

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

WRPORTMADOCHOLIDAYCAMP2903

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

>25 to 50kW

Are there any applications currently being assessed by us that are linked to this application?

Yes

Is the proposed abstraction going to be aggregated with another existing abstraction?

No

Linked applications

Please confirm how this application is linked to the other application(s)

Example: this application could be one of multiple abstractions and/or impoundment licence applications at the same site. The proposal could involve water rights trading, or this application could be linked to another application for a previously exempt activity.

The proposed hydroelectric power scheme at this site has three intakes so this application is linked with the other abstraction and impoundment licence applications that have been made or will be made shortly

Linked application numbers

WRPORTMADOCHOLIDAYCAMP2903

-

-

-

Are any applications, at the same site; being assessed by the Environment Agency?

No

Abstraction details

Abstraction location name/reference
'Far' (Un-named tributary 2)
Abstraction point type
Single point
National Grid Reference
SH 57917 41928
Do you have any further points of abstraction?
No

Means of abstraction

<p>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.</p>
<p>The proposed layout for the Aberdunant HEP scheme is illustrated on the Layout Plan that accompanies the application. Water is collected from three streams, labelled 'Far', 'Middle' and 'Near' in accordance to their distance to a proposed header chamber, via Coanda overspill screens. The 'Near' stream is the upper reaches of the Afon Mŷr-gwenyn.</p> <p>All intakes have the same quarter-height Coanda design, which has the dual benefits of providing ultra-fine screening of the water via apertures of 3mm and of enabling a low profile intake structure. The attached plan shows the intake structure including dimensions and level AOD. The structure forms a weir which is divided in the proportion of the permitted percentage take and the flow to be left in situ. In addition, a minimum residual ("Hands off") flow notch ensures that no water is abstracted below the protected flow rate.</p> <p>We do not believe there to be fish present in any of the watercourses at the proposed intake locations, due to (1) the steep profiles of the watercourses both above and below the intake points, which include many waterfalls and chutes; (2) the small size of the watercourses, meaning that there is little water volume and limited connectivity during drier periods. Nonetheless we have adopted a conservative approach and in accordance with the pre-application guidance the intake structure design includes a plunge pool below the screen to accommodate downstream fish passage, and eel brushes for eel passage.</p> <p>The abstracted water leaves the intake sump via a pipe (200mm nominal bore) and is combined in a header chamber for onward transit down the penstock (250mm outside diameter).</p> <p>Note: I have uploaded the drawings for header tank, power / turbine house, and water crossings, and the environmental statement to the 'Middle' abstraction point WRD application. To avoid filling up your file system with duplicates I have not uploaded these again here.</p>

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

- File: Prefab intake concept 70 pc take v1.4.pdf - [Download](#)
- File: Intake Location far v1.3.pdf - [Download](#)
- File: Design Statement - Intake structure.pdf - [Download](#)
- File: Layout Plan v1_2.pdf - [Download](#)

Abstraction quantities

Abstraction location name/reference

Aberdunant Hall Holiday Park HEP

What purpose will the water be used for?

Hydroelectric power generation

Period of abstraction Will it be all year?

Yes

Maximum quantities (cubic metres)

Annual 1513728 (combined total across three intakes)

Daily 4147.2 (combined total across three intakes)

Hourly 172.8 (combined total across three intakes)

Peak abstraction rate (in litres per second)

48 (combined total across three intakes)

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.

The abstraction for hydropower can operate at any time when there is sufficient water. 100% of the abstracted water will be returned to the watercourse within a short time.

The maximum quantities in the attached spreadsheet are calculated based on the maximum peak design flow. In practice, the amount will be determined by availability of water and it is certainly not expected that the scheme could run 24/7 for the whole year.

Please note the maximum abstraction rate and maximum quantities are the combined total across three intakes, not the total for a each intake individually.

The calculation for hands off flow is also included in the spreadsheet, as it was in the Design Statement.

Additional document. (Spreadsheet file formats need to be: .xls, .xlsx, or .ods)

- File: Abstraction quantities.xlsx - [Download](#)

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% (Zone 3)	10%	1.3 km ² (combined for 3 watercourses)	115m

	Turbine efficiency (%)	System efficiency (%)	Maximum power output (kilowatts)	Annual capacity (kilowatt hours)
	-	74.5% (Including turbine)	41	117,000

State the length of depleted reach (in metres)

1200

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

Q95 0.005 (combined catchment area)
Q10 0.104 (combined catchment area)
Qmean 0.048
What is the ratio of Q95:Qmean? 2.2
What is the ratio of Q10:Qmean? 0.096

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)?

0.005

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.

As it is a run of river HEP scheme 100% of the water is returned to the river. None is wasted.

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	Flat bar screen
Screen aperture size (mm)	3mm	40mm

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.

All reasonable steps have been taken to protect fish and eels at both the intake and outfall and these measures are shown in the drawings.

Please see the Environmental Statement:

4.3. Fish

Intake locations

As stated earlier we do not believe there to be fish present in any of the watercourses at the proposed intake locations, due to (1) the steep profiles of the watercourses both above and below the intake points, which include waterfalls; (2) the small size of the watercourses, meaning that there is little water volume and limited connectivity during drier periods.

Nonetheless we have adopted a conservative approach. The pre-application letter contained advice from a Technical Fisheries Officer who indicated that provision for downstream fish passage should be made on the weirs at all three intake locations. This has been included in the submitted designs via rectangular notches that pass the protected low flow, with plunge pools below to prevent stranding and physical harm to fish. Provision for upstream eel passage has also been incorporated into the design per the pre-application advice.

Outfall

The pre-application advice advised that lower sections of the Afon Mûr-gwenyn provide supporting habitat for migratory salmonids. The Afon Mûr-gwenyn is a tributary of the Afon Glaslyn, much of which is included with the Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC and part of which is designated the Glaslyn SSSI.

The SAC Management Plan does not mention migratory salmonids. The Glaslyn SSSI Citation states that Atlantic salmon *Salmo salar* and sewin (sea trout) *Salmo trutta trutta* use the Glaslyn river as a migration route to access their spawning grounds higher up the catchment.

The outfall from the HEP scheme is not located in an area designated SAC or SSSI.

As stated above and further evidenced in the Geomorphology Photosurvey which is part of the licence application, there is a natural waterfall that is likely to prevent migratory fish moving further than about 275 metres upstream from the outfall location, in addition to a smaller waterfall 175 metres upstream, which may also be a barrier. The contribution that the Afon Mûr-gwenyn makes to support Afon Glaslyn (with length of about 16 miles) as an ecosystem for Salmonids is therefore limited. Further, as 100% of the abstracted water is returned to the watercourse before it joins the Afon Glaslyn, there is no effect on that river or its SSSI.

Water outfall from a turbine house can have undesirable effects where it returns to the natural watercourse in two areas: it can create a vigorous flow which attracts migratory fish towards the turbine house outfall, and high energy flows can potentially disturb the river bed which could be a spawning ground for fish.

In the case of Aberdunant the impact is likely to be limited and there are also a number of mitigations:

- In between the abstraction points and the outfall point, there are 4 additional tributaries adding water to the watercourse. This will cause the water that is being returned to the river to form a materially lower percentage of the flow than at the abstraction points, thereby reducing the risk that migratory fish are attracted to it.
- The river bed at the outfall location is comprised mainly of slate shards (see picture below), which appear robust and less likely to be disturbed by the hydro outfall.
- The turbine house is designed so that after passing through the turbine the water falls into a pit where any remaining energy is dissipated, before returning to the river via a riprap which further serves to distribute and slow down the flow as much as possible so that it cannot disturb the river bed or form an attraction to migratory fish. The turbine house is located about 5 metres away from the river bank to allow appropriate distance for this to happen.
- The water is returned to the river at a 45-degree angle to further smooth the flow and reduce turbulence on the riverbed.

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)
Turbine house	SH 58938 41879	1513728	-
-	-	-	-
-	-	-	-
-	-	-	-

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

Please see the Environmental Statement:

The pipe enters the turbine house and delivers the water to the turbine after which it falls vertically into a pit below the turbine house, allowing any remaining energy to dissipate and the flow to slow down, before exiting through a 40mm screen into a riprap channel.

- The turbine house is designed so that after passing through the turbine the water falls into a pit where any remaining energy is dissipated, before returning to the river via a riprap which further serves to distribute and slow down the flow as much as possible so that it cannot disturb the river bed or form an attraction to migratory fish. The turbine house is located about 5 metres away from the river bank to allow appropriate distance for this to happen.
- The water is returned to the river at a 45-degree angle to further smooth the flow and reduce turbulence on the riverbed.

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 none. The depleted reach is entirely within the land owned by the applicant.

Planning application

Have you sought advice on your planning application?

No

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 Adam Dobson
Print name ADAM DOBSON
position Company Director

Date

* 30/03/2023

Would you like a copy of your submission?

Yes

Your email address

tom.bartlett@derwent-hydro.co.uk