

Penllergare Trust

Project type: Hydro

Location: Penllergare Valley Woods, Swansea

Aim: Use electricity generated by a low head hydropower development to supply electricity to an onsite café and generate an additional income to support organisational aims.



About the scheme

The Penllergare Trust successfully built a 25kW Low Head Hydropower development at the upper lake in Penllergare Valley Woods on the Afon Llan, in line with the overall restoration works carried out at the park.

The incorporation of the low head hydropower development seemed fitting based on the background of the site and the opportunity that presented itself as a result of the regeneration works.

The development is projected to generate 71,000kWh per annum and use the electricity generated by a low head hydropower development to supply electricity to an onsite café and generate an additional income to support organisational aims, specifically conserve and maintain the historic environment, education and training, enhance biodiversity and provide sustainable employment and volunteer opportunities.

Partners

MannPower Consulting Ltd: Hydropower consultants who delivered technical support throughout the development and build phase. Demonstrated good understanding of the additional challenges faced by community organisations when developing hydropower systems such as this one. On-going engagement and consultancy services provided for the operation and maintenance of the system.

Ynni'r Fro: provided development officer and funding support to progress the site through the planning and licensing process.

Natural Resources Wales: provided clear communication in identifying and granting the required licensing at the site. On-going collaboration with the community relating to the site.

Bellway Homes and The Monument Trust : The Penllergare Trust paid for the installation with financial support from these organisations.

What was the outcome?

The 25kW low head hydropower development was installed over the summer of 2014 and successfully commissioned that same autumn. The development phase ran alongside the wider restoration works of the historic gardens which included the de silting of the lake which feeds the hydropower development.

The three years since the development was commissioned has seen the site successfully supply renewable energy to the onsite café and the education centre with the remainder being exported to the grid.

The annual average energy yield for the site has been 58,877kWh, which is only slightly less than what was projected in the feasibility studies. There have been a range of teething problems at the site that has reduced the annual generation but these issues have since been resolved.

What was learned?

Community acceptance is very important

The hydropower development was designed with the restoration and preservation of the historic gardens in mind. The project was expected to have minimal impact on the site however, some of the users of the valley woods were unhappy with the visual intrusion of the industrial development within a historic garden. The location of the turbine house and the topography of the surrounding lake also resulted in proliferation of the mechanical noise and significant noise intrusion was experienced as a result of the pressure change within the housing of the screw. Vandalism of the screw screening and the potential for vandalism of the turbine house and switch gear resulted in necessary changes to the site security.

Factor in volunteer time

It is very important to account for volunteer time and organisational capacity required to engage the local community and mitigate operational issues that fall outside of the scope of the maintenance carried out by the hydropower engineers. Budget needs to be available to help remedy unforeseen problems such as reducing the noise caused by the operation of the project and the damage caused by vandalism.

Fully explore and understand the development site

The low head hydropower development off takes from the upper lake in Penllergare Valley Woods. Initial advice indicated that the lake would not re silt for five to ten years but this has not been case and an additional operational cost had to be factored into the annual maintenance budget to ensure efficient future availability of flow to the turbine for continued operation.

You may need additional consultant support in the first few years of the project

The system is designed to need minimal personnel time for effective operation however, during the first couple of years there have been a number of issues with the operational setup of the system which required the help of hydropower engineers to resolve. It was important for the organisation to understand the operational characteristics of the interface systems and how these impact efficient operation. The time spent understanding the changes to the system and the expected generation as a result of rainfall allowed problems to be identified remotely. Given the additional cost required to have a consultant available to mitigate and resolve the issues it may be useful to have a price structure in place for this for the first few years.

Take steps to financially secure the site

The feed in tariff took around 12 months to secure and for payment to be received. The energy supplier chosen for the site did not advise in initial discussions that they do not provide PPA contracts for developments under 50kW. There was also a period of dry weather whereby the annual generation was significantly lower than predicted, though inline with the rainfall for the year.

By taking the necessary steps to financially secure the site you can ensure that the project does not run into cash flow problems as a result of delayed income from supporting tariffs as well as allowing for years when the system will experience a reduced flow due to a lower level of rainfall.

Welsh Government's Local Energy service support

Support was provided through the development officer service and a £113,918 grant towards aspects of the capital development at the site.

About Local Energy

The Local Energy service supports the development of locally owned renewable energy schemes through development officer support, grants and loans. To find out more visit the Local Energy website.

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