



**JNP GROUP**  
CONSULTING ENGINEERS



## Kirkthorpe Hydropower Scheme

## Case Study

**Client:** Yorkshire Hydropower Ltd

### Design Services Provided

- Civils design including sheet piles, cofferdam and RC retaining walls
- In situ RC works including concrete channel, suspended slabs, walls, and structural capping beams)
- Structural steelwork
- Secondary steelwork (stairs, ladders, walkways)
- Substation foundations
- All RC detailing works
- Principal designer role

### Overview

Kirkthorpe Hydropower scheme is Yorkshire's biggest-ever low-head hydroelectric scheme and is on the largest weir in West Yorkshire that received a "highly commended" in the BCI Awards 2017. JNP Group provided structural and civil engineering services for the project.

The scheme consists of a single Kaplan turbine, which is estimated to produce 2.4 million kilowatt-hours of electricity per annum, equivalent to the consumption of 800 households. The addition of a 3.8m wide fish pass allows safe passage of migratory fish upstream. Fish travelling downstream are prevented from entering the hydro scheme by the custom-built inlet screen.



## Project Solutions

To enable construction works to take place within close proximity of the existing weir, a cofferdam was created with sheet piles and dewatered with a sump pumping system. By cutting off the river flow, it allowed for a dry working environment for construction to take place. After completion and prior to the plant being commissioned, the site was flooded and the sheet piles burnt off by specialist divers.

The sheet piles and outlet channel walls were designed at a height of 7m, utilising the concrete base slab as a prop at the bottom, and walers, tiebacks, and deadman anchors at the top.

The success of this scheme was helped greatly by the well-established working relationship with the client. Collaborative working on a previous project of a similar nature enabled a smooth consultation process, resulting in program timescales being met by the end date required for electricity production.

The scheme was compromised by a sluice gate failure during construction. To rectify the issue, a remedial solution was proposed between the designers and the contractors. The addition of further sheet piling within the river, along with grouting to stabilise the wall, proved to be an effective solution, allowing the completion of the works in line with the agreed timescales.

## Case Study

### Project Challenges

- Working in the river adjacent to the existing weir
- 7m high wall in outlet channel
- Tight timescales and meeting client dates for power generation.
- A set of sluice gates at the east end of the weir failed during construction

### Project Solutions

- Creation of a cofferdam and use of a sump pump to dewater the construction site.
- Installation of sheet piles with supporting base slab, walers, tiebacks and deadman anchors.
- Collaborative working relationship established in a previous scheme ensured project success
- Remedial sheet piling solution including grouting for stability.





## Summary

JNP Group's previous experience in renewable energy played a key role in the success of the project. The design team was able to model and execute plans for construction to take place in a challenging environment. They troubleshooted by creating remedial solutions and were able to stick to client-led time frames, facilitated by a well-established working relationship with the client. The project showcases how green energy can be produced with minimum impact to the wildlife residing in the River Calder. The highly commended scheme has brought efficient, green hydroelectric generation assets to one of the very rivers on which the UK industrial heritage was born.



## Case Study

### JNP Group Project Team

#### Project Manager:

Victoria Walker

#### Project Team:

Marta Jackson, Cameron Lehmann

### Client Feedback:

*"Kirkthorpe is a significant and long-term investment in Yorkshire's energy infrastructure and all credit must go to those involved in its design and construction. Kirkthorpe delivers clean and sustainable energy to local homes and businesses and will further improve the quality of the River Calder for future generations to come."*

Mark Simon

Chief Executive, Barn Energy

