



## Hydropower Feasibility Studies - A General Guide

A feasibility study is a preliminary study undertaken to determine and document a project's viability. Hydropower projects usually have many factors that influence the projects viability from engineering issues through to licensing. The feasibility study is also a source of information on which all parties involved can make preliminary observations and decisions. The feasibility study will cover:

- Historical overview
- Topographic site analysis
- Flow analysis
- Environmental permissions
- Planning permissions
- Additional permissions
- Turbines and Ancillary Equipment
- Health and Safety
- Revenue and Cost analysis
- Funding
- Project Management
- Recommendations

The feasibility study does not aim to provide a turn key solution and will not include: detailed designs of systems or civils, on site flow measurements, sub-soil analysis, land surveys, structural surveys, plans for planning and licence applications, detailed drawings and quotations from suppliers or installers, or negotiations with agencies or authorities.

### Historical Overview

Many hydropower schemes are reinstatements of existing mill sites which may not have generated power for many years but have had a long history of industrial activity. Given the effort required to divert rivers and build leats, the original builders sited their mills at the optimal point in the river. A brief look at the history of a mill can reveal much about the local environment, including frequency and location of flooding. Anecdotal evidence can be useful in determining the nature of the site. Old photographs and plans can also be useful to reveal old sluices or watercourses that may have been built over or buried in more recent times.

### Topographical Analysis

It may be that a site has detailed plans that adequately show all watercourses and all other relevant structures. If there are no plans it is strongly recommended that a survey be conducted. A site plan will be of great use to others involved in the project such as planners and contractors, and the specific heights are crucial in determining the head, and hence output of the proposed plant. The site survey does not necessarily form part of the feasibility study and may be priced separately.

### Flow Analysis

As with determining the head it is most important to know what flows the site experiences in order to be able to size the equipment and determine output. Gauging station data is available from the Environment Agency and this can be compensated for to accurately reflect the flows at the site. If this data is not available then a Low Flows or a Hydra report may be acceptable. Calculation of the head duration curve is also important and this can generally only be done through direct observation.

## **Environmental Permissions**

Hydro power schemes will require licensing from the Environment Agency or SEPA, and determining what licenses are required is a key part of the feasibility study. The EA or SEPA is usually happy to attend the site for an initial meeting in order to identify what licenses are required as well as whether it will be necessary to carry out an environmental impact assessment or other studies. This early meeting is useful as it may well inform the direction that the feasibility study takes. Natural England, formerly English Nature, will be consulted if the site lies within, or impacts on an SSSI (Site of Special Scientific Interest), and / or an SAC (Special Area of Conservation) or another designated area. The study will identify whether the site lies within these areas.

## **Planning Permission**

It is very likely that planning permission will be required, and how stringent this is will be determined by the nature of the site and whether there are conservation issues. It is unlikely that the feasibility study will yield detailed plans on which to make an application, however, some indication as to what permissions are necessary should be included.

## **Additional Permissions**

Rivers and streams frequently form boundaries and it is often necessary to obtain permission from an adjacent landowner to allow the project to proceed. This may be due to access or operation of a sluice to control water levels. It may also be necessary to obtain permission for power lines to come over or under a neighbour's property.

## **Turbines and Ancillary Equipment**

Flow and head will tend to dictate what sort of turbine type is going to suit the site best. However there will be a fair choice of options once this point has been arrived at and it should be possible to put forward several different solutions. Installation of plant will also affect the type of system that is chosen. In addition to the turbine selection there is also ancillary equipment to be considered, such as trash rack cleaners and control systems that will facilitate plant operation.

## **Health and Safety**

Current regulations state that it is necessary to appoint a CDM Coordinator (Construction and Design Management Coordinator) [CDM Regs April 2007], at the feasibility study stage of a project to scope out any possible Health and Safety issues that may arise. This is not only important during construction but also for operation and maintenance, and the feasibility study will reflect this, in relation to the specific site.

## **Revenue and Cost analysis**

Revenue and costs will not only be determined by equipment and installation costs but also the amount of water that can be abstracted for the scheme, as determined by the Environment Agency. It should be possible to model revenue and costs across several different scenarios. Energy prices and accompanying subsidies are subject to change and where possible, this should also be part of the analysis.

## **Project Management**

Hydro schemes are complex and frequently lengthy. The feasibility study will show an estimated timeline from the present to completion, with suggestions as to how to manage the various stages of the project. This will include the impact on other activities at the site and likely extent of any disruption that may be caused.

## **Recommendations**

The feasibility study will provide enough information on which to base a decision about taking the project forward, and a recommendation will be made as to which is the best course to follow. However the feasibility study is not a turnkey solution that the client can pick up to give to a contractor. It may well be the case that the study points to areas that need further investigation, such as structural surveys or fisheries reports which are outside the scope of a feasibility report.

## **Costs**

We are happy to provide initial advice free of charge, and we should be able to get a good idea as to how long the feasibility study will take. Cost will vary depending on the complexity of the site, but in general will take anywhere from one day to a week. Please call the office on 0117 2301597 if you have any questions or require further information, or email [team@riverpower.co.uk](mailto:team@riverpower.co.uk).