MIENA DAM No. 2

Tasmania

Submission for an

HISTORIC ENGINEERING MARKER

from

The Engineering Heritage Committee
Tasmania Division
The Institution of Engineers, Australia

April 2000

MIENA DAM No. 2

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INTRODUCTION

The Great Lake is a large natural storage located on Tasmania's central plateau 1000 metres above sea level. The natural outflow from the lake passes down the Shannon River in a southerly direction.

The potential for hydro-electric power generation was recognised by Mault in 1897, and in 1901 he prepared a report for the Tasmanian government suggesting a large reservoir at the Great Lake and a series of dynamos on the Shannon River. A more feasible proposal arose in 1904 when a local land owner pointed out that a diversion of Shannon River into the nearby Ouse River would involve a drop of at least 300 metres.

In 1909 the Complex Ores Company needed electrical power to smelt zinc ores from Broken Hill and the company gained approval to develop the Shannon-Ouse scheme. Construction began in 1910 but the company had difficulty in raising sufficient capital and the government took over the works in progress in 1914. When the first stage was commissioned by the Hydro-Electric Department in 1916, the power station at Waddamana had a capacity of 7MW and the transmission line supplied the City of Hobart.

Releases from the Great Lake were controlled by a small dam (Miena Dam No 1) at the outlet to the Shannon River. The lake itself was quite shallow.

In response to demand from the Carbide Works at Electrona and the proposed Electrolytic Zinc Works in Hobart, more water, more storage and more generators were required. By 1923, Liawenee Canal was diverting the upper Ouse River into the Great Lake, the Miena No 2 Dam had enlarged the storage capacity by a factor of four, and the station capacity had been increased to 49MW.

To enlarge the storage, the Department needed a dam 360 metres long and 12 metres high above riverbed level. It was located in a remote area with poor roads. A multiple arch buttress dam was chosen because its slender buttresses and arches required the minimum quantity of concrete. Some cement and other construction materials were landed in the north of the State and transported the last 24 kilometres to the dam site by boat. The men walked in and lived in their own tents. Conditions in winter were freezing with frequent snowfalls. Nevertheless the dam was soundly-constructed and served its purpose well for 45 years.

In 1967 the capacity of the Great Lake was increased again by the construction of a higher rockfill dam immediately downstream of Miena Dam No 2. As a result Miena Dam No. 2 is periodically submerged.

Waddamana Power Station was awarded a National Engineering Landmark in 1995.

Commemorative Plaque Nomination Form

Date..............................

To:

Commemorative Plaque Sub-Committee
The Institution of Engineers, Australia
Engineering House
11 National Circuit
BARTON ACT 2000

From…***Tasmania Division***
Nominating Body

The following work is nominated for an ***Historic Engineering Marker***

Name of work............................***MIENA DAM No. 2***

Location, including address and map grid reference if a fixed work

At the southern end of the Great Lake, Grid reference E 477 000 N 352 000

Owner..***Hydro-Electric Corporation***

The owner has been advised of the nomination of the work and has given approval

Copy of letter attached

Access to site.............................***By road***

Future care and maintenance of the work.... ***Will be maintained by the Hydro-Electric Corporation as part of the Great Lake Power Development.***

Name of sponsor........................***Engineering Heritage Committee, Tasmania Division***

…………………………………………
Chairperson of Nominating Committee

…………………………………………………
Chairperson of Division Heritage Committee

ADDITIONAL SUPPORTING INFORMATION

Name of work................. ***MIENA DAM No. 2***

Year of construction or manufacture…***1918-1922***

Period of operation...................................***1922-1967***

Physical condition ....***Good (submerged 1967)***

Engineering Heritage Significance:

Technological/scientific value............. ***Yes***

Historical value .... ***Yes***

Social value .... ***Yes***

Landscape or townscape value................. ***Not applicable***

Rarity.. ***Moderate***

Representativeness .... ***A good example***

Contribution to the nation or region .... ***Yes***

Contribution to engineering...................... ***Yes***

Persons associated with the work ...... ***Yes***

Integrity.. ***Sound; some superficial frost damage***

Authenticity.. ***Complete***

Comparable works (a) in Australia...... ***Yes***

(b) overseas .... ***Yes***

Statement of significance, its location in the supporting doco…***Page ??***

Citation (70 words is optimum)…..

Miena Dam No. 2

This multiple arch buttress dam, designed and constructed by the Hydro-Electric Department, was completed in 1922 to increase the storage of the Great Lake and regulate the flow to the Waddamana Power Station. The design minimised the concrete required in a remote area with difficult access. The dam was the second longest of its type in the world. It has been periodically submerged since a higher dam was built in 1967.

Dedicated by the Institution of Engineers, Australia

2000

Attachments to submission (if any)....................

Proposed location of plaque (if not a site)..........

MIENA DAM No. 2

STATEMENT OF SIGNIFICANCE

GENERAL

Miena Dam No. 2 has been nominated for listing on the Register of the National Estate. For that purpose a comprehensive Nomination was prepared in accordance with Australian Heritage Commission requirements. In that document the heritage significance of the dam was tested against nine National Estate criteria.

As one would expect, there is considerable overlap between the criteria for National Estate listing and the criteria for the award of an Historic Engineering Marker. This submission has drawn freely upon the text and illustrations in the Nomination.

TECHNOLOGICAL/SCIENTIFIC VALUE

The first multiple arch buttress dam in Australia was Junction Reefs Dam in New South Wales which was completed in 1897. It is 18 metres high and 43 metres long, and its buttresses and arches were built of brickwork.

The second dam of this type is Miena Dam No. 2. It is the first such dam in Australia to be constructed of reinforced concrete. Its maximum height of 27 metres (above lowest foundation) and length of 360 metres made it a much larger undertaking. The choice of dam type was significant given the primitive means of access to the site for importing construction materials.

When the dam was superseded in 1967, the reinforced concrete in the structure was still sound, showing that good quality concrete was produced in the 1920s despite the harsh weather conditions in winter. The dam also demonstrates that such concrete can withstand 45 years of fluctuating climatic conditions including frost, ice and snow. Periodic battering by waves and logs damaged the concrete handrails along the crest walkway but not the dam proper.

HISTORICAL VALUE

The dam is associated with a significant expansion of the Waddamana Power Scheme to supply the Carbide Works at Electrona and the Electrolytic Zinc Works in Hobart. *It became an integral part of the first hydro-electric public supply system in Australia. Yes or no??*

The increased summer flow down the Shannon River produced an annual fishing phenomenon known as the "Shannon Rise" which comprised the hatching of Snow Caddis Moth *Asmicridea grisea* in their thousands. The moths attracted brown and rainbow trout in large numbers, and these in turn attracted fly fishermen from around the world. The Shannon Rise came to an end in 1962 when the Great Lake water was diverted northwards to the new Poatina Power Scheme.

SOCIAL VALUE

The construction of the dam over 4 years brought people to a very sparsely populated area. Many stayed in the general area, working on farms and later on hydro-electric constructions, giving benefit to the local communities.

The enlarged lake occupied an area of 150 km^2 and became very popular trout fishing In time hundreds of fishing lodges were erected.

LANDSCAPE VALUE

The concrete dam was a significant landmark clearly visible from the adjacent Lake Highway.

RARITY

Only four multiple arch dams have been constructed in Australia: Junctions Reefs, NSW,1897; Miena No. 2, 1922; Ingleburn, NSW, 1934; and Julius, Qld, 1976. Miena No 2 is therefore one of a very small group. There are another 12 buttress dams of different types in Australia.

REPRESENTATIVENESS

The dam is a good example of this type of dam. The upstream face slopes at 60^0 to the horizontal and the buttresses are stiffened against buckling by horizontal struts at two levels.

CONTRIBUTION TO REGION

The main contribution was the supply of electricity to the population centres and of low cost power to a new industry, the reduction of zinc ores to zinc metal using the electrolytic process. That industry is still operating today, using ore mined on the west coast of Tasmania.

CONTRIBUTION TO ENGINEERING

The dam is a well-constructed example of an uncommon type of dam, built at a high elevation in a remote area. Its construction fully is described in a paper published by the IEAust (Bastow, 1926).

PERSONS ASSOCIATED WITH THE WORK

Several of the engineers in the Hydro-Electric Department associated with the design and construction became very eminent in their fields.

J.H.Butters	Chief Engineer and General Manager, HED. (later Commissioner, Federal Capital Commission, and Federal President I E Aust 1927-28)
C.C.Halkyard	Design Engineer (later Chief Engineer, Humes Ltd)
W.E.McLean	Resident Engineer, Great Lake Dam Construction (later HEC Commissioner, 1933-1946)
A.H.Bastow	Engineer for Hydraulic Construction

INTEGRITY

The structure was in sound physical condition when it was superseded in 1967, except for the removal of the handrails which had been damaged by wave action and logs.

AUTHENTICITY

A genuine and impressive example of a large multiple arch buttress dam.

COMPARABLE WORKS

(a) One of only four in Australia, easily the longest. Its height was not exceeded until 1976. See "Rarity" above.

(b) The world's first multiple arch buttress dam was the 15 metre high Meer Allum Dam in India completed in 1806. It was 900 metres long and had vertical masonry arches spanning between masonry buttresses spaced up to 45 metres apart. A number of other multiple arch buttress dams are listed in the World Register of Dams.

REFERENCES

1. A MAULT, "Great Lake and Its Water Power", *Proceedings Royal Society of Tasmania*, 1897, pp.XVII-XX.

2. A J GILLIES, *Tasmania's Struggle for Power*, MF and CA Lillas, 1984, pp.13-19.

3. H H McFIE, "Great Lake, Tasmania and Waddamana Hydro-Electric Power Development, First (1916) and Second (1923) Stages, an Engineering Heritage Perspective." *First Australasian Conference on Engineering Heritage,* Christchurch, N.Z., 1994, pp.61-69.

4. R H WIGRAM, *The Shannon Rise*, Launceston 1953, p.11.

5. A H BASTOW, "Construction of a Multiple Arch Dam at Miena", *Journal IE Aust*., Vol.VII, No.3, 1926, pp.65-94.

6. *The Hydro-Electric Power of Tasmania*, Hydro-Electric Dept of Tasmania, Tait Publishing Co, Melbourne, 1925, pp.65.

7. Waddamana A Power Station. *Submission for a National Engineering Landmark,* Institution of Engineers, Australia, Tasmania Division 1994.

2.2 Historical Summary

Originally the Central Plateau of Tasmania was inhabited by the Big River (ie Ouse River) or Lairmairrener Aborigines. Their tribal area included the valleys of the main tributaries of the Derwent River, the Ouse, Clyde, Dee and Shannon, and the associated plains country around the principal lakes, Great, Echo, Sorell, Crescent and two Arthurs. Most of this country has an altitude of over two thousand feet (600 metres) and is exposed to sudden extremes of weather. The Great Lake is at an altitude of 3380 feet (1030 metres) with the plateau just to the west rising to 3900 feet (1170 metres).

The Aborigines visited the Great Lake country during the summer to take advantage of the abundant game, both kangaroo and water bird. In addition there was the intoxicating sap of the Cider Gum (E gunii) which also attracted visits from other tribes. The Aborigines frequently burnt the plains or marshes.

In the early years of European occupation of the Van Diemen's Land, the colony's food supplies dwindled and free settlers and convicts alike were encouraged to hunt for kangaroo. One such kangaroo hunter and ex-bushranger was Thomas Toombs, the first white man to discover the Great Lake in 1815. He also discovered Toombs Marsh on the Macquarie River, the site of an irrigation storage dam built in 1840.

In December 1817 John Beaumont, protégé of Lt Governor Thomas Davey, officially discovered the Great Lake. The country traversed to the Great Lake was a mixture of barren (mostly stoney) and fine grazing land but the extremely poor weather, hail and snow, combined with poor drainage near the Shannon River made Beaumont doubt the area's potential for European habitation. In evidence to Commissioner Bigge in 1820 he revealed that he had further explored the region, though the dates are by no means certain. One companion, Jones, had walked around the Great Lake in five days (1).

It was not long before landholders in the Bothwell, Clyde and Ouse area began to run sheep and cattle on summer grazing around Miena, establishing several huts for their convict shepherds. Summer grazing is still common today but is being discouraged due to the soil degradation it causes.

In 1824 a private party led by Mr Barker, a Hobart businessman, took a boat to the Great Lake intending to make a detailed survey of the lake. They found the lake which had a circumference of 120km was 32km long and 16km wide. It contained five islands which were mostly covered by pencil pines. At its deepest the lake was 5.4m deep but in most parts was only one metre deep (2).

In March 1825 surveyor John Wedge explored the Great Lake area, passing through the later site of Miena Dam at the Shannon River's exit from the lake. In his diary Wedge makes particular note of the soil he encountered, his troubles with his bullock team which kept getting bogged, but little else! (3)

George Augustus Robinson camped on the dam site on the 4th December 1831 during his search for the Big River Tribe accompanied by Trugunanna (Trugunini) and other Aborigines. He wrote in his journal -

> The Great Lake was not more than a quarter of a mile distant and in one part we could distinctly see the swans on the water. ..... Some of the natives from the south that had not before visited these parts seemed struck with amaze on catching the first glimpse of this spacious water and called out ironically that it was the sea. The scenery was new to me and had a singular appearance. It represents a large expanse of water and was surrounded by some expansive tracts of clear country but the hills in every direction had the appearance of being low. Kangaroo was in abundance and are mostly of a cream colour [rare].....
>
> Proceeded to the lake and encamped at the source of the Shannon River on the banks of the lake [ie at the Miena dam site].(4)

The Aborigines with Robinson found several freshly slaughtered kangaroos indicating that the Big River Tribe were near but they were not in a hurry to meet a tribe with such a ferocious reputation. They observed two convict shepherds on the other side of the Shannon. Another shepherd had barricaded himself in his hut because of the presence of the Big River Aborigines. The next day Robinson noted that "the Great Lake had a fine appearance and the strong northerly wind on the face of the water had agitated the waters and the white foam gave it the appearance of the sea in miniature."

They found a platypus hole on the bank of the Shannon and the Aborigines proceeded to dig it out for Robinson's benefit.

In 1837 there was a great frost which killed thousands of trees in the surrounding area and the Great Lake froze over.

Trout were successfully introduced to Tasmania in 1864 and the major lakes and rivers were soon stocked. The Great Lake was stocked with 120 young brown trout from Bothwell in 1870 (5). After the construction of an accommodation house at the northern end, the Great Lake became a popular fishing spot. The largest brown trout caught was 11½kg.

The proprietor of the Launceston *Examiner*, Henry Button, visited the lake on a fishing expedition in the 1880s. He described a forest on the road between Steppes and Miena, a few miles from Miena:

> Gaunt trunks of long dead trees (killed by the 1837 frost), warped, gnarled and distorted, bereft of bark and leaf stand white and ghostlike amid the wreckage of those which have already fallen.... A rim of dry and sapless moss encrusts the ancient debris, shrouds the dead wood fences that line the roadside, covers the boulders that crop out thickly from the ground.

Getting close to the dam site:

> ......then descending the last rise we cross the broad and shallow Shannon and turning towards the water pull up at the FISHERMEN'S CAMP. .....We dined and then sat around the huge log fire, listening to the roaring of the wind over the lake and the wash of the surface on the shore. ......We breakfasted royally of salmon-trout sent down to us from the police station, half a mile further round the bay.(6).

As early as 1856 and again in 1861 a proposal was made to utilise the waters of the Great Lake by diverting it for irrigation. Later in 1897 an engineer, A Mault, suggested that the Ouse and Shannon Rivers could be harnessed into electrical energy by the use of turbines and recently invented dynamos (7). In 1901 he wrote a report to the Tasmanian government suggesting that a large reservoir be constructed at the Great Lake in conjunction with dynamos on the Shannon River which fell 2400 feet in the 35 miles between the Great Lake and its junction with the Ouse River.

Then in 1904 Harold Bisdee whose family ran stock on the upper Shannon about 10 miles below Miena showed a visitor, Professor Alexander McAulay of the University of Tasmania, that the Ouse River was approximately 300m below the Shannon River near his property and suggested that the Shannon could be easily diverted into the Ouse. McAulay wrote an article in the Hobart *Mercury* outlining the basic elements of the scheme. It was McAulay's idea that the Great Lake be dammed and the fall be utilised for the production of electrical energy for commercial use (8).

However nothing was done until in 1908 metallurgist JG Gillies visited Tasmania seeking electrical power for his patent method of smelting zinc ores from Broken Hill. Gillies was taken to the Shannon and met Bisdee who showed him the drop to the Ouse River and outlined McAulay's scheme. Surveyor Leslie Butler surveyed the proposed canal line and showed that a fall, ie head, of 1100ft could be developed. He also showed that the upper reaches of the Ouse could be diverted into the Great Lake (by the later Liaweenee Canal) to supplement the Great Lake's water (9).

Gillies formed a company, the Complex Ores Company, which was given the right by the Tasmanian government after a heated and acrimonious public and parliamentary debate to construct and benefit from a Great Lake power development. At one stage the Bill was passed with a proviso that the Government could after five years resume all conservation works at Great Lake and all land acquired or occupied by the Company in connection with the works. The Labor Party opposition voted for this in order to kill the Bill. At that point the House believed that the proposal to harness the State's water power had been completely frustrated.

The Company was considering breaking off negotiations, but Gillies drafted an alternative proposal that the government could resume after ten years instead of five years, that twelve months notice of intended resumption must be given, that after such a resumption the government would provide the Company with adequate water power from the Great Lake and that any disputes were to be decided by a judge of the Supreme Court.

The amended Bill was passed on the 10th December 1909. Gillies had been compelled to "fight all the way against self-interest, prejudice, ignorance and some measure of suspicion which Tasmanians at that time entertained of business people from the other States" (10).

The proposed Great Lake power development then consisted of the 9MW Waddamana hydro-electric station on the banks of the Ouse River, a small 4.5m gravity storage weir at the Shannon River outlet to the Great Lake, a diversion weir on the Shannon River 7.5km downstream, a 5.0km canal leading to the small Penstock Lagoon and the 2.9km long penstocks (pressure pipelines) leading to the power station.

Work commenced in 1910. By late 1912 the Company started having difficulty in raising sufficient capital and negotiations were begun for the government to take over the power scheme. There was much, often uninformed, public criticism. One prominent citizen, Henry Button of Launceston, who had visited Miena in the 1880s and was regarded as an oracle, wrote: "the Hydro-Electric Company has undertaken a task as hopeless as Swifte's scheme for extracting sunbeams from cucumbers" (11). Mr Hope (MLC) stated that in all his experience he "had never heard of such a rotten scheme." (12)

Finally in May 1914 the government took over the scheme paying the Company its outlay minus 10%. The government formed the Hydro-Electric Department, retaining the Company's Chief Engineer, John Butters, as Chief Engineer and General Manager.

The transmission line to Hobart was completed in 1915 and the following year the streets of Hobart were lit with "Great Lake Sunshine". The scheme was officially opened by the Governor-General Sir R Munro-Ferguson on 5 May 1916 at Waddamana. Not everybody was enthused; Ida McAulay, daughter of Professor McAulay, (perhaps she was the first Tasmanian conservationist.)wanted "to put a huge iron fence all around the Lakes and keep everybody out." (13)

Work commenced on the 27m high concrete multiple arch buttress Miena Dam in 1918 to increase the storage capacity of the Great Lake. The dam and the Liaweenee Canal, diverting the upper Ouse River to the Great Lake, were completed in 1922 and 1923 respectively. (14)

The construction of the Miena dam (16) and the diversion of the Ouse River into the lake resulted in an increased summer flow down the Shannon River to the Waddamana Power Station. This produced the fishing phenomenon known as the Shannon Rise, being Snowflake Caddis Fly *Asmicridea grisea* which hatched in their thousands. The Shannon Rise was described:

> An hour passes and the fly becomes thicker and thicker. Up near the head of the river (at the dam) there is a white haze when millions of males dance up and down.....By midday it is unpleasant to stand close to the river. One's clothing is quickly covered by crawling moths. They are in the air in countless millions. So far as the eye can see down the (Shannon) lagoon the fish are rising, but ever working slowly toward the river. There are thousands of trout, brown trout and rainbow trout, big fish and small fish. The rise is on.... (15).

This hatch became irregular as the end of January approached. Anglers from all over the world fished "The Rise" which was described "as possibly the finest dry fly fishing in the world".

During the 1920s the Miena Hotel was built on the western headland just upstream of the dam and an Island Fisheries trout hatchery was established just downstream of the dam. Later the hotel and the hatchery buildings accommodated an army contingent which guarded the dam during the second World War!

In 1967 the then Hydro-Electric Commission completed the Great Lake North Power Development, diverting the Great Lake at its northern end through a tunnel and a high head penstock to the 250MW and 830 metre head Poatina underground hydro-electric power station which discharged into the Brumby Creek and the Lake and South Esk Rivers. The maximum output of Poatina Power Station has since been increased to 300MW with the addition of a sixth turbine.

Thus the Waddamanna Power Development became redundant and was closed down.

Unfortunately this new scheme cut off the flow in the Shannon River practically eliminating the Shannon Rise.

To give this new scheme increased water storage capacity a new higher sloping clay core and rockfill dam was constructed just downstream of the Miena concrete multiple arch dam. The old buttress dam (43 years old) was eventually submerged but can still be seen at times of low lake level as can the original low gravity (No.1) dam.

The buttress dam, although somewhat frost scarred, is still intact except for two large openings. The walkway across the top of the dam has also been demolished for safety reasons. The buttress dam still serves to protect the lower level of the new dam from wave action when the lake is low.

Because of the construction of the new dam the grave of the Great Lake's "official" discoverer John Beaumont just downstream of the buttress dam had to be moved and is now located on the headland overlooking the Great Lake. The old Miena Hotel, being lower than the new water level, was demolished as also were the various Inland Fisheries Department buildings.

When Miena Dam was built it was enthusiastically hailed as being the only one of its kind in the British Empire and at 349m, the longest buttress dam in the world (19). In fact the world's first multiple arch buttress dam, the 15m high Meer Allum Dam built in India in 1806, was longer at 900m.

A detailed history of the Waddamana Hydro-Electric Power Development is given in reference 14.

2.3 Historical Biographies

See the biographies in Section 3, Criterion H1.

2.4 Technical Description

The Miena multiple arch buttress dam was completed in 1922 by the then Hydro-Electric Department to provide additional storage for the Waddamana hydro-electric power station, allowing its installed capacity to be increased from 7MW to 49MW. The dam designer was C C Halkyard.

The dam consisted of 27 reinforced concrete arches, each cylindrical in horizontal plan and spanning 12m between reinforced concrete buttresses. The arches and buttresses sloped down at 60° to the horizontal in an upstream direction. The arch thickness was 300mm at the crest increasing to 810mm at the base. The buttresses also increase in thickness towards the base and were stiffened and tied together by a reinforced concrete crest walkway and two reinforced concrete beams or struts at lower levels. The walkway and the upper beam ran the full length of the dam.

The arches were designed against water pressure by an elastic analysis in the same way as similar bridge arches. The weight of water acting on the sloping upstream face of the arches helps to resist overturning of the dam, and by increasing the friction on the base helps to resist sliding.

The dam was 360m long and 27m high above lowest foundation level and approximately 12m above lowest ground level. Each buttress and arch was founded on fresh dolerite rock covered by a mantle of decomposed dolerite clay up to 16m deep in places. Great care had to be taken in excavating down to this level as the excavations were very close to the original masonry weir and up to 15m below lake level.

In the aftermath of World War I, cement supplies were difficult to obtain with the result that cement was obtained (in barrels) from six different countries - Australia, Japan, Sweden, Denmark, Netherlands East Indies (now Indonesia) and England. The concrete for the dam was mixed in a unique travelling mixer-house, 24m high, which ran on timber rails the full length of the dam. The mixer-house contained aggregate and cement bins with a capacity equal to one day's requirements. The concrete was carried to the top of the mixer-house internally and then discharged direct into the forms by a series of chutes suspended from jibs supported from the mixer-house's central tower.

Because the Great Lake storage was so large in comparison with the estimated peak inflow, no spillway was required, although during storms a flow of water up to $35m^3$/sec was blown over the crest of the dam without damage.

In 1967 the Miena Multiple Arch Buttress Dam was superseded by a higher sloping clay core rockfill dam constructed immediately downstream which raised the storage volume to 3056 million cubic metres. After 45 years the dam's arches were still sound but the thinner concrete walkway across the crest of the dam had become unsafe due to frost action and was closed to the public. The multiple arch buttress dam can still be seen at times of low storage levels and still serves to protect the lower part of the new dam from the erosive effects of wave action.

Personnel associated with the dam were:

J H Butters	:	Chief Engineer and General Manager, Hydro-Electric Department
C C Halkyard	:	Design Engineer
W E McLean	:	Resident Engineer Great Lake Dam construction (later Commissioner of HEC, 1933-1946)
A H Bastow	:	Engineer for Hydraulic Construction

Hydro

Hydro-Electric Corporation
ARBN - 072 377 158

GPO Box 355D
Hobart Tasmania 7001

4 Elizabeth Street
Hobart Tasmania 7000

Telephone (03) 6237 3400
Fax: (03) 6230 5823

Our Ref.
Your Ref.
Ask for

24 February 2000

Mr K C Drewitt
Chairman
Engineering Heritage Committee
The Institute of Engineers
2 Davey Street
Hobart Tas 7000

Dear Mr. Drewitt,

Thank you for your correspondence of 14 February 2000, advising of the eight dams which have recently been nominated for national heritage listing on the National Estate Register.

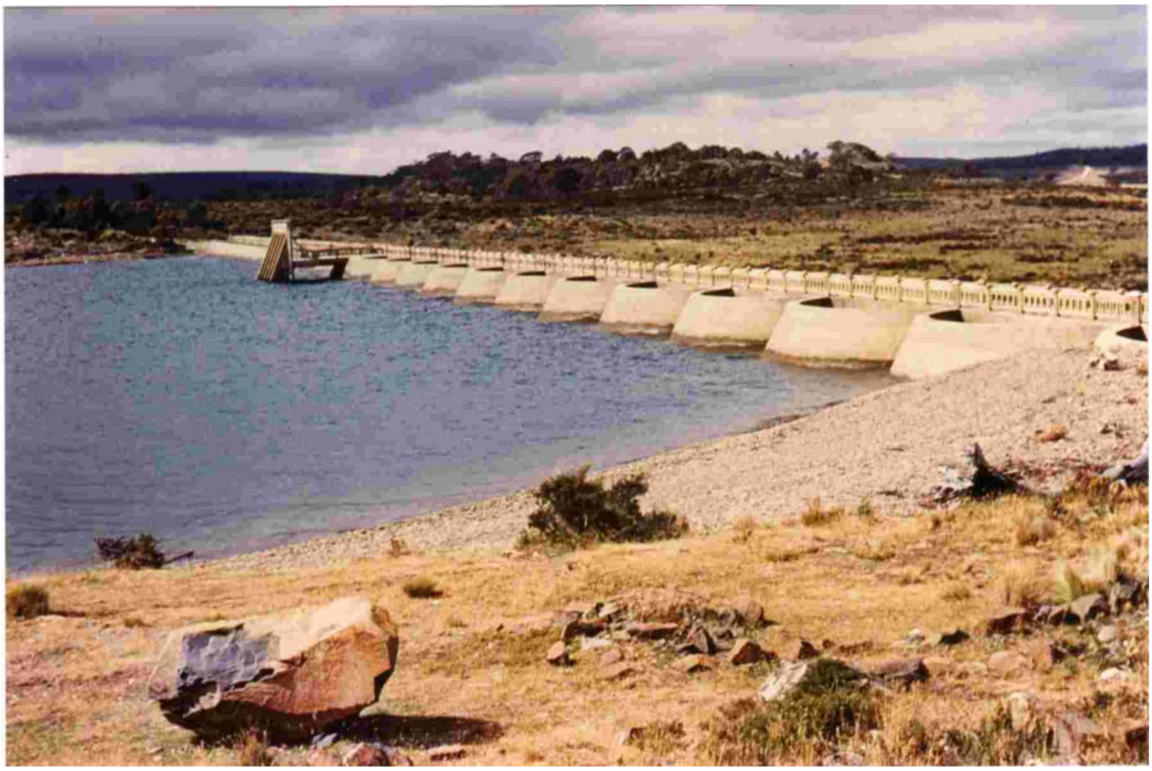
The Hydro is very pleased to approve the nominations and we look forward to hearing the outcome of the proposed public recognition awards.

With kind regards,

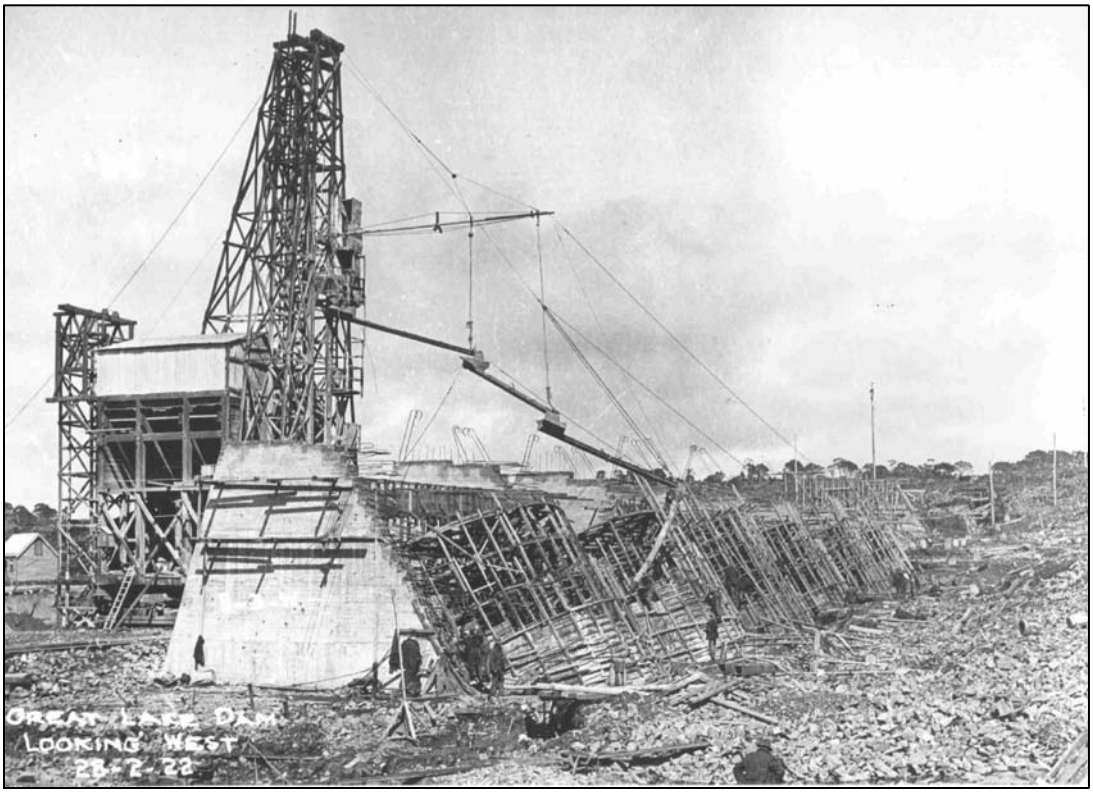
Yours sincerely,

Roger Gill
Generation Manager Generation

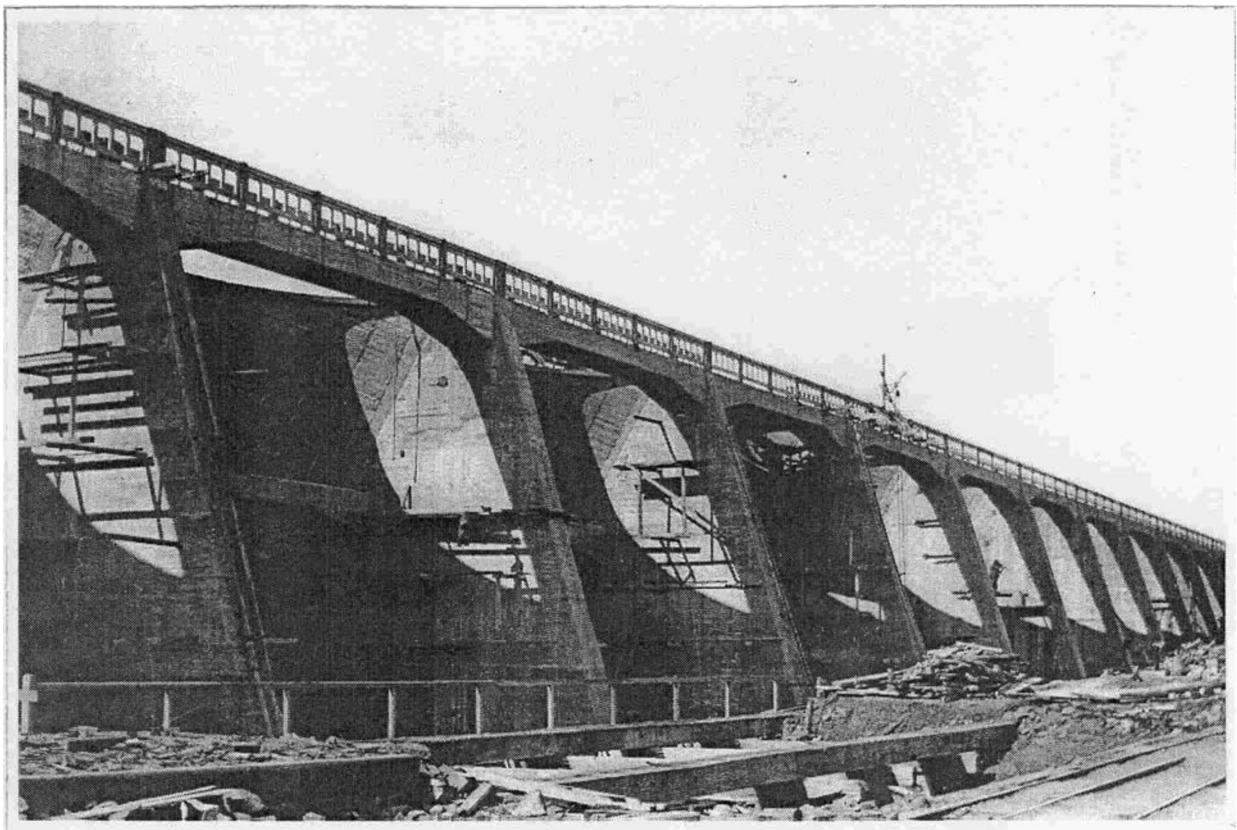
c.c. Andrew Pattle, Dam Safety Manager
Peter Grierson, Manager Power Schemes



Miena Multiple Arch Dam c.1960



Buttresses and arches under construction in 1922
Note travelling mixer house and concrete chutes

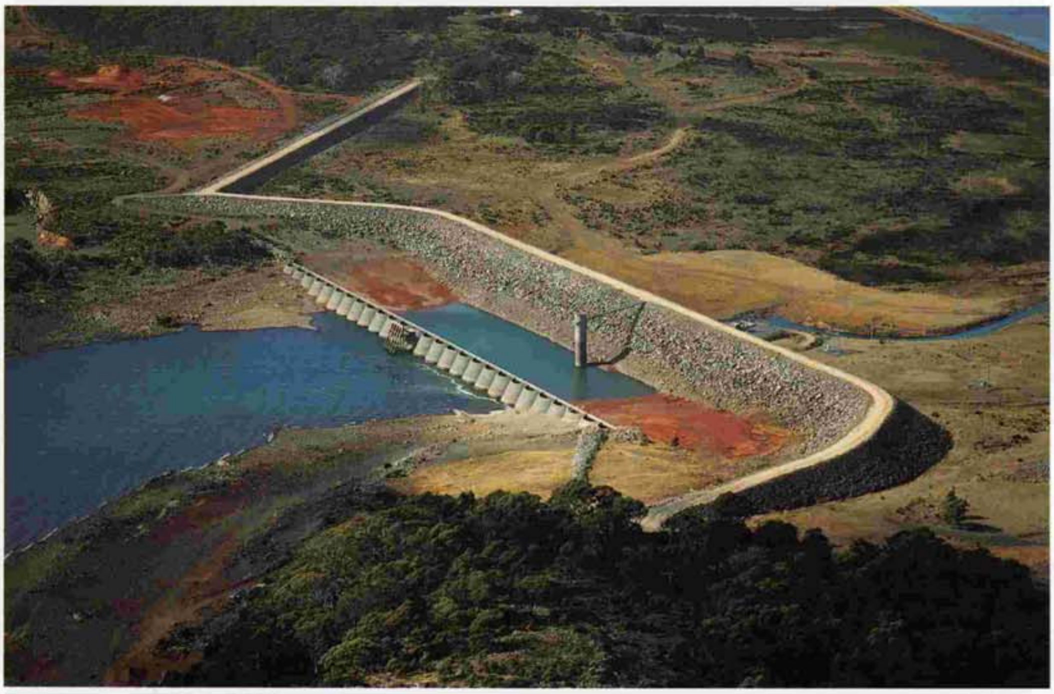


Miena Multiple Arch Dam nearing completion in 1923
27 arches x 40 ft = 1080 ft (330 m)

Miena Multiple Arch Dam c.1930

MIENA DAM

AUSTRALIA



TYPE: Rockfill with clay core
HEIGHT: 28 m CREST LENGTH: 1140 m
EMBANKMENT VOLUME: 466 000 m^3
STORAGE VOLUME: 3056 million m^3
SPILLWAY CAPACITY: 53 m^3/s (through dam outlet)
COMPLETED: 1967 (Raised 1981-82)
OWNER: Hydro-Electric Commission of Tasmania

Miena Dam impounds Great Lake, the main storage of the Great Lake Power Development, which has a Full Supply Level of 1039 metres above sea level. Water is drawn off through a tunnel and surface penstock to the underground Poatina Power Station, which exploits a static head of around 830 metres. The dam replaces the multiple arch dam, immediately upstream, which was completed in 1992.

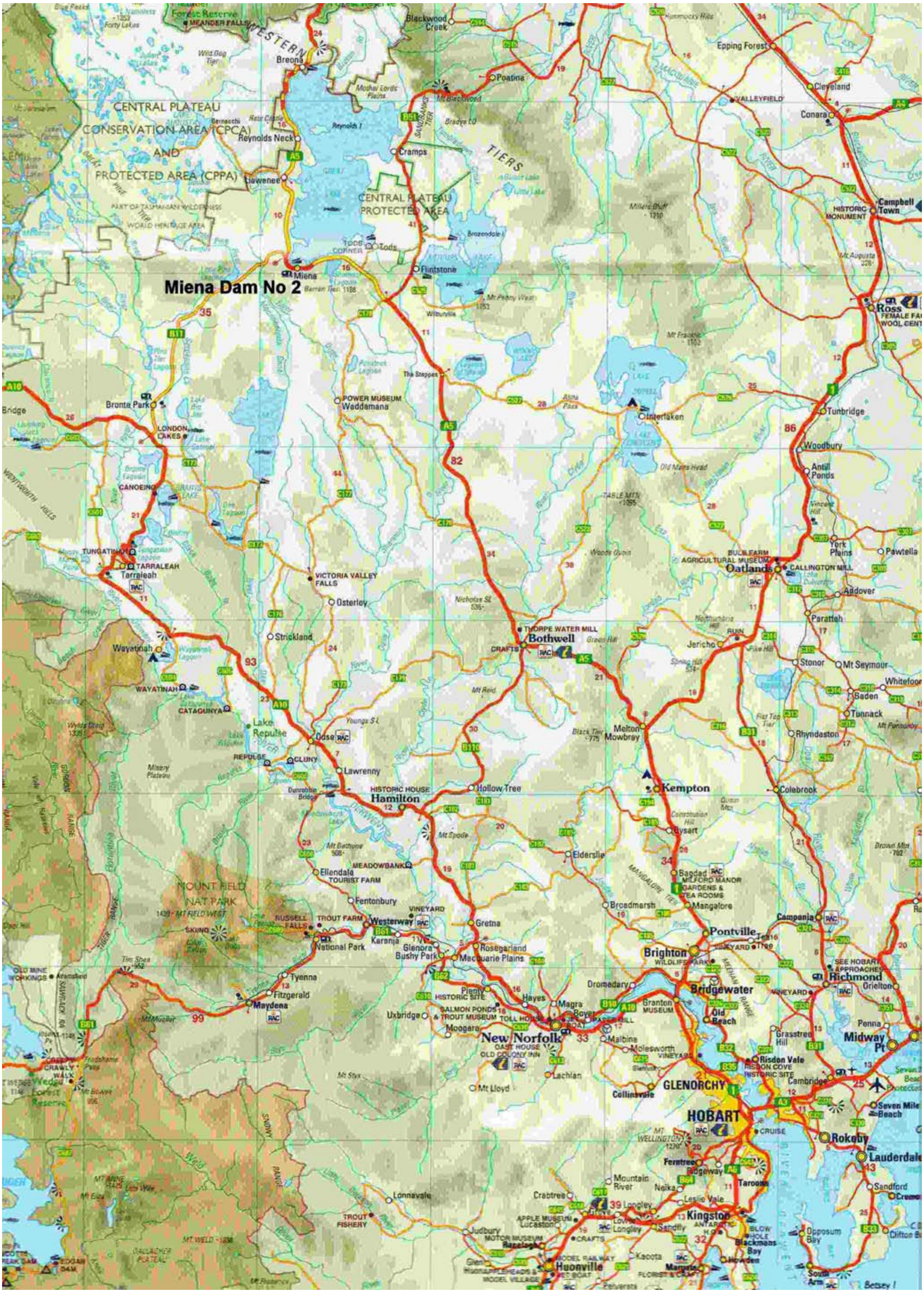
The dam consists of a rockfill embankment with batters of 1:1.33, supporting a clay blanket 2 to 3 metres thick and a 3 to 4 metres thickness of protective rockfill. The lake is large and the dam is exposed to powerful waves, so the dolerite rip-rap is large in size, with 50 percent having a stone weight exceeding 1500 kilograms.

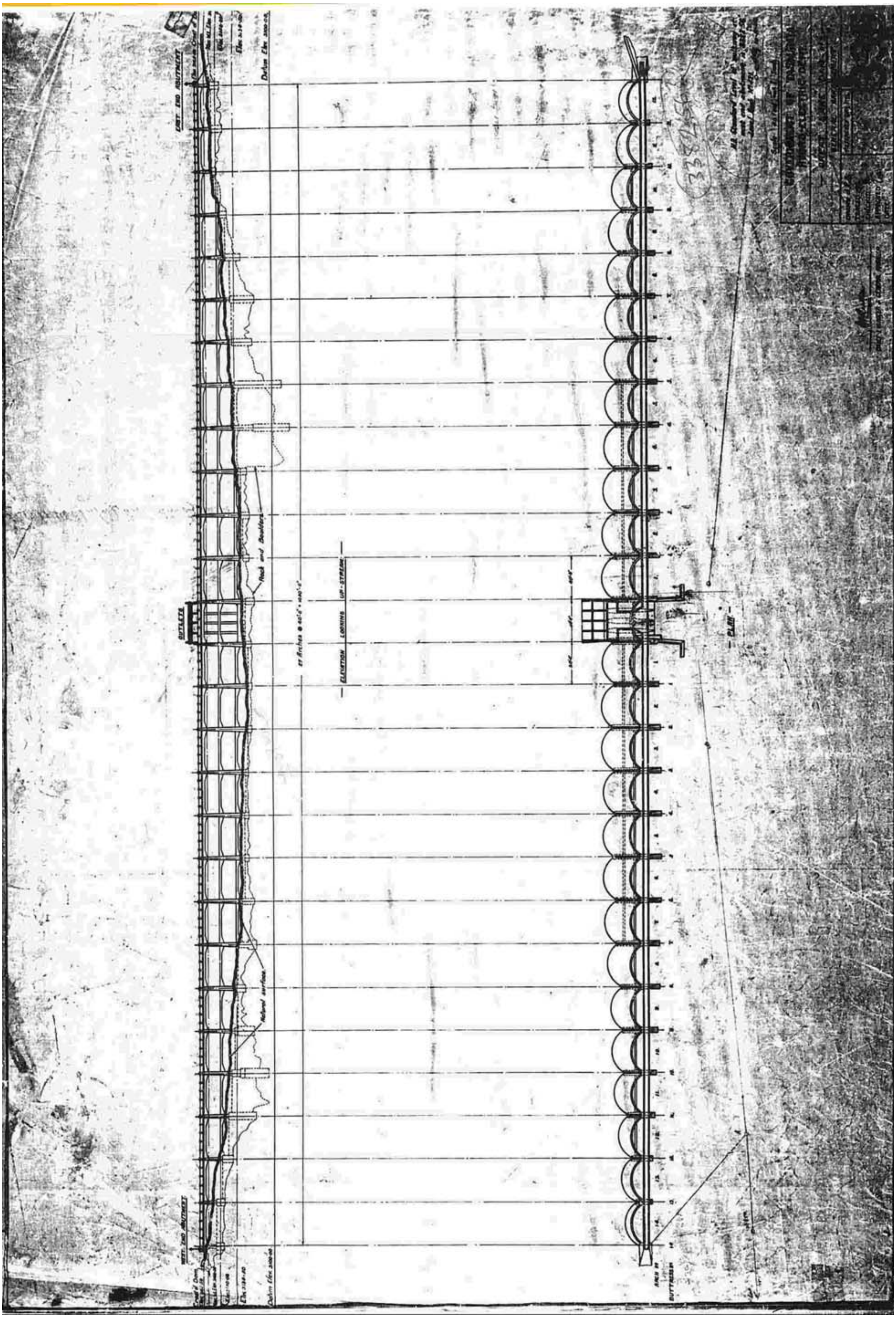
Although water is normally drawn off through the Poatina headrace tunnel some 20 kilometres from the dam, there is an outlet under the embankment which allows for the delivery of 18 m^3/s (2.2 times average inflow) to an alternative power station to the south of the lake, or up to 53 m^3/s flood discharge. The outflow passes under a radial gate and through a 30 metres long energy dissipator.

Services Provided

Feasibility study, investigations, detailed design, documentation, supervision of construction, operation and maintenance.

HEC


Miena Dam No 2
CENTRAL PLATEAU CONSERVATION AREA (CPCA) AND PROTECTED AREA (CPPA)
CENTRAL PLATEAU PROTECTED AREA
Breona
Reynolds Neck
Liawenee
Cramps
Poatina
Miena
Tods Corner
Flintstone
Bronte Park
London Lakes
Tarraleah
Wayatinah
Waddamana
Interlaken
Bothwell
Oatlands
Ross
Tunbridge
Kempton
Hamilton
Ouse
Lawrenny
Hollow Tree
Ellendale
Fentonbury
Westerway
National Park
Gretna
Maydena
New Norfolk
Brighton
Pontville
Bridgewater
Richmond
GLENORCHY
HOBART
Kingston
Huonville
Lauderdale
Rokeby
Campbell Town
Epping Forest
Cleveland
Conara
Colebrook
Midway Pt
MOUNT FIELD NAT PARK
Lake Repulse
Osterley
Strickland
Mangalore
Bagdad
Broadmarsh
Tyenna
Fitzgerald
Lonnavale


OUTLETS
ELEVATION LOOKING UP-STREAM
PLAN