

# Hydro-power Engineers



## Case Study:

Site: New Mills, Derbyshire  
Turbine: Archimedes screw  
Power: 63kW  
Head: 3.0m

Western Renewable Energy (WRE) was brought in by MannPower Consulting (MPC) after the feasibility stage. WRE and MPC carried out detailed design, leading the WRE planning and carrying out the construction for the client. WRE also designed and installed the fish-pass element for the Environment Agency.

WRE were first consulted in January 2007 about the engineering feasibility of the scheme, and despite a range of obstacles, a detailed plan and costing was developed. Major issues to be worked around included:

- the existence of a storm water outfall across the site, which needed to be integrated into the new works, but without affecting the discharge during construction.
- Archaeological issues which required an Archaeologist on site at all times during the excavations, and a large amount of detail to be recorded.
- Restricted site space in a rocky gorge.
- Very limited access, restricted to 7.5t on site, and no crane access.
- Large volume of spoil for removal, all requiring double-handling and off site disposal.
- Additionally the site was very public and in an attractive park area.

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Work physically started in March, replacing the storm water discharge, which had to run through the intake area

After the diversion was complete, archaeological excavation by WRE, under the direction of staff from Archaeological Research Services continued for a month. The extensive remains on site were documented and artefacts retained, as part of the planning permission



Once through the level of archaeology, another 3m of Gritstone bedrock was removed to provide the correct tailrace depth



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The floor pour for the turbine and fish pass then occurred

The restricted access to site required all the walls to be cast in one day, when the pump, pipelines and manpower was available, and access could be arranged for the procession of concrete lorries, so all shuttering for the structure was set up to be carried out in one pour



With concrete complete, the complicated phase, unique to the Torrs project was started. Because weight on site was limited to 7.5t, no crane could be brought it, and indeed the turbine itself exceeded this weight. Firstly wooden ramps were installed



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The wooden ramp provided a continuous slope from ground level to the bottom of the slope. Because of tight space restrictions, the screw had to be brought in sideways and lowered onto the ramp

With the main road through New Mills closed, and hundreds looking on, the screw was lowered into the gorge, to avoid the weight restrictions on the normal access route.



The turbine landed on a purpose built trolley, with steerable castors, which was rigidly coupled to two mini diggers to pull it into position at the top of the ramp



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The turbine was crabbed out sideways, over the concrete channel and onto the temporary wooden structure. From here it was then suspended at one end to allow the removal of part of the trolley, and part of the wooden temporary structure



With the temporary wooden structure changed, the supported end was lowered until it was at 22 degrees, but at the top of the slope. From here electric winches under the wooden structure were gradually released, allowing the turbine to slide into position on a carefully located central rail running down the slope. This positioned the turbine in the approximately correct position, and allowed completion of the concrete works



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The top slab was then cast, and the turbine lowered onto it, after it had cured



While the concrete was going off, other jobs commenced, including craning excavators into the river to excavate the tailrace and adapt the river bed



The fish pass was installed at this point, to allow migration of fish past the weir for the first time in over two centuries



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Transmission and generation equipment, as well as sluices and other ancillary equipment was then installed



Finally the intake was excavated and the temporary storm outfall was removed, to leave the system looking much as the original artists impression had envisaged



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The final step was the installation of the guarding and fencing, as the system is located in a public park.

The system was commissioned and handed over in September 2008, and by the end of the year had generated almost 100,000 kWh.

