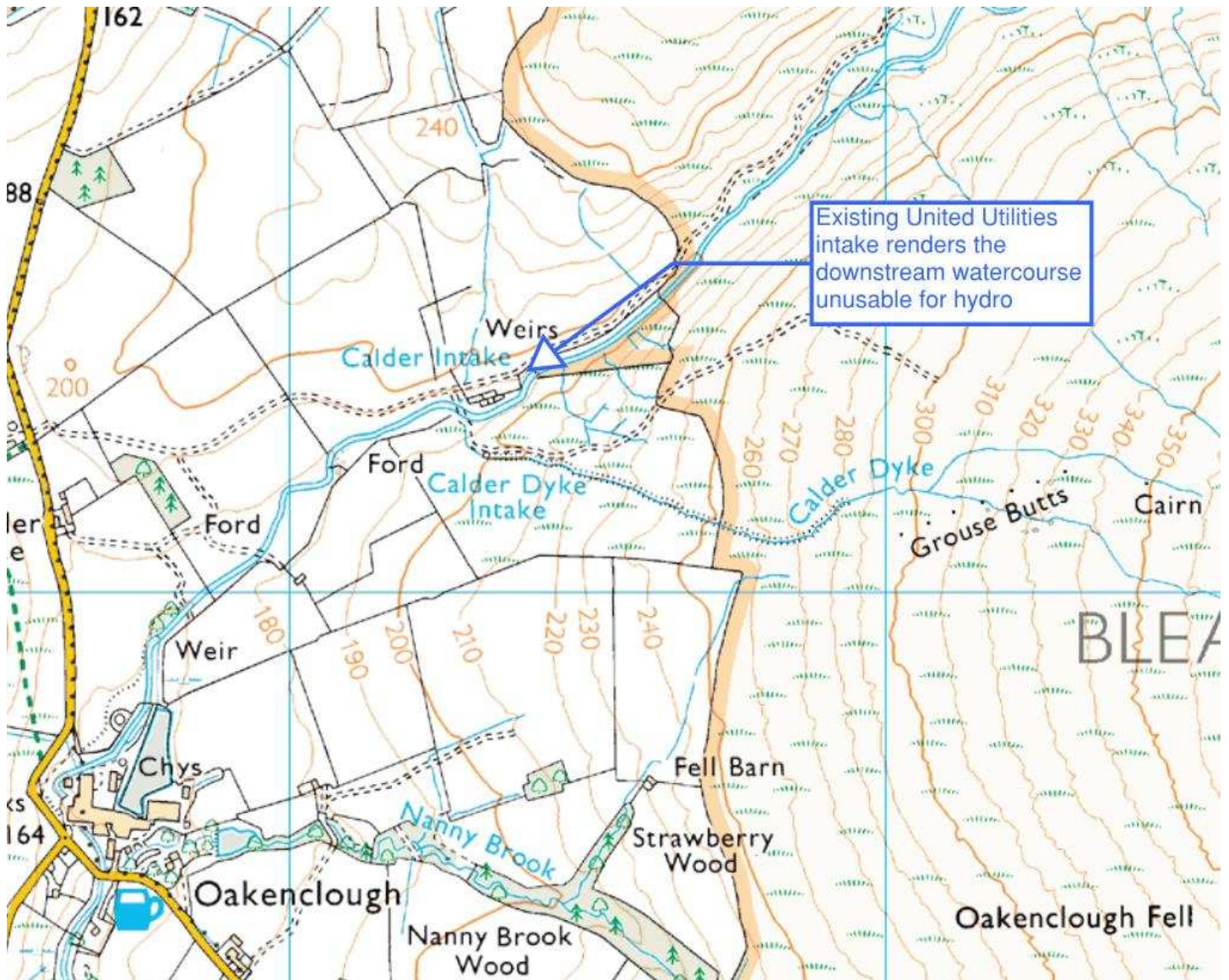


## Site 33: Calder Intake, nr Oakenclough

### Site Assessment

Figure 1 Map showing general layout



The head and flow potential of this site are good; and there is good access to the potential intake and a load for the power. However, there is an existing intake which unfortunately renders the stream unusable from a hydro point of view.

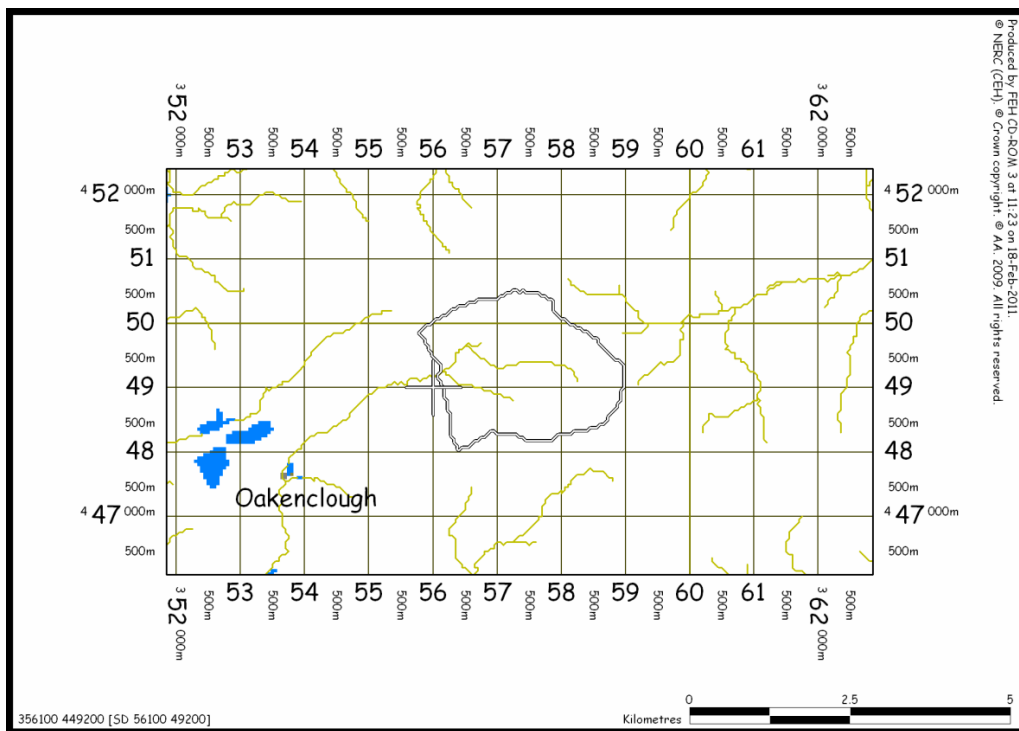
Installing a scheme any higher up in the catchment, above the intake, would make grid connection and access difficult, as the load for the power is well downstream in Oakenclough. It would also mean working with less water.



Figure 2 The depleted river downstream of the United Utilities Calder Intake

## Catchment Analysis

Figure 3 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. This assessment represents the unmodified natural catchment.

Intake Grid Reference	356100 449200
Powerhouse Grid Reference	356100 449200
Catchment Area	5.4 km <sup>2</sup>
Annual Rainfall	1679 mm

## Annual Flow Statistics

Due to the artificial influences on this river it is not relevant to present flow statistics using the conventional Low Flows software. It is likely that the only meaningful flow data will be collected on site via a flow monitoring system. United Utilities are best placed to assess whether there is a consistent enough surplus flow (plus the necessary compensation flow) to warrant any further investigation of a hydro scheme.

## Hydropower Analysis

Due to the difficulty in predicting likely flows at the site, it has not been possible to generate a potential power output or annual average energy production.

The table below states the theoretical potential of the watercourse and head without the existing United Utilities intake.

Table 3 Hydropower Analysis

Gross Head [m]	80
Net Head [m]	75
Design Flow [m <sup>3</sup> /s]	0.18 m <sup>3</sup> /s
Rated Capacity [kW]	90 kW
Average Annual Energy Output [MWh]	350 MWh
Average annual Carbon Dioxide offset	190 tonnes

## Impact Assessment

This site is within the Forest of Bowland, AONB and is classified as Unenclosed Moorland Hills. According to the original desk top suggestion of potential, this scheme may have involved an 80m long pipeline. This would have had an impact on the stream ecology and a varied flow regime would have to be designed to minimise this impact.

Provision for fish passage would need to be made at the intake weir. It is likely that a fish pass is already present at the Calder Intake.

## Statutory Requirements

It would be necessary to consult with United Utilities and the Environment Agency for advice on abstraction and available water, but it is perceived that there is not sufficient water for a hydro scheme on this watercourse due to the existing abstraction.

Planning permission would be required for the installation of a turbine and the new weir.

An ecologist will be able to advise on the extent of environmental assessment required.

## Budget Development Cost

Due to the absence of sufficient water in the watercourse, budget costs have not been calculated for this scheme.

## Revenue and Simple Payback period

Due to the artificially low flow regime it is not possible to assess the likely power and energy generation potential. Therefore, it is not known whether a grid connection is likely to be economic. Due to the inconsistent flow it is probably unlikely that a grid connection is necessary. The revenue and simple payback times have not been estimated.

## Conclusion

The hydro power potential at this site has been compromised by the existing intake. However, if in the future the intake were to be abandoned, then the existing weir infrastructure, proximal grid connection and existing access to this site would make it worth further investigation.

## 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>