

## Proposed micro-hydro system for Hafod y Rhedrydd.

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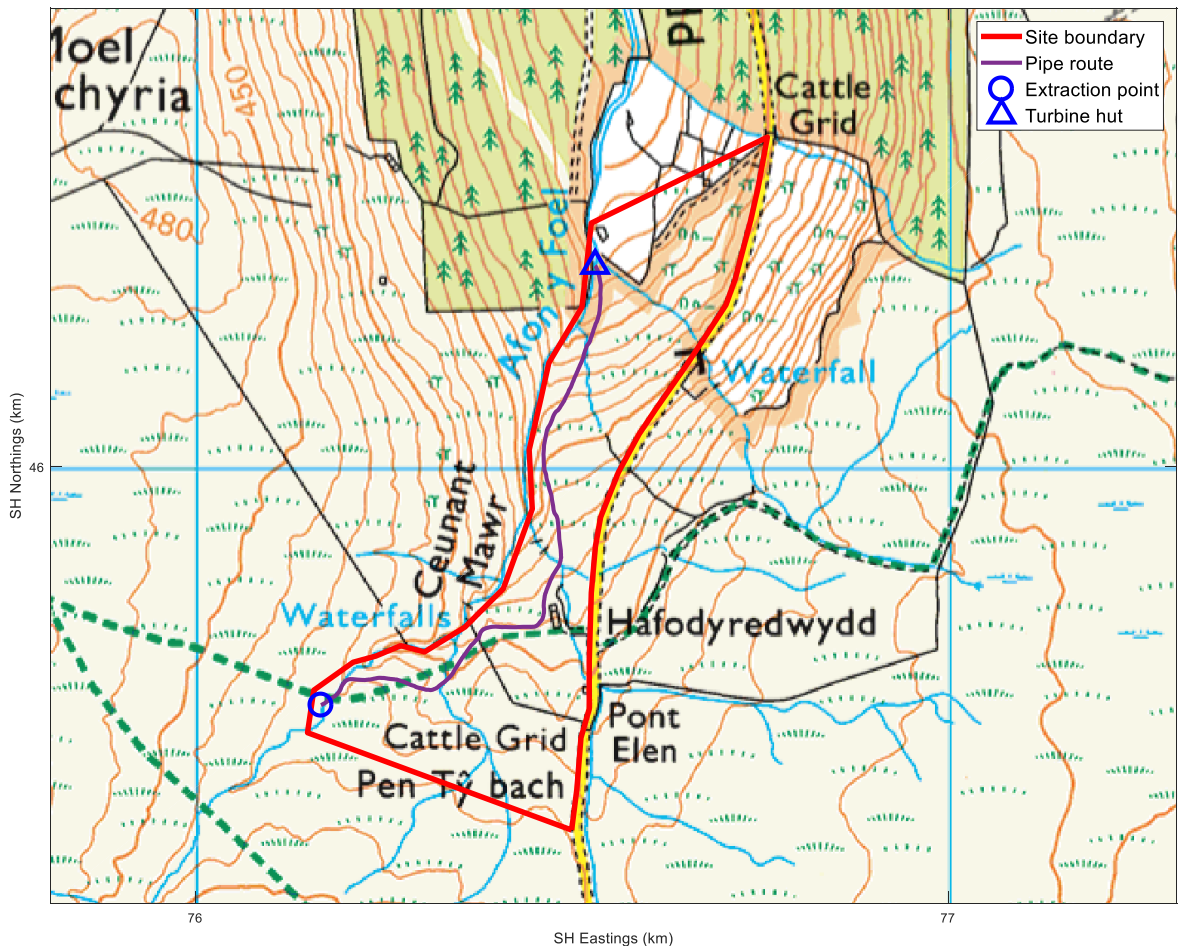
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The proposed micro-hydro system will generate electricity for the off-grid cottage Hafod y Rhedrydd (LL24 0RF). The pipeline will also improve the domestic water supply to the cottage.

Depending on the level of water in the stream, the system will be able to provide between 0.4 kW and 9 kW. The scheme lies within the Snowdonia National Park and the Migneint-Arenig-Ddualt SAC.

Water will be taken from Afon y Foel, extracting at a point 35 m higher than the house. The pipe length to the house is 380 m; pipe diameter is 110 mm.



**Figure 1.** Map scale 1: 10000 (grid squares are 1 km wide). OS map is © Crown Copyright, reproduced by permission of Ordnance Survey. (Map purchased from Blackwells Mapping Online 5/12/2018, order number BW1-899389-43094-051218).. Extraction at grid reference SH 76164 45687, turbine hut at SH7654 4627. Site area approximately 18 ha.

The pipeline has a tee-off to the house for domestic water before continuing for another 475m down towards the bottom of the valley. A 65mm flexible conduit buried alongside the pipe will carry a steel-wire armoured power cable and an optical fibre for control signals.

All pipes and wires will be buried except for the initial 47 m where the stream falls away until the pipe is above bank level and the pipe can curve away to pass across the spur.

### **Summary of works:**

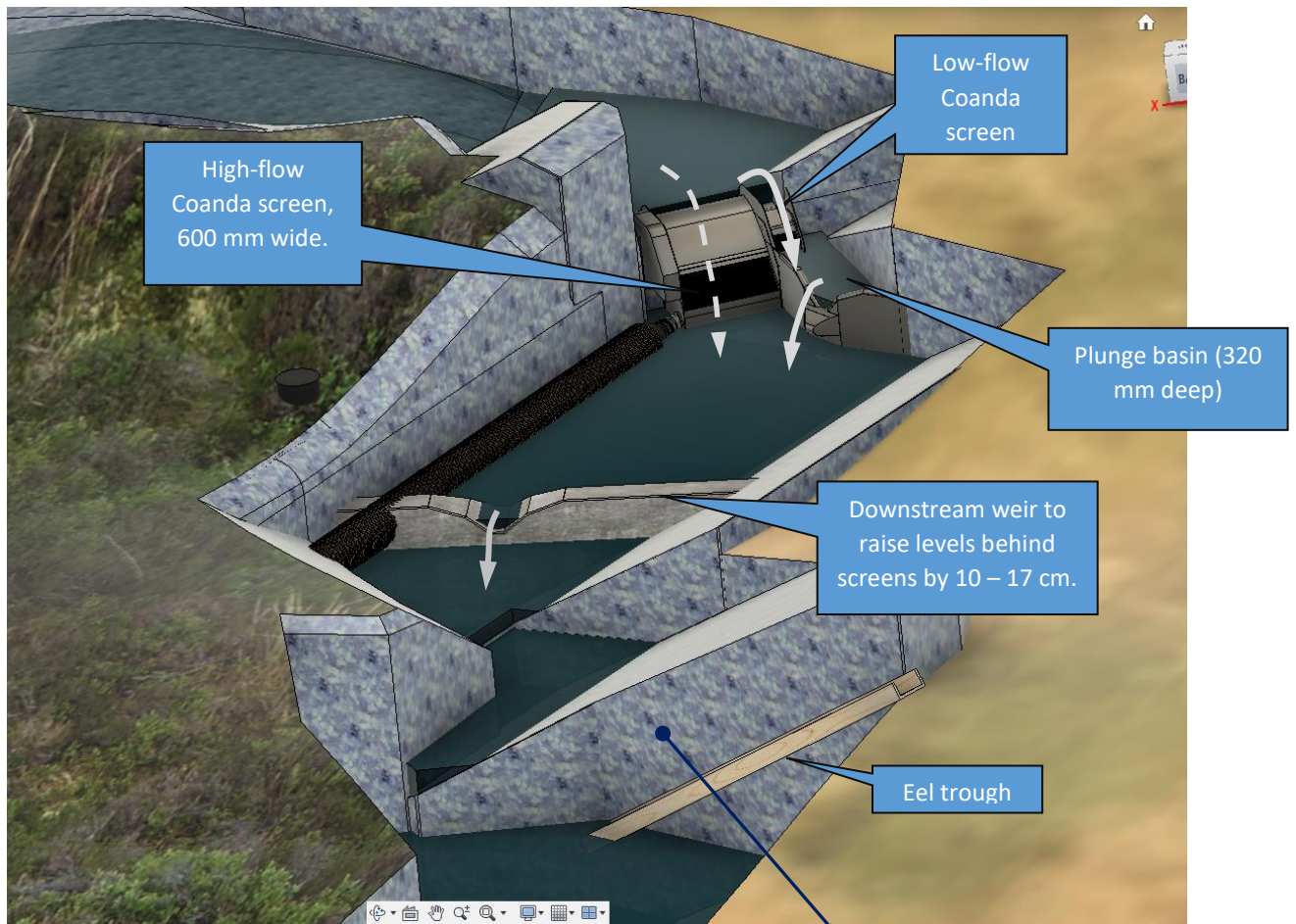
- (1) To install water extraction screens in Afon y Foel in accordance with an abstraction licence from Natural Resources Wales.
- (2) To place a settling tank approximately 30m from the extraction point to prevent entrained air from entering the pipeline.
- (3) To bury 860 m of pipe and conduit linking the extraction point, cottage and turbine hut.
- (4) To build a hut to house the turbines, alternators and associated equipment.
- (5) To return water to Afon y Foel where it passes the turbine hut.
- (6) To transport materials as required for the construction.

### **Details:**

- (i) The hardware will limit the extraction rate to safeguard the remaining water level and include features to ease fish passage.



**Figure 2.** Small waterfall at the extraction point. Stick with tape at 1 m intervals to show scale.



**Figure 3.** Abstraction system . Fish can progress up and downstream in three stages (black arrows), with jumps of less than 25 cm. Water levels shown for stream flow of 4 litres/sec. At higher stream levels, water starts to flow over the high flow screen (dashed arrow). n.b. Grey features are existing bedrock.

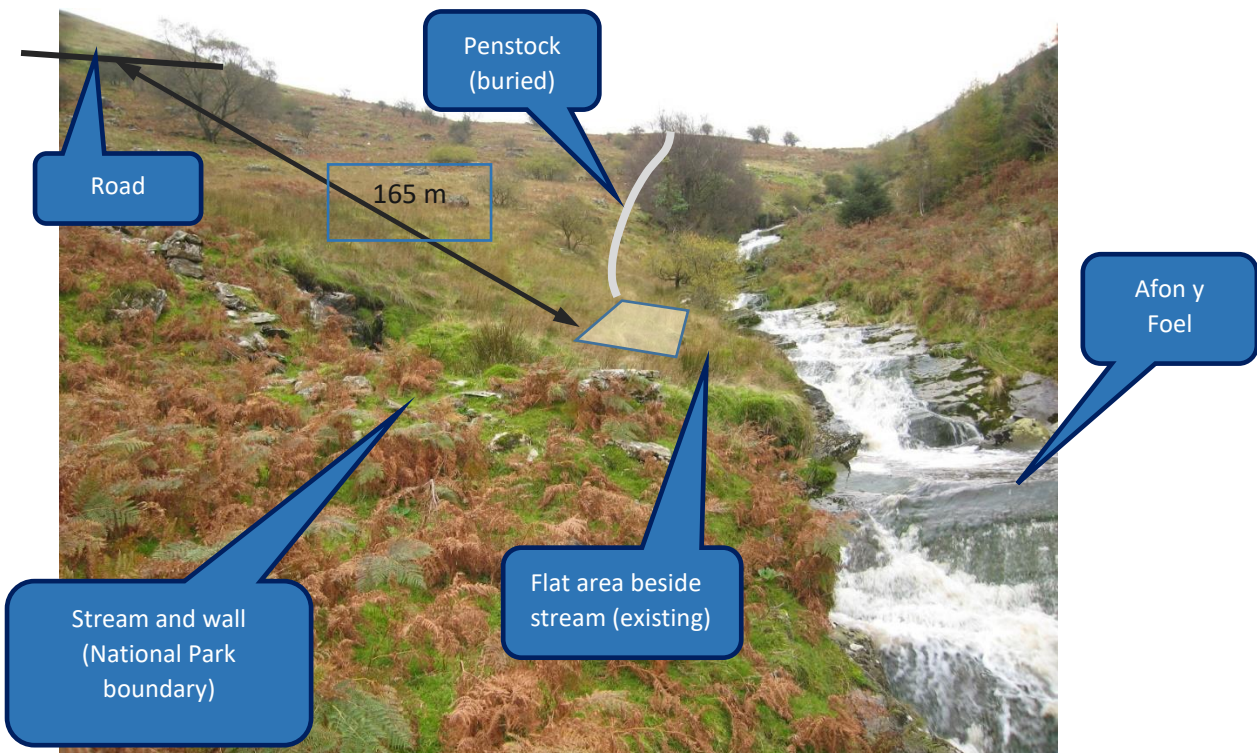
(ii) The settling tank will be made from a short vertical section of pipe (roughly 0.5 m diameter × 2 m high) that will be held against the rock face beside the stream. It will not protrude above the top of the rock wall.



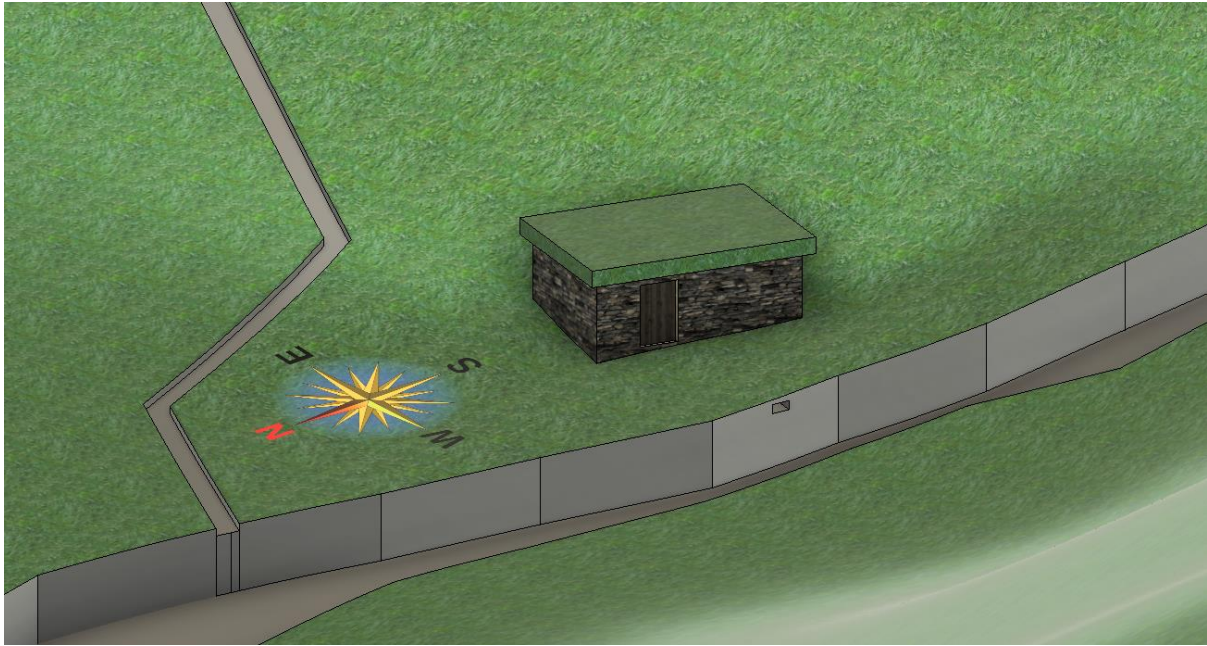
**Figure 4.** Settling tank location. The tank will fit against a natural cleft in the rock face and be hidden behind wooden shiplap fencing.

(iii) The pipe will be buried to be invisible once vegetation has regrown. Turf and soil will be separated during trenching so the turf can be replaced afterwards.

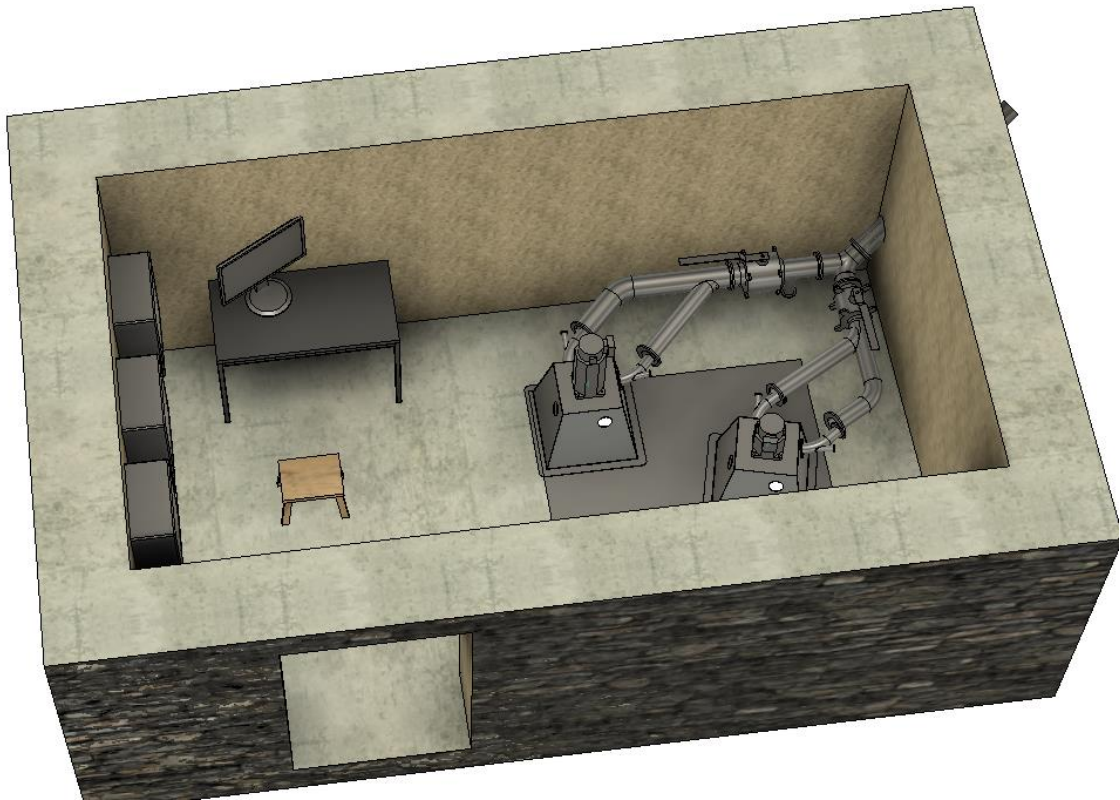
(iv) Turbine hut. The turbine hut will be made of Blaenau Ffestiniog slate and have a shallow-pitch turf roof (using turf from the foundation area). It is 170 m from the road at the bottom of a steep slope: it will not be noticeable from the road.



**Figure 5.** Site for turbine hut.



**Figure 6.** Turbine hut appearance. Wall dimensions (external) 4.6 m long  $\times$  2.8 m wide. Internal height (floor-ceiling) 1.52 – 1.66 m; roof overhang 20 cm. Turf roof.



**Figure 7.** Internal layout showing normal and dry weather turbines, switchgear and screen to access control system software. The tailrace duct runs out to the river bank from the sump below the turbines.