Form WRD: Application for a new abstraction licence or a technical variation to an abstraction licence

Application type

Reference number (The number you generated in form WRA). Example: WRNATURALRESOURCESWALES1101
WREgniMynydd0909

For hydropower abstractions, specify the capacity (in kilowatts) of your scheme.
>100kW

Are there any applications currently being assessed by us that are linked to this application?
No

Is the proposed abstraction going to be aggregated with another existing abstraction?
No

Linked applications

Linked application numbers
WA/065/0018/0026 - - -

Are any applications, at the same site; being assessed by the Environment Agency?
No

Tell us when you want your abstraction licence to end: [DD/MM/YY]
31/03/2037

If you require a shorter or longer duration licence, please provide details and your justification

We are very close to the common end date for abstraction from the Ogwen catchment in 2025 which after construction would leave us with only 2.5 years on the license. This is too short to provide sufficient comfort to the bank financing the project.

The purpose of the abstration is to generate hydroelectricity. - the need to increase renewable energy generation has not changed - indeed the declaration of a climate emergency by the Welsh Government on the 29 April 2019 (https://gov.wales/welsh-government-makes-climate-emergency-declaration) the urgency of the shift to a low carbon economy has, if anything, increased. The anticipated annual power generation will be sufficient to cover average consumption of 160 homes at a saving of 16.3 tonnes of carbon emissions. We are in talks with a local factory and Energy Local and anticipate being able to sell power to local customers thereby increasing energy resilience and maximising the benefits to the local community and economy.

Abstraction is yet to start which is the same position we were in when the license was first granted, there has been no changes since 2018 which would suggest that the abstraction would not be environmentally sustainable.

The applicant is a community-based not-for-profit and the income from the sale of electricity is to be used to fund local community and environmental development projects which will further enhance environmental sustainability.

The turbines to be fitted are rated as operating at minimum 75% efficiency. The water will be returned directly to the river without any alteration.

Abstraction details

Abstraction location name/reference

Coanda intake screen

Abstraction point type

Single point

National Grid Reference

SH 60625 65514

Downstream National Grid Reference (If abstracting from a reach), or corners of the area.

SH 61477 66293
-
-
-

Do you have any further points of abstraction?

No

Means of abstraction

Provide full details of the equipment you propose to use to abstract water, such as maximum pump capacity and any relevant dimensions, e.g. pipe diameter. For groundwater abstractions, include details about the borehole (depth and diameter) and details of screening and lining.

Small intake weir which creates a minor impoundment, but replaces existing step in bed level, therefore only very limited upstream ponding will be created (a few meters). Intake will be a concrete stone faced coanda screen intake, connected stilling chamber. Intake weir will be backfilled (using material excavated from the footprint of the intake structure) to ensure that it does not present a sediment trap, this means that during high flows sediment passes downstream unaffected by the intake weir.

Details of intake have been updated from the drawings provided in 2018. The new drawings are:
File: 4 Intake Plan 10 009 drg 101.pdf
File: 4a Intake Sections 10 009 drg 102.pdf
File: 4b Intake Sections 19 009 drg 103.pdf

Changes from the earlier drawings are summaried as:
- Inclusion of an isolation valve to allow flow to the penstock to be stopped. This would be positioned inside the intake structure to allow access for pipe pigging. Minor related modifications to access arrangements are also required.
- Coanda screens would be type C, as type D screens are not suitable for joining together.
Increase
- Coanda screen apature to 1.2-2 mm
- The impoundment drain down pipe is considered unworkable and will be replaced for stop logs. It is noted that stop logs must be flush with weir level to maintain the licensed flow split.
- A funneled section will be incorporated to benefit flow into the pipe.
- The concrete ledge to the downstream side of the intake will be extended to 1m to improve screen cleaning access.
- The pipe invert in the chamber has been established as 245.645mAOD. This is likely to be slightly lower than suggested on the planning drawings, although no dimensions are given. The additional depth is required to minimise entrained air entering the penstock.
- The settling tank is assumed to be 3x5m in plan. Some internal detailing has been adjusted to benefit flows.
- The chamber will be vented to allow air escape and avoid pipe collapse if drained.
- The peak flood level will completely submerge the intake structure. Electrical terminations will need to be raised above flood level.
- The wing walls will need to be extended to connect fully with the surrounding ground level.
Increase width of abstraction weir by 30mm to allow tolerance for fitting and gaskets. A 30mm steel spacer will be fitted to this section of weir to reduce the operating width the to 5.25m that is presently licensed; so there should be no impact to the flow split.

Method statement fro installation of weir and notch calculations are unaltered and are contained in files already with NRW:
GLFH-DOC-Method Statement-A-210317-DM.pdf

Please upload your drawings and calculations here. (Spreadsheet file formats need to be: .xls, .xlsx, or .ods)

- File: 4 Intake Plan 10 009 drg 101.pdf - Download
- File: 4a Intake Sections 10 009 drg 102.pdf - Download
- File: 4b Intake Sections 19 009 drg 103.pdf - Download
- File: Galedffrwd Hydro Geomorph Report and Assessment of Cumulative Impacts.pdf - Download

Abstraction quantities

Abstraction location name/reference
Coanda Intake Screen

What purpose will the water be used for?
Hydropower

Period of abstraction Will it be all year?
Yes

Maximum quantities (cubic metres)	
Annual	11195280
Daily	30672
Hourly	1278

Peak abstraction rate (in litres per second)
355

Number of hours of abstraction per day
24

Add quantities for another location?
No

Calculations and supporting information

Use this section to show us how you have calculated the amount of water you require. This should include details of your operational regime (for example, number of hours and days you intend to abstract, number of units produced or area to be irrigated). We use this information to determine if the volumes you propose to abstract are appropriate for the purpose. Depending which industry you are in, you may need to provide additional information below. If your proposal involves the provision of a residual flow via a notch or orifice, provide information on how this is being calculated. This should include details of the equation being used.
Q95 Hands off flow and 70% flow split. (As in existing license) Notch calculation unchanged and provided in file: Notch Calcs RevB.xls already with NRW.

Industry-specific requirements

	% abstraction and zone applied for	Average gradient of depleted reach (%)	Catchment size above abstraction point (kilometres squared)	Net head between abstraction and discharge points (metres)
	70% of abstraction, Zone 3 of the GPG (as in existing license)	8.33	5.772	86.95

	Turbine efficiency (%)	System efficiency (%)	Maximum power output (kilowatts)	Annual capacity (kilowatt hours)
	75	73	215 (limited to 200 by SPEN)	706000

State the length of depleted reach (in metres)

1300

Provide the flow data (in cubic metres per second) & ratios specified below:

Q95	0.03
Q10	0.897
Qmean	0.355
What is the ratio of Q95:Qmean?	0.0845
What is the ratio of Q10:Qmean?	-

What low flow protection (Low flow protection is the flow rate above which abstraction can begin and is separate to the abstraction % take) do you propose to maintain in the depleted reach when the hydropower scheme is operating (in m3/s)?

Notch made into weir for hands off flow.

Means of measurement

State how you intend to measure the quantity of water you abstract. You do not need to do this for a temporary or transfer licence.

Power Generated

Water efficiency

Provide details of what measures you provide or intend to implement, to ensure efficient use of water. This could include water storage, re-use or recirculation, monitoring and checking for leaks, undertaking water audits or other industry specific good practice.

Galedffrwd is a high head hydro scheme, this allows a small amount of water to be used for the power output compared to a low head hydro scheme.

Fish and eel considerations (surface water abstractions only)

Does your proposal include measures to safeguard fish and eels? Only provide details of outfall screening if abstracted water is to be discharged back into a watercourse. For further guidance on appropriate screening Intake screening for fish

	Intake	Outfall
Type of fish screen	Coanda screen	Square bar
Screen aperture size (mm)	2	25

Confirm the fish species present at your site. If you're not proposing any measures to protect fish and eels, you must justify this. For example, we may have confirmed in our pre-application response that the intake is inaccessible to fish or you undertook a fish survey to confirm.

Limited fish species present due to total fish blockers throughout depleted reach and fish blocker immediately downstream of outfall. Only fish present are isolated brown trout. Hands off flow notch includes an informal fish pool passage to ensure that fish movement is not restricted or changed by the intake weir.

Details of fish pass are included in new intake drawings.

The Pre-feasibility study prepared by Dulas in 2010 includes a summary of consultation with Environment Agency which included a sit visit on the 12th May 2010. The relevant section of the report notes:

"EA consultation
The EA carried out an initial assessment of the site on 12th May 2010. It was confirmed that the river is used by migratory fish but there is no substantial bryophyte colonisation or other ecological factors that may affect the abstraction levels. On inspection of the dam and weir, it was proposed that the permitted abstraction will be
50% of the available flow left after arranging for the permanent “Q95” residual flow in the river. This was mainly due to the assumption that the dam is the furthest point up river the migratory fish could get. It was also stated that an additional 10-20% would be available for abstraction between January and March.

On further inspection the EA concluded that lower dam near the proposed powerhouse location is the furthest point that migratory fish could reach and if all discharge was at this dam then 60% abstraction above the Q95 residual flow would be permitted. This still includes the additional 10-20% between January and March
and in a later e-mail, Tecwyn Evans of the EA suggested that the increase might be
extended until the end of April. This still includes the additional 10-20% between January and March
and in a later e-mail, Tecwyn Evans of the EA suggested that the increase might be extended until the end of April."

The license was eventually issued to pernit abstraction of 70% of flow all year. Our understanding is that alongside the lack of migratory fish this was to reflect the nature of the river as being in the main a steep, step-pool boulder stream (as described by Hydro-Morph in 2018 whcih indictaes an overall channel gradient of 0.065.

The permitted maximum screen width of 1 mm on the Coanda screen is too small to allow passage of the permitted maximum flow. It is requested that the permitted maximum width be increased to 2 mm to give some allowance.

Discharge details

If you intend to return any of the abstracted water to the environment, provide details below. Details of discharge location(s) should correspond with any maps submitted. Do not include discharges to a public sewage system.

	Discharge location name / reference	National Grid Reference of discharge point (12 digit)	Total volume to be discharged (cubic metres)	Environmental Permit for Water Discharge Activity number (if applicable)
	Outfall pipe	SH 61477 66293	0.355 m3/s	-
	-	-	-	-
	-	-	-	-
	-	-	-	-

Provide a description of the structure and equipment involved in discharge.

Tail race pipe will discharge water from the power house back into the watercourse. A 750mm by 750mm screen with 25mm bars will be mounted onto the front of the tail race; to prevent fish from trying to navigate up the tail race.

Other abstractors / water users

Provide details of nearby abstractors or users of water who could be affected by your proposal. This should include deregulated users (exempt activities or abstractions < 20 cubic metres per day), anglers and canoeists.Your local authority's environmental health will hold details of exempt domestic abstractors.

There are three other abstractions in the catchment:
- Dwr Cymru abstraction of drinking water from Marchlyn Bach to the Mynydd WTW
- Welsh Slate abstration from Llyn Owen y Ddol into the Penrhyn quarry
- First Hydro impoundment of water at Marchlyn Mawr for the Dinorwic pump storage station

These are all well upstream of the Galedffrwd intake and will not be affected by the proposal.

Planning application

Have you sought advice on your planning application?

Yes

Submit a copy of the Planning Authority's response.

- File: Dyfarniad - Decision.pdf - Download

Declaration

By signing below, you are declaring that, to the best of your knowledge; the information given in this form, on any map and in any supporting or additional information; is true.

Signed	See attachment
Print name	Jennifer Wong
position	Chair / Director

If you need to submit additional signatures, please upload here in a separate document.

- File: jenny signature.jpg - Download

Date

* 22/09/2021

Would you like a copy of your submission?

Yes

Your email address

jenny.wong@wildresources.co.uk