

### *Dams and Spillways*

Dams are used to create a reservoir to store water and to develop the necessary water pressure known as hydraulic head. There are a variety of different types of dams used in small hydroelectric developments. The most common types are earth fill dams, rock fill dams, and concrete gravity dams.

Spillways are required to ensure that water elevations inside the reservoir do not exceed safe levels. Spillways allow for the controlled release of water to regulate reservoir water elevations without damaging the down stream habitat. To avoid damage, the excess water must be safely discharged over the dam. Carefully designed overflow passages are incorporated into dams as part of the overall structure. These overflow passages are known as spillways.

An intake structure including trashracks and a gate provide the entrance for the water into the penstock. The trashracks ensure that large solid objects such as wood or ice do not enter the penstock. Trashracks are made up of one or more panels, fabricated from a series of evenly spaced parallel metal rods. The intake gates can be opened or closed to control water flow. Automatic closure of the intake gate may happen when a generator emergency stop is initiated. These gates are also used to seal off the penstock when it needs to be drained for inspections and maintenance. The intake is generally built of reinforced concrete and is an integral part of a dam structure.

### *Penstock and Surge Tank*

The penstock carries the water from the intake structure downstream to the power house. Penstocks, which carry the water under pressure, can be made of steel, fibreglass, plastics, concrete or wood.

The water pressure in the penstock must be maintained at safe levels under all operating conditions. One of the most common ways to regulate penstock pressure is through the use of a surge tank. The surge tank must be elevated above the penstock such that it can support a column of water equal to the maximum design pressure for the penstock. If there is no surge tank, the turbine must be fitted with a large pressure relief valve to accomplish the same functionality.