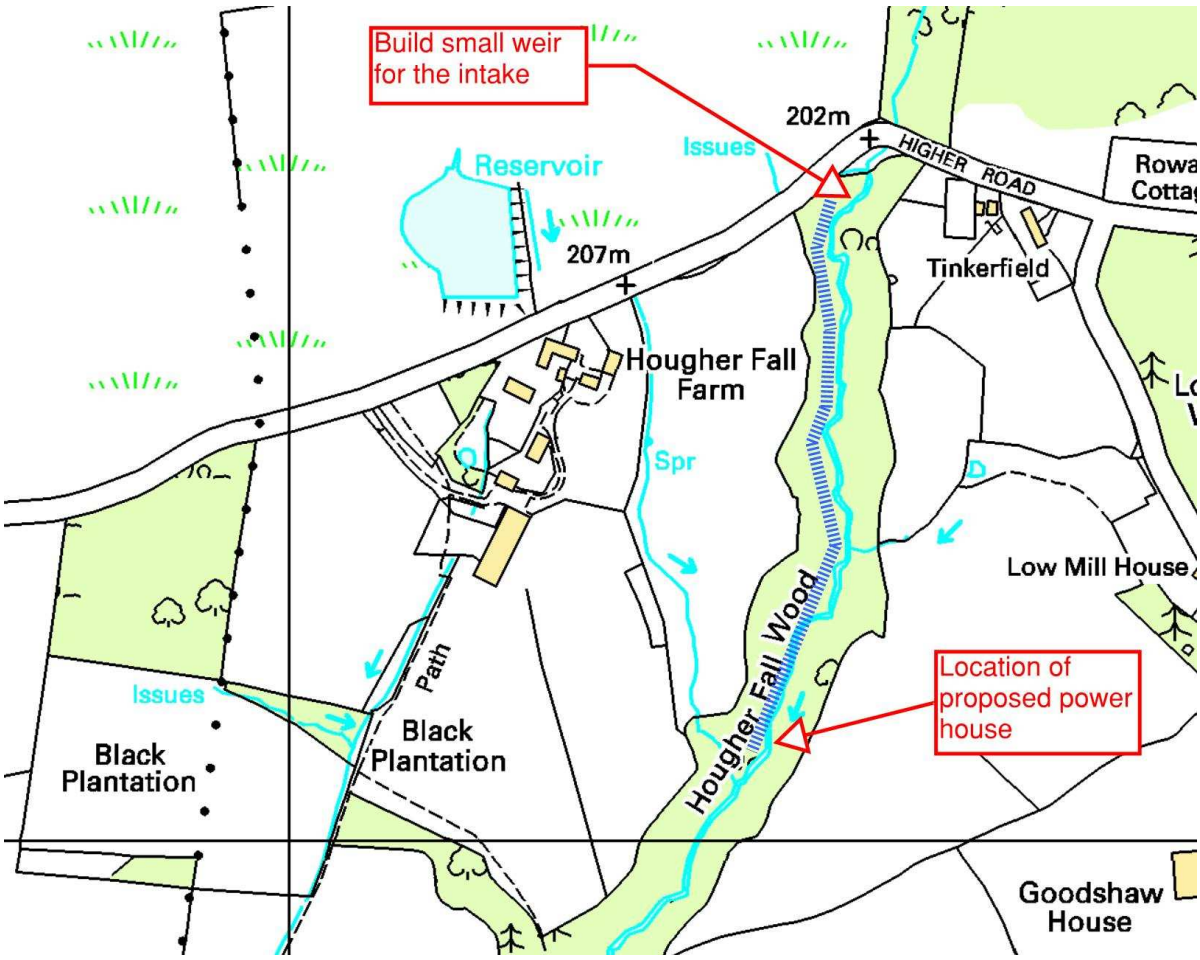
Site 28: Hougher Fall Farm, Longridge

Site Assessment

Figure 1 Map showing general layout



Hougher Fall Farm is a free range chicken farm on Old Clitheroe Road near Dutton. Running south past the farm is Duddel Brook. The brook runs through a small wooded valley.

It is proposed that a small intake weir be installed just below Higher Road and a pipe installed from here downstream, approximately as far as the next tributary running from the farm. This pipeline would potentially be challenging to install through the woodland and on uneven ground. The whole scheme would be screened well by the woodland and the natural topography.

Figure 2 Potential intake location

Figure 3 The potential power house location

Catchment Analysis

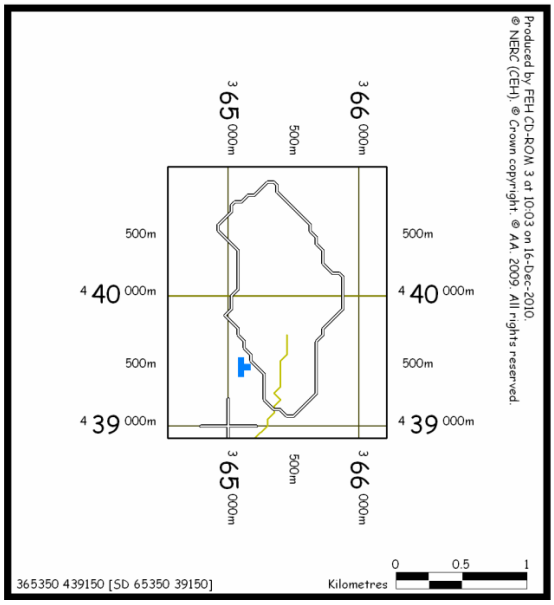


Figure 4 Catchment boundary defined by Flood Estimation Handbook Software

The Flood Estimation Handbook software is used to determine the following catchment descriptors, for the proposed intake location, selected during the site visit.

Intake Grid Reference	365400, 439450
Powerhouse Grid Reference	365300, 439020
Catchment Area	1.0 km^2
Annual Rainfall	1392 mm

Annual Flow Statistics

Low Flows software is used to produce a Flow Duration Curve (FDC), which demonstrates how the river flow varies throughout the year. It presents the percentage time of the year each flow rate is exceeded. A particular notation is used to refer to FDC flow rates; e.g. 'Q_{95}' refers to the flow rate which is exceeded 95% of the year.

Table 1 Mean flow rate and flow rate at Q_{95}

Period	Mean Flow Rate [m³/s]	Flow Rate at Q_{95} [m³/s]
Annual	0.0593	0.00557
January	0.0966	0.0149
February	0.0735	0.0122
March	0.0766	0.0125
April	0.0507	0.00938
May	0.0345	0.00619
June	0.0215	0.00422
July	0.0265	0.00455
August	0.0392	0.00346
September	0.043	0.00411
October	0.066	0.0066
November	0.0843	0.0105
December	0.0994	0.015

Table 2 Annual flow duration data

Exceedance Probability	Flow Rate [m³/s]
5	0.218
10	0.143
20	0.084
30	0.055
40	0.038
50	0.028
60	0.02
70	0.015
80	0.011
90	0.007
95	0.006
99	0.004

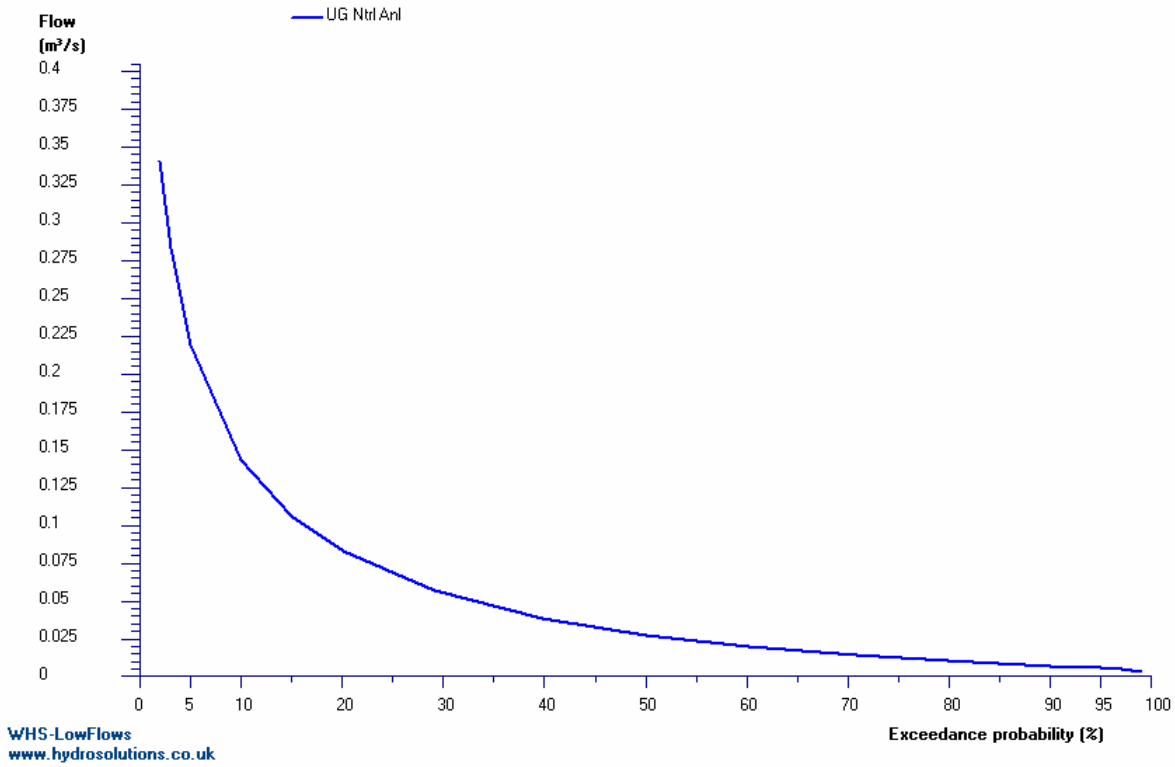


Figure 5 Annual flow duration curve produced using low flows software

Hydropower Analysis

Site: Hougher
Run Date / Time: 16 December 2010 at 10:35

Mean Flow: 0.023 m3/s
Provisional Rated Flow: 0.027 m3/s
Residual Flow: 0.004 m3/s
Rated Flow: 0.023 m3/s
Gross Hydraulic Head: 40.00 m
Nett Hydraulic Head: 38.00 m

Applicable Turbines	Gross Annual Average Output	Nett Annual Average Output	Maximum Power Output	Rated Capacity	Minimum Operational Flow
Crossflow	28.2	27.9	6.9	6.4	0.007
	MWh	MWh	kW	kW	m3/s

Table 3 Hydropower Analysis

Gross Head [m]	40
Net Head [m]	38
Design Flow [m^3/s]	0.2 m^3/s
Rated Capacity [kW]	6.4 kW
Average Annual Energy Output [MWh]	28 MWh
Average annual Carbon Dioxide offset	64.4 tonnes

Impact Assessment

Hougher Fall Farm is within the Forest of Bowland AONB and has a Landscape Character Assessment of Moorland Fringe.

Any development here would be unlikely to impact the historic landscape and would be hidden from view, screened by the topography and the woodland. It is likely that a fish pass would be required on the intake to facilitate fish movement. It will be important to assess the number and type of trees that might need to be felled along the proposed pipeline. This site may require a bat survey.

Statutory Requirements

It will be necessary to apply to the Environment Agency for an abstraction license, and planning permission will be required for the installation of an intake, pipeline and powerhouse.

An ecologist will be able to advise on what extent of environmental investigation is required.

Budget Development Cost

The total budget cost for the whole scheme is **£293,355**. It should be noted that the civil works costs can vary considerably as material costs fluctuate. Likewise, mechanical and electrical (M&E) equipment costs vary in accordance with demand. Professional fees should be considered subject to change, as the scope of licensing and planning requirements are not yet defined. Consequently the budget estimate at this stage should be considered accurate to plus or minus 20%.

Revenue and Simple Payback period

Energy produced by this scheme will be consumed on site by the farm; a grid connection is unlikely to be necessary.

Under the current government feed-in tariff regulations, hydropower schemes receive a generation tariff according to their rated capacity. Schemes less than 15kW receive 19.9p/kWh. This generation tariff is received regardless of how the electricity is used. The owner has indicated that the electricity would be used on site, thereby offsetting import costs. This increases the value of the generated electricity by the import tariff, which we have assumed is 5p/kWh.

In conclusion, the total value of the generated electricity would be 24.9p/kWh, giving an average annual value of approximately **£6412.** The simple payback period for this scheme is **46 years**.

Conclusion

The payback time for this scheme suggests that development is not economic. However, it will be possible for the site owner to construct this scheme relatively cheaply as the skill sets already exist and the plant and materials available on the farm. The costs have been estimated assuming an external contractor will be used.

Further Information

This site report is produced by Inter Hydro Technology on behalf of Forest of Bowland AONB, and funded by a partnership including Lancashire County Council, Lancaster & District Local Strategic Partnership, Pendle Borough Council and Ribble Valley Local Strategic Partnership.

This site report should be read in conjunction with the rest of the Forest of Bowland AONB Hydro Feasibility Study which can be downloaded at http://www.forestofbowland.com/climatechange#hydro

Table 4 Development Budget Cost

Budget Scheme Cost Estimate
Hougher Fall Farm, Longridge

	UNIT	QUANTITY	MIN	MAX
Turbine				
Turbine Quotation	No	1	£40,000.00	£50,000.00
Grid Connection				
Grid Connection	No	1	£0.00	£0.00
Civils				
Weir	m^3	15	£7,500.00	£9,375.00
Fish Pass	m^3	8	£4,000.00	£5,000.00
Weir Screen Length	m	2	£4,000.00	£5,000.00
Fish Pass Length	m	2	£4,000.00	£5,000.00
Pipe Installation	m			
Rock	m	50	£5,500.00	£6,875.00
Gravels	m	450	£18,000.00	£22,500.00
Soft	m	0	£0.00	£0.00
Pipe Materials	No	1	£50,000.00	£62,500.00
Temporary Access	m			
Rock	m	0	£0.00	£0.00
Gravels	m	0	£0.00	£0.00
Soft	m	500	£27,500.00	£34,375.00
Temporary Access on Good Ground	m	0	£0.00	£0.00
Powerhouse				
Powerhouse	kW	6	£15,000.00	£18,750.00
Prelims				
Duration	Months	3	£9,000.00	£11,250.00
Sub Total				
Sub Total			£184,500.00	£230,625.00
Professional Fees				
Professional Fees			£27,675.00	£46,125.00
Sub Total				
Sub Total			£212,175.00	£276,750.00
Contingency				
Contingency			£42,435.00	£55,350.00
GRAND TOTAL			£254,610.00	£332,100.00