



GALLOWAY HYDROS FLOOD MANAGEMENT FACTSHEET



OVERVIEW

The Galloway hydro-electric scheme is operated by ScottishPower in line with regulations and licence conditions that are designed

to uphold public safety and protect the environment.

With flood conditions becoming more common, the Galloway Hydros can

find itself implicated, when, in fact, the scheme actually contributes to flood alleviation. This leaflet describes the regulations

and rules under which ScottishPower operates the Galloway scheme and the extent of its influence on flood management.

UPHOLDING PUBLIC SAFETY, PROTECTING THE ENVIRONMENT

The Galloway Hydros was the first large-scale integrated hydro-electric complex to be built in Britain for the purpose of public electricity supply.

The scheme was built by the Galloway Water Power Company, which was incorporated under an Act of Parliament in 1929.

It consists of six stations with an installed capacity of 109 MW, eight dams plus a network of tunnels, aqueducts and pipelines. The scheme is controlled from Glenlee Power Station, near St John's Town of Dalry.

Since the scheme was completed in the mid 1930s, local records show that average annual rainfall in the area has increased by around 20%.

This has led to flooding becoming a more regular occurrence.

Whilst the hydro scheme's reservoirs can store a certain amount of water, helping to alleviate flooding, they were not built as flood defence structures.

The volumes of water involved in some flooding incidents are far in excess of the available storage capacity of the scheme's reservoirs.



■ *Left, visitors to Tongland Dam, above, the de-watered Kendoon Canal and, below, floodgates open at Tongland*



REQUIREMENTS OF REGULATION

ScottishPower is licensed to use water for power generation under the Water Environment (Controlled Activities) Scotland Regulations 2005.

It is a condition of our licence that the operation of the reservoirs that form the Galloway Hydros shall not exacerbate flooding that would occur under natural conditions.

This means that we restrict the amount of water we release from Loch Doon and Clatteringshaws Reservoir for electricity generation during flood conditions to avoid sending more water downstream.

However, when rainfall is heavy and sustained, these reservoirs can rise to levels where they begin to spill.

To control dam levels in the interests of public safety, water has to be released through the turbines or the dam gates.

ScottishPower must also operate its reservoirs and dams responsibly, in the interests of public safety, under the Reservoirs Act 1975.

We have produced a DVD and information sheet on water safety for local schools.

CONTACT US

Galloway hydro-electric scheme

Glenlee Power Station,
New Galloway,
Kirkcudbrightshire DG7 3SF
telephone: 01644 430238

web: www.spenergywholesale.com

email: visit.hydros@scottishpower.com



■ *The Kendoon surge tower*

CATCHMENT AREA AND ANNUAL RAINFALL

The Galloway Hydros has a catchment area of 1,344 square kilometres that includes parts of South Ayrshire and much of Galloway region.

Average recorded annual rainfall for the catchment area was 1,678mm over the 30 years from 1971 to 2000, compared with a Scottish average of 1,521mm.

However rainfall patterns vary widely between the north and south of the scheme.

Rainfall in the northerly catchment areas that feed Loch Doon and Clatteringshaws Reservoir can reach over 2,000mm annually, while the southern areas of Loch Ken and Tongland receive around half that at 1,200mm.

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HOW THE SCHEME HELPS TO REDUCE THE IMPACT OF FLOODING

The construction of the Galloway Hydros has served to reduce and mitigate the impact of flooding in the area.

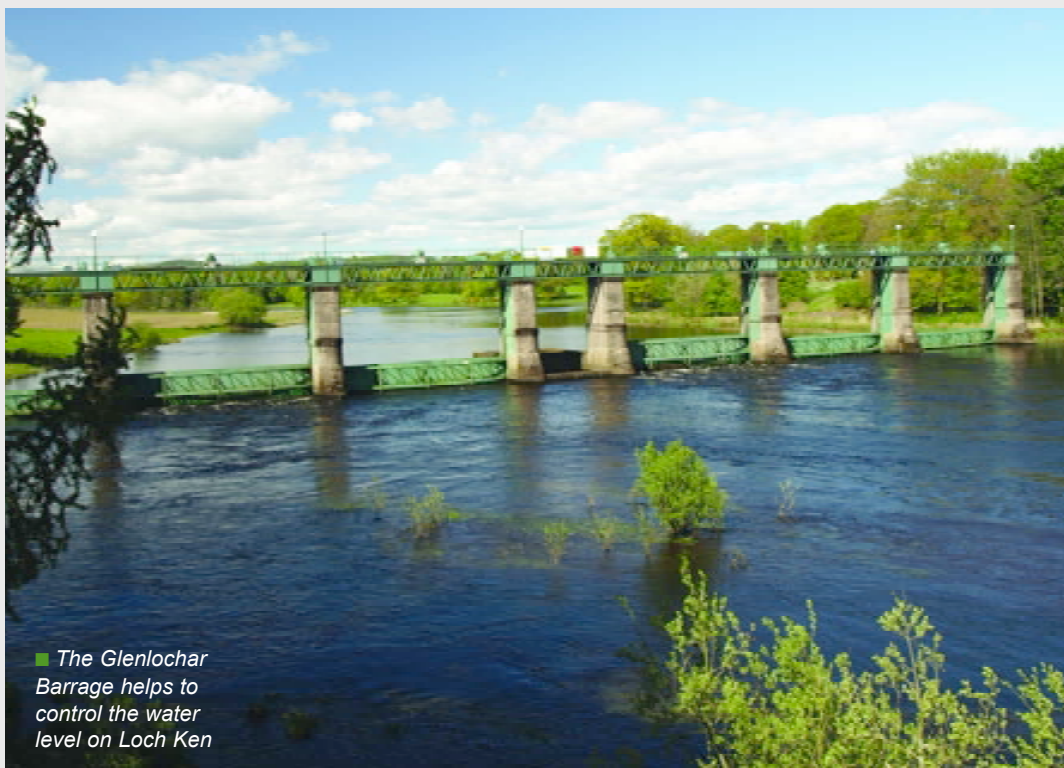
The large storage capacity of its two main reservoirs, Loch Doon and Clatteringshaws, allows water to be stored in times of heavy rainfall and released later in a controlled fashion.

ScottishPower also monitors river levels in the higher, northerly parts of the scheme and can react to the threat of flood by lowering reservoir levels and alerting stakeholders by telephone with flood warnings.

This gives individuals time to take any necessary precautions, such as moving livestock to a safer location.

Without these water management features provided by the scheme the impact of flooding could be far greater.

However, in extreme circumstances, or when rain falls persistently over a period of many weeks, floodwater can spill over dams or through floodgates and there is limited action that ScottishPower can take.



■ *The Glenlocharr Barrage helps to control the water level on Loch Ken*



■ *Loch Doon, above, provides storage in times of heavy rainfall and, below, the formidable Clatteringshaws Dam*



OPERATION OF THE RESERVOIRS

The storage reservoirs at Loch Doon and Clatteringshaws have considerable capacity to store water during periods of heavy rain that could otherwise contribute to flooding downstream.

Loch Doon has a surface area of 7.125 km² and can therefore store an additional 7.125 million cubic metres for every metre rise in water level.

The corresponding figure for Clatteringshaws Loch is an additional 3.94 million cubic metres for every metre rise in water level.

In addition, rainfall patterns at the sites vary, so it is possible to release water from them at different times to

reduce the downstream peak of a flood.

CLATTERINGSHAW RESERVOIR

It is normal for Clatteringshaws Dam to spill every couple of years, increasing flows down the Blackwater of Dee.

This raises the level of Loch Ken and increases the flow in the River Dee down to Tongland.

The gates on the barrage at Glenlocharr automatically lift clear of the water when levels in Loch Ken reach 148ft above sea level – the upper limit of its normal operating range.

This allows the unrestricted flow of water out of Loch Ken, returning the

loch to conditions that would have existed before the scheme was built.

When Loch Ken is within its normal range of 144ft-148ft, the flow from Glenlocharr is limited to the volume of water it takes to run two generators at full load at Tongland Power Station.

ScottishPower strives to maintain Loch Ken at certain levels during the bird-nesting season at the request of the RSPB, to avoid flooding out nests of waterfowl and waders.

LOCH DOON

Spilling at Loch Doon dam occurs less frequently – the spillway siphons on its

dam have only once been brought into operation, 15 years after the scheme began operation.

When the loch level reaches 697ft above sea level, ScottishPower puts additional water through Drumjohn Power Station and releases compensation water down the River Doon, avoiding the need to operate the spillway siphons.

OTHER RESERVOIRS

Every reservoir in the scheme has a spillway over which water can flow during periods of flooding.

However, the smaller reservoirs at

Kendon, Carsfad, Earlstoun and Tongland have limited storage capacity and can hold only a few hours' worth of floodwater

The spillways on the dams at Earlstoun and Tongland are shorter but these dams also have floodgates that are used to control the reservoir level within its design limits. The typical maximum spillway design limit is for three feet of water.

The flood banks that extend from Earlstoun Dam to below Glenlocharr Barrage were built around 1850 – long before the hydro scheme was built.

They were constructed by French prisoners of war.