

**NOMINATION  
OF  
DUCK REACH POWER STATION  
AS A  
HISTORIC ENGINEERING MARKER**



**VOLUME 1 - NOMINATION**

Prepared by Anthony Lee  
Engineering Heritage Tasmania  
Engineers Australia

September 2005

## CONTENTS OF VOLUME 1

	Page
<b>INTRODUCTION .....</b>	<b>2</b>
<b>NOMINATION FORM .....</b>	<b>3</b>
<b>LOCATION MAP .....</b>	<b>4</b>
<b>HISTORY .....</b>	<b>5</b>
<b>ENGINEERING HERITAGE ASSESSMENT .....</b>	<b>7</b>
<b>1. Basic data .....</b>	<b>7</b>
<b>2. Assessment of significance .....</b>	<b>8</b>
<b>3. Statement of significance .....</b>	<b>10</b>
<b>DRAFT CITATION FOR PLAQUE .....</b>	<b>10</b>
<b>ATTACHMENTS</b>	
<b>A References .....</b>	<b>11</b>
<b>B Owner's permission letter .....</b>	<b>12</b>
<b>C Photographs .....</b>	<b>13</b>

## INTRODUCTION

Duck Reach Hydro-Electric Power Station is located beside the South Esk River above the Cataract Gorge on the outskirts of Launceston, Tasmania. See Location Map.

The power scheme was built by the Launceston Town Council to provide electric street lighting to replace gas lights. The station generated direct current for arc lamps and alternating current for both incandescent lamps and electric motors.

The first machines were commissioned in 1895. As the demand for electricity increased, the station was expanded by installing more machines and larger machines. In 1929 the station was destroyed by an extreme flood and rebuilt in 1930. The station continued to operate until 1955 when a much larger scheme (the Trevallyn Power Development) harnessed the full potential of the river.

While only one machine remains in the power house, many of the other components are still on site: the inlet weir, headrace tunnel, forebay, two penstocks, the distributor, the station building, tailrace, winding shed, access footbridge and three stone cottages built for the operators.

The power station is open to the public during daylight hours and contains interpretive signs and photographs displaying its illustrious past. The site lies at the upper end of the popular Cataract Gorge walking track which begins at the Kings Bridge (Historic Engineering Marker, 1992).

This nomination recommends that the Duck Reach Power Station and the associated engineering features at the site be recognised by an Historic Engineering Marker.

**NOMINATION FORM**

Name of Work: **DUCK REACH POWER STATION**

The above-mentioned work is nominated for an

**Historical Engineering Marker**

Location, including addresses and map grid reference if a fixed work:

**Corin Street, Launceston, about nine km from the City Centre  
Tasmap Sheet 5041 edition 2 1968 Approx 41°28"S, 147°06"E  
AMG Zone 55 5093E 54101N  
See also Location Map in this volume.**

Owner (name & address)

**Launceston City Corporation  
Town Hall, St John Street  
Launceston Tas 7250**

The owner has been advised of this nomination, and a letter of agreement is attached (Attachment B).

Access to site:

**Foot access from Corin Street, West Launceston. See Location Map.  
Foot access from Cataract Gorge track.**

Nominating Body: **Engineering Heritage Tasmania.**

Signed....A J Lee  
Nominating Person.

Date.....8<sup>th</sup> September 2005

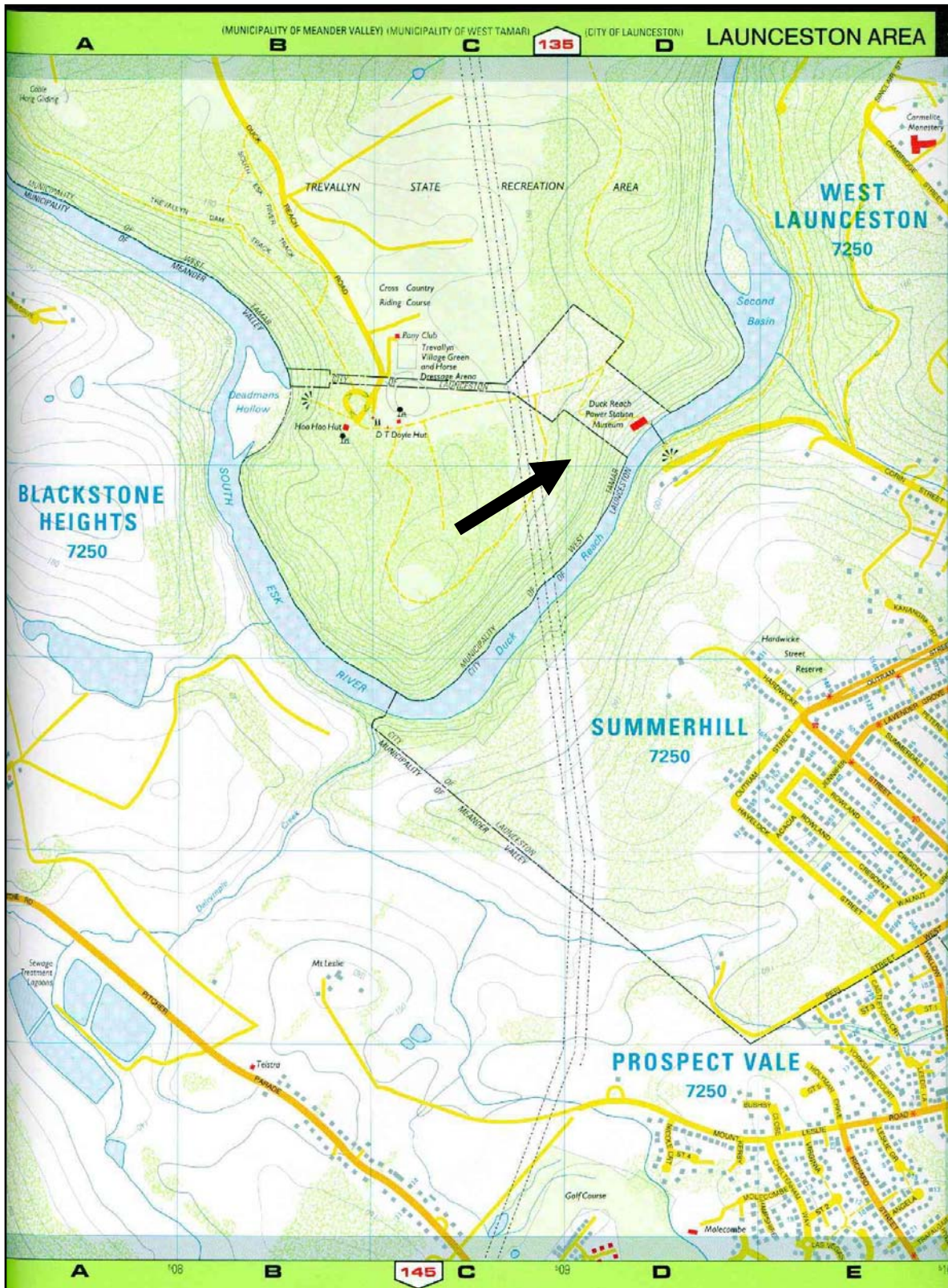
This plaquing nomination is supported and is recommended for approval.

Signed....K C Drewitt  
Chair, Division Engineering Heritage Group

Date.....8<sup>th</sup> September 2005

To:  
The Administrator  
Engineering Heritage Australia  
Engineers Australia  
11 National Circuit  
BARTON ACT 2600

# LOCATION MAP



## HISTORY

For several decades the water flow of the Cataract Gorge had been used to power a water-mill. In the 1870s the Town Council through visionaries on the board began to consider the utilisation of this supply to provide amenities to the townsfolk for the public good. However private companies were also interested in developing the water power and the Council had considerable difficulty until finally, in 1887, an Act of Parliament granted the Council control of the riparian flow of the South Esk River.

The Council still vacillated, however, daunted by the large outlay they expected to have to make, and by the believed experimental nature of electricity generation at this date. They were finally forced to action by the time limits in the Act. The City Surveyor, Mr Fitzherbert, was instructed to examine the sites, and the Council then engaged three prominent engineers from the State of Victoria, Professor Kernot, Mr K Murray and Mr C Gordon (all of whom were to become Presidents of the Victorian Institute of Engineers) and Mr C James, to act as consultants to devise a scheme.

The consultants modified the plan suggested by Mr Fitzherbert and nominated Mr Murray to act as the Electrical Engineer for the project. Mr Fitzherbert suddenly died, and subsequently his position was filled by Mr Charles St John David. David became responsible for the civil design and Murray the electrical design. David believed that a tunnel across the bend in the river would be cheaper and give more head to the water than the much longer forty inch (1 m) diameter wrought iron pipeline following the river around the bend as proposed by Fitzherbert. Tunnelling firms approached gave huge costs for this so David, using Council labourers, drove a pilot tunnel into the nearby quarry to determine the actual costs. His trial proved that a tunnel would be cheaper than the pipeline.

The principal features of the final scheme were a low diversion weir across the gorge of the South Esk, a tunnel half a mile in length and five feet in diameter through dolerite rock, and a five foot diameter wrought iron penstock leading down the steep slope to the power station perched above the river bank. The head was about 110 feet (34 m).

The original eight turbines by Gilbert Gilkes & Co. and generators by Siemens Bros. provided a total output of about 360 kW. Five small sets generated 60 kW direct current (DC) at 1750 volts for the street arc lamps. Three larger sets produced alternating current (AC) at 2000 volts and 92 cycles per second for incandescent street lamps, domestic lighting and electric motors. From the distribution Station in the city, electricity was supplied at 190/110 volts.

There was space in the station for two more 100 kW AC sets and these were installed in 1899.

A significant expansion took place in 1903-05. Water storage was increased in three lakes located in the upper catchment to boost low summer flows, and a second penstock was constructed from the tunnel to the power station. Four of the five 100 kW machines were replaced with four 300 kW machines. Two of the smaller DC machines were removed, and the remaining three used to power the pilot exciters on the new machines. Under the dynamic City Electrical Engineer, Mr William Corin, the station output was converted to 3 phase AC at 380/220 volts.

Further expansion occurred in 1919-21 when a flume was constructed along the river bank from the intake to the forebay, and an 800 kW set was installed. This machine brought the station capacity up to 2000 kW.

Proposals for further development were pre-empted by the construction of a transmission line from Waddamana to Launceston, and the connection of Launceston to the State grid in 1924. At that time, the retail supply was upgraded from 110 volts to 240 volts.

In 1929 disaster struck. Floods of 20,000-30,000 cusecs (570-850 m<sup>3</sup>/s) were normal occurrences in the South Esk River but, in April 1929, a flow estimated as greater than 150,000 cusecs (4,250 m<sup>3</sup>/s) occurred, and amongst its victims was Duck Reach Power Station. The station building was heavily damaged, and the machines inundated. By 1932, the station building was rebuilt, and the generators etc repaired, and restored to service. In the interim period, the power deficiency was supplied by the Hydro-Electric Commission.

Duck Reach gave the City the power to attract new industries. Among them were three woollen mills, a tyre manufacturer, and numerous small businesses, such as the world famous (for its time) Alexander Tennis Racquet manufacture.

In 1944 the station was compulsorily acquired by the Hydro-Electric Commission and continued in service, usually at full capacity (especially in WW2) until 1955 when the water was diverted to the new Trevallyn Power Station. The old station was closed in 1956. Most equipment was removed and the building was offered back to the City Council. Four machines were preserved, one at the Queen Victoria Museum, two at the Trevallyn Station area, and one at the Engineering Department of the University of Tasmania.

In recent years, some attempt at rehabilitation and restoration has been done. A small car park has been provided opposite the Station, and the pathways and suspension bridge have been up-graded with new hand-rails and signage. In 1988, the building was re-roofed and put into good repair. A clearway with guard-rails runs the length of the building and interpretation panels are mounted on the walls. One machine has been returned as a static exhibit. The original penstocks remain in situ but the penstock valves inside the building are missing.

Visitors are encouraged to inspect the site. From the car park they cross the river on a suspension footbridge, and walk past the cableway winder shed to the Station entrance. There remote sensors switch on the lighting system as people cross the threshold. Another path climbs the hillside beside the penstock to the forebay.

**TABLE 1 – STATION INSTALLED CAPACITY OVER TIME**

<b>YEAR</b>	<b>HISTORICAL SUMMARY</b>	<b>CAPACITY</b>	<b>TOTAL</b>
1895	5 x 21 hp turbines, 5 x 12 kW DC arc lighters, 1750 V 3 x 156 hp turbines, 3 x 100 kW alternators, Station AC output 190/110 volts, 92 cps	60 kW 300 kW	360 kW
1899	2 x 156 hp turbines, 2 x 100 kW alternators added	200 kW	560 kW
1905	Second penstock added and station roof raised. 2 x 21 hp turbines, 2 x 12 kW DC arc lighters removed 4 x 156 hp turbines, 4 x 100 kW alternators removed. 4 x 445 hp turbines, 4 x 300 kW alternators installed. Station AC output converted to 3 phase 4 wire system, 380/220 V, 50 cps	-60 kW -400 kW 1200 kW	1300 kW
1921	Flume from intake to forebay completed 1 x 156 hp turbine, 1 x 100 kW alternator removed 1 x 1180 hp turbine, 1 x 800 kW alternator added	800kW	2000 kW
1929	Station demolished by floods, rebuilt 1930.		2000 kW
1944	Acquired by HEC with 5 machines running		2000 kW
1955	Decommissioned (replaced by Trevallyn Power Station)	-2000 kW	0

## ENGINEERING HERITAGE ASSESSMENT

### 1. Basic Data

Item Name:	<b>Duck Reach Power Station.</b>
Other/former Names:	Launceston Electric Power Station
Location:	
Address:	Corin Street
Suburb:	West Launceston.
State:	Tasmania
Local Government Area:	Launceston City
Owner:	Launceston City Corporation.
Current Use:	Tourist venue.
Former Use:	Hydro-electric power station.
Designer:	Civil - Charles St J David Electrical - Kynaston N Laphrop Murray

**Physical Description:** Tunnel, forebay and penstocks, the power station building, including one turbine and generator, winch house, suspension bridge and cottages

**Physical Condition:** The tunnel, forebay and both penstocks are mostly intact but have not been maintained since 1955. Parts of the distribution pipe outside the wall of the power house are missing. The power station building has been refurbished along with the suspension bridge for its centenary in 1995, and converted into a tourist site. Walkways and guardrails to allow safe access for visitors have been installed. The flying fox was temporarily refurbished to transport materials across the river and then removed again. Only one of the original direct current machines is located within the building as a static display. Information panels are mounted in the building portraying the history of the site. The three cottages are in good repair and inhabited.

**Modifications and Dates:** 1899: Two machines added.  
1905: A second penstock was added, the building was enlarged and four machines replaced with larger ones.  
1921: A much larger machine was installed  
1929: The building was destroyed by flood and was rebuilt 1929-30.  
1944: The power station was compulsorily acquired by the Hydro-Electric Commission.  
1955: Station closed down, water diverted to Trevallyn Power Station and site eventually returned to the City of Launceston as a relic

**Historical Notes:** A short history of the Duck Reach development is set out in the History section of this nomination, and is expanded in the papers located in Volume 2.

**Heritage Listings:** The power station, associated buildings and cottages are registered on the Tasmanian Heritage Register as part of the Cataract Gorge Reserve (Reference R3476).



## 2. Assessment of Significance

### Historic Phase

From the 1870s Launceston was the financier for most of the mining exploration on the West Coast of Tasmania and the hub of railway and industrial development that followed. This called for a cheaper energy source to replace the imported NSW coal. The use of the South Esk River to generate electricity had long been considered but was held up by the actions of private entrepreneurs wishing to monopolise flow for their own purposes. The matter was resolved by an Act of Parliament which vested the water rights in the Launceston Town Council in 1887.

Electric street lighting in Launceston marked the end of forty years of gas lighting.

### Historic Individuals or Association.

It is significant that, for the Duck Reach proposal, the Council was able to assemble a panel of learned engineers within Australia, demonstrating the confidence of the Australian public in the competence of engineers either trained or working in Australia. Duck Reach has a close association with the following eminent engineers:

#### ***Professor W Kernot (1845-1909)***

Kernot was one of the three consultants charged with the task of devising the best scheme to develop the hydro-electric power at Duck Reach. An Australian engineering graduate, he became the first professor of engineering at the University of Melbourne and President of the Victorian Institute of Engineers. An abridged version of his career, extracted from the Australian Dictionary of Biography (ADB), is included in Volume 2.

#### ***Charles St J David (1855-1924)***

David, Launceston's City Engineer and Surveyor, proposed a radical change from the original pipeline proposal to a tunnel through hard dolerite rock, and demonstrated its economy. He served the City so well that he was accorded a civic funeral and burial on his sudden death. An extract of his biography in the ADB is included in Volume 2.

#### ***Kynaston N L Murray (1836-1916)***

Murray was responsible for the electrical design and procurement, and overseeing the construction and commissioning, of the power station. He rose from a telegraph operator to a commissioner of the Victorian Railways. He had a long association with Kernot. He was President of the Victorian Institute of Engineers. A short biography and his paper on the Duck Reach project appear in Volume 2.

#### ***William Corin MIEAust (1867-1929)***

Duck Reach brought Corin to Tasmania. He was appointed Electrical Engineer to the City of Launceston in 1895. He was responsible for the ongoing expansion and upgrading of the station until 1907 when he joined the NSW Department of Public Works, becoming its Chief Electrical Engineer in 1913. He was involved in many important NSW electricity projects, culminating in his name being given to Corin Dam for the Canberra's Water Supply. He was awarded the Institution of Civil Engineers Telford Premium in 1911 for his paper on efficiency tests of the Duck Reach machines. A biography and his paper are included in Volume 2.

### Creative or Technical Achievement.

The design and construction of Duck Reach attracted considerable interest. Engineers from Victoria came to study the scheme and the view expressed by the Victorian Institute of Engineers member W Stone was that "Launceston water power scheme is an engineering work of no mean order" (see discussion of Murray's paper in Volume 2). The use of a pilot tunnel to prove costs and feasibility by David when proposing an alternative scheme appears

to be unusual for this period of time. The later use by Corin of a load tank and water measurements to establish the efficiency of the turbines and generators seems to have been so unusual that the Institution of Civil Engineers (UK) bestowed a Telford Premium Prize on him for that work. His later conversion of the station to three phase alternating current was contemporary with changes in the U.K.

#### **Research:**

A study of the papers and reports of the construction and efficiency testing of Duck Reach is necessary to fully comprehend the further careers of Corin and Murray, and the scheme's importance to the development of hydro-power in Australia.

#### **Social:**

Duck Reach gave the new City a sense of pride in its achievements consistent with the City motto "Progress with Prudence". It also developed a new skill base in employment as the use of electricity expanded. Among the benefits it gave to the community were better street lighting and the attraction of new industries.

As a tourist venue, Duck Reach is an interesting engineering heritage site, and the major focus at the upper end of the popular Cataract Gorge track.

#### **Rarity:**

Duck Reach is not a rare example but is best described as uncommon. It has no road access. There is a footbridge for pedestrian access and a cableway was used to deliver equipment.

#### **Representative:**

Duck Reach is a good example of an early hydro-electric power station. It had most of the features except for a substantial head pond. Eventually storages in the upper catchment were increased to boost low flows. The station had many small machines and more were added as the demand grew.

The early hydro-electric developments in Australia are listed below:

<b>DATE</b>	<b>PLACE</b>	<b>PURPOSE</b>	<b>CAPACITY</b>
1883	Mt Bischoff Tin Mine, Tasmania	Office & workshop lighting	?
1886	Mt Bischoff Tin Mine, Tasmania	Street lighting in Waratah	?
1890	Waverley Woollen Mills, Tasmania	Electric lighting	63kW
1893	Thargomindah, Queensland	Street lights	16kW
<b>1895</b>	<b>Duck Reach, Tasmania</b>	<b>Street lighting</b>	<b>360kW</b>
<b>1905</b>	<b>Duck Reach, Tasmania</b>	<b>City supply</b>	<b>1200kW</b>
1909	Pioneer Tin Mine, Tasmania	Mining	1135kVA
1914	Mt Lyell Mining & Railway Co, Tas	Mine and Queenstown	4800kW

### 3. Statement of Significance

Duck Reach is the first commercial hydro-electric power station to be built in Australia and its cost represented a major investment for the City of Launceston. The project featured a diversion weir, a tunnel driven through hard rock, a wrought iron penstock, a distributor and eight water turbines driving both DC and AC generators. The only access to the power station was from the opposite side of the gorge via a footbridge. A cableway was erected to transport equipment across the river.

DC power was used for carbon-arc street lighting in Launceston, replacing 40 years of gas lighting. The brighter lights improved public safety in the streets and parks and were much appreciated by the citizens of Launceston.

AC power was used for incandescent street lights and electric motors. The conversion of the machines to three-phase AC was a pioneering event for Australia although contemporary with similar developments in Europe and America. The expansion of the station enabled the City to attract new industries, and the profits assisted municipal developments.

The scheme is associated with several eminent engineers during the investigation, design, construction, operation and expansion phases.

Although the station no longer operates, it is a valuable tourist destination close to the city. Sufficient components of the scheme remain for visitors to appreciate its extent, and interpretive signs and photographs fill in the gaps. There is scope for the exhibit to be enhanced by recovering and reinstating more of the missing machines.

#### DRAFT CITATION

##### DUCK REACH POWER STATION

Built in 1895 to light the streets of Launceston, the station initially supplied direct current for arc lamps and alternating current for incandescent lamps and motors. Engineer Kynaston Murray and City Engineer Charles David designed the scheme for the City Council. Later additions produced three phase AC electrical power for new industries. Duck Reach is the first commercial hydro-electric scheme in Australia. After destruction by floods in 1929, the station was rebuilt and enlarged to 2000 kW, and remained in service until 1956. (83 words)

The Institution of Engineers Australia and  
The Launceston City Council, 2005

**ATTACHMENT A****REFERENCES**

1. K.L.Murray 1897: *Electric Lighting of Launceston, Tasmania*. A paper read to the Victorian Institute of Engineers, July-August 1897. (3 parts).
2. Martinek & Lauri 1906: *Launceston Hydraulic Power-Station*. Transactions of ICE as above.
3. William Corin 1907: *Efficiency Tests of a Hydro-Electric Plant, with Observations upon the Water-power of Tasmania* (Abridged) Transcribed from selected papers of Transactions of Institution of Civil Engineers, vol.CLXXX111 1910/11.
4. Henry Button 1909: *Flotsam & Jetsam*.
5. Hydro-Electric Commission 1962: *A Million Horses*.
6. H.H.McFie 1992: *Duck Reach-The First Significant Hydro-Electric Development in Australia*. A paper read at the Sixth National Conference on Engineering Heritage, Hobart.
7. Engineering Heritage Victoria, website.
8. Tasmanian Pioneer Index website.
9. Gibney & Smith: *A Biographical Register 1788-1939*.

**ATTACHMENT B**

**OWNERS PERMISSION**

**LAUNCESTON CITY COUNCIL**

*A Leader in Community & Government*

LAUNCESTON CITY COUNCIL

File No: SF0847/SFO841 AS:GL

24 September 2004

Keith Drewitt  
Chairman Engineering Heritage Committee  
2 Davey Street  
HOBART 7000

Dear Keith

Thank you for your letter of the 26 th August 2004 regarding the Duck Reach Power Station and the possible erection of an Historic Engineering Marker.

We would be most pleased to be considered for such an award and recognition of this most important historic site.

We would also participate in a dedication ceremony if and when a plaque was awarded.

If you require any further information, please contact me on 6323 3612 during normal office hours.

Yours sincerely

ANDREW SMITH

MANAGER PARKS & RECREATION  
Town Hall St. John Street  
Launceston Tasmania 7250

PO Box 396  
AusDoc DX 70127 Launceston  
Phone(03 )63233000  
TTY (03) 6323 3003  
Fax (03) 6323 3001  
E-mail [council@launceston.tas.gov.au](mailto:council@launceston.tas.gov.au)

## ATTACHMENT C

## PHOTOGRAPHS



*Photo G.Dineen*

**Photo 1: Duck Reach Power Station circa 1896**

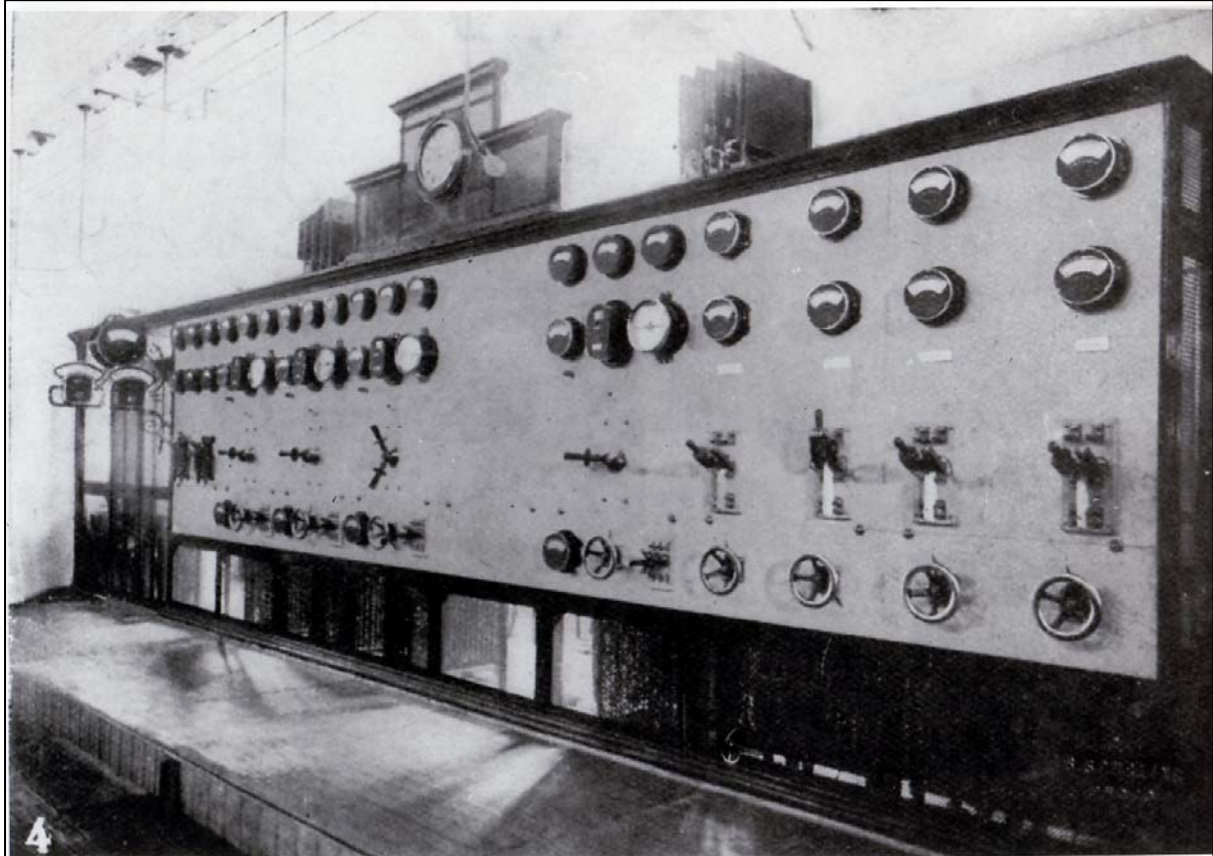
- Notes
- a. The parallel wires are DC conductors carrying power from the station.
  - b. Storm damage has deposited rubbish on the wires.
  - c. Women and children are inspecting the site. They are probably the families of the operators from the station cottages.



*Photo G.Dineen*

**Photo 2: Power Station extended and roof raised**

- Notes
- The water cascading down the hillside from the forebay is excess flow from the tunnel.
  - The suspension footbridge is in the foreground.
  - There is a haulageway and fence up the hill on the right.



*photo Weekly Courier 11 May 1907*

**Photo 3: Switchboard for the three-phase AC machines in 1907**

- Note:
- a. The paralleling meters on the extreme left.
  - b. The field resistances above the switchboard on each side of the clock.
  - c. The minimum of metering used in those times.





*Photo G. Dineen*

**Photo 4: Duck Reach Power Station c. 1905**

- Notes
- The second penstock has been added on the left.
  - Photograph probably taken in 1905 during the efficiency tests conducted by William Corin. There is a hydraulic flow measuring flume in the foreground, and a circular load test tank on the right, behind the walkway.