Chapter 2: Sloy Pumped Hydro Storage Scheme: The Existing Hydroelectric Scheme

Chapter 2: The Existing Hydroelectric Scheme - Contents

Figures

There are no figures associated with this Chapter.

Appendices

There are no appendices associated with this Chapter.

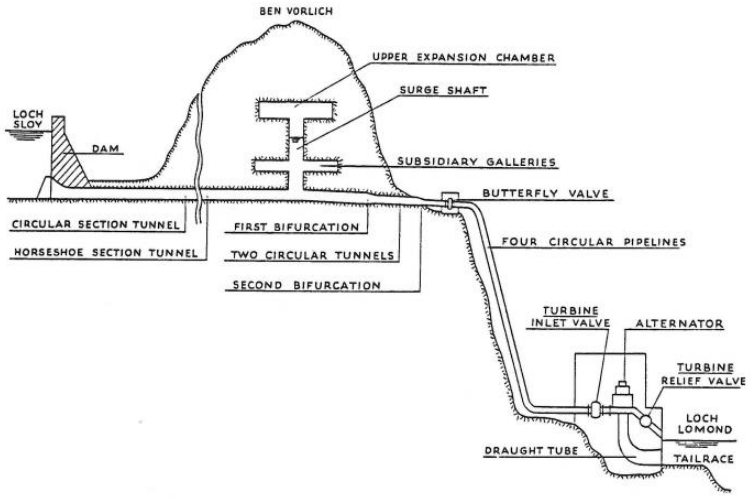
2. The Existing Hydroelectric Scheme

2.1. Introduction

The existing Sloy Hydroelectric Power Station came into operation in 1950. It makes use of the waters of Loch Sloy, the surface of which now lies at 285m above sea level and the steep slope down to the shores of Loch Lomond, lying at less than 10m above sea level but only 4km away. Such a difference in height within a small horizontal distance offered ideal conditions for the development of the scheme. Sloy Dam (55m high and 357m long), raised the surface level of the loch by about 47m and doubled its length. A system of aqueducts and tunnels were built to divert water into Loch Sloy from areas well to the north and south, significantly increasing the catchment.

From Loch Sloy the water is carried over 3km by a tunnel through Ben Vorlich, which towers almost 940m above Loch Lomond. The water then falls down the side of the mountain in 4 steel penstocks to the power station at Inveruglas Bay. A surge shaft and surge chamber, built into the tunnel system near its outlet, cope with variations in pressure during the operation of the turbines.

Plate 2.1: Cross Section of the Existing Sloy Hydroelectric Scheme



Inside the power station, four Francis Turbines drive four vertical shaft generating sets. Currently, three of these sets are rated 40MW and the fourth is rated 32.5MW. There is also a 450kW Pelton Turbine for emergency supplies. Energy is exported to the grid via 132kV overhead lines connected to the nearby Sloy Substation. With an installed capacity of 152.5MW Sloy is the UK's largest conventional hydroelectric scheme.

Sloy Dam, with a spillway crest level at 285m above sea level has an operational range of approximately 25m and when full, holds 36 million cubic metres of water. The operational storage capacity of Loch Sloy is approximately 15GWh.

Sloy Hydroelectric Power Station generates around 130GWh per year of average rainfall, with a rated capacity of 152.5MW this gives a load factor of approximately 10%. This means that for the equivalent of 90% of the time there is inadequate water in Loch Sloy to generate, Sloy is therefore generally run only at times of peak demand.

The Proposed Development would enable water to be pumped up to Loch Sloy at times of low demand or oversupply enabling the load factor at the existing power station to increase from 10% to (up to) 20%, minimising the likelihood of renewable energy from other sources being constrained off the grid during times of low demand.