

# CASE STUDY – LOW HEAD HYDRO

## KEY DATA

- Turbine 100 kW axial flow from Newmills Engineering
- Head 12m Gross Head
- Maximum flow 1.2 m<sup>3</sup>/s
- Date of first generation November 2011
- Annual Electricity production 424 MWh



## BROOKLINN MILL HYDRO CLIENT: TIM COPELAND

Brooklinn Mill is a former jute mill in Blairgowrie. A Francis turbine operated at this site since the early 1900's. However this upgrade programme enabled a huge increase in power output and electricity production.

The key elements of this project were:

### INTAKE STRUCTURE

The former intake consisted of a metal screen covering the end of the pipeline where it passed through the base of the dam wall. It was prone to silting, and was difficult to clean, being some 4m below water level. To minimise blockages, and reduce head losses, a new self-cleansing wash over type screen was installed, on a new intake structure behind the current dam wall.

### PENSTOCK

The existing cast iron pipeline was replaced with a GRP pipe to reduce friction losses. Use of GRP made it possible to manhandle the pipe in areas which were difficult to reach with a crane.

### TURBINE HOUSE

A considerable amount of rock was excavated to accommodate the turbine and a new draft tube, to maximise the available head.

### TURBINE SELECTION

Given the wide range of flows through the year a turbine capable of running efficiently throughout these flows is needed. At the available gross head of 12m a propeller type turbine is most suitable, with adjustable blades and guide vanes. To make best use of the existing structure a 100kW Z-type double regulated axial flow turbine was proposed. The turbine is controlled automatically by a level sensor at the dam, which ensures that the system uses the maximum available water flow.

### SUMMARY

The scheme was successfully commissioned in November 2011 and is reliably exporting power. It is presently on track to pay back its capital and development costs in less than 7 years