680	1,134
Total	726	974	996	1,969	2,162	4,620

Table 1 Overview of onshore wind production in Wales

In Sustainable Energy – without the hot air (4), David MacKay developed a simple formula for the wind energy we could extract from an area of land; this formula is used by Arup to explore the potential of the NDF areas. From this formula the potential of the TAN8 areas covering 726 square kilometres could be as high as 14 TWh. This is certainly unrealistic, but if 50 % of the TAN8 areas remain available and useable then they could deliver 7 TWh of renewable generation. The total from renewable sources in

Wales by 2030 would be 8.04 TWh, leaving a shortfall of 3.71 TWh on the Priority 10 target **which would require a land space of 172 square kilometres.**

Continuing with TAN8 Strategic Search Areas would make a significant contribution to delivering the renewable generation Policy 10 target.

For the Re-energising Wales Initiative, TAN8 will deliver 4.62 TWh onshore wind capability by 2030, well on the way towards the 2035 target of 5.3 TWh. To meet the Re-energising Wales target would require space for 0.72 TWh of wind generation and 2.6 TWh of solar. **This would require very little land space - approximately 70 square kilometres.**

Continuing with TAN8 Strategic Search Areas comes very close to delivering the complete onshore wind generation target of the Re-energising Wales initiative.

4 Future renewable generation from offshore wind and small modular reactors

The Welsh Government is exploring interest in developing new offshore wind generation around the coast of Wales (23). An extension to the Gwynt y Môr wind farm and the possibility of several new sites in Leasing Round 4 suggest that new offshore generation may be in place by 2030. At present the UK government is not subsidising onshore wind and solar while the payment levels for historic Renewable Obligation Certificates and Feed in Tariff contracts remains high. So expansion of Wales' onshore wind and solar generation fleets may be financially constrained. This situation is likely to continue to the end of the next decade. However, the UK Government is entering into Contracts For Difference with offshore wind developers, which offers indication that offshore wind development for Wales may be easier than onshore wind and solar. **The Gwynt y Môr extension could add 1.9 TWh to Wales' annual renewable generation, 16 % of the renewable target of Policy 10**

The Welsh Government is considering (24) making the existing nuclear licensed site at Trawsfynydd in North Wales available as a location for the building and demonstration of a Small Modular Reactor (SMR). The site is ideal: it has a lake for cooling water, a grid connection, and a local workforce that includes skilled professionals. . The UK Government is also financing research into Advanced Nuclear Technologies to build factory assembled nuclear reactors (25) which may also be suitable for deployment in Wales (25). **A 300 MW capacity SMR operating at 85 % capacity factor would generate 2.24 TWh per annum, 19 % of the 2030 Policy 10 renewable generation target, and would match the production from 1 GW of onshore wind or 2.3 GW of solar.**

5 The NDF areas

Table 2 shows information for the NDF areas shown in Figure 2. The Priority Areas cover 22 % of the area of Wales; for Anglesey the coverage is 26.3 %.

There is sufficient area available in the 15 Priority Areas for Wales to exceed ALL its energy needs (89 TWh) by a factor of 3.

The NDF document has a presumption for renewable generation but if the true intent of the NDF is to cut carbon dioxide emissions (rather than a renewable generation crusade) then one 870 MW nuclear generator enjoying at a 80 % load factor would delivered all the energy required of the NDF framework.

	Land Areas km ² (extracted by computer analysis, not stated in NDF documentation)		Average extraction rates of wind energy MW/km ² (4) (5)	Solar Irradiance (kWh/m ² per annum) (6) (7)	Predicted Annual Production (TWh)	
	Wind	Solar	Wind	Solar	Wind	Solar
Area 1	175	188	2.90	950	4.5	13.3
Area 2		32		975		2.4
Area 3	130	142	2.42	950	2.8	10.1
Area 4	26	26	2.57	950	0.6	1.8
Area 5	292	292	2.75	975	7	21.3
Area 6	422	422	2.75	975	10.2	30.8
Area 7	38	38	2.75	1000	0.9	2.8
Area 8	185	185	2.93	1025	4.7	14.2
Area 9	341	341	2.75	1050	8.2	26.8
Area 10	181	190	2.56	1075	4.1	15.2
Area 11	722	726	2.56	1075	16.2	58.4
Area 12		203		1075		16.3
Area 13		235		1075		18.9
Area 14	602	938	2.90	1075	15.3	75.4
Area 15	152	208	2.93	950	3.9	14.8
Total	3,584	4,164			86	322

Table 2 Overview of the NDF areas and generation potential.

Sections 3 and 4 show the Priority Areas are far too large and should be scaled downwards.

The impact on the landscape in most areas will be significant.

House prices within the Priority Areas will be reduced.

6 The use of planning constraints in developing the NDF Priority Areas.

The NDF areas have been developed in a two stage process, the first (5) examining the application of the various county Local Development Plans (LDP) in conjunction with the Planning Policy Wales, Edition 10 (PPW10)(18), and in a second stage (7) refining these areas through visibility impact, LANDMAP and other techniques.

PPW was originally published by the Welsh Government in 2002 and sets the context for planning in Wales, under which Local Planning Authorities prepare their statutory Development Plans. **It is the principal and authoritative source of national planning policy** (author's bold) (26)

All Welsh councils have developed LDPs for renewable generation planning. These take the form of Geographic Information Maps (GIS) for each type of constraint which typically include built up areas, natural features, conservation areas, landscape considerations (such as AONB, geophysical importance), agricultural land classification, and heritage, recreational areas. These maps are combined to form a map where development will meet one or more constraints counter to any renewable development. Figure 3 shows the process followed for solar development on Anglesey (8).

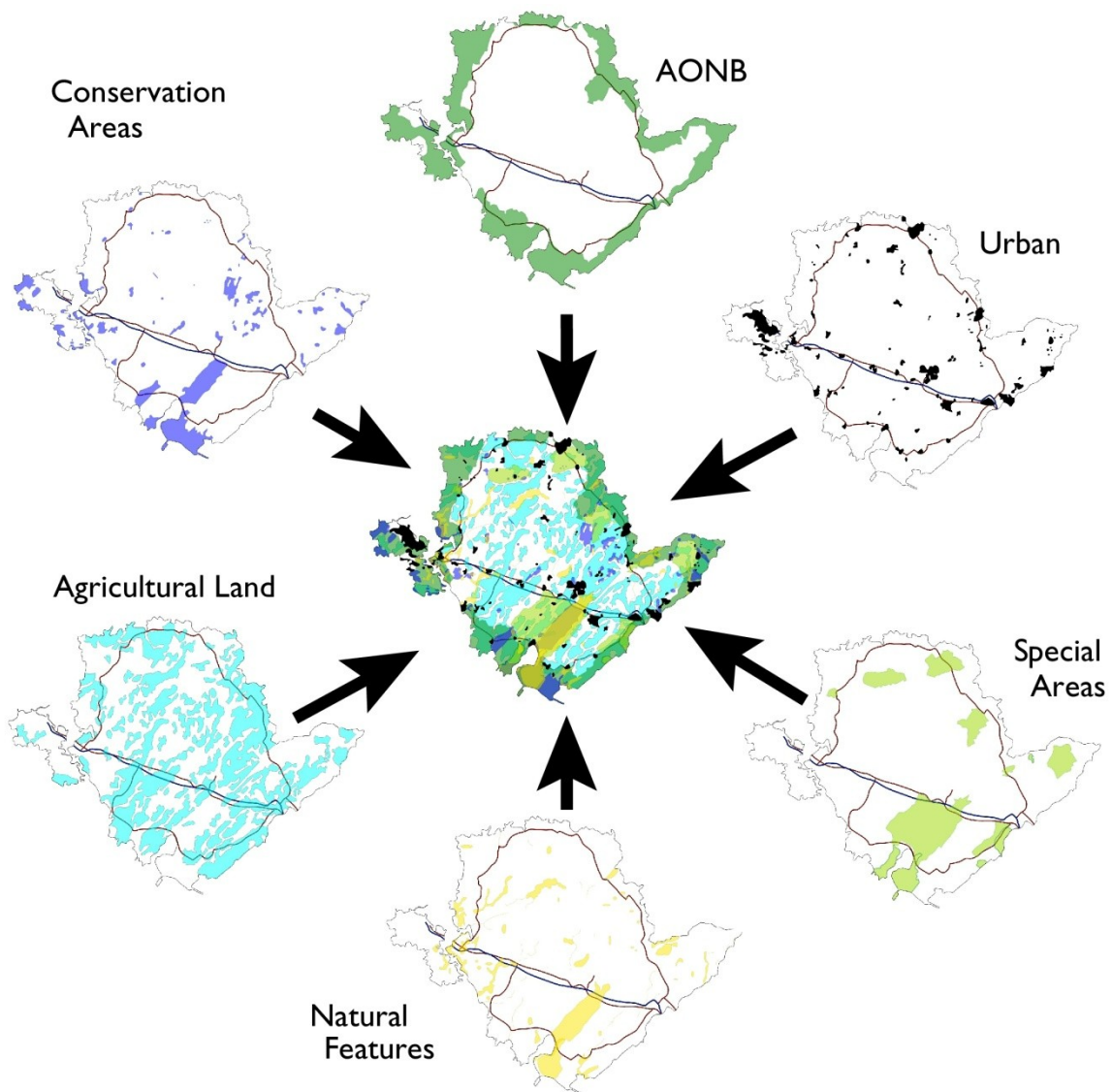


Figure 3 Constraints areas for solar development on Anglesey

The negative copy of this map then shows areas where renewable development is deemed 'unconstrained'; the Anglesey map is shown in Figure 4, alongside the Priority Area drawn in the NDF document.

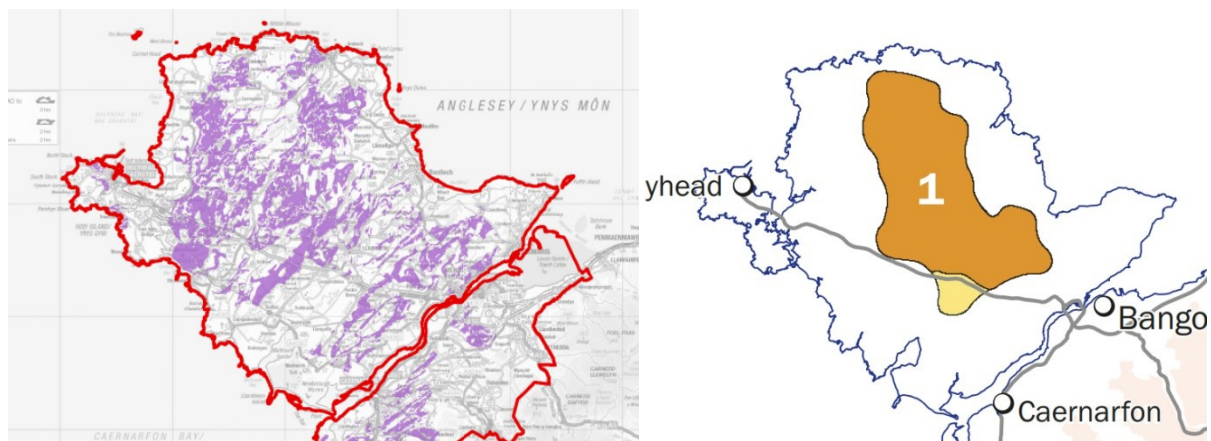


Figure 4 Anglesey Council solar opportunity map (left), Wales NDF (right)

Whereas a local council would probably have applied all these constraints to all planning application, this is not the case for the development of the Priority Areas. The Welsh Government adopts a nuanced approach to the applicability of the constraint areas. Four scenarios, each with different levels of constraint application, are considered, described (see (5) Section 4.1) in the NDF documents thus:

Scenario 1: This scenario had the fewest constraints switched on in the dashboard. Only constraints defined as fixed were applied to the map. This left the maximum amount of land available for development and therefore would correspond to maximum potential energy output.

Scenario 2 and Scenario 3: In these scenarios, varying levels of the constraints considered to be variable were applied to the map.

Scenario 4: This scenario had all of the constraints identified as variable switched on in the dashboard. This left the minimum amount of land available for development and would therefore correspond to the minimum potential energy output.

The application of the constraints across these scenarios is shown in Table 3, taken from (5) Tables B2 and B3.

Constraint	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Flood areas		W/S Zone 2	W/S Zone 3	W/S Zone 2/3
Woodland			W/S	W/S
Peat			W/S	W/S
Active travel routes			W/S	W/S
SSSI			W/S	W/S
Agriculture Land Classification			W/S	W/S
AONB	W-no buffer	W-5km buffer	W-11 km buffer/S	W-20 km buffer/S
National Nature Reserves			W/S	W/S
National parks	W-no buffer	W-5km buffer	W-11 km buffer/S-no buffer	W-20 km buffer/S-7km buffer
Outstanding/high areas in LANDMAP		S	W/S	W/S
Registered parks			W/S	W/S
Open access			W/S	W/S
RIG sites			W/S	W/S
Tranquil areas			W/S	W/S
NATS radar sweep			W/S	W/S
500m buffer around existing buildings			W/S	W/S
Historic landscapes			W/S	W/S
Special Landscape Areas			W/S	W/S

Table 3 Planning constraints and their application in the four scenarios. Blanks indicate the constraint is NOT applied, W indicates application of the constraint in the wind assessment, S the solar.

Section 6 of Planning Policy Wales, Edition 10 (PPW10)(18) pp 118-35 attaches great importance to the protection of Listed Buildings, Conservation Areas, Historic Assets of special local interest, Historic Parks and Gardens, Historic Landscapes, World Heritage Sites, and Archaeological Remains. As an example, this quotation covers the policy for conservation areas:

6.1.14 Conservation Areas

There should be a general presumption in favour of the preservation or enhancement of the character or appearance of conservation areas or their settings. Positive management of conservation areas is necessary if their character or appearance are to be preserved or enhanced and their heritage value is to be fully realised. Planning authorities should establish their own criteria against which existing and/or new conservation areas and their boundaries should be reviewed. The preparation of conservation area appraisals and management plans can assist planning authorities in the exercise of their development management functions.

6.1.15

There is a strong presumption against the granting of planning permission for developments, including advertisements, which damage the character or appearance of a conservation area or its setting to an unacceptable level. In exceptional cases, the presumption may be overridden in favour of development considered desirable on public interest grounds.

6.1.16

Preservation or enhancement of a conservation area can be achieved by a development which either makes a positive contribution to an area's character or appearance or leaves them unharmed. Mitigation measures can also be considered which could result in an overall neutral or positive impact of a proposed development in a conservation area.

6.1.17

Conservation area designation introduces control over the total or substantial demolition of unlisted buildings within these areas, but partial demolition does not require conservation area consent. Procedures are essentially the same as for listed building consent. When considering an application for conservation area consent, account should be taken of the wider effects of demolition on the building's surroundings and on the architectural, archaeological or historic interest of the conservation area as a whole. Consideration should also be given to replacement structures. Proposals should be tested against conservation area appraisals, where they are available.

If scenario 4, with all constraints applied, was used to define the NDF Priority Areas then only 30 square kilometres of land would be available for wind development, and 325 square kilometres for solar, (5) Table 1, p14. These areas would have a production potential of 0.6 TWh from wind and 23.1 TWh from solar, assuming the lowest extraction rates for extraction shown in Table 2. This is sufficient, with a considerable margin, to meet the 2030 renewable generation target.

There is no mention in any of the NDF documents concerning the protection of great crested newts. NRW have carried out assessments for the conservation status of great crested newts across the whole of Wales, and in detail for several counties. NRW have published a Spatial Action Plan for Great Crested Newts in Anglesey (10). There appears to be no consideration of great crested newt conservation in the NDF assessment.

In the Anglesey LDP for solar (8) the flood plain of the River Cefni appears in their map 2.3. The Cefni estuary was drained after construction of the Telford cob and still floods at least once every year and may have standing water for months on end, so this exclusion is simply common sense. But in the NDF Priority Area 1 (Figure 4) the eastern part of the solar extension to Priority Area 1 covers this floodplain, presumably because the floodplain constraint has been removed, see Table 3.

It seems particularly egregious that the opportunity to apply a 500 metre buffer around existing buildings for wind and solar has not been taken. Who in Government would accept this if applied to themselves?

The more land that becomes available for wind and solar development, the more these developments encroach upon obvious protected areas which are enjoyed by the public and contribute to their

employment in industries such as tourism, then the more objections there will be. In the analysis of scenario 1 reference (5, Section 4.2) the NDF development state the obvious:

[The] larger area available for [renewable] allocation means that there is more likelihood of an areas prompting objection being allocated.

Application of ALL planning constraints developed within LDPs for wind and solar generation would result in more than enough renewable development area to meet the Priority 10 target of 70 % electrical energy to be from renewables by 2030.

Application of ALL planning constraints developed within LDPs for wind and solar generation would result in more than enough area for renewable development to meet the energy targets set in the Re-energising Wales initiative.

Application of ALL planning constraints developed within LDPs for wind and solar generation would reduce the number of public objections, provide the greatest protection to the environment, and may avoid planning mistakes.

7 Further development of the Priority Areas

This Section describes some of the techniques used in the second stage of derivation of the Priority Areas. Anglesey will be used as an exemplar.

7.1 Visual sensitivity

This assesses the visual impact of large wind turbines upon observers within designated landscapes (AONB and National Parks). Solar developments are excluded from the study because it was too difficult to study (7 p13). PPW10 should apply to **all** activities that affect the designated landscapes.

The NDF planning process has not discharged its obligation under PPW10 to assess the impact of solar development visibility with designated areas. If it cannot do so then it should set a generous contingency buffer zone around designated areas constraining solar development.

Figure 5 shows the visibility of 150 m turbines built across Anglesey within the AONB.

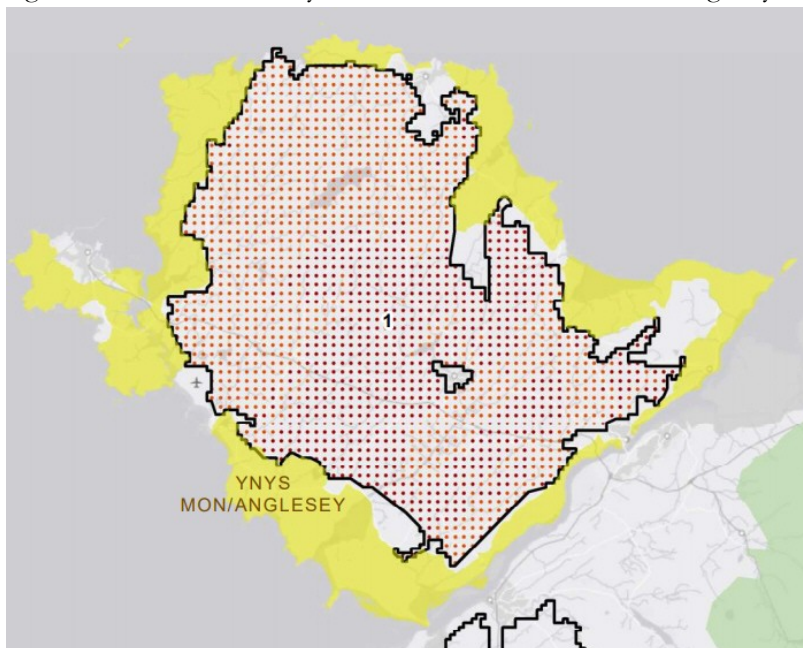


Figure 5 Visibility of 150 metre high wind turbines across Anglesey within the AONB. Each red dot signifies 95 % visibility within the AONB.

The NDF documents ((7), Section 9.5.2) reports some revision of the Priority Area:

Anglesey AONB surrounding this area is important due to the views outwards across the sea rather than into the priority area. On this basis, we have given the intervisibility analysis less weight. Nevertheless, the Priority Area for Wind and Solar Energy has been refined to include a buffer area around the AONB.

This is quite ludicrous and obviously biased in favour of a larger Priority Area. How on earth can this judgement be applied in the light of PPW10's statements on AONBs?:

6.3.7 In AONBs, planning authorities should give GREAT weight to conserving and enhancing the natural beauty of AONBs, and should have regard to the wildlife, cultural heritage and social and economic well-being of the areas.

6.3.8 National Parks and AONBs are of equal status in terms of landscape and scenic beauty, and must both be afforded the HIGHEST status of protection from inappropriate developments.

7.2 Using the Wales LANDMAP resource

The LANDMAP tool was used to refine the analysis described in Section 3. LANDMAP is used to assess four types of landscape

- Geological Landscape
- Landscape Habitats
- Visual and Sensory
- Historic Landscape

Figure 6 shows the LANDMAP results for Anglesey

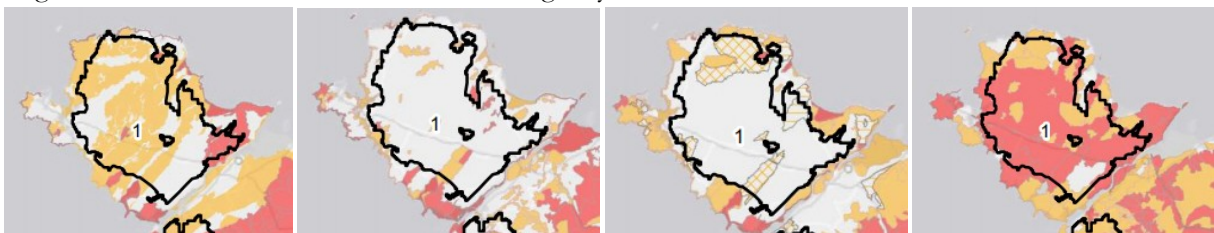


Figure 6 Anglesey Landmaps: Geological, Habitat, Visual, Historic. Red=Outstanding, Orange=High.

The geological LANDMAP seems surprisingly understated. Under the name **GeoMôn (20)**, in recognition of its extraordinary geological heritage, the island gained membership of the European Geoparks Network in spring 2009. Further, in 2015 UNESCO placed Global Geoparks alongside its World Heritage Sites in status - giving the island's geology the same status as Edward I's Welsh castles. Anglesey now enjoys the title GeoMôn UNESCO Global Geopark.. Parys Mountain Copper Mine (21) is an anchor point on the European Route of Industrial Heritage (22). Even the areas of Edward Greenly's discoveries on Holy Island and the Skerries get a lukewarm orange grade.

Perhaps the habitat LANDMAP also needs revision in the light of NRW spatial survey of great crested newts on Anglesey (10), see Figure 7.

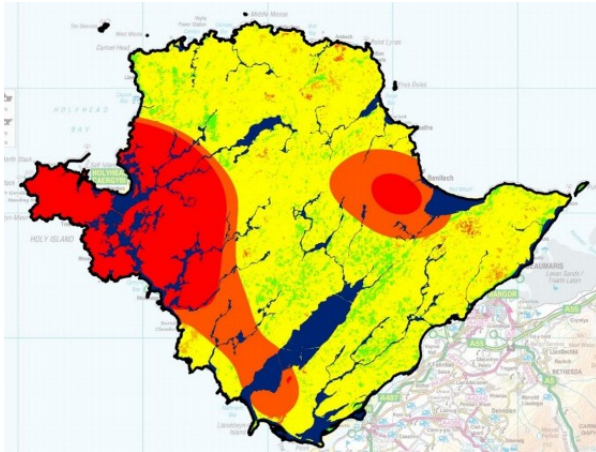


Figure 7 NRW Habit value for great crested newts on Anglesey. Red=core habitat, Orange=most suitable habitat, Yellow=suitable habitat. The blue areas indicate flood zones (constrained off for the NDF).

The geological and historic LANDMAPS further reduce support for the existence of Priority Area 1 on Anglesey. The density of constraints against renewable development shown in the Anglesey LDP (Figure 3), the visibility of wind turbines built on Anglesey from the AONB (Figure 5), the significance of the geological and historic LANDMAPs for Anglesey (Figure 6), and NRW's proposals for the protection of great crested newts (Figure 7) clearly demonstrate that NDF Priority Area 1 (Figure 4) should be removed in its entirety.

8 The cost of renewables – including system integration costs

Wales should be wary of a dash for renewable generation since this will cause electricity prices to rise. Figure 8 shows the impact of adding renewable generation to the UK generation mix from 2005 onwards (16) (17).

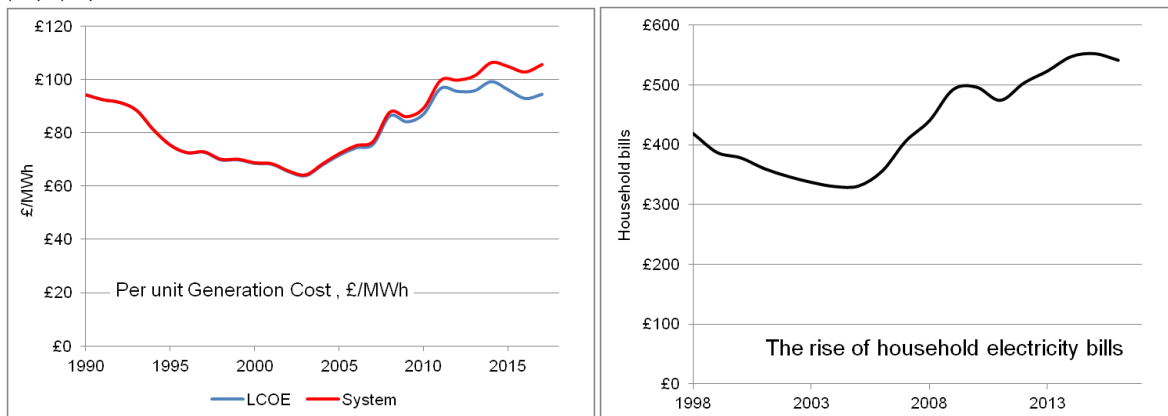


Figure 8 The rising costs of unit generation and household electricity bills caused by increasing renewable generation

The rise in costs and prices shown in Figure 8 were partly due to rising fuel prices, but the main rise is due to the rising proportion of renewables in the generation mix. This will have an impact on the economy of Wales and employment.

British steelmakers fork out £55million a year more for electricity than French rivals, a report reveals today.

UK firms also stump up an extra £47million compared with German counterparts, the UK Steel study shows.

UK steel companies pay 62% more for electricity than Germany firms and 80% more than those in France, according to The Energy Price Gap - A New Power Deal for UK Steel.

8/10/19

9 Why bother with solar generation at all?

Solar parks are detrimental to amphibian habitat (17). The insolation energy reaching the ground beneath the panels is roughly half the usual energy, reduced to levels experienced in northern Norway and having a huge impact on the level of photosynthesis. These low energy level inputs will almost certainly reduce or even exterminate great crested newts from the area of the solar farm since their food sources will be reduced in direct proportion to the reduction in photosynthesis energy. Great crested newts are not found in northern Norway.

National Grid's Summer Outlook 2019 (4) page 11 states:

'During the summer months solar generation has a more prominent impact on demand profiles. For a number of years maximum solar generation output has coincided with the fall in demand after lunchtime.'

If this is so then there seems little point in any expansion of grid connected solar generation: how will this be manageable during summer months when solar expansion across Europe prevents export of excess power? The excess energy can only be spilt or constrained off.

In 2012 (13) - the paper is undated and publication is inferred from the paper's content - National Grid issued a briefing note *Solar PV* to DECC on the potential impact of solar PV on transmission system operation and balancing. In this they note:

at the start of the [power] ramp up [in the morning], there could be no fossil generation synchronised apart from that providing frequency response. This will make the management of the ramp very difficult using plant that has just synchronised, wind, pumped storage and interconnectors. . . . To maintain inertia, fault levels and HVDC commutation, Wind/Solar output must not exceed 60% of network demand. . . . With 22GW solar PV the system would require an unacceptable dependence on the ability to export over the interconnectors, or the construction of additional storage.

In 2018 the UK grid had 13 GW of connected solar generation.

Ferroni and Hopkirk (14) show that the ratio of Energy Returned over Energy Invested (EROEI) for solar generation in regions of moderate insolation, inclusive of storage to mitigate intermittency, is 0.8. In other words, solar will absorb rather than generate energy.

A 1 GW nuclear plant operating at 85 % capacity factor can generate as much energy as 100 square kilometres of solar generation, a massive saving of valuable agricultural land.

With these serious difficulties, and observing that solar production will be near non-existent in winter when peak demand occurs, it seems senseless to support any further expansion of solar generation, either transmission or distribution connected, beyond the present levels.

10 Concerns about falling grid system inertia, grid stability, risk of loss of supply

Caution should be exercised in expanding Wales' proportion of asynchronous connected wind and solar generation. Asynchronous generators provide no grid inertia. In a continental grid this should not be important since there will usually be sufficient heavy, high rotation speed generation and load connected to the grid that store rotational energy and resist any change of frequency caused by load or generation

disconnections. But Great Britain is an island grid and frequency control is more difficult. The proportion of generation that is synchronously connected has fallen from nearly 100 % in 2010 to 60 % today and could fall to 30 % by 2030. Dinorwig power station has played a unique role in responding to grid disturbances but will not cope with the anticipated rates of frequency change in the future. These problems were outlined in National Grid's System Operability Framework 2014 (19). A further concern for Wales should be awareness of black start capability since, like Scotland, the number of grid connections to England are limited, and a renewable grid may be difficult to restart; this is now a serious issue for Scotland.

Adding SMR generation would add valuable grid system inertia; built at Trawsfynydd, remote from the main GB grid, would be an especially valuable.

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Solar Farm Development and Great Crested Newt Conservation in Anglesey



Capell Aris
2019

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Summary

Anglesey and Gwynedd Councils have published a Joint Local Development Plan (JLDP) which identifies areas where construction of solar farms will be constrained by areas set aside for conservation, natural unsuitability, or built infrastructure. National Resources Wales has recently published (2018) a Spatial Action Plan for Great Crested Newts in Anglesey. This plan identifies a large area along Anglesey's west coast where the existing great crested newt population could be progressed to Favourable Conservation Status (FCS). This report argues that solar farm development should be constrained in the FCS area, advocates that NRW's FCS area should be adopted into the LJDP and assesses the impact of doing so.

The great crested newt is Britain's most strictly protected amphibian yet their numbers are declining despite full European-level protection. Anglesey lies at the western edge of the great crested newt's range. Northeast Wales, particularly parts of Flintshire and Wrexham, is one of the strongholds of the great crested newt; Anglesey has a significant great crested newt population and is considered important for the species within Wales.

National Resources Wales (NRW) embarked upon a national species' status report in 2014 (1), and pointed out that conservation is a devolved function. The Welsh Government is obligated to maintain or restore the favourable conservation status of great crested newts within Wales. Following that initial assessment NRW have now published several county-level special action plans for great crested newt conservation, one of which is for Anglesey (2), hereafter: the *NRW Report*. This builds on the 2014 assessment to model the present status of great crested newts within Anglesey, and develops a plan to consolidate and recover the Anglesey population of great crested newts. The scope of this plan is outlined using maps of great crested newt habitat suitability and development that mirror the GIS mapping approach taken in the Anglesey and Gwynedd Joint Local Development Plan (JLDP) so the two planning reports plans can be easily merged.

The Anglesey and Gwynedd Joint Local Development Plan 2011-2026 assesses the potential for the development of renewable energy schemes within the council areas. Appendix B of that plan (3) studies the potential for solar PV farm of greater than 0.5 MW capacity, assessing the generation potential and facility of grid connection whilst taking account of a series of land use and environmental constraints. The assessment is undertaken using Geographic Information Systems (GIS). This study makes no mention or assessment of the protection or sustainability of great crested newts within the joint area.

1 Introduction

1.1 NRW: Quantifying the Status of Great Crested Newts in Wales.

In order to maintain and restore the favourable conservation status of the great crested newt's range the *NRW Report* includes a number of GIS layers which will be of particular practical use to those engaged in great crested newt conservation across Anglesey. It identifies the number of remaining ponds within the county (2,146) and how many of these are occupied by great crested newts (334). NRW proposes an objective to recover the population of great crested newts to previous levels by targeting the number of occupied ponds towards 464; they seek to reverse the present decline of habitat into an expansion.

More specifically, NRW wishes to restore the great crested newt on Anglesey to have a Favourable Conservation Status (FCS). FCS is defined for species in Article 1 of the European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the "Habitats Directive"). According to the Directive, the conservation status of a species is "favourable" when the following criteria are met:

- i. population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- ii. the natural range of the species is not being reduced for the foreseeable future; and
- iii. there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The conservation effort for the species is considerable and is included within the Habitats Directive requiring national governments to monitor, maintain and restore the species to FCS. The decline of the species is so high that it is included within the UK Biodiversity Action Plan (BAP) and subsequently many Local BAPs such as Anglesey.

1.2 JLDP Appendix B - Assessment of the potential for solar PV farms in Gwynedd and Ynys Môn

LUC Bristol and Carbon Smart were commissioned to provide the solar appendix to the JLDP; the study was a desktop exercise, with no field verification. The methodology follows Welsh Assembly guidelines (4). The exercise develops GIS layers which explore constraints on solar farm development caused by:

- i. alternative land uses such as housing, biodiversity and geodiversity, landscape , heritage, and so forth,
- ii. natural obstacles such as flood plains, sloping land, and
- iii. connection and capacity constraints in the distribution network for Anglesey.

2 Overview of the GIS maps from the JLDP and the NRW report

2.1 GIS constraint maps from Appendix B of the JLDP plan for solar parks

Appendix B of the JLDP solar potential assessment shows six GIS layers for the whole of Anglesey that indicate various levels of constraint against the development of solar farms, as shown in Table 1. Map 2.6 of Appendix B considers unsuitable slope and aspect of the landscape as a constraint on solar farm construction; it is not considered here. These six maps are shown in Appendix A of this report. Figure 1 shows these various constraints combined into one map omitting the agricultural land category ‘constraint’ as this is usually honoured in the breach. There is considerable overlap between the constraining areas of the six GIS layers; of Anglesey’s area of 714 sq km, 350 sq. km. are removed for solar development by these 6 GIS layers.

Appendix B goes on to map the availability of distribution grid connection points which are not, at present, capacity constrained and to match these with areas not constrained by issues covered in these six GIS maps. There are several connection points in Anglesey capable of handling small to large solar farms that would not be constrained by the GIS landscape sensitivity assessment. One of these connection points is at Caergeillio where the assessment considers small to medium scale (up to 5MW) would be permissible.

Appendix B Ref.	Title	Nature of solar development constraints stated in document
Map 2.2	Built-up areas, Infrastructure	The location of built up areas will significantly constrain any deployment of large-scale stand-alone PV farms.
Map 2.3	Natural Features	Woodland, Lakes, Rivers, Flood warning areas. There is no direct constraint statement in the document, but solar development seems unlikely in these areas
Map 2.4	Biodiversity/Geodiversity (Conservation)	Refers all forms of protected sites such as SSSI, etc. The Welsh Assembly assumes there is no potential for large-scale solar development within these areas.
Map 2.5	Landscape (AONB)	The Welsh Assembly assumes there is no potential for large-scale solar development within these areas.
Map 2.7	Land Classification	Large-scale ground mounted solar PV should be located on less productive agricultural land or previously developed land. Appendix B states discussions with the Welsh Government indicate they will tend to constrain development on grade 1-3 land
Map 2.8	Landscape, Heritage, Recreational areas	All of these areas are considered constrained.

Table 1 Appendix B maps showing constraint areas against large-scale solar farms development

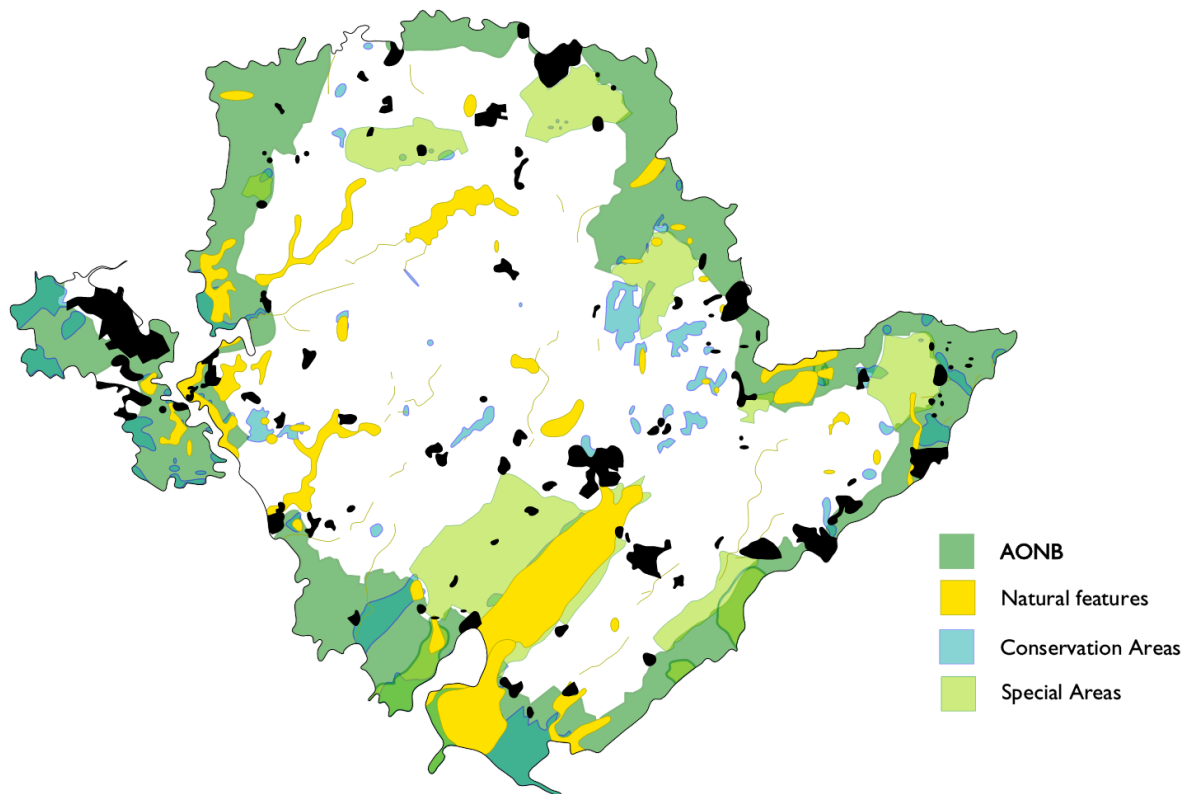


Figure 1 Combined solar farm constraint GIS layers from JLDP. Existing and approved solar farms are shown in magenta, to scale.

2.2 NRW GIS maps assessing the habitat value and suitability for great crested newts on Anglesey

Rather than surveying for great crested newt presence, such as DNA sampling of pond water, NRW have developed a predictive model for great crested newt extent based upon climate variables, land use, pond density, land slope, and other variables. The resolution of the model is 25 metres. The output for this modelling is shown in two figures. Figure 2 shows the suitability of habitat for great crested newts across the county.

Figure 3 shows the value of particular areas for great crested newts in a landscape context, indicating regions where NRW would seek to increase the number of ponds occupied by great crested newts and thus consolidate the population. The Current Conservation Status (CCS) of great crested newts depends upon:

- i. Range and area of land occupancy
- ii. Variability and abundance of populations
- iii. The amount of available habitat, and
- iv. The future prospects of the above.

The red and brown coloured areas shown in Figure 3 are those where NRW would seek to achieve FCS (Section 1.1) for the great crested newt on Anglesey.

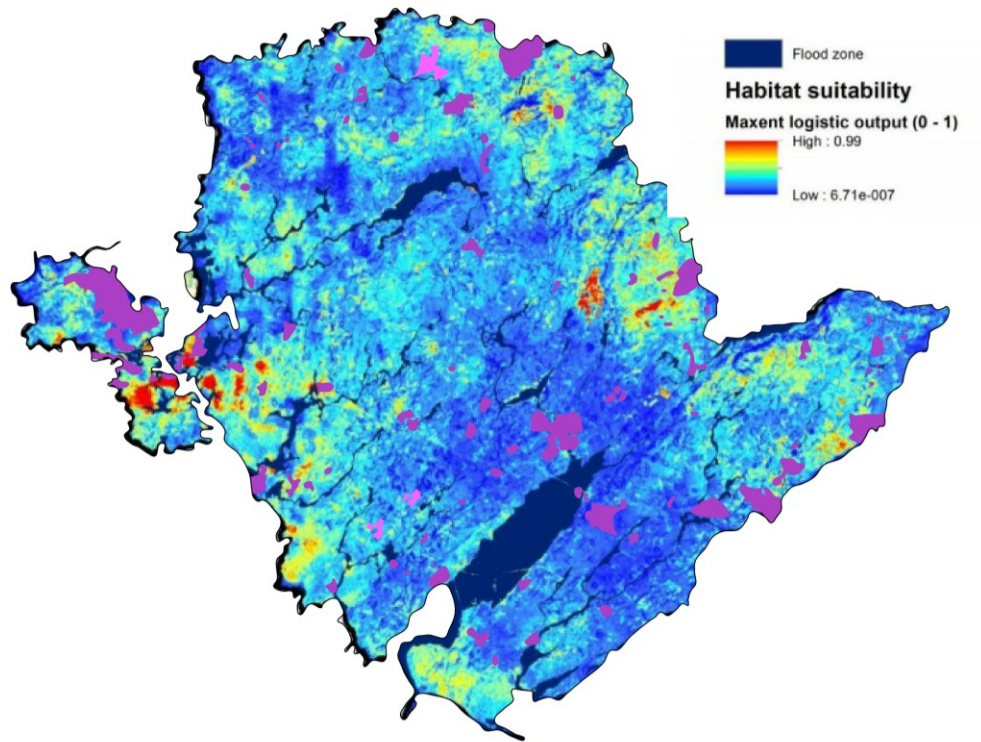


Figure 2 NRW great crested newt habitat suitability modelling for Anglesey. Housing is shown in dark purple for clarity. Existing and approved solar farms are shown, to scale, in magenta.

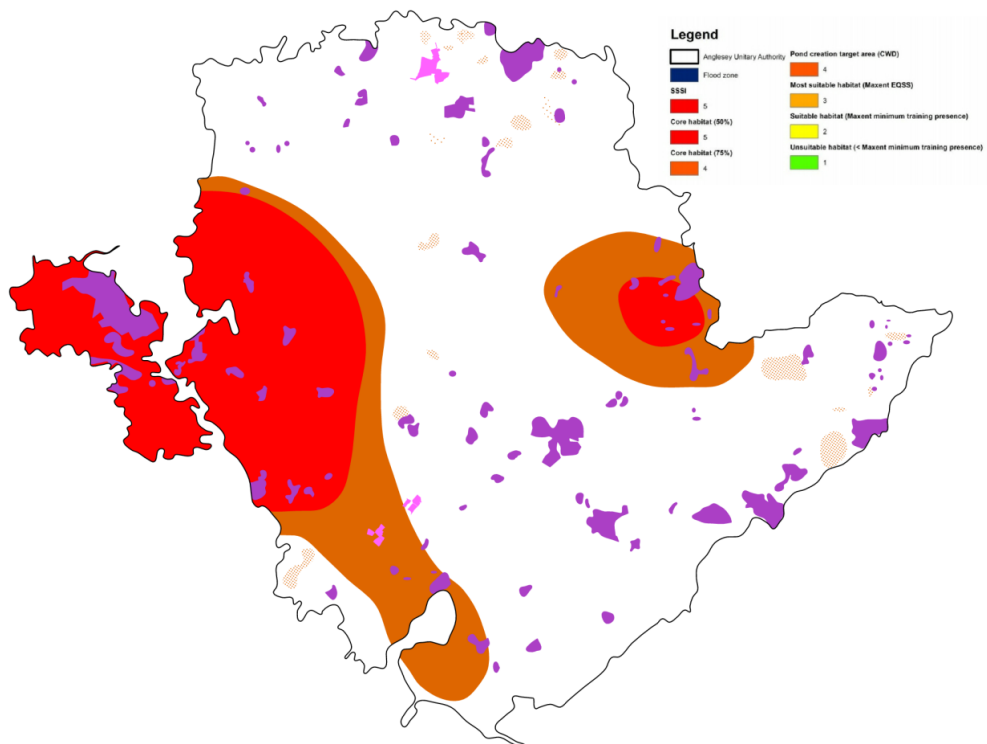


Figure 3 NRW Habitat value for great crested newts across Anglesey. Housing and solar farms coloured as per Figure 2. The areas coloured red and brown are where NRW would hope to develop FCS for great crested newts.

2.3 The NRW Habitat Value map as a new GIS layer for the JLDP

Figure 4 shows the NRW Habitat Value GIS layer for FCS added to the JLDP solar farm constraints map. If this new layer is added to the constraint layers of the JLDP, then, *approximately*, another 110 sq km will be removed for the construction of solar farms on Anglesey. The potential site at Caergeilliog (see Section 2.1) would be lost. 264 square kilometres would remain for solar farm development. Section 3 presents reasons why this NRW GIS layer should be added to the JLDP constraints map for solar farms.

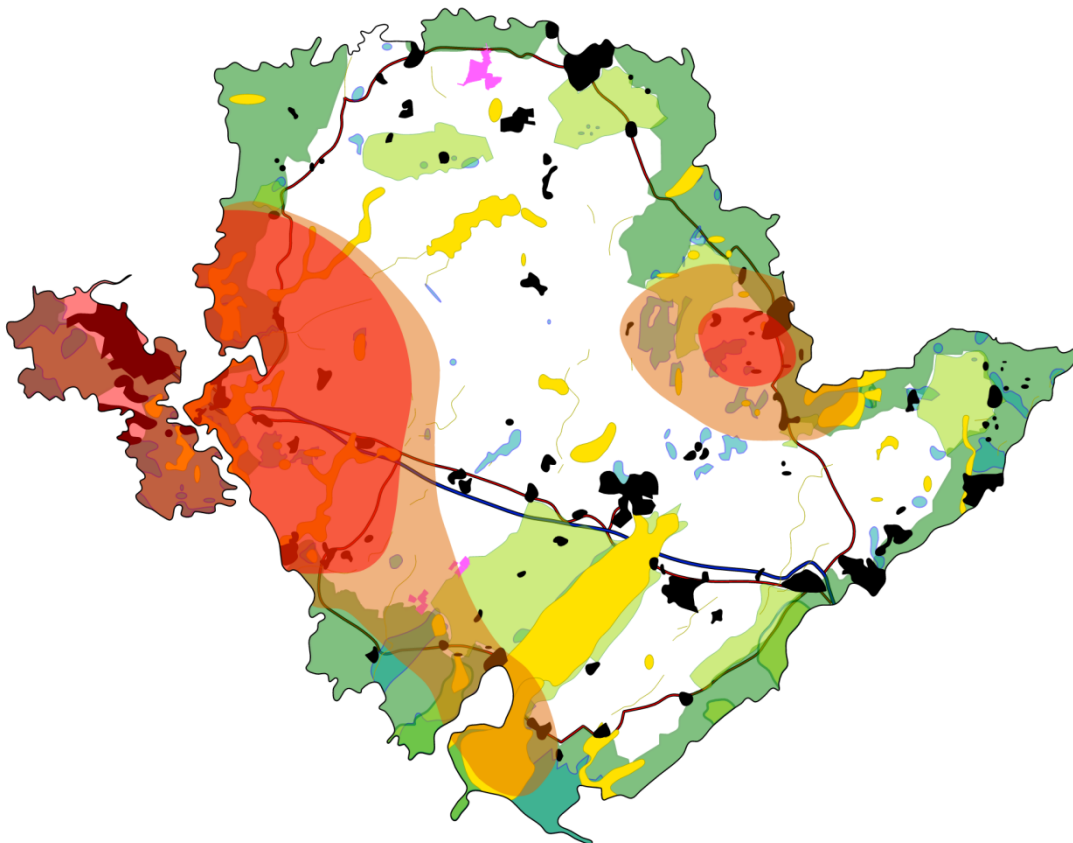


Figure 4 The JLDP Appendix B solar farm constraints GIS maps combined with NRW's proposals for consolidation of great crested newt habitat and achieving FCS status.

2.4 Conservation of great crested newts in areas outside those moving towards FCS

The main focus of the NRW Report is, perhaps, the areas designated to achieving FCS for great crested newts. However, the NRW Report shows significant populations of great crested newts outside these areas:

- i. In the north: between Amlwch and Parys Mountain, south of Porth Wen, 1 mile west of Rosgoch, and south of Rhosybol
- ii. South west of Llanddona
- iii. Llyn Gors, north east of Llandegfan

The usual conservation procedures for great crested newts are assumed to continue in the areas outside those marked for achieving FCS.

3 Should Anglesey County Council add the NRW habitat value map FCS zones to the JLDP solar deployment constraint maps?

3.1 What is entailed with great crested newt habitat conservation?

The Great Crested newt Conservation Handbook (5) states:

‘. . great crested newts occur [in] marshes, reed beds, spring fed ponds, pingos, bog pools, sand dune pools and ox-bow lakes. . .

‘In some areas of high pond density, such as . . . north Wales, populations are distributed across a dense network of farm ponds within extensive metapopulations. Populations in this situation are considerably more robust than those where landscapes are fragmented by urbanisation or industry, or where populations are centred on small numbers of isolated breeding ponds.. . (A metapopulation is a group of associated populations. That is, a metapopulation is made up from newts which breed in, and live around, a cluster of ponds.). . .

Factors [causing] the decline of this species are:

- The deliberate filling in or destruction of ponds
- Chemical pollution and nutrification of breeding sites
- Loss of terrestrial habitat
- Habitat fragmentation
- Habitat management which renders sites unsuitable for great crested newts
- Deterioration of ponds through neglect or misuse’

Section 7 of the *NRW Report* addresses the impact of any industrial, housing or farming development upon their plans to consolidate and expand the habitat of great crested newts on the island. They are quite explicit:

‘For sites which are allocated within Local Development Plans, the Local Authority may also consider great crested newts whilst developing the plan.’

The following assessment of the issues consequent on the development of large solar farms upon the habitat of great crested newts suggest their impact will be considerable.

3.2 Characteristics of solar farms that are counter to great crested newt conservation

The construction of solar farms destroys the habitat of great crested newts: ponds are filled in, hedgerows cleared, areas of rough grass are removed, cable trenches disturb land drainage, and so forth.

Anglesey receives an annual, average insolation energy of 975 kWh/m²; about 80 % of this energy is received directly, the rest after scattering in the atmosphere (8). The extraction of electrical energy from the environment reduces the annual insolation energy over the solar farm’s fields to between 500 and 600 kWh/m² (typical of northern Norway). Below the panels, the annual insolation energy is reduced to between 200 and 350 kWh/m² (see Appendix B for

supporting calculations). The calculated insolation fraction below the panels equates to the diffuse insolation fraction. This insolation loss is a reduction in the amount of energy available for photosynthesis; other energy inputs will continue (for example, by wind transport), but the photosynthesis loss cannot be recovered. We have all witnessed this effect: if we pitch a tent for a few days, the grass below turns yellow; if we lift a sheet of discarded iron roof after a few years there is no vegetation left. Insolation loss will persist until such time as the solar panels are removed. None of Anglesey's built solar farms contained any escrow funding for decommissioning within their planning applications so any insolation deficit could persist until funds to remove the panels are available, or the panels rot away. These low energy level inputs will almost certainly reduce or even exterminate great crested newts from the area of the solar farm since their food sources will be reduced in direct proportion to the reduction in photosynthesis energy. Great crested newts are not found in northern Norway.

Solar farms occupy large areas of land and are an impediment to the free movement of great crested newts between ponds and adjacent populations. Each MW of solar farm capacity requires 2.4 hectares of land; the most compact arrangement would be circular, with radius/diameter as shown in Table 2.

	Solar Farm Output Capacity (MW)					
	5	10	20	30	40	50
Radius (m)	200	280	390	480	550	620
Diameter (m)	390	550	780	960	1110	1240

Table 2 Relationship between solar farm capacity and circular dimensions (to nearest 10 metres).

The colonisation time of newts to new ponds increases with separation: ponds over 1,000 m distant may require several years to accomplish migration (5) so larger solar farms will tend to fragment the habitat.

The 15 MW Tai Moelion solar farm can be seen (Figure 3) making a significant cut across the south east corridor of the proposed NRW Habitat corridor. Large solar farms could slice and dice the proposed FCS area, fragmenting the habitat of great crested newts..

NRW detail methods of mitigating human development impacts on great crested newt habitat by either in situ or ex situ (within/without the development) measures such as replacement pond creation. The preceding observations of energy deficit and scale suggest that only the latter, ex situ, will be worthwhile. This may have a significant impact on the costs of any solar farm development within the NRW Habitat Value FCS area. However, siting a mitigation pond at the periphery of a large solar farm may be of little value. Great crested newts migrate from pond to pond and we can assume (certainly for a new pond with no hereditary migration paths) that this migration direction is random. If so, half the great crested newt population migrating into the solar park area will likely die. The only way to prevent this will be to enclose the solar farm with well-maintained newt fencing.

Great crested newt conservation manuals (5), and NRW's own statements of mitigation policies not only guide conservationists, but also landowners preparing their land for a solar farm and seeking to avoid difficulties with the Environmental Impact Assessment process.

3.3 The impact of the NRW Report on Anglesey County Council planning decisions for large-scale solar developments

Given the impacts caused by large solar farm development revealed in Section 3.2 it seems sensible that any development of large-scale solar farms should be constrained within the FCS areas identified in the *NRW Report*. This would directly remove

- i. 110 square kilometres of Anglesey's area,
- ii. the potential of one the distribution connection points with spare capacity (Caergeilliog, see Section 2.3).

Consequential benefits would include:

- i. a reduced number of planning applications,
- ii. provide certainty to the NRW that their planned actions to achieve FCS for the great crested newt could continue with a much reduced threat of reversals caused by development within the area, and
- iii. removing all incentive for landowners to prepare their land for solar sites.
- iv. provide a buffer zone protecting the western section of the AONB

Elsewhere, large-scale development of solar would be restricted only by considerations of any local populations of great crested newts and handled, as before, within the usual planning process as discussed in Section 2.4. There are several brownfield sites, such as the Rhosgoch oil terminal, 82 hectares, available for large scale solar farms.

A recent report concerning the approved, 50 MW solar farm at Rhyd y Groes indicates that the developers have received an environmental assessment that removes any requirement for newt fencing around the farm (9). Considering the proximity of great crested newt populations close to the farm (Figure 3 and (2)) and the observations of section 3.2 this seems surprising, albeit the assessment (9) was published prior to the *NRW Report*.

3.4 Great Crested Newt Protection in other parts of Wales

These are just two examples found in a brief, desktop search of Welsh government authorities. It indicates the concerns and actions others are taking with regard to great crested newt conservation.

3.4.1 Flintshire

Flintshire has produced (2018) a guidance note to protect great crested newts: *Supplementary Planning Guidance 8a Great Crested Newt Mitigation Requirements* (6). This contains many of the features mention in the *NRW Report*: special conservation areas, FCS target areas, mitigation or compensation areas to compensate for any loss of great crested newt environment, a system of charges for management of mitigation plans, and so forth. This guidance note makes reference to the NRW spatial action plan for Flintshire.

3.4.2 Cardiff

Cardiff has published a *Great crested newt (triturus cristatus) species action plan for Cardiff* (7). The note is brief but it sets targets for the city:

- i. Maintain current range.
- ii. Maintain population in 8 known ponds (sites).
- iii. Periodically survey all known sites.
- iv. Survey 3 sites per year on a rolling programme.
- v. Maintain current management of ponds with known populations and surrounding terrestrial habitat.

3.5 Scientific literature that reports the impact of large solar farms on amphibian life

Since large-scale solar farms didn't appear in Britain until late 2011 it is not surprising there is very little evidence-based literature reporting the impact of solar farms on amphibians. Natural England produced a comprehensive literature review of the evidence for the impact of utility scale solar farms on birds, bats and general ecology in 2016 (10), but only two pages of this considers 'general ecology'. This provides one paragraph of useful information:

*'Hernandez et al. (2015) attempted to quantify land-use change and land cover characteristics of existing utility scale solar developments in California, United States. The article concludes that poor siting of large scale solar developments can result in ecologically adverse land-use change, including outside of protected areas where the removal or conversion of habitat providing contiguity and corridors between protected areas may lead to **habitat fragmentation**. This is agreed upon in Hernandez, Easter, et al., (2014), who refer to the potential for changes in soil dynamics leading to invasive species propagation and water stress caused by the necessity to clean solar PV systems. The potential land change impacts of solar farms on biodiversity is discussed in Fthenakis et al (2011), who state that the land may be scraped to bare earth during a facility's construction, requiring a long time period to return to habitat of ecological value. **This article also refers to shadows cast by solar PV panels that have the potential to alter microclimatic conditions within a solar development.**' (author's bold).*

4 Conclusions

Anglesey County Council should adopt and collaborate with NRW's spatial action plan for the great crested newt in Anglesey. This collaboration should apply special attention to the development of solar farms since these have a large-scale impact on the habitat for great crested newts.

Anglesey County Council should adopt and incorporate NRW's FCS GIS areas into the JLDP document Appendix B Assessment of the potential for solar PV farms in Gwynedd and Ynys Môn.

The Welsh Government should ratify the status of the NRW spatial action plan for great crested newts in Anglesey with special reference to those areas marked for FCS.

Acknowledgements

I am grateful to Helen McDade, head of policy for the John Muir Trust, Dr John Constable of the Renewable Energy Foundation and Sally Sykes MSc, BA(Hons), Chart. PR, FCIPR, FIoD for reading and commenting on this paper.

About the Author

I attended Bangor University for a degree in Electronic Engineering (summa cum laude) and a Ph.D. in Conduction in Organic Solids between 1966 and 1972. I was awarded an MBA with the Open University in 1997. I worked locally in the generation industry at Wylfa, Dinorwig and Ffestiniog between 1975 and 2003.

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Appendix A JLDP GIS layer maps showing solar farm construction constraints

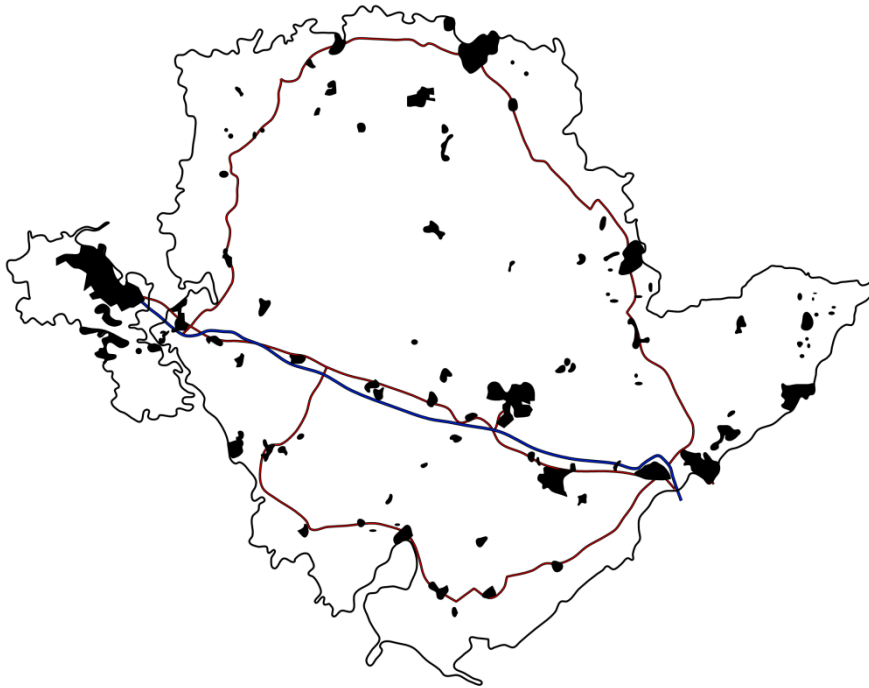


Figure A1 Map 2.2 housing and infrastructure

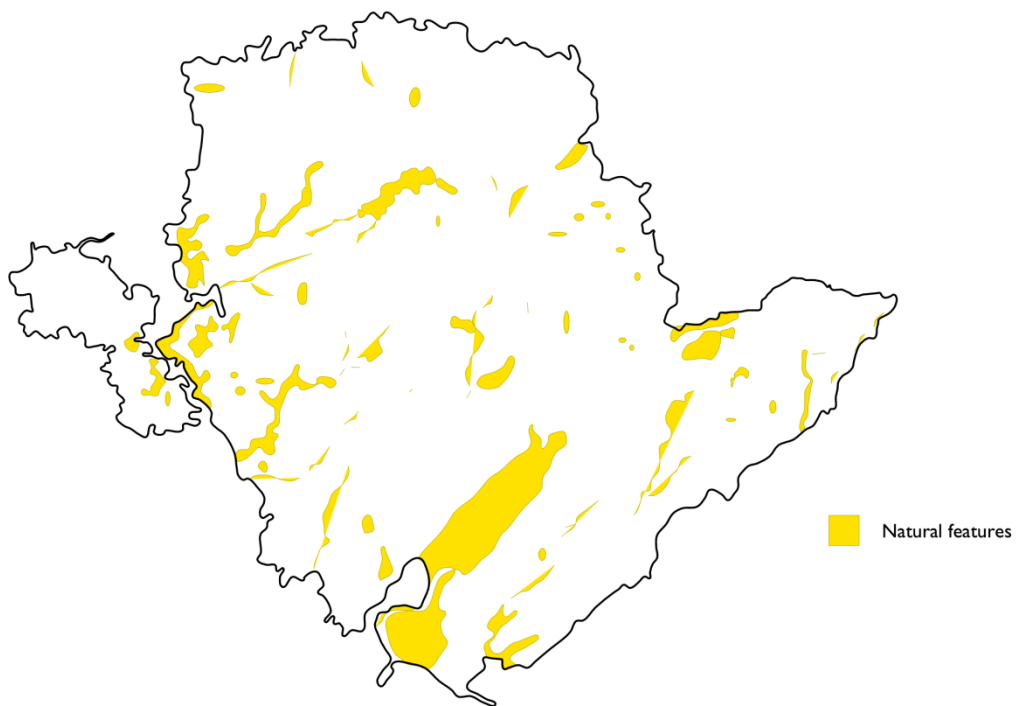


Figure A2 Map 2.3 Natural Features including surface water, woodland, and flood warning areas.

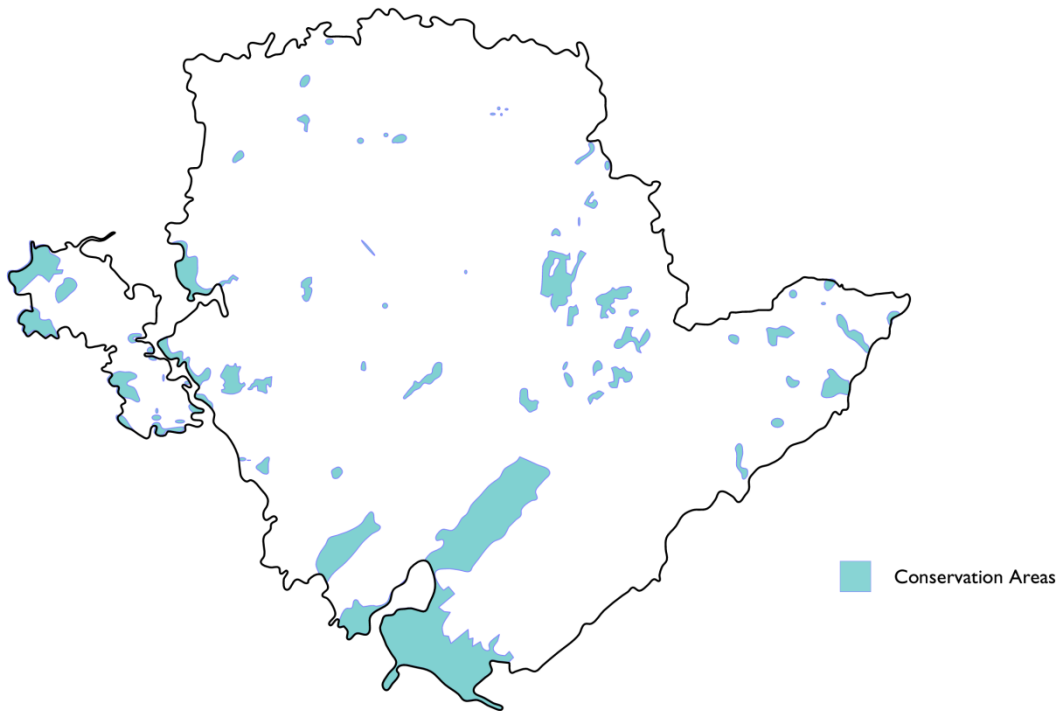


Figure A3 Map 2.4 Biodiversity and Geodiversity including international and local conservation sites and local nature reserves

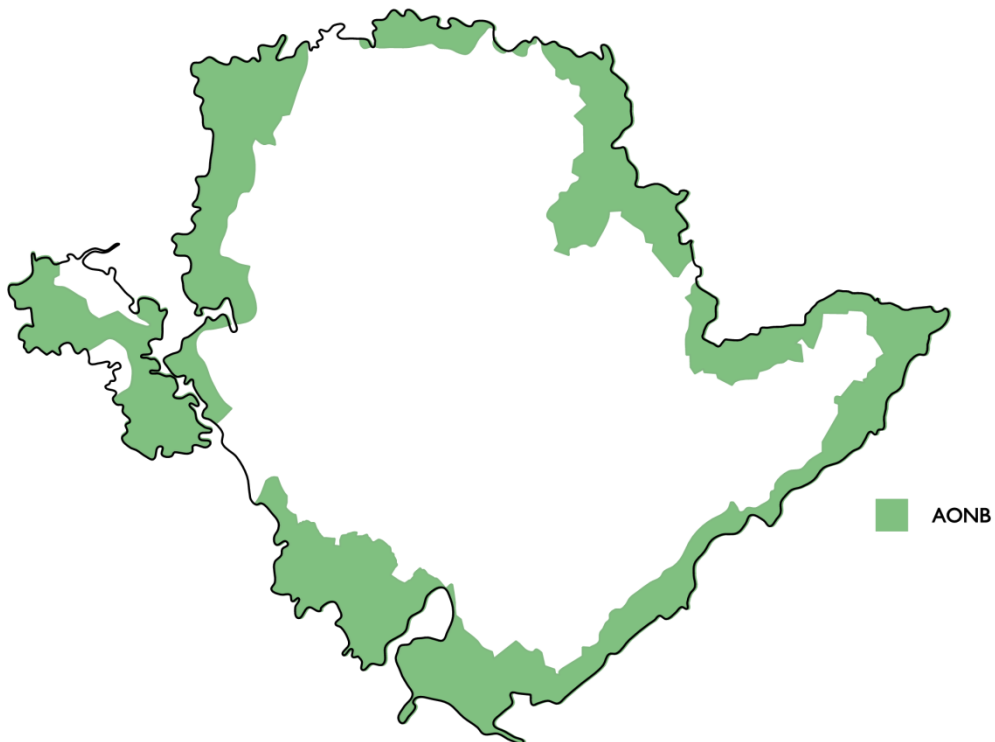


Figure A4 Map 2.5 Heritage and Landscape: the AONB

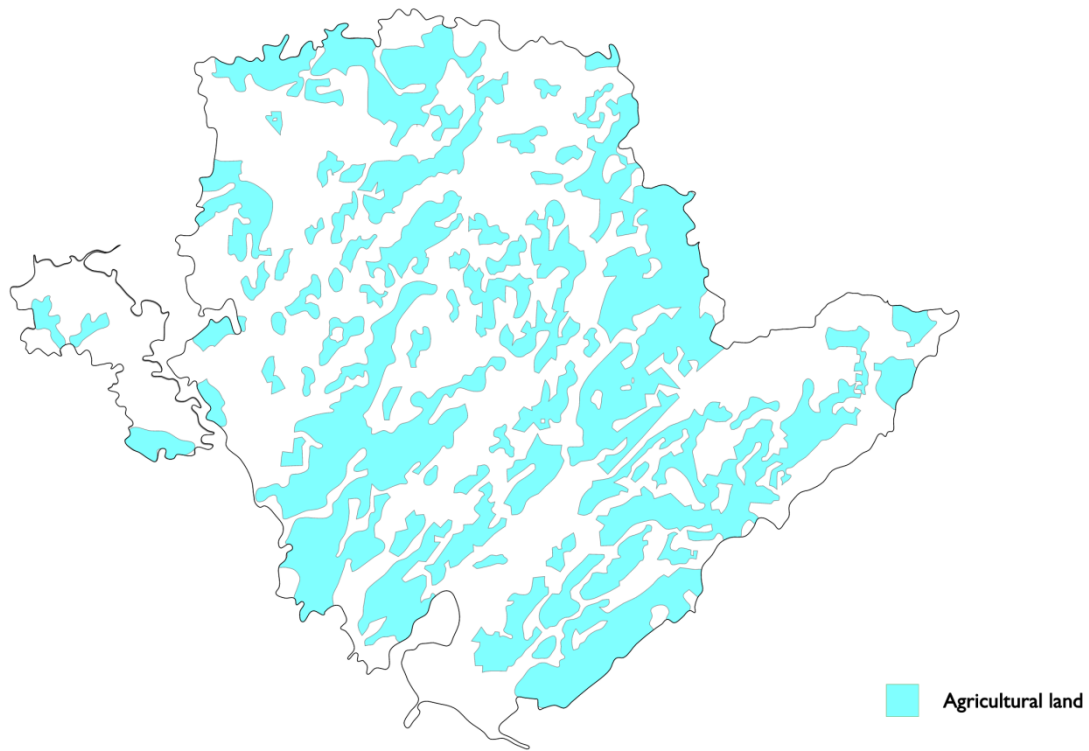


Figure A5 Map 2.7 Agricultural Land Classification grades 1, 2, and 3

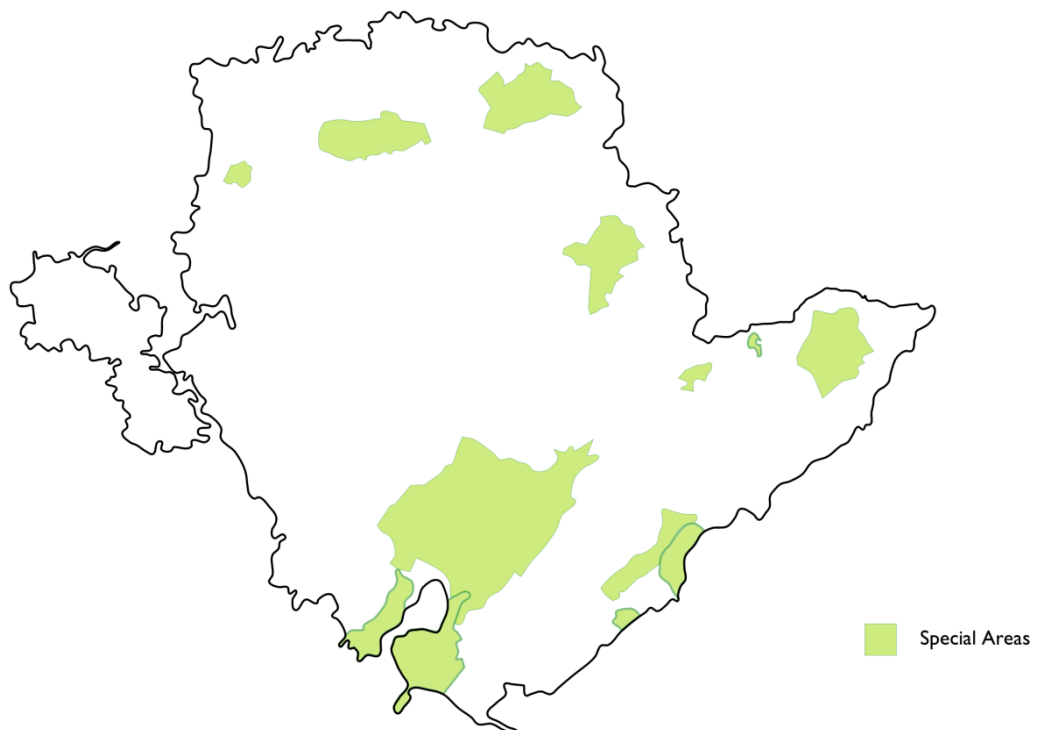


Figure A6 Map 2.8 Further Considerations: parks, special landscape areas, countryside and rights of way dedicated land.

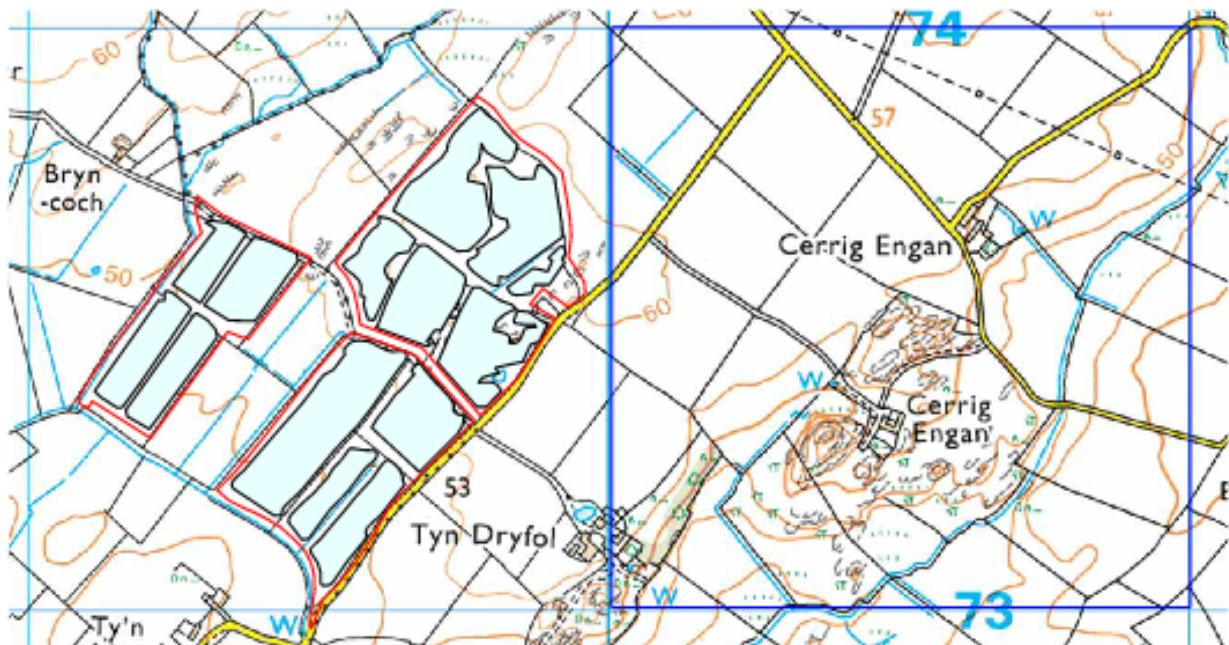
Appendix B Energy flows at existing solar farms

B.1 Bryn y Odin energy balance calculation



Using a vector graphics software package, the Google Earth and map images can be scaled to each other and the areas of solar park fields and panels determined as 29.44 and 20.44 hectares respectively.

Annual insolation is 975 kWh/m^2 , so each year the fields and panels receive 287 and 199 GWh respectively. This farm generates 14,672 MWh per annum at 11.2 % efficiency, removing 131 GWh from the land insolation budget. The annual insolation available for photosynthesis to the fields and beneath the panels is then 156 GWh and 68 GWh, equivalent to annual insolation rates of 530 and 333 kWh/m^2 .



B.2 Tai Moelion energy balance calculation



As before, the Google Earth and map images can be scaled together, and the areas of solar park fields and panels determined as 31.10 and 16.73 hectares respectively.

Annual insolation is 975 kWh/m^2 , so each year the fields and panels receive 303 and 163 GWh respectively. This farm generates 14,624 MWh per annum 11.5 % efficiency, removing 127 GWh from the land insolation budget. The annual insolation available for photosynthesis to the fields and beneath the panels is then 176 GWh and 36 GWh, equivalent to annual insolation rates of 565 and 215 kWh/m^2 .

