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Galedffrwd Hydro Scheme

Method Statement

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Hydropower Consultancy & Development

Document Control

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Client Name: Coetir Mynydd (Community Woodland Group)

Client Address:
C/o Jenny Wong, Wild Resources
Ynys Uchaf, Mynydd Llandygai
Gwynedd, LL57 4BZ

Ellergreen Hydro Ltd Reference: GLFH

Ellergreen Hydro Ltd
Ellergreen Estate Office
Hollins Lane
Burneside
Kendal
Cumbria
LA9 5SD

Tel: 01539 726 013
Web: www.ellergreen.com

Ellergreen Hydro Ltd
Pod 3 Avon House
19 Stanwell Rd
Penarth
Vale of Glamorgan
CF64 2EZ

Tel: 02921 320 083
Web: www.ellergreen.com

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Prepared by:	D.Morgan		
Approved by:	A. Cropper		
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1 Summary

This outline method statement (MS) describes the proposed activities required for the installation of a micro hydro scheme on the watercourse of Galedffrwd, Parc yr Ynys near Mynydd Llandegai, Bethesda, Gwynedd.

The purpose of this document is, along with the accompanying Environmental Management Plan and Design and Access Statement, to enable planning, environmental and abstraction arrangements to be finalised. Once permissions are in place it will then form the basis of the Construction Phase Plan, with any revisions or modifications made as required.

2 General Description of Works

The layout is shown in the drawing GLFH-DWG-General Layout-D-170
17-AJF, and the works consist of the following:

- A small stone faced concrete intake structure across Galedffrwyd, incorporating a Coanda screen with 1mm apertures, and an adjacent buried stilling chamber. (Grid ref: 260625, 365514)
- A penstock of 1250m HDPE plastic pipe (560mm outside dia.) running from the intake down to the turbine house.
- A stone clad turbine house building with a slate pitched roof (local slate), enclosing the hydroelectric turbine, generator, control panel and metering. (Grid ref: 261473 366303)
- A 7m 600mm diameter discharge pipe with a screen with 10mm spacing, and an outfall, in the form of a mortared stone cascade, to return water to the beck at the rear of the powerhouse. (Grid ref: 324408 513861)
- A buried electrical cable from the turbine enclosure to the nearest point of connection.

All materials / equipment will be delivered to the site compound as indicated on the site location plan appended.

3 Documentation

In addition to this document and the Design and Access Statement, the outline design is shown in the following drawings:

1. GLFH-DWG-General Layout-E-050417-ARC
2. GLFH-DWG-Intake-A-030217-AJF
3. GLFH-DWG-Powerhouse-B-290317-DM
4. GLFH-DWG-Outfall-A-290317-DM
5. GLFH-DWG-PipelineDetail-A-050417-DM

Another document also details the pipeline design this is GLFH-DOC-PipelineLowImpact-A-080517-ARC.

4 Duration of Works

It is estimated that the works will take 9 months to complete. However, the weather could have a significant impact on the length of time required on site. The preferred approach for schemes of this scale is to hold back on construction during very wet periods in order to avoid degrading the working area.

5 Timing of the work

The breeding bird survey has shown that there are breeding birds in the vicinity and therefore the items of works happening during the breeding bird season February – August, will need further survey work to ahead of the works and or suitable vegetation clearance ahead of the season. Down at the powerhouse outfall it has been discovered that Dipper are nesting at the moment and therefore work on the outfall will avoid the Feb-Aug season.

6 Outline Method Statement

1	**Site Preparation**
1.1	Set up compound area including storage and welfare in the designated area
1.2	Install signage and fencing as required
1.3	Silt protection measures to be implemented
1.4	Consolidate access route for excavator to intake.
2	**Intake Construction** The intake is to be a Coanda screen intake. Work to install the intake will only commence when water levels are low and no heavy rain is forecast.
2.1	Use Ø600mm twin-wall pipe (or similar) with sandbags, visqueen and plastic sheeting to create a temporary diversion from natural stream crest upstream of works. The flow will be returned to the beck in a rocky section where the risk of the flow disturbing the river bed is minimal.
2.2	Place straw bales & terram downstream of works to catch any displaced sediment
2.3	Any remaining water below the diversion point will be pumped out and returned to the stream via a silt trap and/ or discharged over grass: whichever is necessary to

	ensure that no silt from the working area enters the watercourse.
2.4	If required, remove bedrock using heavy duty battery SDS chisel or pecker, attached to excavator, to form stable bedrock base for weir to sit on; depth of excavation will be commensurate with the integrated sump
2.7	Wire-brush bedrock to remove slime and allow good bond with concrete
2.8	Pour blinding layer/ sump base slab
2.9	Drill and chem-set steel rebar into base slab
2.10	Form timber shuttering around rebar to required dimensions/ design of weir wall
2.11	Prepare concrete on ply board laid on terram; to contain spillages this will be done on level ground away from riverbank within compound area.
2.12	Transport prepared concrete to weir
2.13	Cast weir NOTE - Check weather forecast and only proceed with placement of concrete if three clear dry days ahead – this is to prevent washout of works in spate flows.
2.14	Upstream of weir to be back filled to raise bed level to just below the coanda crest and residual flow notch.
2.15	All tools are to be washed in a specially dug pit away from the river.
2.16	Allow minimum three days for concrete to cure before removing any diversion works.
3	**Pipeline**
3.1	Deliver pipe to site
3.2	Place sections of pipe along route using winches within woodland and where pipe is buried in fields pipe can be moved around by excavator, tracked dumber or tractor.
3.3	Pipeline is to be installed in stages working up from the powerhouse
3.4	First half of pipeline is through fields outside of the woodland. Here pipe is to be butt welded in to long strings and rolled into a pre prepared trench. Extent of pipe bedding dependant on ground conditions but pipe is generally to receive pipe bending at the high pressure end of the pipeline and the pipe bedding to be to the standard spec for PE buried pipe.
3.5	At bends, which will be formed by the natural flexibility of the pipe material, the pipe should be buried with at least 600mm cover to help restrain thrust forces. Particular attention should be paid to the outside of bends.
3.6	Pipe route through these fields is to have a soil strip with top soil set aside along the route. Trench is then dug and each string of pipe installed. Joining of strings can

	be done with electrofusion couplers.
3.7	Signal cable to be laid along pipe route. Cable to be covered in slit trench or similar
3.8	Pipeline in woodland is to be installed as per GLFH-DOC-PipelineLowImpact-A-080517-ARC where possible works are to be carried out by hand and with small machinery only. Pipe is to be pulled into place using petrol logging winches.
3.9	Overground pipe and overburdened pipe is to be secured using bespoke galvanised clamps, shapes to be minimised as far as visible impact.
3.10	Securing to ground is to occur at locations as necessary and dependant on ground conditions found during to works, setting out engineer to check and establish locations. Typical will be every 20m but more or less dependent on need.
	Moss regrowth to be encouraged at specific areas where suitable and natural regrowth is possible. Pipe surface to be scratched adhering to the 'no scratch beyond 10% of wall thickness'.
4	**Powerhouse** The powerhouse is designed around a concrete floor slab which underlies both the pipe and the turbine. The building will be of reinforced concrete & block work construction with stone facing and a flat roof. The turbine will discharge into a concrete sump, with a tailrace made from 600mm twin-wall pipe or similar. Care will be taken to prevent runoff flushing excavated material into the watercourse.
4.1	Mark out powerhouse and tailrace
4.2	Excavate foundation trenches, sump and upper trench for tailrace
4.3	Cast wall footings and floor of sump
4.4	Install tailrace pipe
4.5	Construct formwork for sump around first section tailrace pipe, and formwork for turbine bed frame. Include anchor block, floor drain and cable ducts (as will be shown in engineering drawings)
4.6	Cast sump walls and main floor slab, with starter bars for anchor block. Slab to have slight fall to allow drainage into floor drain, and apron to slope away from building
4.7	Build up block walls, leaving cut-out for anchor block, and including ventilation notches at top and bottom of southern gable end
4.8	Fit wooden A-frames and rafters, clade with slate to complete the roof
4.9	Fit baffle boxes over ventilation notches
4.10	Fit doors and rainwater goods as appropriate

5	**Tailrace & outfall**
5.1	Use steel piles or sandbags/visqueen to form barrier around outfall to isolate works from watercourse
5.2	Dig remaining trench for tailrace pipe to watercourse
5.3	Install tailrace pipe
5.5	Fit Outfall screen (stainless steel with 30mm spacing)
5.6	Backfill pipe trench (selected backfill to avoid damage)
6	**Electro-mechanical installation**
6.1	Deliver turbine/generator, control panel and ancillaries to site, unload onto concrete apron and use rollers to move into powerhouse lifting area
6.2	Fit turbine and generator in place, align, bolt down and grout in
6.3	Fix main inlet valve support to concrete, and check alignment/ positioning of unit
7	**Connect & restrain pipe**
7.1	Pipe to be flushed with intake screen in place to remove debris from pipe (small stones etc.)
7.2	Cut pipe to length, and fit reducer with stub pipe to suit turbine inlet; reducer to be located within anchor block, at upstream end
7.3	Connect pipe to turbine inlet using VJ coupling or similar, ensuring 5-10mm gap between flange and end of pipe
7.4	Construct formwork for anchor block, fixing pipe securely to prevent suspension in concrete
7.5	Pour anchor block
7.6	Backfill around block
8	**Electrical Installation & Power Cabling**
8.1	Install control cabinet
8.2	Connect generator, actuator and sensor cables; install local power and lights
8.3	Connect signal cable from intake
8.6	DNO to complete installation of substation and HV cable within the substation room of the powerhouse.
8.7	Powerhouse fuses to be fitted by DNO following electrical installation

8.8	Warning tape to be placed in trench; cover depth and other details to be specified by DNO
8.9	Install intake level sensor(s) under intake screen
9	**Final civils, making good**
9.1	Stone face powerhouse
9.2	Final pumping out and clearing of working area prior to removal of diversions; all silt water to be pumped out of working area
9.3	Remove waste and excess materials
9.5	Remove sediment from any traps; fill and reinstate turf
10	**Commissioning**
10.1	System commissioning as per turbine supplier instructions