Beinn Ime Hydro Design and Construction

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1. Description of Beinn Ime Burn and Hydro Scheme

The stretch of the Beinn Ime Burn that would be affected by a reduction in water flow when the hydro scheme is in operation is approximately 1234m in length with a fall of approximately 248m. The vegetation along the banks mainly comprises grasses and boggy land. There is natural water erosion, resulting in collapse of some of the bank on both sides of the burn.

The riverbed on the Beinn Ime Burn, from which our scheme diverts some of the flow, is made up of large boulders and bedrock and a series of waterfalls.

From an aesthetic point of view, the hydro scheme will be designed for minimum visual and environmental impact. The penstock and the armoured telemetry cable will be buried and the hill land will return to its former state.

2. Intake Site

We have one main intake and three very small intakes to catch some small hill burns. All four intakes are situated above a number of waterfalls.
Please see images below:

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The intake will comprise a small concrete intake weir with a concrete front to create a suitable chamber to then attach the pipe. It will utilise the natural drop in the stream: the total height, including the drop, will be 2.075m. Construction of the intake will be made in two 'halves' requiring a temporary sandbag cofferdam built around the working area, to achieve dry working conditions. Extreme care will be taken to prevent concrete getting into the stream.

Please refer to the documents for detailed drawings of intake design:

1. *Intake A pt1*
2. *Intake A pt2*
3. *Intake B pt1*
4. *Intake B pt2*
5. *Intake C*
6. *Intake D*

Flow Monitoring and Control Processes

The abstraction volumes have been measured using LowFlow 2 for total abstratction and at each individual intake location

A rectangular hands-off-notch will be built into each intake to allow the agreed compensation flow to passthrough (details of the hands-off-notch are on the intake drawings).

The orifice will be inspected regularly to ensure that it is allowing water to pass.

In addition regular checks will be carried out to ensure that no debris is blocking the compensation flow and no silt/gravel is building up around and in the intake. A coanda screen will be used to prevent any tiny fish or animals going down the penstock.

3. Penstock

The pipe will be of 450mm external diameter.
The maximum flow rate is 0.222 m^3/s, and the head loss in the pipe is 4.4%. These have been evaluated as the optimum size for the available flow in different sections of the penstock.
Pipe sections will be electrowelded, with the joins reamed out for maximum efficiency. The pipe will be buried at a depth of 18" to avoid damage by frost, beasts and vehicles. Excavation for the pipe will cause no significant disturbance to field habitat and the trench is expected to be invisible within a year.

4. Turbine Site

The turbine house will be sited in rough ground to approximately 180m upstream from where the Beinn Ime burn meets the Kinglas Water. It will have a reinforced concrete base, including foundation for the generating equipment; concrete blocks for the walls, finished in larch cladding; and a turf roof. A pipe will be constructed under the wall and through to the Beinn Ime burn, with a tailrace for discharging and dispersing the water from the turbine back into the Burn. The tailrace will have a grate installed to prevent any wildlife going up and under the turbine. This site will be above the potential flooding level of the river.

Please see details drawing:

1. *Powerhouse Design*

5. Site Plan

The main components are illustrated in the "Site Map" plan attached to this CAR License application.

6. Environmental benefit

The scheme will benefit the environment by saving CO_2 emissions, and is therefore an environmental service qualifying for an abatement of charges.

The hydro scheme generates of 1,410 MWh of clean, renewable electricity each year — enough to power 629 electric cars for a full year, removing 909t of CO2 emissions per year in the process.

7. Fish and other fauna

Fish

We have engaged with Argyll Fisheries and they have requested that you let them know what information you require to satisfy your requirement. Argyll Fisheries are aware that the burn in question is very steep with multiply waterwalls, making it impossible for any migratory fish to access the majority of the watercourse. Furthermore, this is not a large burn in terms of size or flow, the power is coming from the head pressure.

Fauna

A bryrophyte and habitat survey was carried out and attached to the CAR license application.

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