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
WRGLANDWRMILL2011

For hydropower abstractions, specify the capacity (in kilowatts) of your scheme.
25kW or less

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

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

Abstraction details

Abstraction location name/reference
Intake

Abstraction point type
Single point

National Grid Reference
SH 63384 17585

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.

A coanda screen, with a 2mm aperture, will be fitted on a concrete chamber into the existing stone weir. The screened water will then flow into a 24m long, 500mm diameter HDPE pipe and a 500mm diameter gate valve into the existing masonry leat. The leat is 110m long and it supplies a plastic penstock (pipe) with an outside diameter of 280mm. The penstock is 45m long and supplies the existing Gilkes Francis turbine.

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

- File: 21072701-v1 Stephen Cochrane Intake Front Elevation.pdf - Download
- File: 21072702-v1 Stephen Cochrane Intake - Section through Coanda.pdf - Download
- File: 21072703-v1 Stephen Cochrane Intake - General Layout.pdf - Download
- File: 211017 Flow duration curve, catchment area & hydrology assessment.pdf - Download
- File: 211017LB02-V1 Outfall.pdf - Download
- File: 210327LB01-V2 Site layout.pdf - Download

Abstraction quantities

Abstraction location name/reference

Intake

What purpose will the water be used for?

Hydropower

Period of abstraction Will it be all year?

Yes

Maximum quantities (cubic metres)

Annual	2838240
Daily	7776
Hourly	324

Peak abstraction rate (in litres per second)

90

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.

It is intended that abstraction take place all year round.
Maximum instantaneous flow (Design flow): 90 l/s
Max hourly abstraction (Design flow x 3600 sec): 324 cubic metres
Max daily abstraction (Max hourly abstract x 24h): 7,776 cubic metres
Max Annual abstraction (Max Daily Abstraction x 365 days): 2,838,240 cubic metres
Estimated annual generation 57,000kWh

Hands Off Flow of Q95, 42l/s is proposed. This will be a channel cut in the crest of the existing stone weir. Formula as follows:
Discharge coefficient, Cd = 1.6
Notch depth, h = 0.189m
Notch width, w = 0.321m
HOF flow Q = Cd * w * h^1.5= 1.6 * 0.321 * 0.189^1.5 = 0.0422 m^3 / sec= 42.2 lps

Proportional take of 70% is controlled also by the width of the HOF notch as follows:
Total Crest Width : Coanda Width 750mm + HOF Width 321mm = 1071mm
Take : 750/1071 = 70%

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

- File: 211017 Flow duration curve, catchment area & hydrology assessment.pdf - 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	11%	10.753	17.1

	Turbine efficiency (%)	System efficiency (%)	Maximum power output (kilowatts)	Annual capacity (kilowatt hours)
	85%	77%	9	57000

State the length of depleted reach (in metres)

160

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

Q95	42
Q10	973
Qmean	426
What is the ratio of Q95:Qmean?	0.10
What is the ratio of Q10:Qmean?	2.28

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)?

0.042

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.

A high efficiency Gilkes Francis turbine and generator are proposed.

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	None
Screen aperture size (mm)	2mm	N/A

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.

The stone weir has been in situ for over a hundred years. No screen is proposed on the outfall as it is at a high level, preventing fish from entering.

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	SH 63459 17451	All abstracted water	N/A
	-	-	-	-
	-	-	-	-
	-	-	-	-

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

The water falls from the turbine through a draft tube into a concrete sump. It then spills out of this sump into a concrete channel and then drops 0.5m onto a riverbed made up of loose rocks and bedrock. Please see drawing "211017LB02-V1 Outfall".

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.

None

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	Stephen Cochrane
Print name	STEPHEN COCHRANE
position	Ownder

Date
* 21/11/2021

Would you like a copy of your submission?
Yes

Your email address
cochranest@aol.com