

Dyffryn Crawnnon Green Energy Micro Hydroelectric.
NRW Abstraction Licence and Impoundment Licence applications -
Document C: Supplementary information for NRW forms.

This document provides information relating to Dyffryn Crawnnon Green Energy's (DCGE) applications for abstraction licence and impoundment licence for a micro hydroelectric scheme on the Nant y Wenynen watercourse in the Dyffryn Crawnnon valley near Llangynidr in Powys. All of the following documents should be read together:

- Completed Form WRA – NRW Provide Applicant Details and Proposal Outline.
- Completed Form WRD – NRW Application for a New Abstraction License.
- Completed Form WRE – NRW Application for a New Impoundment License.
- Document A: Covering letter to NRW.
- Document B: Design and construction statement.
- Document C: Supplementary Information for NRW Forms. **THIS DOCUMENT.**
- Document D: Geomorphology photo survey.
- Document E: 2011 EA letter with relevant comments for 2026 applications.
- Document F: Rights of access lease.
- 09001/01/F Site plan and pre-2015 intake area (A3)
- 09001/02/F Existing post-2015 intake details (A3)
- 09001/03/G Existing turbine house and outfall (A3)
- 09001/06/A Proposed intake details (A3)
- 09001/07/A Document H: Extent of land access rights (A4)
- 09001/08/A Document E: OS map of site (A4)

Contents:

PREAMBLE.

- 1) Abstraction regime**
- 2) Catchment size, WHS Lowflows data, hands off flow rate and abstraction rate.**
- 3) Abstracted volumes.**
- 4) Calibration and control of the required hands off flow.**
- 5) Control of the required 70%/30% split of flows.**
- 6) Control of the allowed instant abstraction flow rate**
- 7) Control of the allowed annual abstraction volume.**

PREAMBLE.

Dyffryn Crawnon Green Energy CIC (DCGE) are applying to Natural Resources Wales (NRW) for a new abstraction licence and a new impoundment licence relating to an existing, but mothballed, micro hydroelectric scheme on the Nant-y-Wenynen watercourse in the Dyffryn Crawnon valley near Llangynidr in Powys.

Since 2015 DCGE operated the micro hydroelectric scheme as covered by the original abstraction licence WA/056/0038/001 and original impoundment licence WA/056/0038/002. The original 2012 licences were reissued on the 14th March 2013 to take into account a slight change in the position of the turbine house and outfall pipe (all other details remained the same).

For a variety of reasons, the 2012 and 2013 licences were held by TGVHydro Ltd. (the designers and builders of the scheme). TGVHydro Ltd ceased trading several years ago. During the winding up process for TGVHydro Ltd. the transfer of the above licences to DCGE did not take place. Towards the end of 2025 NRW became aware that TGVHydro had been wound up without transferring the licences. At this point NRW cancelled the original licences (back dated to February 2025).

The micro hydroelectric scheme is currently mothballed because there is no valid abstraction licence and there is no valid impoundment licence.

DCGE wish to continue to operate the scheme and are applying for new licenses for the same basic scheme using the same installed structures, pipes and mechanical/electrical equipment (although abstraction regime, and thus intake, to be amended to suit the current NRW guidelines).

This document provides additional information for the DCGE scheme relating to the filling in of NRW's abstraction license application form WD and NRW's impoundment license application form WRE.

1) Abstraction regime

Total scheme fall is 134m with a depleted reach sloping along the stream line of about 610m (horizontal distance is about 595m). Overall scheme slope is about 22%.

The watercourse is high up in the catchment area and the overall scheme slope is greater than 10%. Previously the Environment Agency Wales confirmed that no fish easement would be required and there were no significant environmental or biodiversity issues that needed to be addressed (see *Document E 2011 EA letter with relevant comments for 2026 applications*).

Based on current NRW guidelines the scheme is defined as a Zone 3 with a regime of Q95 hands off flow, Qmean peak abstraction, and limited to 70% abstraction of available flows above hands off flow up to allowed peak abstraction.

2) Catchment size, WHS Lowflows data, hands off flow rate and abstraction rate.

Figure 1 below shows the defined catchment area feeding into the intake. This is calculated to be 0.618 km²

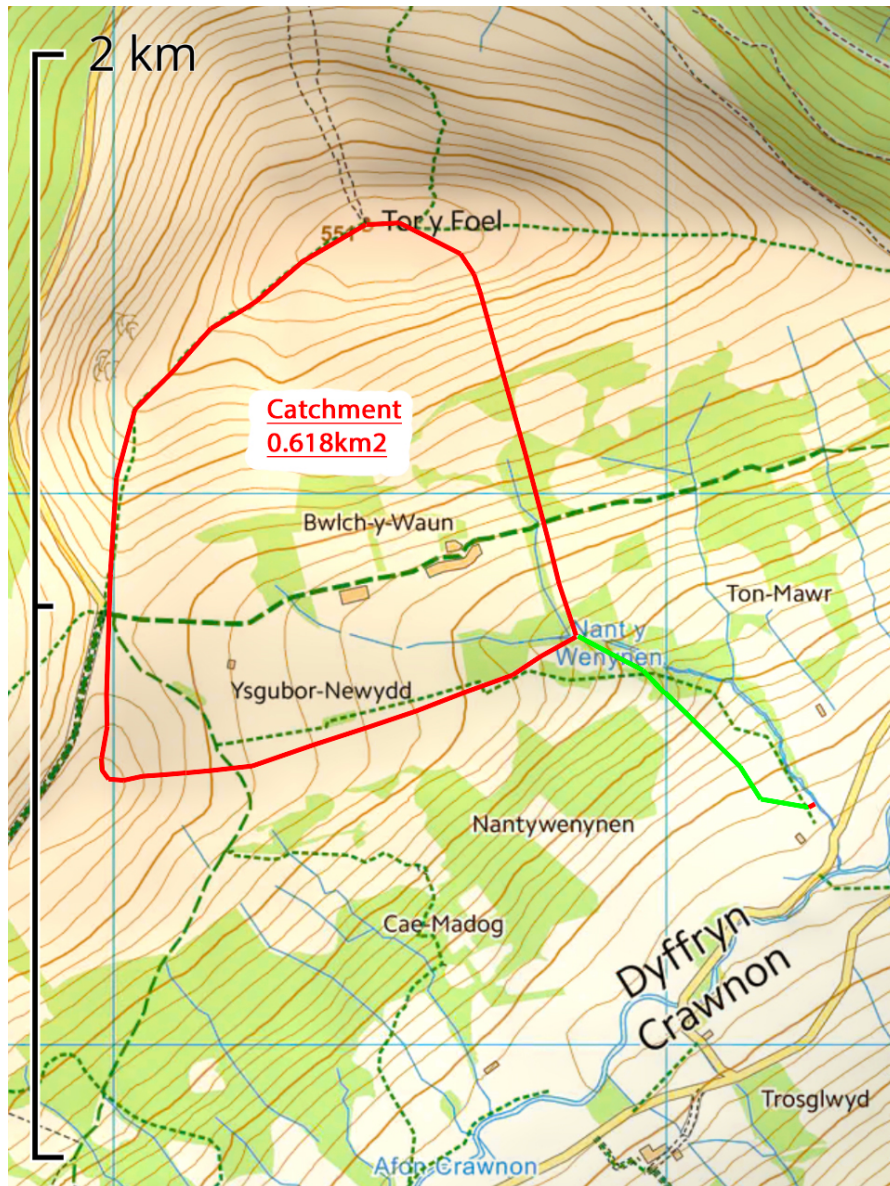


Fig 1: Defined catchment.

Period	Mean Flow (lts/sec)
Year mean	20.67
Jan	38.53
Feb	33.06
Mar	29.45
Apr	19.91
May	14.09
Jun	10.73
Jul	8.20
Aug	8.68
Sep	10.19
Oct	17.00
Nov	24.21
Dec	34.92

Table 1: Year and monthly average flows.

Q number (%)	Flow (lts/sec)
5	61.7
10	45.4
15	37.8
20	30.3
30	22.1
40	17.5
50	14.0
60	10.5
70	8.1
80	7.0
90	4.7
95	4.7
99	3.5

Table 2: Percentage Q flows

Tables 1 and 2 detail the data derived from 2013 WHS Lowflows data for a catchment of 0.618 km² at the intake coordinates (SO 11840 18747). **This suggests a Q95 hands off flow of 4.7lts/sec and a**

Qmean peak abstraction of 20.67lts/sec, with allowed abstraction limited to 70% of available flows above hands off flow up to the allowed Qmean peak abstraction.

3) Abstracted volume limits.

At 20.67lts/sec the theoretical abstraction could be this rate for 24 hrs/day and 365 days/year; equal to 651,849 m³/year. Based on WHS Lowflows data the table below indicates a more realistic average figure would be 253,243 m³/year.

% of year flow will be exceeded	Period Flow Rate (l/s)	Q95 Adjusted Flow (l/s)	70% Allowed Abstraction	Abstracted Volume M ³
100%	3.49	0.00	0.00	0
95%	4.66	0.00	0.00	0
90%	4.66	0.00	0.00	0
85%	5.82	1.16	0.81	1,285
80%	6.98	2.33	1.63	2,570
75%	7.57	2.91	2.04	3,212
70%	8.15	3.49	2.44	3,855
65%	9.31	4.66	3.26	5,140
60%	10.48	5.82	4.07	6,425
55%	12.22	7.57	5.30	8,352
50%	13.97	9.31	6.52	10,280
45%	15.72	11.06	7.74	12,207
40%	17.46	12.81	8.96	14,134
35%	19.79	15.13	10.59	16,704
30%	22.12	17.46	12.22	19,274
25%	26.19	21.54	15.08	23,771
20%	30.27	25.61	17.93	28,269
15%	37.83	33.18	23.22	32,588
10%	45.40	40.75	28.52	32,588
5%	61.70	57.04	39.93	32,588
TOTAL				253,243

Table 3: WHS Lowflows estimated volumes

Peak volume per hour and day.

When water is available hydro scheme can operate for 24 hours/day.

During periods of 20.67lts/sec peak abstraction the hourly volume of abstraction could be $20.67 \times 60 \text{ (seconds)} \times 60 \text{ (minutes)} / 1000 = \mathbf{75 \text{ m}^3/\text{hour}}$ (figure rounded up).

During periods of 20.67lts/sec peak abstraction the hourly volume of abstraction could be $74.412 \times 24 \text{ (hours)} = \mathbf{1,786 \text{ m}^3/\text{day}}$ (figure rounded up).

Peak volume per year.

Table 3 above indicates the average maximum yearly abstraction, based on average rainfall, will total 253,243 m³/year. During particularly wet years the average maximum will be exceeded. For the purposes of this NRW abstraction licence application the applied for volume is based on increasing the the average yearly maximum by 30%. This gives a figure of **329,216 m³/year** (figure rounded up).

4) Calibration and control of the required hands off flow.

Operation and calibration of the Hands off flow set up are noted in sections 1) and 6) of Document B: Design Statement and methodology.

Once set the intake will be inspected on a regular basis to ensure proper operation of the hands off flow arrangement.

5) Control of the required 70%/30% split of flows.

The weir over the dam will be 1428mm wide. The intake box will be 1000mm wide (representing 70% of the width).

Water flowing over the remain 428mm width of weir will bypass the intake box and continue to flow down the stream.

Once set the intake will be inspected on a regular basis to ensure proper operation of the 70%/30% flow arrangement.

6) Control of the allowed instant abstraction flow rate.

When initially built (2015) the efficiency of the system was determined. At peak flow of 20 lts/sec the dynamic driving head was 130.52m (pressure after pipe friction had been taken off) and power output was 20 kW. This gave an overall efficiency at peak flow of 78%. With an abstraction of 20.67 lts/sec the **peak power will be 20.64 kW**.

The flow through the turbine is controlled by a variable flow spear valve.

The spear valve is linked to a level sensor located in the intake box. The control system aims to keep the water level in the intake box at a constant level known as the Head Aim. If the water level rises above the Head Aim then the control system can pulse open the spear valve a little to increase water flow through the turbine. Conversely if the water level drops below the Head Aim then spear valve can be pulse closed a little.

There are two main controls that limit the abstraction to its allowed peak are:

- Firstly, the control system is programmed only to operate up to a programmed peak power. For the restarting of the system this will be set to 20.6 kW. Should the efficiency of the system ever change then the peak power setting can be programmed accordingly.
- Secondly the spear valve has an inbuilt physical stop to the spear valve movement (in the form of a big lock nut). On restarting of the system this will be set at the point where the system will be producing 20.6 kW.

Should the allowed instant abstraction flow rate be other than 20.6 lts/sec then the peak power will be calculated and adjustments made.

7) Control of the allowed annual abstraction volume.

The system will operate with a split phase power supply with two electric meters measuring turbine generator kWhr production. The total of these two meters will record the total generation.

The total generation readings will be recorded weekly and this will be used to determine the cumulative annual production (year to run from 1st April to 31st March of the following year).

Once the annual volume abstraction has been licenced this can be converted into kWhrs of annual production. On a weekly basis the allowed annual kWhrs will be compared to actual kWhrs. Should the actual kWhrs exceed the allowed kWhrs then the turbine will be switched off until the following 31st March.