

Hydro-Electric Projects in North Wales

The British Electricity Authority is putting before the present session of Parliament a Private Bill which deals with extensions of the existing hydro-electric power works at Dolgarrog and Maentwrog and with the construction of a new hydro-electric scheme in the vicinity of Blaenau Ffestiniog

THE present Dolgarrog power station operates on two separate pressure heads, a high head of 1,178 ft. gross from the Cowlyd reservoir in the Carnedd range and a lower head of 855 ft. gross from the small Coedyt reservoir above Dolgarrog. The new catchment area to be brought in is on the lower-head section and

water collected by leat or open aqueduct in this area will be fed into the Coedyt reservoir. The proposals involve the diversion of head waters from the Afon Tafalog or river Ro and abstractions from the Afon Dulyd with other small tributaries. Compensation water will be provided for the Ro and the Afon Dulyd,



Fig. 1. Proposed site of the lower storage reservoir on the Afon Ystradau, Ffestiniog project



Fig. 2. Artist's impression of the lower storage reservoir on the Afon Ystradau

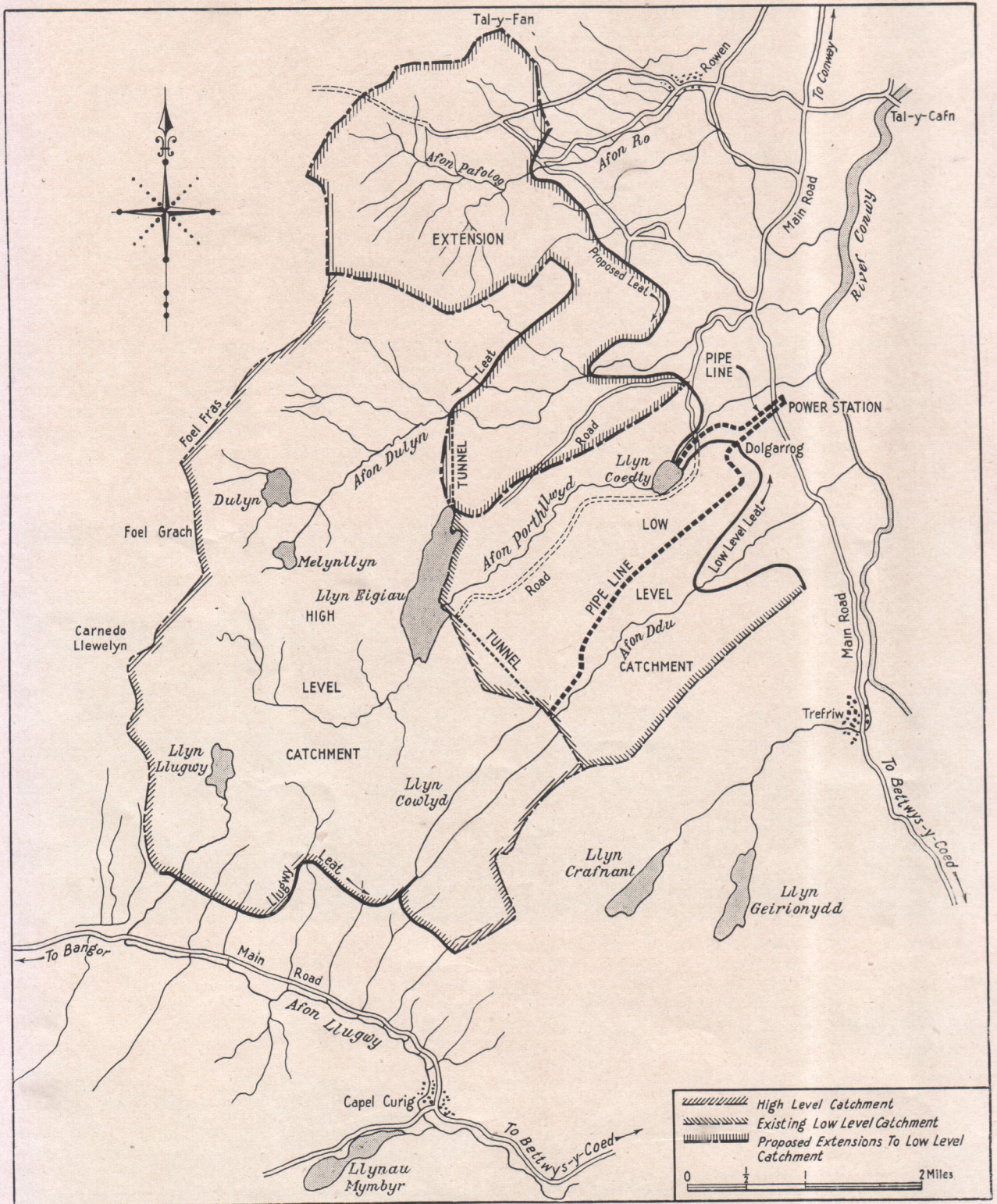


Fig. 3. Map showing the proposed Dolgarrog extension

and piped water supplies will be made available to any farms which are affected along the course of the aqueduct. The existing low-level catchment area will be increased from about 3,400 acres to about 6,800 acres. The scheme is outlined in Fig. 3. Incidentally, Llyn Cowlyd in this figure should have been shown shaded.

In order to make the best use of the extra water runoff from this additional catchment and for better

utilisation of the existing high-level storage it is proposed to install two further Pelton-wheel turbo-alternators in extensions to the existing Dolgarrog station, which will increase its normal output capacity from some 18 MW to 28 MW. The existing output of the station will be increased by these means by 13.5 million units per annum above its present average value of some 42 million units.

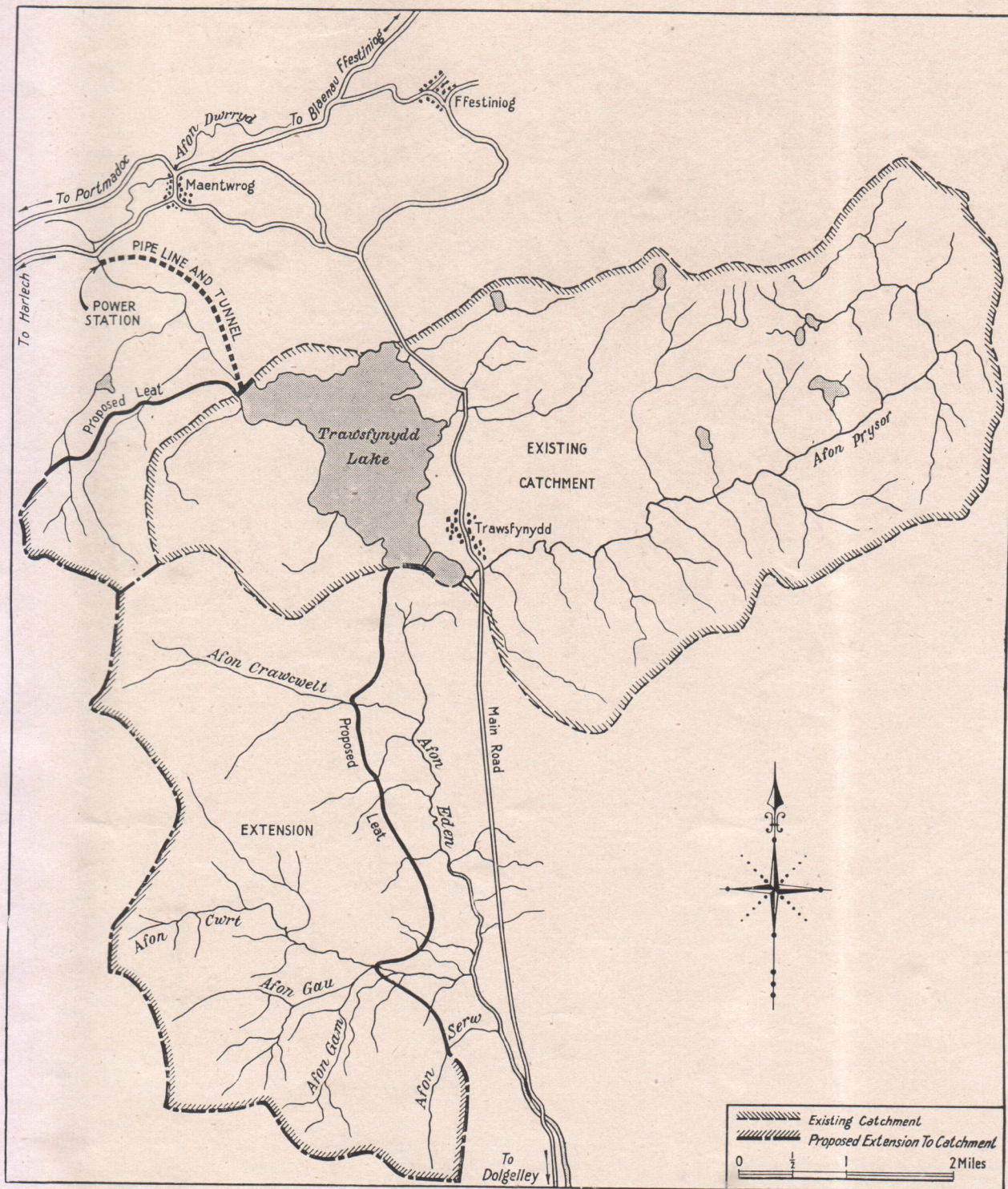


Fig. 4. Map showing the proposed Maentwrog extension

Maentwrog Extension

The existing station at Maentwrog draws on a catchment area of some 22 square miles above and adjacent to the Trawsfynydd reservoir, which forms part of the natural watershed of the river Prysor. The proposed new works would add indirect catchment amounting to approximately 13 square miles and would increase existing generation from 30 million units by 22 million in an average year. The existing generating plant of four 6 MW sets would remain unchanged. The addi-

tional catchment would be obtained by the construction of two leats or open aqueducts, the Ardudwy leat, which would divert water from 11½ square miles on a part of the adjacent catchment area of the Afon Eden, and the Llenyrch leat which would add a further 1½ square miles from the Afon-y-Glyn and Prysor catchment west of Trawsfynydd Lake.

The Ardudwy leat will divert water from five streams, viz., the Afon Crawswell, the Afon Cwrt, the Afon Gau, the Afon Gain and the Afon Serw, all

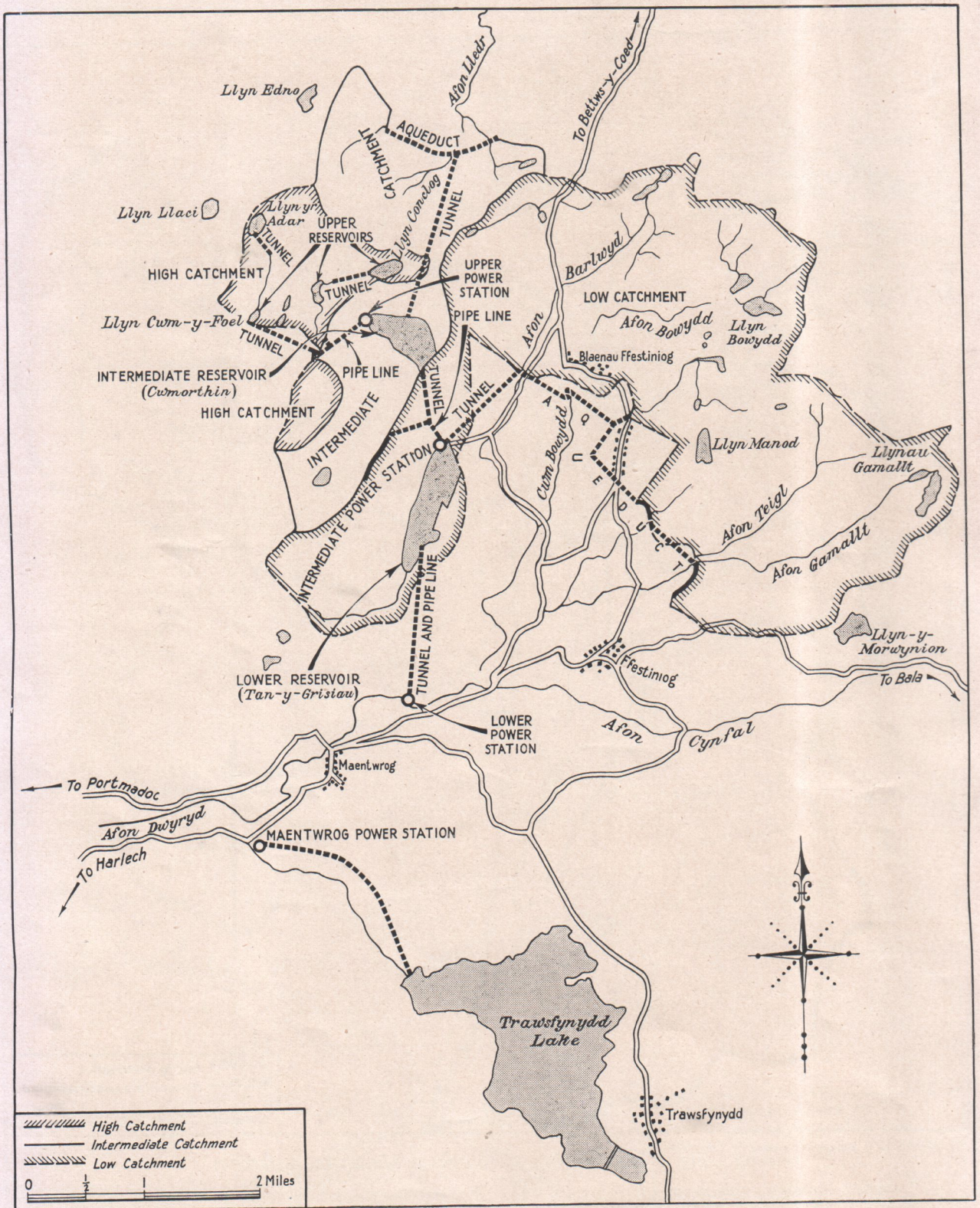


Fig. 5. Map of the Ffestiniog project

tributaries of the Afon Eden, which rises immediately south of the Trawsfynydd reservoir. The total length of this lead will be $6\frac{1}{2}$ miles (see Fig. 4).

The Llenyrch lead will divert water from the Ceunant Gewr, a tributary of the Prysor, and also the head waters of the Afon-y-Glyn, a tributary of the Afon Dwyryd. This lead will be about $1\frac{1}{4}$ miles in length.

Ffestiniog Project

The arrangement proposed is a three-stage development with reservoirs Llynnoedd Conglog, Corsiog Adar and Cwm-y-Foel, the last-named at an operating level of 1,460 ft. O.D. for the upper stage, Llyn Cwmorthin at 1,123 ft. O.D. for the intermediate stage and a reservoir on a site at Tan-y-Grisiau at a level of 645 ft.

O.D. for the lower stage. The lowest generating station will discharge at a level of below 20 ft. O.D. and the gross head utilised will be about 1,400 ft. through the three stages. The scheme is shown in Fig. 5.

The catchment area is in the northern part of the County of Merionethshire and consists of mountainous country surrounding the slate-mining town of Blaenau Ffestiniog, which is some five miles from the existing Maentwrog hydro-electric station. The land, being high lying, is used chiefly for grazing, but includes numerous slate mines, now mostly disused, and also the town of Blaenau Ffestiniog and the adjoining village of Tan-y-Grisiau. This area is almost entirely excluded from the North Wales National Park, mainly on account of the despoliation of amenity values through former slate mining. The natural catchment drains into the Afon Dwyryd in the Vale of Ffestiniog. It will be increased by the diversion, by leats and tunnels, of water from adjacent watersheds situated to the North and West of Blaenau Ffestiniog, including a small area in Caernarvonshire.

Storage will be provided for the upper stage by the enlargement of the two natural lakes, Llyn Conglog and Llyn Corsiog, and in the existing reservoir at Llyn Cwm-y-Foel. A new dam will be built at Llyn Conglog about 27 ft. high and another at Llyn Corsiog about 22 ft. high. The water from these two storages will be controlled by hand valves and conveyed to Llyn Cwm-y-Foel reservoir along an improved watercourse to a shaft leading to a pressure tunnel. These works will provide a storage of 25 million cu. ft. at a level of 1,460 ft. O.D. This is equivalent to 0.15 million kWh in the upper stage and 0.70 million kWh through all three stages of the development.

Llyn Cwm-y-Foel will be directly connected to the upper generating station by means of a pressure tunnel of about 6 ft. in diameter terminating in a 4ft. diameter pressure pipe on a total length of a mile. Connections to the pressure tunnel by shaft will be made to receive water from Llyn Conglog and Llyn Corsiog as stated. When the station is not operating, the flow in the pressure tunnel will be reversed and the water from this source will increase the storage in Llyn Cwm-y-Foel. The generating station, which will be situated at the upper end of the intermediate reservoir (Llyn Cwmorthin), will operate within a mean head of 320 ft., and the plant capacity proposed is 2.5 MW. The output expected in an average year is $2\frac{1}{2}$ million kWh.

The direct catchment for the intermediate stage will be supplied from the upper-stage catchment and from the southern slopes of Moel Druman and the northern slope of Moel-yr Hydd, which drain into Llyn Cwmorthin. The total area will be about 0.95 square miles, with an average rainfall varying between 120 and 140 in. per annum. Indirect catchment will be diverted to provide a total gathering ground for this stage of about 3.25 square miles, excluding the upper stage. The indirect catchments will be obtained from the northern side of Moel Druman by an open aqueduct about a mile long, taking water from head streams of the Afon Lledr and a tunnel about 6 ft. diameter and $1\frac{1}{2}$ miles in length, through Moel Druman to Llyn Cwmorthin, and also from the head waters of the Afon Stwlan. The intermediate reservoir will be formed in Llyn Cwmorthin by raising the level from 1,049 ft. O.D. 1,123 ft. O.D. by a dam about 80 ft. high and 1,170 ft. long at the lower end of the lake. The storage provided in this reservoir will amount to 265 million cu. ft., equivalent

to 5.60 million kWh when developed through the two lower stages of the development. The water will be conveyed from Llyn Cwmorthin by a tunnel about 6 ft. diameter, the lower end of which will be joined to the generating station by a steel pipeline on the hillside about 5 ft. diameter and 1,500 ft. long. The generating station for the intermediate stage will be at the southern extremity of the village of Tan-y-Grisiau and will operate under a mean head of 455 ft. The capacity proposed is 12 MW. The average annual output will be 10.5 million kWh.

The lower reservoir will be formed in the natural basin on the Afon Ystradau near Tan-y-Grisiau. The general level of the basin is about 590 ft. O.D. and the dam, about 65 ft. high, will provide a reservoir with a top water level of 645 ft. O.D. and a storage of 222 million cu. ft. Allowing for the reservation of compensation water, there will be 208 million cu. ft. available for power purposes.

The water will be conveyed from this reservoir to the power station by pressure tunnel, about 8 ft. diameter, on a total length of about $1\frac{1}{2}$ miles. The station will be on the right bank of the river Dwyryd in the Vale of Ffestiniog, about a mile upstream of the village of Maentwrog. The mean operating head of the station will be 600 ft. and the output in an average year will be 36 million kWh. The plant capacity proposed is 21 MW. The total power capacity of the scheme will be 35.5 MW and the total output in an average year will be 49 million kWh. Figs. 1 and 2 show existing conditions on the Afon Ystradau near Tan-y-Grisiau and the conditions as they will be when the proposed lower dam is completed.

Control Battle for Japanese Hydro

A brisk battle over government control versus private enterprise has developed in Japan over proposals for the development of water power.

The Japanese government's Electric Power Development Bill, recently introduced in the National Diet, provides for the development of hydro-electric power by a special semi-government corporation capitalised at £100,000,000. The Public Utilities Commission—the government agency controlling electricity production in Japan—is opposed to the measure and advocates the formation of a private development company with the nine existing regional power companies as the nucleus. To which the Economic Stabilisation Board and the ruling Liberal Party retort that the nine companies have not the capacity to raise the huge sums necessary for power development, and further, that as government money must be used in large amounts, the government must exercise control.

Public Utilities Commission statistics state that the development plan will create 5,600,000 kW of hydro-electric power and 1,520,000 kW of steam-generated power—a total of 7,440,000 kW (including additional power from the improvement of existing installations) by 1956.

Advocates of private enterprise assert that it would prove more efficient than bureaucracy, that foreign investors would prefer to place their money with private operators, that a powerful single corporation would be tantamount to the revival of the wartime monopolistic "Japan Power Generation and Transmission Company," and that the progressive development of the existing nine regional power companies would be crushed.