



# Town-scale Gravitational Water Vortex Power Plant at Llandysul 9/2/15



## Agenda

1. Introduction
2. Flood Risk Analysis
3. Impact on Dendrocryphaea  
Lamyana and Cornish  
Moneywort
4. Impact on Fish
5. Hydromorphology
6. Overriding public interest

## Attendees

Elin Jones, AM, Ceredigion

Mary Davies, PA to Elin

### *Cyfoeth Naturiol Cymru*

Ben Wilson, Operations Manager for Ceredigion

Daron Herbert, Area Natural Resources Planning Team Leader

Elizabeth James, Area Hydropower Account Manager

Alex Harding, Environmental Impacts Advisor

Jon Turner, Senior Conservation Officer

### *Llandysul a Phont Tyweli Ymlaen Cyf:*

Tom Cowcher, Chairman & Community Councillor

Lesley Parker, Company Secretary

Ann Jones, Community Officer

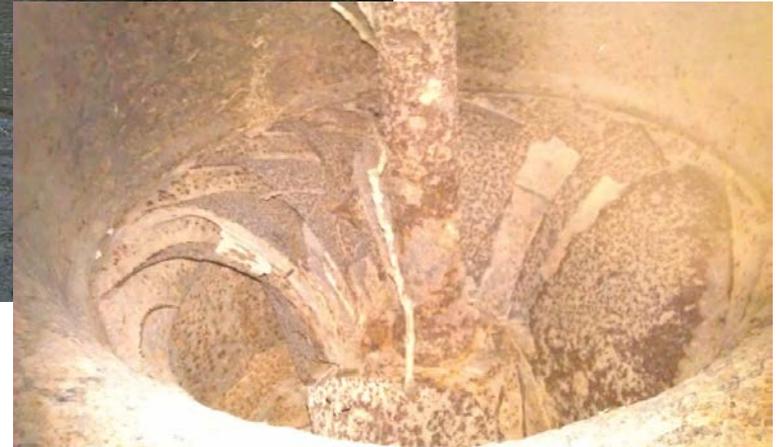
Peter Evans, County Councillor

Greg Parker, Volunteer

John Owen, Volunteer

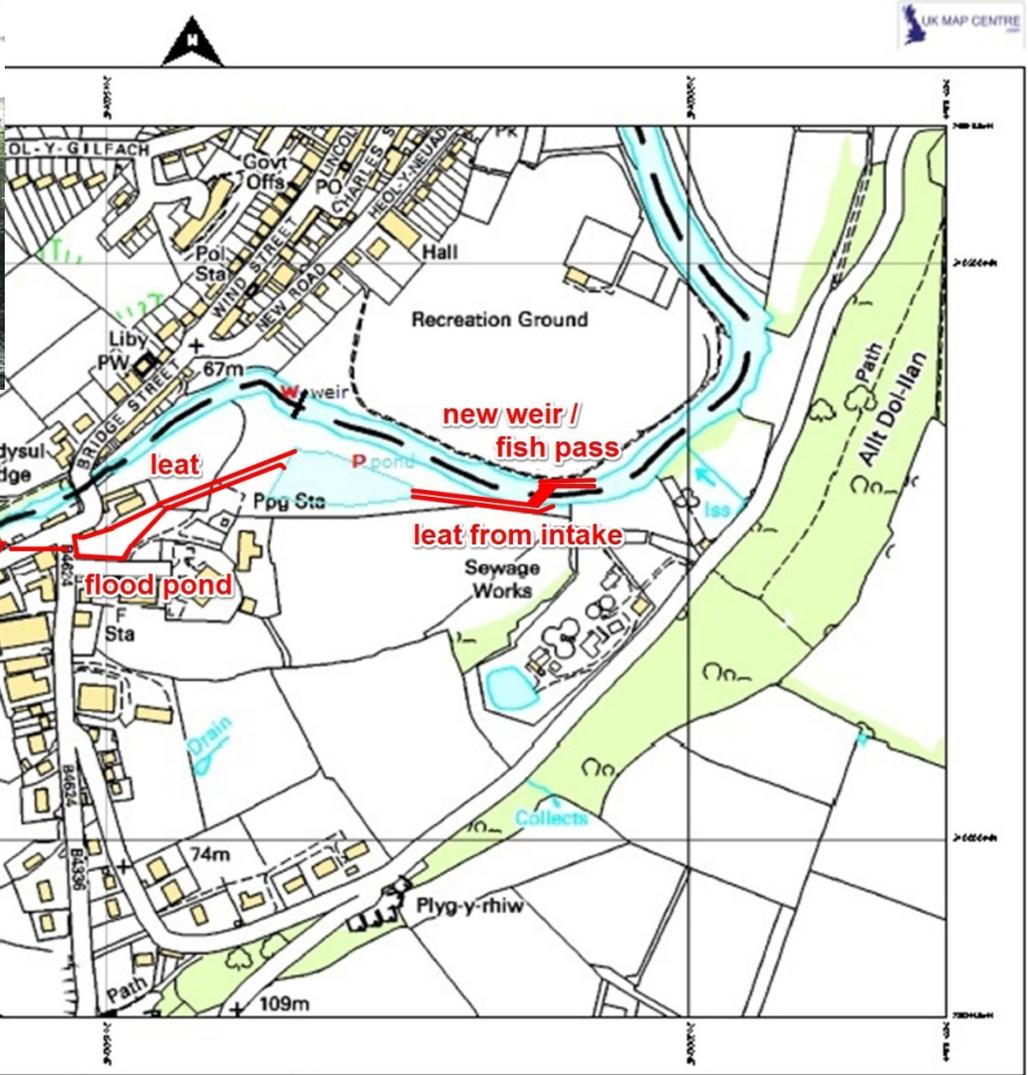
Andy Rowland, Manager, Ecodyfi, Ynni'r Fro

# Y Pwerdy/Powerhouse, Pont Tyweli

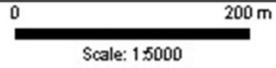


**1920 – 3 turbines 106kW peak**

# Options 1a (51kW) & 1b (100kW)



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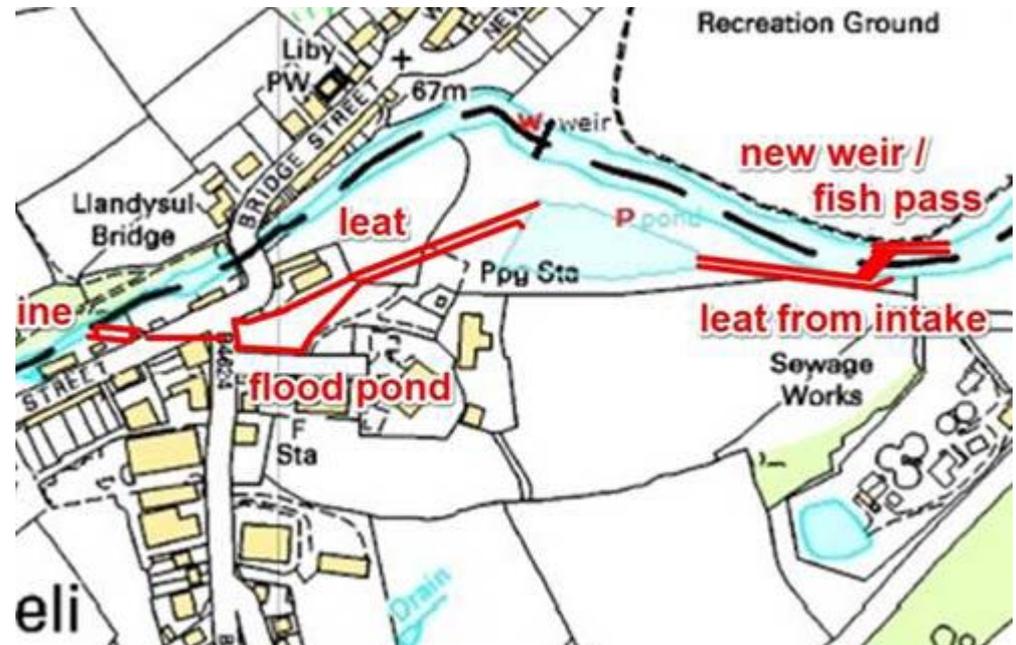
OPTION 1: layout plan, approx 1:5000 at A4

# Issues Raised by Natural Resources Wales

- Migratory fish – Salmon, Lamprey
- Rare moss - *Dendrocryphaea lamyana*
- Flooding risk analysis
- Impact on other SSSI species and features
- Hydromorphology
- Other water users – Anglers & Paddlers
- Abstraction & Impoundment Licence
- Too small to be over overriding public interest (140MWh/year – annual electricity consumption of 43 houses)

# NRW Issues – Reasons – “Depleted Reach”

- Migratory fish
- *Dendrocryphaea lamyana*
- Flooding risk analysis
- Impact on other SSSI species and features
- Hydromorphology
- Other water users
- Abstraction & Impoundment Licence



# Gravitational Water Vortex Power Plant

www.zotloeterer.com

## Positives

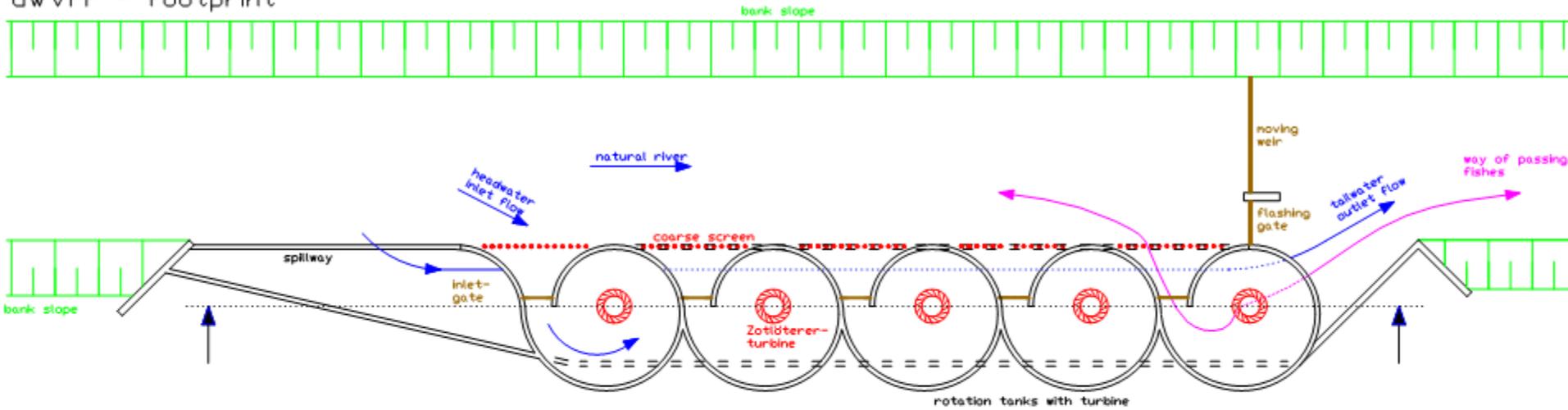
1. No depleted reach
  2. No impact on fish
- (<http://tinyurl.com/pwvafw7>)
3. No impact on moss
  4. No impact on flooding
  5. No abstraction



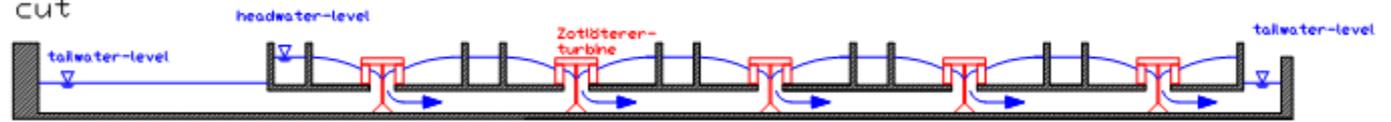
## Negatives

1. Visual Impact:  
up to 20 x 6m diameter 10kW tanks -> 200kW
2. Construction impact: 120m of bank disturbed.

### GWVPP - footprint

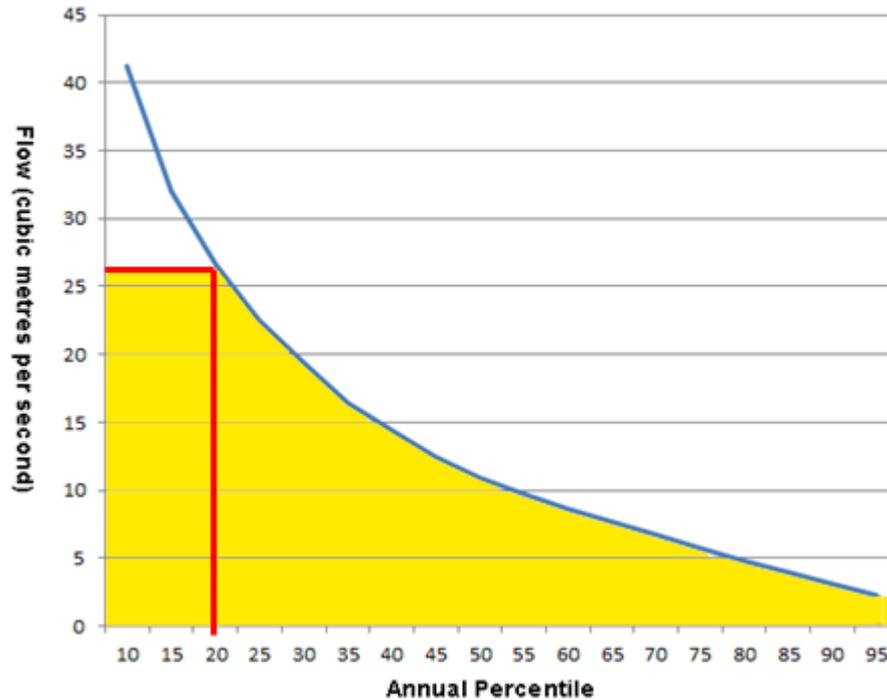


### GWVPP - longitudinal cut



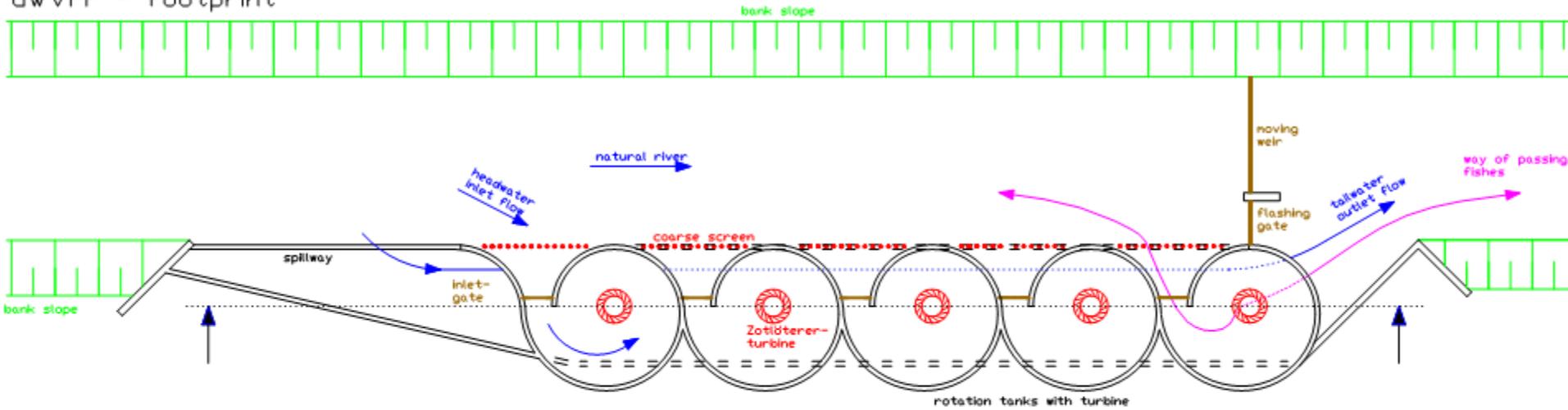
% of year	m <sup>3</sup> /s
0	229.770
1	93.696
5	57.420
10	41.221
15	32.008
20	26.635
25	22.520
30	19.438
35	16.462
40	14.403
45	12.460
50	10.930
55	9.732
60	8.683
65	7.660
70	6.770
75	5.710
80	4.810
85	4.025
90	3.160
95	2.329
99	1.669
100	1.361
Mean flow	17.826

**Flow Duration Curve**

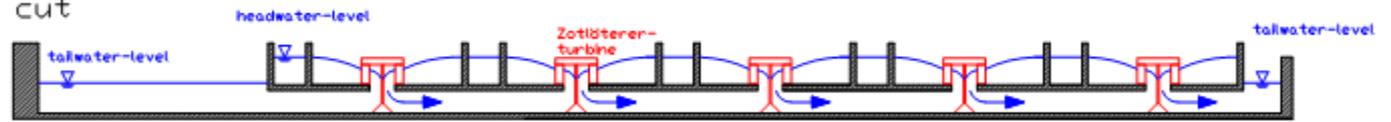


Each chamber passes up to 1.3m<sup>3</sup>/s. So with 20 tanks the full flow of the river (up to 26m<sup>3</sup>/s) will flow through the GWVPP for 80% of the year.

GWVPP - footprint



GWVPP - longitudinal cut

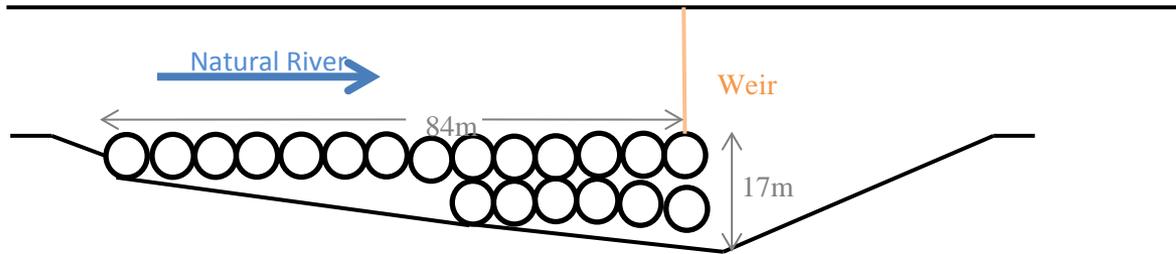


GWVPP exit speed limited to 1m/s.

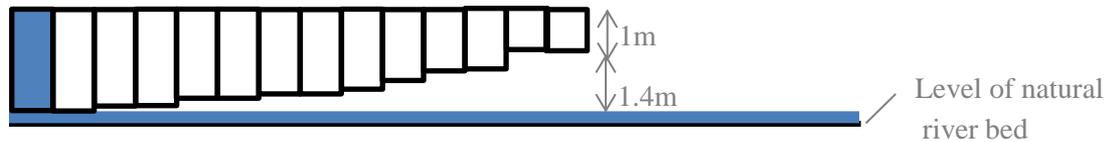
To take full flow of 26m<sup>3</sup>/s requires an exit area of 26m<sup>2</sup>.

If we have an exit channel width of 17m that gives a depth of approx. 1.5m

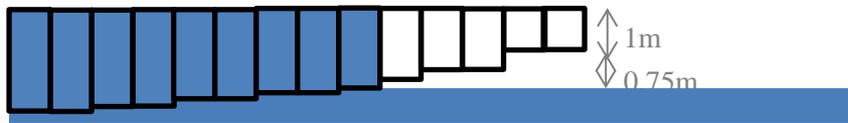
Plan view



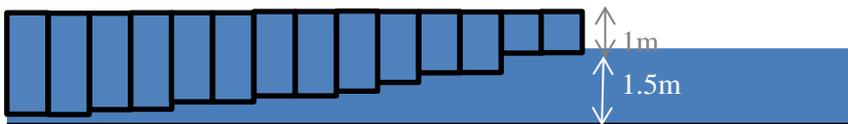
Longitudinal view – 1 chamber open – flow 1.3m<sup>3</sup>/s – water depth 0.1m



Longitudinal view – 10 chambers open – flow 13m<sup>3</sup>/s – water depth 0.75m



Longitudinal view – 20 chambers open – flow 26m<sup>3</sup>/s – water depth 1.5m



## Reasons for Project

- 1. Historical precedent:** Llandysul & Pont Tyweli originally powered by electricity from water turbines at Powerhouse (1920s-1940s).
- 2. Energy security:** UK's coal fired power stations closing. Huge demand on national grid. Local energy security is vital. The GWVPP provides 60% of the electricity requirements of Llandysul Town for 100+ years of energy security.
- 3. Energy policy:** UK law to provide 15% of all energy by renewables by 2020 (currently only 5%). (40% reduction in CO<sub>2</sub> by 2020, 95% by 2050)
- 4. Alternatives:** Hydro is better alternative than wind, nuclear power and gas fracking.
- 5. Community benefit:** Local project, not a large foreign company. Income for local investors. All have a chance to be involved. No minimum investment. £1.2m investment potential at 8% annual return.
- 6. Community fund** for local projects up to £30,000 per year.
- 7. Community Energy Supply Company:** Sell electricity direct to members.
- 8. Teifi Valley Local Growth Zone:** Recommendation 11: Energy and the Environment (key sector)
- 9. Environment:** Reduces CO<sub>2</sub> so improves environment and reduces climate change.

## Overriding Public Benefit

1. Llandysul GWVPP project will be an exemplar of new technology not yet used in the UK.
2. If we can prove through this exemplar project that the GWVPP poses no significant negative impact on the river environment then it opens the way for thousands of small plants across the UK's rivers in the same way we had thousands of water wheels not so long ago.
3. Potential to provide up to 50% of Wales' total electricity generation\*.
4. It will provide 100+ years of energy security for the UK.
5. This will make a significant impact towards reducing climate change. And it is climate change that is the biggest single threat to the environment and public not just in the UK but globally\*\*.

\* Policy Paper on Energy Policy in Wales, Welsh Liberal Democrats Spring Conference 2014: "13TWh/year estimated physical resource for UK hydro if it can be tapped" – using the GWVPP makes this much more possible than conventional hydro methods. Currently 27TWh/year is generated in Wales (2TWh of which is from renewable sources), so this has the capacity for replacing 50% of Wales' non-renewable electricity generation with hydro power.

\*\*Natural Resources Minister Carl Sargeant 21/10/14: "The science tells us that not only is climate change happening, but that we only have a generation in which to act. The severe weather we saw last winter is a further reminder of the very real impacts we face and the longer we wait, the more it will cost. By tackling climate change now it can help us to not only become more efficient and resilient, but to build a more prosperous, secure future. As a government our focus is on ensuring that we put in place the key foundations to support people to take action, for the benefit of our generation and those to follow."

*“While we agree that this innovative technology has prospective uses and could be investigated further, a more suitable site should be identified for the first trial in Britain of this technology. A suitable location should avoid main rivers and designated conservation sites. From our understanding of the existing operating schemes they are sited on canals and leats supplied from a main river and not in the main river channel itself.”*

*Elizabeth James briefing note to Elin Jones*

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*Elizabeth James briefing note to Elin Jones*

To generate a significant amount energy to make a significant improvement to the environment requires a large volume of water e.g. 10m<sup>3</sup>/s. This by definition means major rivers must be used.

Are there any that are not protected?

SACs (in green on map):

River Teifi, River Tywi, Cleddau Rivers,

River Dee and Bala Lake, River Usk, River Wye.

[http://jncc.defra.gov.uk/ProtectedSites/SACselection/SAC\\_list.asp?Country=W](http://jncc.defra.gov.uk/ProtectedSites/SACselection/SAC_list.asp?Country=W)



## Zotloeterer Installations on Major Natural Rivers

12kW-GWVPP on AYUNG River in Ubud (Bali/Indonesia)



4kW-GWVPP on HILLE River in Winterberg (Germany)



8kW(2x4kW)-GWVPP on HILLE River in Niedersfeld (Germany)



6kW(2x 3kW)-GWVPP on WIMITZ River in Wimitz (Austria)



**Swiss-Indian enterprise to launch 1,000 GWVPP in India - SRF Schweiz Aktuell**

<http://www.swissinfo.ch/eng/multimedia/swiss-hydro-technology-exported-to-india/40528326?rss=true>

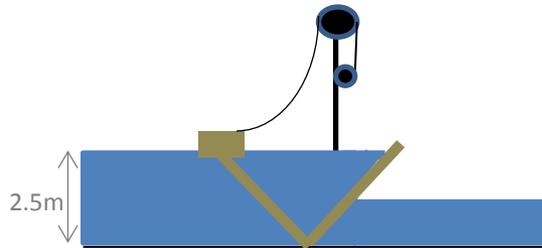
<https://www.youtube.com/watch?v=D5r6hoi4tPo>

## Flooding Risk Analysis

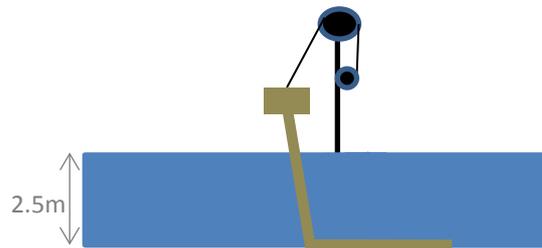
1. The weir is movable.
2. Once the weir is opened the river channel is exactly the same as it was before installation of the GWVPP.
3. Therefore it cannot have any impact on flooding.
4. What if weir fails to open?
5. Is it possible to have a fail-*safe* weir?

# Fail-safe weir

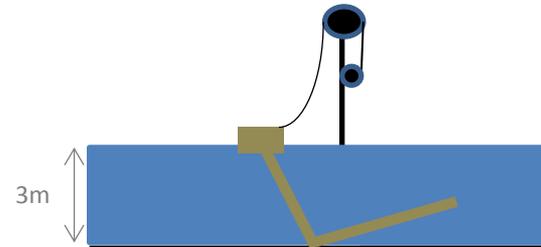
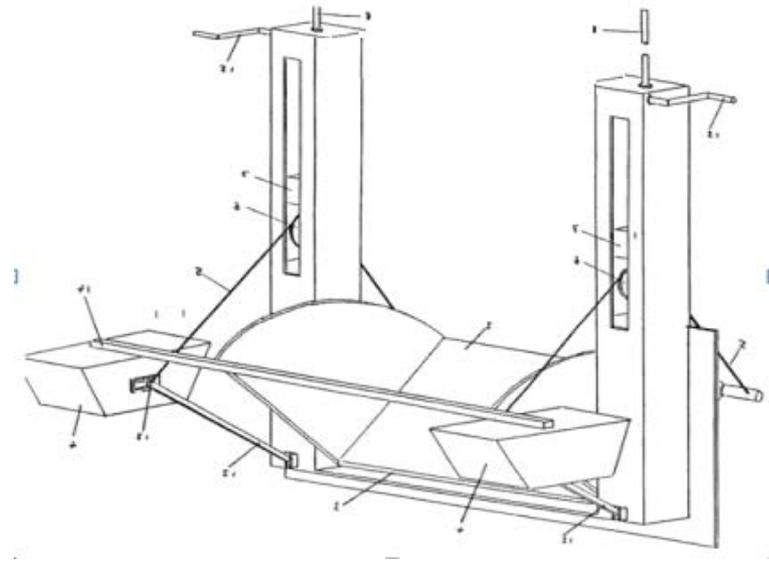
## Counterbalance Float Weir



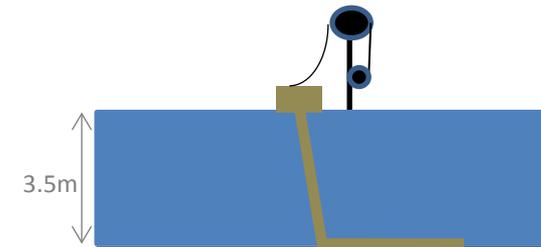
Standard Operation



Emergency Open –  
Motorised/Hand Operated Winch



Motorised/Hand Operated Winch Fails  
Weir Partially Open by Floats



Motorised/Hand Operated Winch Fails  
Weir Fully Open by Floats

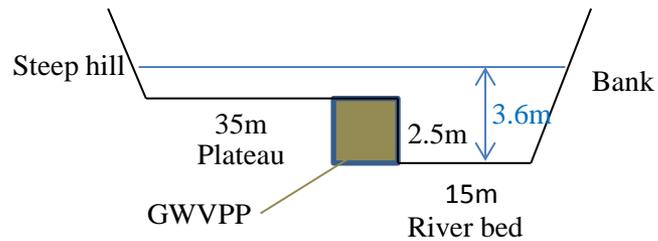
# Flooding Risk Analysis

Maximum flow ever recorded  $230\text{m}^3/\text{s}$

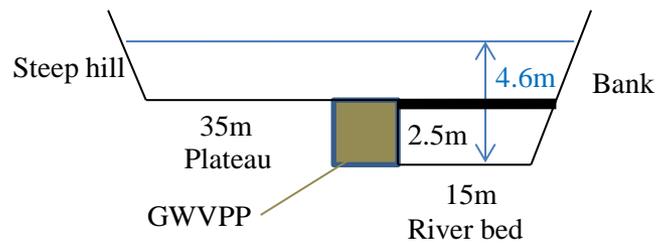
Assume conservative average speed of river flow  $3\text{m}/\text{s}$

Cross Sectional Area Required for flow  $76\text{m}^2$

*Weir Open*



*Weir Closed*

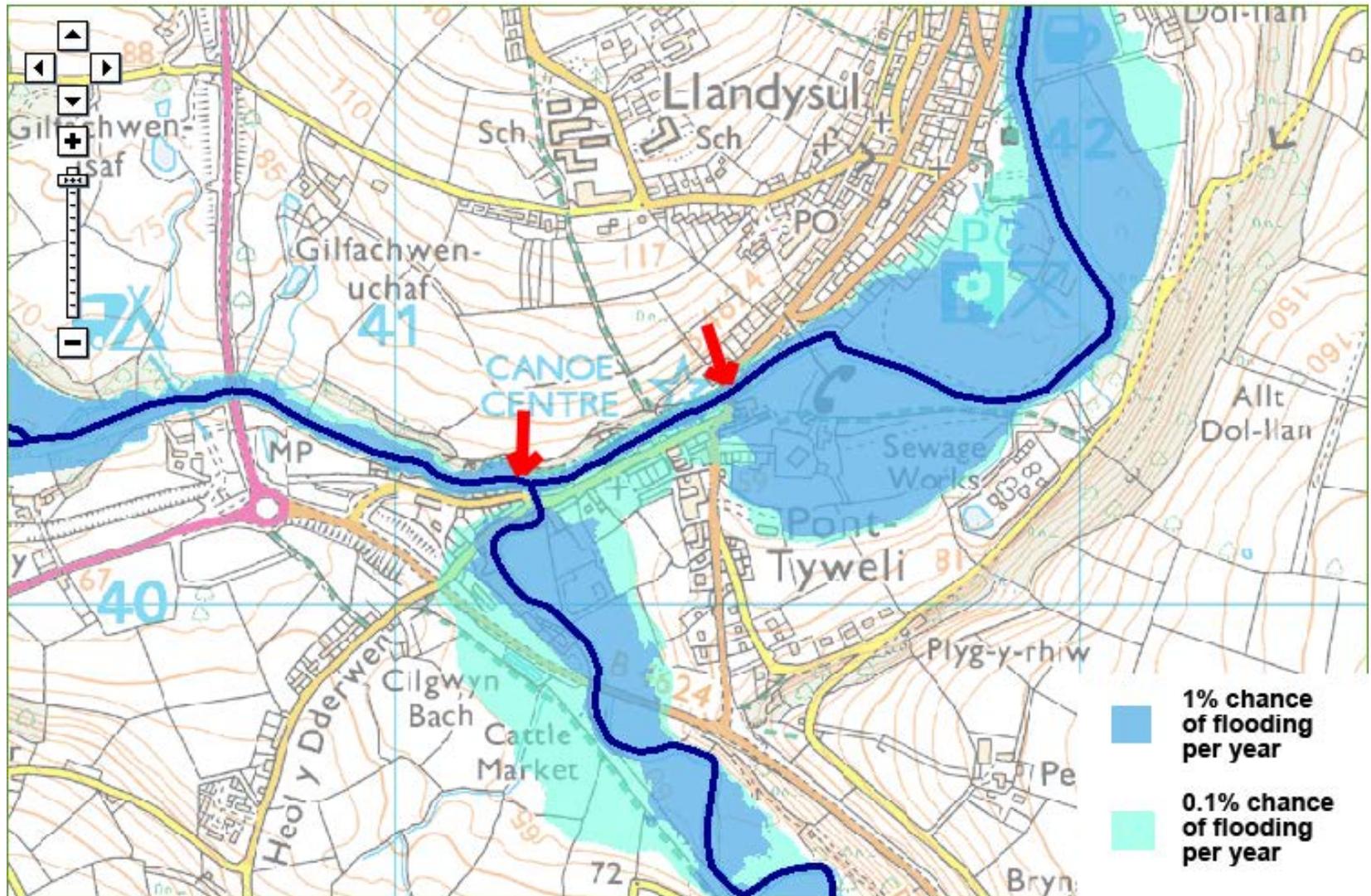


-> Increase in water height 1m

# Impact area of 1m increase in water height



# Environment Agency Flood Map



## Pinch Points

### Llandysul Bridge - Teifi

Approx 5m top of arch to bed of river  
18m wide  
Plus 2x 0.9m diameter holes  
Total area: 56m<sup>2</sup>  
Maximum bridge can pass at 3m/s =  
168m<sup>3</sup>/s  
Maximum flow 230m<sup>3</sup>/s  
-> 30% of flow is bypassing the bridge.



### Tyweli Bridge

Approx 4m top of arch to bed of river  
6m wide  
Total area: 20m<sup>2</sup>  
Maximum bridge can pass at 3m/s =  
60m<sup>3</sup>/s  
No figures for maximum flow.



## Flooding Risk Analysis - Summary

1. Weir automatically opens so there is no impact on flooding.
2. Weir is *fail-safe* – so will always open.
3. In the event of terrorist attack welding up the weir, there is still no impact on property.

## Flooding Risk Analysis – NRW Reply

1. Don't believe weir is fail-safe. But none of the NRW attendees had an engineering background so did not understand the mechanics.
2. Must have a very expensive Flood Consequence Assessment with full hydraulic model. Or all at risk must sign to agree to the risk.
3. No flood expert was present so no one was able to explain why Greg's Flood Consequence Assessment was not sufficient. Only suggestion was redraw the flood map with the 1m raised section. In our case you would not be able to see the difference as the hillside is so steep in the affected area.

Further attempt at simple explanation:

If I applied for planning for a weir in Cardigan would you ask me for a Flood Consequence Assessment for Llandysul?

I hope after some thought you would say no.

But why? Because it's pretty damn obvious that adding a weir in Cardigan will have no effect on flooding in Llandysul.

But why? Because Cardigan is 20 miles from Llandysul.

OK. But that's not the reason. There could be an effect from 20 miles downriver. But there isn't in this case because the Teifi in Llandysul is 55m higher than the Teifi in Cardigan and we are only raising the water level by 1m in Cardigan so it cannot have any effect.

In the case of our GWVPP site, our weir is 1.2m below the exit point from the Tyweli to the Teifi which is where the flooding risk occurs. If we block that exit further there is an increased risk. However, we are only raising the water by 1m in an absolute worst case scenario. So we are below the level at which any risk could occur. Admittedly it's only 20cm. But I have shown that using the same speed assumptions, that much flow cannot fit through the Llandysul bridge in the first place, so that much flow will not be in the channel so the height difference at the weir reduces to 0.4m so we have 0.8m allowance – plenty to demonstrate it can have no effect.

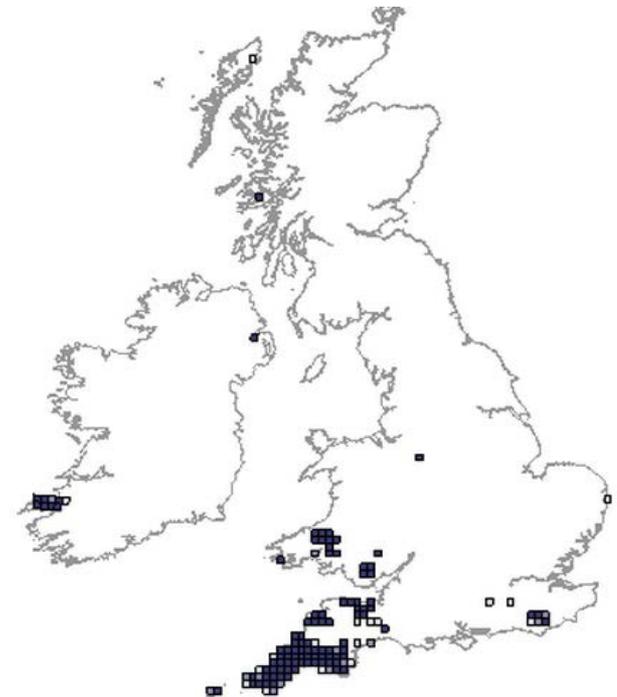
## ***Sibthorpia europaea* (Cornish Moneywort)**

### **Online Atlas of the British and Irish Flora**

<http://www.brc.ac.uk/plantatlas/index.php?q=node/1846>

This inconspicuous plant has not decreased markedly in range or abundance, although it may have declined locally where roadside streams have been piped. It has only recently been found in Monmouthshire (1990) and Dorset (1992) and may be overlooked at other sites on the fringe of its range.

It occurs in western Europe from the Azores, Spain and Portugal to south-western Ireland and Wales. It also occurs in Greece (Mt Pelion), Crete and in the mountains of tropical Africa.

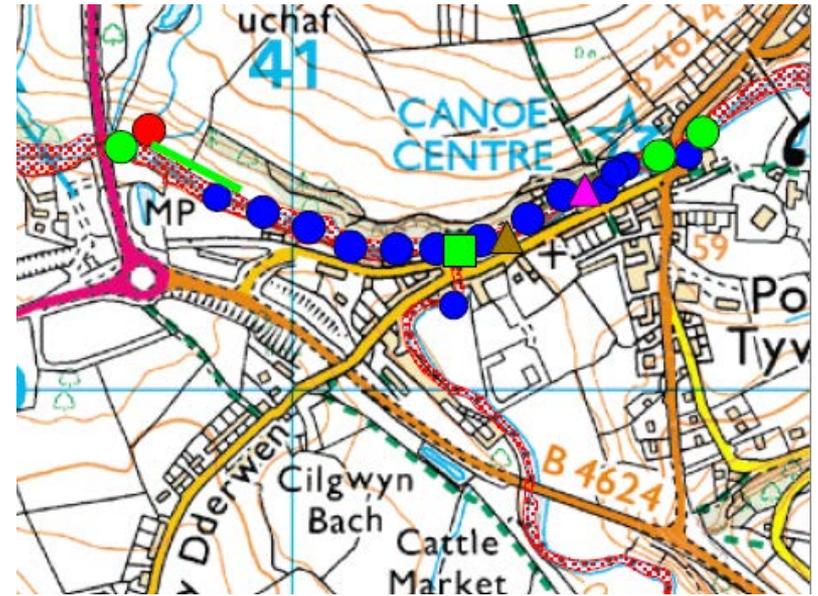


# Sibthorpia europaea (Cornish Moneywort)

## NRW's distribution map of protected species

Red dot - Cornish Moneywort

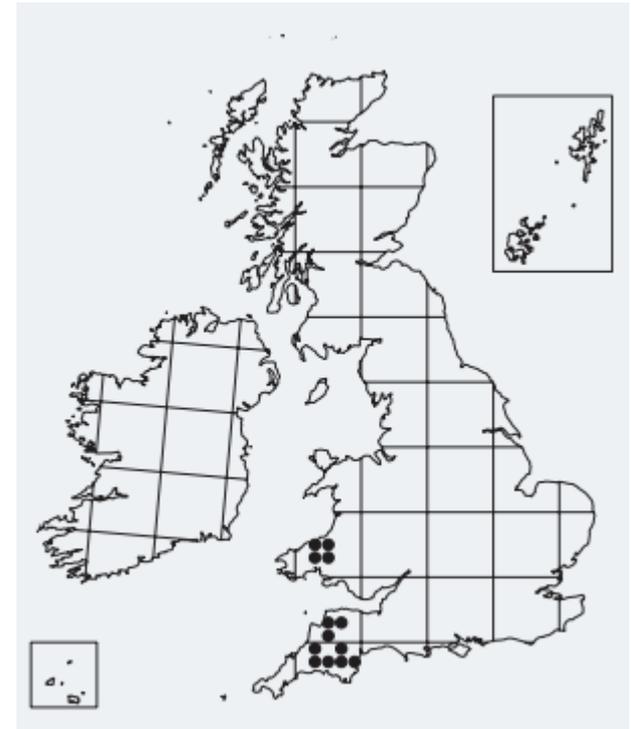
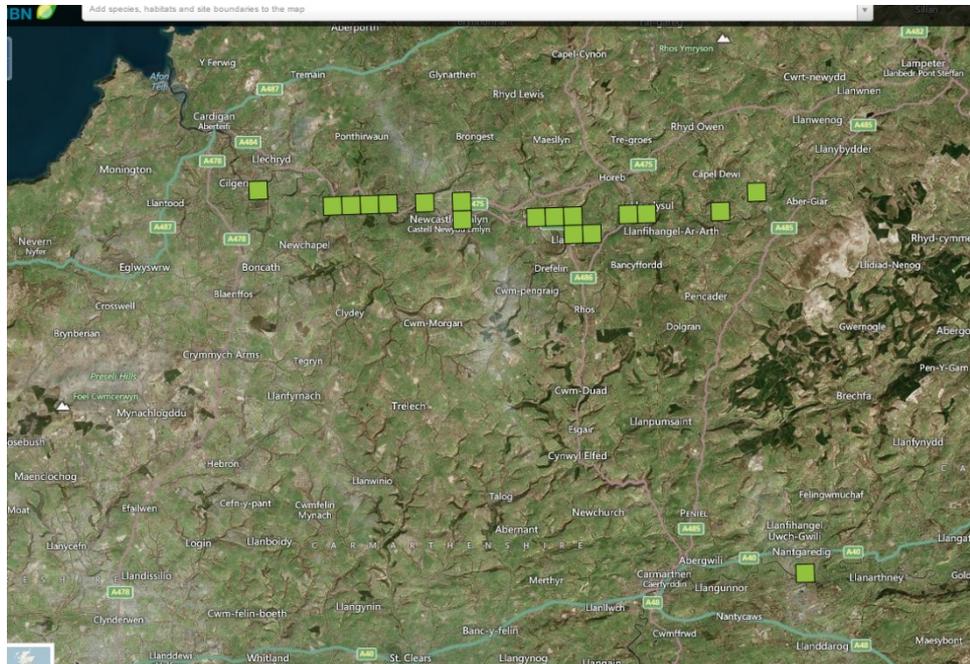
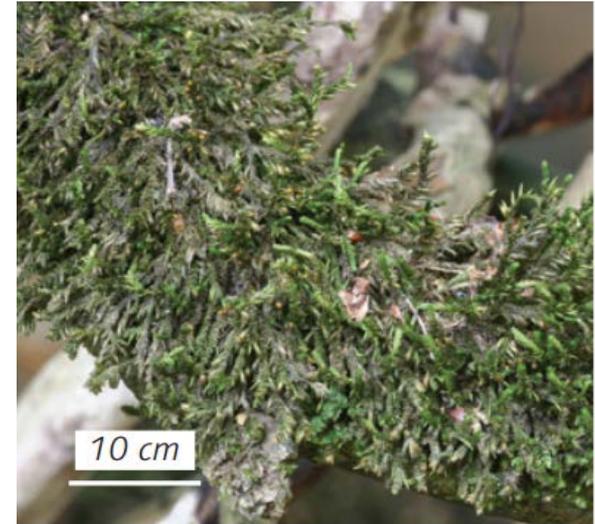
GWVPP proposed to be moved up river to avoid damaging population.



# *Dendrocryphaea Lamyana*

[http://www.bbsfieldguide.org.uk/sites/default/files/pdfs/mosses/Dendrocryphaea\\_lamyana.pdf](http://www.bbsfieldguide.org.uk/sites/default/files/pdfs/mosses/Dendrocryphaea_lamyana.pdf)

*D. lamyana* grows only on rocks and trees by the side of large rivers in south-west England and south-west Wales. It occurs above the normal water level, but in a zone which is frequently flooded.



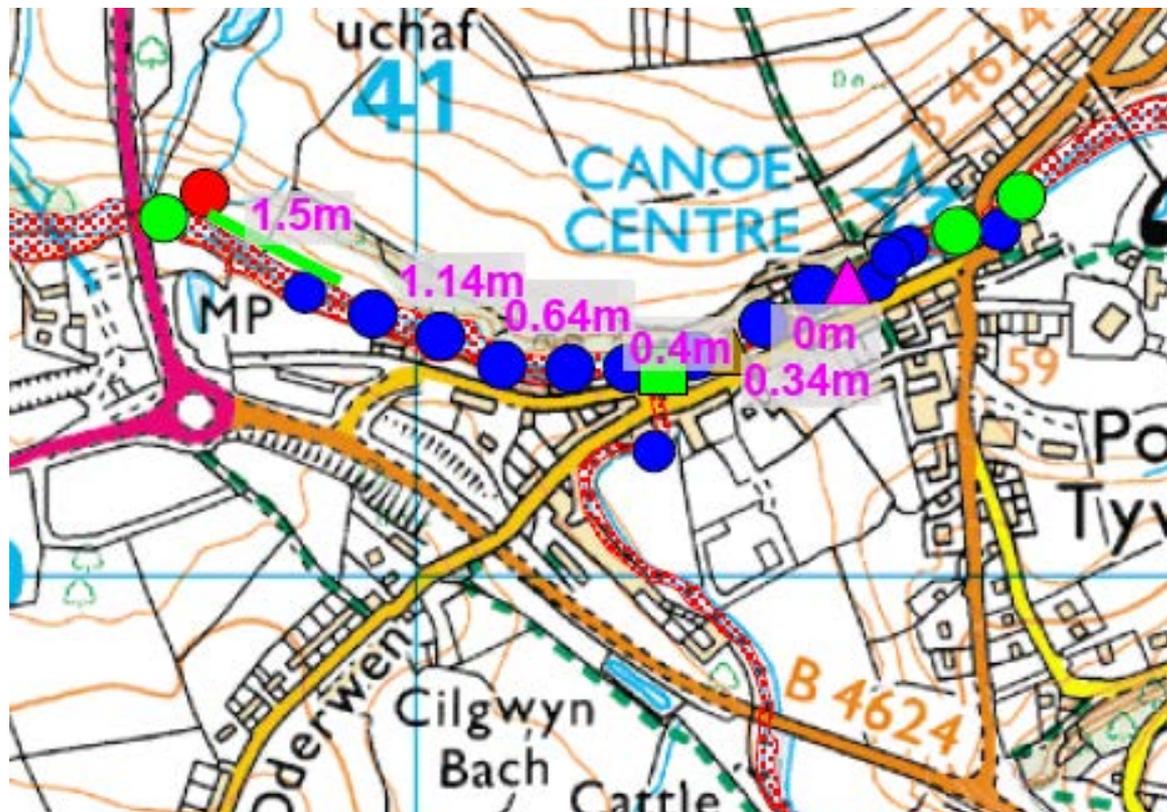
## *Dendrocryphaea Lamyana*

### NRW's distribution map of protected species

Blue dot – *Dendrocryphaea Lamyana*

Possible construction impact on first dot on left –

Possibly not if we double up the tanks width-wise 120m bank length -> 84m.



## *Dendrocryphaea Lamyana*

### **Second blue dot on map**

River levels raised by 1.5m may cover some specimens.

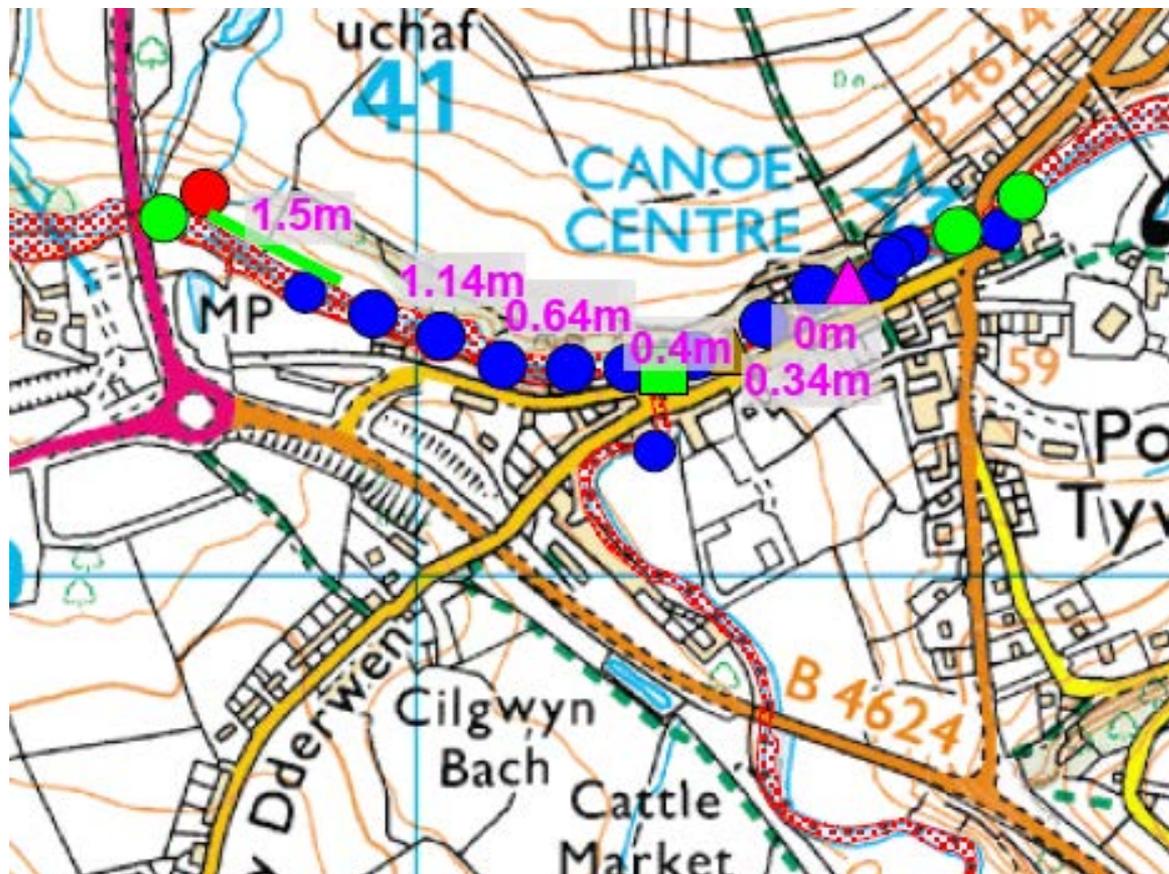
However, *Dendrocryphaea Lamyana* coverage extends to well above 1.5m so much of colony will survive.



## *Dendrocryphaea Lamyana*

From third blue dot onwards up river the banks are much higher and the water is raised less: 0.6m and less.

-> Less impact



## Impact on Dendrocryphaea Lamyana and Cornish Moneywort - Summary

1. Cornish Moneywort – No impact.

2. Dendrocryphaea Lamyana –

Possible impact on 1 out of 14 sites in close vicinity which in itself is only 1 site in 17 along the Teifi (perhaps 0.4% of population).

This will not have a significant effect on the overall population of the protected species in the area.

Feedback from Jon Turner:

Only 2 of the sites on the Teifi (Llandysul & Cenarth) have sustainable populations. So the percentage affected is 1 out of 14 in this close vicinity then this is 1 of 2 sites = 4% affected on the Teifi.

# Impact on *Dendrocryphaea Lamyana* and Cornish Moneywort - Statute

*Habitats Directive –*

*Article 6(2):*

Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be **significant** in relation to the objectives of this Directive.

*Article 2:*

1. The aim of this Directive shall be to contribute towards ensuring bio-diversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies.
2. Measures taken pursuant to this Directive shall be designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest.
3. Measures taken pursuant to this Directive shall take account of economic, social and cultural requirements and regional and local characteristics.

*conservation status of a species* means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the territory referred to in Article 2; The *conservation status* will be taken as 'favourable' when:

- 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, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis;

## Impact on *Dendrocryphaea Lamyana* and Cornish Moneywort - Exemptions

*Habitats Directive - Article 16:*

1. Provided that there is no satisfactory alternative and the derogation is not detrimental to the maintenance of the populations of the species concerned at a favourable conservation status in their natural range, Member States may derogate from the provisions of Articles 12, 13, 14 and 15 (a) and (b):

**(a) in the interest of protecting wild fauna and flora and conserving natural habitats;**

(b) to prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property;

(c) in the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment;

(d) for the purpose of research and education, of repopulating and reintroducing these species and for the breedings operations necessary for these purposes, including the artificial propagation of plants;

(e) to allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of certain specimens of the species listed in Annex IV in limited numbers specified by the competent national authorities.

## Impact on Dendrocryphaea Lamyana and Cornish Moneywort – NRW Reply

1. There is no specific embargo on development in an SSSI. The impact on protected species must be analysed. If there was plenty of a particular species then they would not be too concerned.
2. Main sites for Dendrocryphaea Lamyana are Cenarth & Llandysul – not evenly spread over the 17 sites on Teifi. So the percentage affected increases – to 4% on the Teifi.
3. Will need to survey and analyse exactly how much of each Dendrocryphaea Lamyana patch is affected.
4. If 50% of a species was lost then that would be a major significance and not approved. If less would be affected you would still need to jump through some hoops to get approval, but it is possible.
5. The Habitats directive applying is for the site as a whole so need to refer to Directives 6(3) and 6(4) – but the are similar requirements. But they haven't done a derogation of 6(3) before so unsure exactly what is required.
6. With SSSI it is more difficult as there are no directives of what we want to achieve.
7. We suggested adding rocks & trees at the sites at the new water level to give the moss a chance to establish further (other species may colonise first, must these could be weeded out). But the habitable range (from high to low water will be decreased).

## Impact on Fish

1. What is “Natural”?
2. Cenarth Falls formed an impassable barrier for migratory fish until it was blown up in 1867 by the Teifi board of “Conservators”.

A Flyfisher’s Guide to the Teifi Valley, Pat O’Reilly

3. So it is not natural for migratory fish to be up river of Cenarth, in the Llandysul part of the Teifi and perhaps the migratory fish have damaged the ecosystem for the native fish in the area.
4. Why class “natural” as of an arbitrary point in time at which some legislation was written – why not as of 150 years ago and remove all migratory fish?

## Impact on Fish

1. Have the number of obstructions and weirs in the Teifi *decreased* over the last 50 years?

## Impact on Fish

2. Have the number of fish in the river *decreased* over the last 50 years?

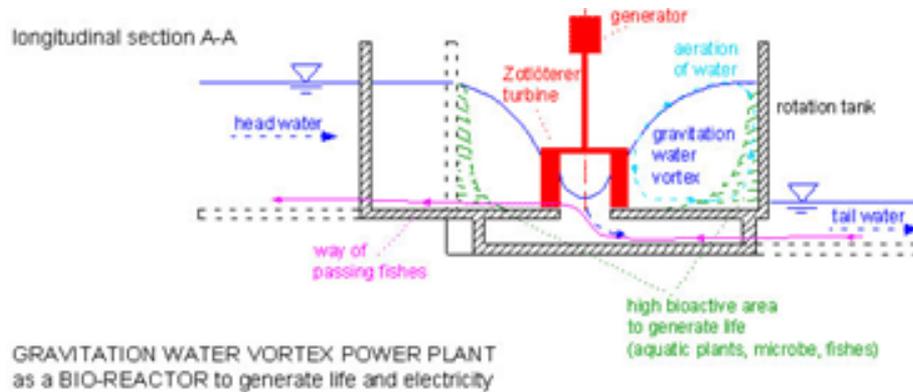
## Impact on Fish

1. Have the number of obstructions and weirs in the Teifi *decreased* over the last 50 years? *Yes*.
2. Have the number of fish in the river *decreased* over the last 50 years? *Yes*.
3. Therefore you cannot argue that obstructions and weirs *as such* are bad for fish, because removing the obstructions should cause fish numbers to increase, but it hasn't.
4. In fact the statistics show that increasing the number of obstructions increases the number of fish.
5. This could make sense – obstructions cause areas of slow moving water where insects can breed more easily so producing more food for fish. And providing quieter areas for spawning away from the main current.
6. So why not go back to the 1945 situation with the weir in Llandysul parks, and the Powerhouse with its hugely fish un-friendly turbine? The fish survived the weir and the turbine – in fact they prospered as there were many more fish in the river then. The weir did not have a negative impact on the fish.

## **Impact on Fish – Gravitational Water Vortex Power Plant**

1. There is no depleted reach so no part of the river has less flow than natural flows. So there are no non-natural restrictions to swimming.
2. Conventional Hydro Electric Plants need a fish ladder to help fish swim up river past the obstruction. The GWVPP is completely open to fish and forms no barrier.

## Gravitational Water Vortex – Compared to a vertical slot fish ladder



1. Fish easily find entry to GWV as ALL water passes through GWV unlike traditional fish passes which only has a small part of the flow, so confuses the fish.



2. GWV is a bio-reactor generating microbes which are food for fish, which lure them into the tank so they can pass freely. These also act as an additional food source, and clean the water.

## Gravitational Water Vortex – Compared to a vertical slot fish ladder

3. Maximum speed of water is lower than 1m/s. While a traditional fish ladder can be up to 1.8m/s.
4. The power density is 120W/m<sup>3</sup> as opposed to 150W/m<sup>3</sup> for fish ladder.
5. The entry speed to the GWV is less than 0.5m/s so there is no danger to fish at all.
6. Fish can pass both up and down stream. Fish ladder only works up stream.
7. Fish only have to traverse a single GWV tank (we have 20 tanks, but the fish can chose any of them and pass through freely directly to the main river). With fish ladder there could be 20 or more basins and doorways that have to be traversed.
8. The GWV needs no additional fish ladder so there is no additional building required.
9. The GWV aerates the water so improving the quality.

## **Impact on Fish – Gravitational Water Vortex Power Plant**

“Study of fish migration through the gravitation water vortex power plant at the Klängen-Obergrafendorfer-Canal in Obergrafendorf in Lower Austria.”

### **Conclusion:**

The present study shows that in a very short period (only 6 days) of observation more than 30% of fish, which were caught for the fish-monitoring in the Pielach River, migrate upstream through the Zotlöterer-Turbine of the testing gravitation water vortex hydro power plant at the Klängen-Obergrafendorfer-Canal.

## Impact on Fish – Weir

1. The best areas for fishing on the Teifi are where there are deep pools.

A Flyfisher's Guide to the Teifi Valley, Pat O'Reilly

2. Presumably because there is always plenty of water even in low flow conditions of the river. The pools are protected from the main current so make ideal spawning grounds.
3. The weir will create a 120m stretch of river that is always at least 1.5m deep no matter how low the flow. Some areas will be sheltered from the main flow, making ideal insect breeding grounds, providing food for fish.
4. This could create the ideal fish nursery.

## **Impact on Fish – Conclusion**

1. The GWVPP and Weir combination poses no negative effect on fish movement up or down river.
2. The increased stable depth of the 120m stretch of river may improve spawning conditions and make it more likely more fish will survive.
3. Possibly increased fish food generated in the GWVPP and by the weir.
4. -> Overall impact: Benefit

## Impact on Fish – NRW Reply

1. Very interested in potential of this new technology and would be keen to see how fish really do respond.
2. The fish study was not using fish in the Teifi.
3. Must have a fish study on Teifi migratory fish, but unable to do that on the main Teifi. But would allow at a site of smaller catchment with a smaller scale trial.
4. Would not suggest an alternative site.
5. “Precautionary principle” is place – need to prove no impact beyond scientific doubt.
6. The Core management plan is the benchmark for what is impact.
7. The legislation is there to allow development if there is no significant negative impact.

## Hydromorphology

1. Hydromorphology: “the physical characteristics of the shape, boundaries and content of a water body”.
2. This is affected by the erosion caused by sediment, gravels and cobbles which pass through the river. NRW guidance: not to interfere with the natural erosion process.
3. The channel at this site is hard bedrock so the scheme does not raise a concern of erosion or mobilisation of sediment within the river either in construction or operation.
4. Unlike most hydro-electric plants, sediment, gravel and small cobbles will pass through the GWVPP without problem as the GWVPP is simply an open channel, so there will be no effect on the morphology of the river further downstream.
5. Larger stones and debris carried down river at times of flood may be stopped at the weir. The weir is movable and can be periodically lowered to allow free transit of the larger material down river.
6. The exit from the GWVPP is at a straight part of the river, with a wide plateau of hard bedrock and banks. Additionally the exit speed of the GWVPP is designed to be a low 1m/s so there is no reason to expect a significant change in the pattern of erosion and movement of the river in the area compared to the GWVPP not being in place.

## Hydromorphology

1. Elizabeth briefing note: “Natural Resources Wales produced revised hydropower guidance in January 2014. Within this guidance, ‘Hydropower Guidance Note (HGN) 14 Weirs’ states that hydropower schemes should avoid disrupting longitudinal connectivity, that is the movement of sediment, animals or organic matter through the channel network, and to avoid sites that require the installation of new weirs. It goes on to say that we are unlikely to be able to grant licences in connection with applications for such schemes in designated sites and their supporting habitats.”
2. The Guidance Note exact wording is: “In most circumstances, hydropower developers should seek to avoid building new weirs ***that interfere*** with the natural movement of sediment, animals or organic matter through the channel network.”
3. This is a valid argument against weirs for use with traditional hydro-electric schemes. However, for the GWVPP we have demonstrated that it will not affect the movement of fish and will not affect the movement of sediment, so there is no reason to object to installation of the movable weir in this particular case.

## **Hydromorphology - Summary**

No Impact.

## Hydromorphology – NRW Reply

1. Will need to prove that the sediment can travel through.
2. Some sediment will drop down at the weir but this could be managed by having a leaky weir with exit for sediment through the bottom, or by periodically opening it (but opening will cause irregular passing of large amounts of sediment).

## Overriding Public Interest

*Habitats Directive - Article 16:*

1. Provided that there is no satisfactory alternative and the derogation is not detrimental to the maintenance of the populations of the species concerned at a favourable conservation status in their natural range, Member States may derogate from the provisions of Articles 12, 13, 14 and 15 (a) and (b):

(a) ..

(b) ..

**(c) in the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment;**

## **Overriding Public Interest**

### **1. Social or economic interest:**

- Helping to preserve local community and local services at every site that is developed.

### **2. Primary importance for the environment :**

- Up to 50% of Wales' entire electricity generation through GWVPPs.
- Huge reduction in CO<sub>2</sub> emissions for Wales.
- Exemplar to rest of the world to help reduce global CO<sub>2</sub> emissions.
- Reduce further climate change.
- Minimises change to environment of protected species in Wales and the Teifi. So helping to ensure their long term survival.

## Overriding Public Interest – NRW Reply

1. Explained process of tests that have to go through.
2. Has been used e.g. for St. David's lifeboat station.
3. Need to have compensation for Atlantic Salmon – very difficult to suggest what that would be. (E.g. if developer destroyed salt marsh in one area they would have to create one in another area). But not saying that it wouldn't get through.
4. Did not accept that the reduction in climate change to help the Atlantic Salmon keep returning to the Teifi for the long term would be sufficient compensation.
5. Derogation tests have to be carefully applied otherwise NRW may be taken to European Court.

## **Natural Resources Wales – Corporate Plan 2014-17**

### **Challenges and Opportunities**

Our environment in Wales faces many challenges: the effects of climate change, pests and diseases, loss of biodiversity, pollution, and competing uses for land and water. We must manage our natural resources to meet these challenges and increase ecosystem resilience, ensuring we meet our national and international responsibilities.

Climate change is real and Wales must play its part; we must reduce our contribution to greenhouse gas emissions and protect and enhance our carbon sinks. Wales must adapt to the consequences of climate change that will affect people directly and have a major impact on Wales' environment and natural resources. We want to understand the impacts of climate change and be an exemplar in how we manage land and water to both adapt to and mitigate its effects.

**How we will work differently:** Prioritising our efforts where they can make the biggest difference.

**Indicator Ed: Climate change** Greenhouse gas emissions in Wales.

### **Our commitments**

**E1: We will be an exemplar in the way that we manage sustainably the land and water that we are responsible for, and help others do the same.**

**E4: We will help to make Wales more resilient to climate change and other impacts, as well as supporting global efforts to reduce emissions of greenhouse gases by, for example:**

Understanding our contribution to mitigating the effects of climate change using the land and water we manage and our other assets, and aiming to be an exemplar in carbon management.

Ensuring climate change adaptation is embedded in all areas of our work.

**Resources for 2014-15: Expenditure:** £46 million **Staff:** 571 FTEs