

Hydro Site Assessment

Thank you for your enquiry. In order for us to give you an idea of the amount of power the RPC Hydro would produce for your site, please provide the following info:

Name:

Address:

Phone: Email:

1. Operating Voltage. The RPC Pelton Wheel (Micro Hydro Turbine) has been designed as a battery charging system. Please indicate (if known) whether the hydro turbine will be connected to a 12 volt, 24 volt or 48 volt battery bank.

Operating Volts = 12 volt 24 volt 48 volt other ...

2. Static Head (Difference in Altitude between Water Source and Hydro Turbine Site). Please also indicate the unit of measurement (metres are preferred).

Static Head = (metres)

How did you measure/estimate this: Dumpy Level Altimeter

Topographic Map Water Pressure Gauge Guess

Other:

3. Pipe Length. The total length of pipe required between the water source and the hydro turbine site (preferred measurement = metres).

Pipe Length = (metres)

Do you have a water pipe installed already? What diameter is it? We may advise you to use a larger pipe diameter in order to get optimum power.

If it is metric pipe: Outside Diameter =(mm)

If it is imperial pipe: Inside Diameter = (inches)

4. Flow Rate. Please indicate average expected flow rate for each month of the year (preferred measurement = litres per second).

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

... ..

5. Cable Run. The total distance from the potential hydro location to where the power is required.

Cable Length = (metres)

Note: If you do not understand some of the above terminology, or if you are unsure of how to measure static head and flow rate then please refer to the back of this sheet for some ideas.

The results of this survey may be combined with Load Requirements and Sizing for a Hybrid System with any combination of solar panels, wind turbine and backup (petrol/diesel/LPG generator or steam engine) charging a common battery bank. Please ask us for a Power System Sizing Form if you are interested in this service.



RAINBOW POWER COMPANY LTD

A.B.N. 74 003 323 420

1 Alternative Way, Nimbin, NSW, Australia 2480

phone: (02) 6689 1430

international: +61 2 6689 1088

fax: (02) 6689 1109

sales@rpc.com.au

www.rpc.com.au

Checking Out a Hydro Site – Head & Flow

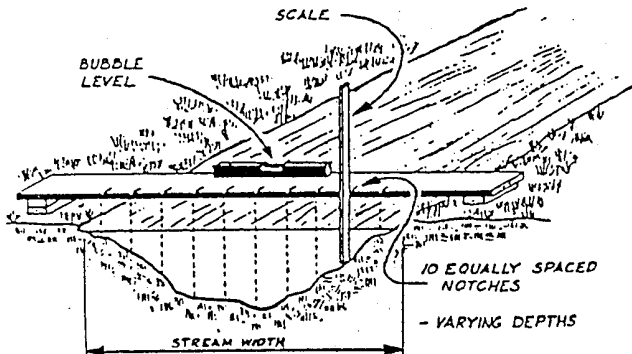
To determine the power potential of water flowing in a river or stream it is necessary to determine both the flow rate of the water and the head through which the water can be made to fall.

Flow Rate

The flow rate is the quantity of water flowing past a point in a given time. This is usually measured in litres per second.

How to Measure Flow Rate

An easy method for measuring flow rate is with a common 10 litre bucket and a stop watch. The litres per second flow rate would then 10 litres divided by the number of seconds it took to fill the bucket. This method can be employed if you have a narrow opening through a weir or a pipe operating at its maximum flow rate.



If you wish to ascertain the flow rate of a stream, when the 10 litre bucket method cannot be employed, you can get a rough idea by measuring the size (cross section) and average flow rate of the stream. For this method the speed of the mid-stream surface water is measured by timing a float. Choose a part of the stream where the cross section is regular. Measure the cross section by finding the average depth as shown, and the width. Time the float over a short distance to obtain the speed. The average speed of the whole stream can then be calculated by multiplying the measured speed by:

- 0.8 for a concrete channel
- 0.7 for an earth channel
- 0.5 for a rough hill stream

For streams less than 150 mm average depth, the factor becomes unpredictable and can be as low as 0.25. The flow rate is then equal to the distance that the float travelled multiplied by the correction factor and multiplied by the average depth and width of the stream and then divided by the number of seconds for the float to cover that distance. If the measurements are taken in metres and the float is timed in seconds, then the result multiplied by 1000 will give you the litres per second flow rate. Overall accuracy of this method is about 80%.

The water flow will always vary widely with the seasons and in some cases by a factor of several hundred. It is therefore essential to obtain as clear a picture as possible of the flow pattern and in particular the lowest flows experienced in the dry season.

What is Head of Water?

The head is the vertical height in metres from the turbine up to the point where the water enters the intake pipe (which may be at a creek, stream, dam or weir).

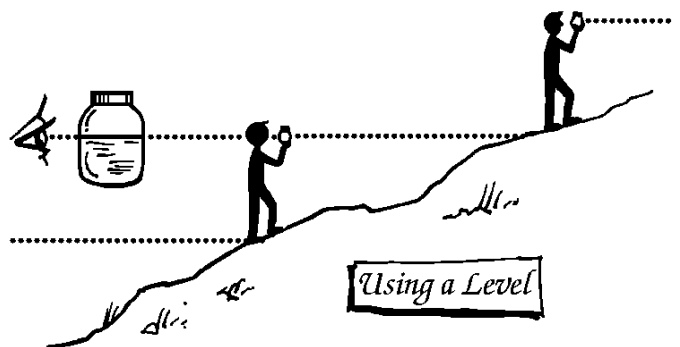
The horizontal distance or the length of the pipe-line does not create an increase in pressure. It is the vertical distance which determines the maximum pressure that can be created in a length of pipe. This vertical distance or difference in altitude is called 'head'. Because hydro-electric systems depend on water pressure to generate electricity, it is important to be able to work out either the existing or potential water pressure.

Remember that the more pressure you have, the less flow you need to create the same amount of power.

How To Measure Head

You can measure or gauge your head by one of several means:

1. **Pressure Gauge:** If you already have a pipeline installed with water flowing, it is just a matter of connecting a water pressure gauge (available from the Rainbow Power Company) to measure the pressure. The head in your situation can be worked out from the pressure that is measured. This pressure must be measured with the pipe completely filled with water (from the water source down) without any air pockets in the pipe and no water flowing in the pipe. If you have water flowing in the pipe due to taps turned on, leaks etc you will be measuring the pressure drop due to the friction in the pipe rather than your potential water pressure.
2. **Contour Map:** Locate the water source and the potential site for your hydro on a reasonably accurate contour map.
3. **Using a Level:** Another method of measuring head is to use a dumpy level or a transparent water container (eg a glass jar). With a glass jar you can get a rough idea of level and make use of this to measure head. Here is how:
 - a. starting at the lowest point (eg where the hydro may be situated)
 - b. viewing a point at eye level (horizontal) on the ground ahead by viewing through the glass over the level surface of the water to a point that you can walk up to
 - c. walking up to that point (and count the number of times you walk up to the next point)
 - d. placing your feet on that point
 - e. repeating b., c. and d. until your eyes are level with the water source (where the pipeline would begin)
 - f. Multiply the distance between your feet and your eyes by the number of times you walked up to the next point (including the final sighting)



You can improve on this way of measuring head by viewing across the level surface of a spirit level or using a long clear plastic tube filled (bar a few inches) with water. With both of these techniques you follow the same procedure as above except that you need a second person to either hold the spirit level or the other end of the plastic tube. With the plastic tube technique you can place your thumb over the end of the tube when you need to move. You may still need to carry extra water to refill the tube to counteract inevitable spillage.