



ENGINEERS  
AUSTRALIA

# EHA MAGAZINE



# Engineering Heritage Australia Magazine

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Cover Images:

Front: The Chaffey-designed Tangye Steam Pumping Engine with Tangye pumps on either side of it, in the Psyche Bend Pumping Station on the Murray River near Mildura, in the Sunraysia region of north-west Victoria. The engine and pumps are featured on page 8 of this magazine.

Photo from Keith Baker.

Back: "Concrete Handling the Hard Way" in the 1920s. The story behind this photo will be found in "Ghosts of Bridges Past" on pages 10 to 13 of this magazine.

Photo: from the Photo Album of Harold Irwin.

This is a free magazine covering stories and news items about industrial and engineering heritage in Australia and elsewhere. It is published online as a down-loadable PDF document for readers to view on screen or print their own copies. EA members and non-members on the EHA mailing lists will receive emails notifying them of new issues, with a link to the relevant Engineers Australia website page.

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## Editorial (With not a picture in sight. Sorry!)

Looking at the List of Contents on the previous page, there seem to be an inordinate number of contributions from Victoria – six if you count the titles not labelled as Victorian. The Chaffey-designed Tangye Pumping Engine is in Victoria, as are the bridges of Harold Irwin. Actually the Engineering Heritage Conference and the Country Weekend are both about three states – Victoria, New South Wales and South Australia. Readers may not be aware that the whole of the Murray River, from its headwaters to the South Australian border, is all in NSW. Victoria starts at the top of the south bank of the river. This fact presents a myriad of complications when considering the heritage significance and protection of all the bridges that cross the river. As an heritage officer in the NSW Government I was greatly assisted by this anomaly in saving the historic Echuca-Moama Road Rail Bridge from demolition by the Victorian Government – but that is another story. I will get around to telling that one in time.

Scott Barnes is Chair of the Sunraysia regional group of engineers who are organising the Country Weekend. The Engineering Heritage Conference organising committee are mostly EHV members in Melbourne, but include Peter Stone from the Sunraysia regional group of engineers. A subcommittee reviewing the conference papers is made up of various EH South Australia members, all in Adelaide (as Richard Venus said ‘Reviewing papers was something that we could be involved in from a distance’) plus Owen Peake in Melbourne.

Owen Peake is a name familiar to most readers of this magazine, he having been a contributor to most issues, and the subject of the first story in the very first issue after he was awarded the John Monash Medal in 2013. He is responsible for two stories in this issue – about the Dalgety Bridge in southern NSW, that he admired when visiting Dalgety, and a review of a book about the Stuart Highway in the Northern Territory. Another frequent contributor is Keith Baker from Canberra. This time Keith writes about the former Point Nepean Quarantine Station, now a museum, on the Mornington Peninsula in Victoria. Another occasional contributor is Miles Pierce, from Melbourne. In this issue he wrote the story about the Lakes Entrance Oil Industry, in East Gippsland. My favourite story from him was the one about Trams in Australia, published in the October 2016 Magazine. I probably liked that one so much, because I really enjoyed hunting for images for the story, and I was very pleased that Miles approved of those pictures.

Our other contributors this time are less familiar. First would be Karen Riddette, now the Chair of EHWA, who sent me the information about EHWA winning a State Heritage Award and about the One Day Heritage Engineering Training Course to be held in Perth in November – see Connections (page 27) for details. I have hopes/expectations that Karen will become a regular contributor. I think she has some good stories up her sleeve. I am also hoping that I will get a range of stories from other Divisions. At the recent EHA National Committee, members agreed to encourage more contributions.

One story that came almost out of the blue and which I received with delight, was the *Ghosts of Bridges Past*, about a consulting engineer practising around Victoria from 1915 until 1935 – a man forgotten by most today, but who left behind a wealth of civil engineering structures of good design and excellent construction. Harold Beresford Irwin’s story was uncovered by his grandson, Patrick Irwin FIEAust, principal of Irwin Structures, Forensic Engineers. Engineering must be in the blood of the Irwin family. Harold Irwin’s son, Bill Irwin, uncle of Patrick, was one of the most gifted and talented engineers of his generation and one of the people I most admired. Some of his famous designs are the Australian Academy of Science Dome in Canberra, the Myer Music Bowl in Melbourne, BHP House in Bourke Street, Melbourne, and the swimming stadium for the 1956 Melbourne Olympics.

Bill Irwin became a colleague and friend of mine in the 1970s, when I was Assistant Site Manager on a building site at Melbourne University and he was the engineer who attended site meetings. He was my mentor when I later did Engineering at MU. All that may seem somewhat of a non sequitur, but by an odd coincidence, Bill’s history ties in with another story in this issue of the magazine – the Review of *A Wartime Journey – Stuart Highway Heritage Guide*. In 1939, at the age of 22, engineering student Bill joined the Army Engineers. He was soon commissioned as a lieutenant. In 1942 he was one of the engineers involved in building the Stuart Highway from Alice Springs to Darwin, completed in double quick time.

But back to Patrick Irwin. I hope he does some more writing like *Ghosts of Bridges Past*. I found it immediately engaging, and my only criticism was I wished it was longer. Patrick was immediately inspired by the marvellous vintage photographs in his Grandfather’s Photo Albums. I understand he started his research of Harold Irwin in the VicRoads Archives, and came across Andrew Boak, a VicRoads engineer, who became his collaborator and principal researcher in the production of a book about Harold. I hope the book is a great success.

Another story I wasn’t expecting to get was the *The Regeneration of the Woolloomooloo Finger Wharf* by Ian Stapleton, a very well known conservation architect in Sydney. I had come to the end of my personal knowledge of what happened to the Finger Wharf, in writing three (probably excessive) episodes over most of a year. The Green Ban was in place, but what happened next? In the early ’90s I was building a house in the Victorian bush, and I moved there in 1997. The information I could find on the internet was sparse at best. I was at my wit’s end when I thought of writing to Ian, whom I knew from 1984, when I joined the Heritage Branch of the NSW Department and he was a partner in a leading Sydney architectural conservation firm, then & now. I heard Ian had been the conservation architect on the ‘Regeneration’. He would know all about the contractors and architects and what happened next. Well he did, and I was delighted to receive his great story.



# Putting Water to Work

Steam Power, River Navigation and Water Supply

Monday 9 - Friday 13 October 2017



## *Engineering Heritage Australia invites you to participate in the 19th Australasian Engineering Heritage Conference 9 - 13 October 2017 in Mildura, Victoria.*

*The theme of the conference is Putting Water to Work: from the steam power that opened Australia's inland waterways to navigation in the 19th century to the nation-building irrigation and water supply schemes that capitalised on Australia's most precious resource.*

### **Why Mildura?**

Mildura is situated in the heart of the Sunraysia district in north-west Victoria on the River Murray, Australia's longest river. The river provides water for Mildura's plentiful grape and citrus crops and many tourist and recreational activities in a year-round sunny climate. The town is the centre of a rapidly-expanding municipality with a population of more than 50,000.

### **Conference Program**

The program will consist of three full days (Tuesday 10 to Thursday 12) of papers and presentations on the water theme and other topics relating to engineering heritage, conservation and practice. The conference will open with an informal welcome event in the evening of Monday 9<sup>th</sup> and conclude with a relaxed dinner in the evening of Thursday 12<sup>th</sup> of October, at which the John Monash Medal and the Colin Crisp Award will be presented. The free evenings will provide plenty of opportunity to sample Mildura's restaurants, wines, and local produce.

A post-conference coach tour on Friday 13<sup>th</sup> of October will visit engineering heritage sites in Victoria's Sunraysia and South Australia's Riverland and conclude with a country barbeque at the Psyche Bend Steam Pumping station – a unique opportunity to see the historic Chaffey-designed Tange pump lifting water from the Murray into the lagoon as originally designed (see page 8).

The afternoon visit to and the evening barbeque at the Psyche Bend Steam Pumping Station coincides with and is also the opening event of the 2017 Engineers Country Weekend from 13<sup>th</sup> to 15<sup>th</sup> October in Mildura. Conference and Country Weekend delegates will be able to attend the Psyche Bend Engineering Heritage recognition ceremony in the afternoon.

It is thought that many conference delegates might like to take part in the other events of the Country Weekend (including an Engineering Heritage ceremony for the *Big Lizzy* tractor) while they are in the Sunraysia region. For that reason, some information about the Country Weekend can be found on the next page of this magazine.

### **Getting there**

**Fly** — Mildura has regular flights from Adelaide (1hr 5mins), Melbourne (1hr 5mins) and Sydney (2hr 10mins). Flights from other capitals connect through these cities.

**Drive** – As part of the conference package, we will provide self-drive engineering heritage tour itineraries from Adelaide, Canberra, Melbourne and Sydney. The direct travel distances by road are: Adelaide, 393 km; Canberra, 800 km; Melbourne, 542 km; Sydney, 1016 km.

**For more information, email:** [heritageconference@engineersaustralia.org.au](mailto:heritageconference@engineersaustralia.org.au)

or go to the

**Conference web page at:** <http://heritageconference.org.au/>

From this web page you can click on, Registration, Conference Tour, Accommodation, Themes, Papers & Posters – **AND the PROGRAM!**

# Engineers' Country Weekend, 13<sup>th</sup> to 15<sup>th</sup> October 2017

*In recent years, the Victorian Engineers' Country Weekends have been organised jointly by Victorian Regional Engineers, Engineering Heritage Victoria (EHV) and the Institute of Public Works Engineering Australasia (IPWEA). This year it is based in Mildura, and it was planned for the Meet & Greet opening event at Psyche Bend near Mildura in the Sunraysia irrigation district of Victoria to coincide with the closing event of the 19th Australasian Engineering Heritage Conference in Mildura. (See previous page.)*

*The Weekend is designed as a casual family weekend, where engineers and associates and non-engineers, their partners and their friends can meet and enjoy themselves while getting to know about the engineering features and history of the region they are visiting – this year of course the weekend will showcase irrigation development in the Sunraysia district.*

*The Editor.*

## The Program

### Friday 13th October 2017 (Optional)

#### From 4.00 pm:

Welcome meet & greet at Psyche Bend, Kings Billabong, Nichols Point.  
Psyche Bend Pump Station Heritage Ceremony.  
Explore the running of the historic Psyche Bend Pumps.  
Drinks & BBQ Dinner on the Murray River Bank.

Psyche Bend Pumping Station >



### Saturday 14th October 2017

#### 9:00 am – 10:00 am:

Registration at Rowers Club Rooms, Mildura Wharf (inc. tea / coffee / muffins).

#### 10.30 am – 12.30 pm:

Buses from Mildura Wharf to Red Cliffs Irrigation & Water Treatment Plant.  
Group tours of Irrigation Pump Station / Urban Water Treatment Plant.  
Buses to Red Cliffs Club.

#### 1.30 pm – 5.00 pm:

Big Lizzie Heritage Marker Ceremony (tea/coffee/cakes)  
Group Tour of Sunwest Citrus Packing or Best Bottlers Wine Bottle Packing.  
Return to Mildura Wharf

Big Lizzie hauling wheat at Merbein >



#### 6.00 pm – 10.30 pm:

Mildura Wharf for Pre-dinner drinks on board the PV Mundoo.  
**(6:30 pm sharp wharf departure)**  
Dinner while enjoying travelling the Mighty Murray River  
Guest Speaker Former Federal Member for Mallee & Engineer  
Consultant Mr John Forrest.  
Return to Mildura Wharf.

PV Mundoo >



### Sunday 15th October 2017

#### 10.30 am – 12.30 pm:

Buses from Mildura Wharf to Wentworth Wharf.  
Explore the Junction of the Murray & Darling Rivers on the Paddle Steamer Ruby  
(inc. tea / coffee / cakes)  
Travel through Lock 10 with narrative from Water NSW on weir, lock & fishway.  
Return to Wentworth Weir

#### 12.30 pm – 2.30 pm:

Lunch at ArtBack Café, Wentworth  
Bus return to Mildura Wharf

Paddle Steamer Ruby >



### For more information and to Register, go to:

[https://IPWEA/562afde2-5970-4b88-9249-9f83032a81b7/UploadedImages/pdfs/Engineers\\_Country\\_Weekend\\_2017.pdf](https://IPWEA/562afde2-5970-4b88-9249-9f83032a81b7/UploadedImages/pdfs/Engineers_Country_Weekend_2017.pdf)

If that link fails, go to <http://www.ipwea.org/home> click on EVENTS and find the Country Weekend in the October page.

# Mining for Oil – the Lakes Entrance Oil Shaft

Australia's vulnerable situation with respect to access to oil and petroleum products was realised during and immediately after the first world war. At that time the only indigenous oil source was from shale oil operations in the Blue Mountains in NSW. These stimulated oil exploration activity in East Gippsland, Victoria, following earlier interest that had been aroused by what were thought to be oil slicks on stagnant water pools.

Interest was further stimulated in 1920 when the Australian Government offered a reward of £50,000 (roughly equivalent to \$3.5 M today) for the discovery of a commercial oil field in Australia. In 1924 the Lake Bunga No.1 oil bore, about 5 km east of Lakes Entrance in East Gippsland, Victoria, struck traces of oil in ground water from a sand horizon at a depth of 326 m. It was claimed to be the first substantiated discovery of liquid 'well oil' in Australia.



Above: Site of Lake Bunga No.1 Oil Bore, showing a concrete ring on the bore hole location & a model drilling rig.  
Left: The Lake Bunga signboard. Photos: Miles Pierce



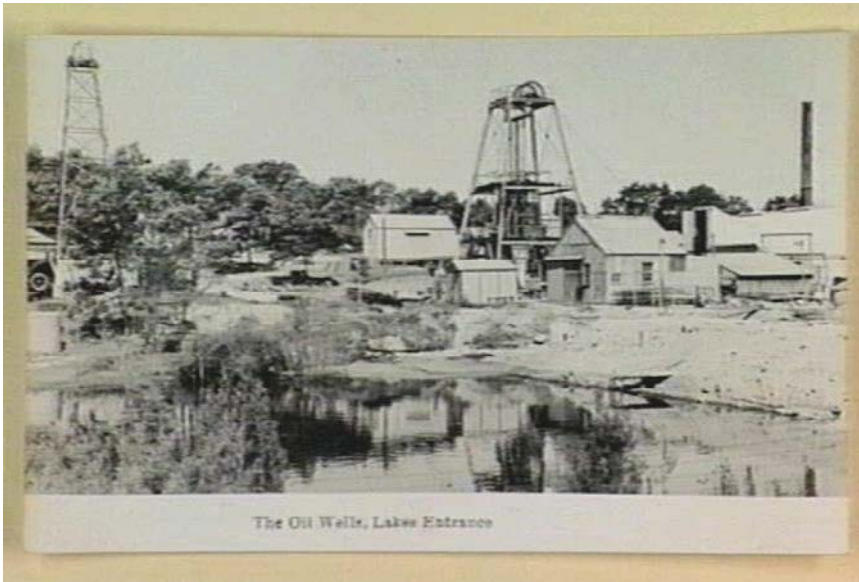
Over the next fifteen years some 40 wells were drilled by private prospectors over an area of about 20 sq km centred on the then small township of Lakes Entrance. Reportedly, 75% of these drilled wells produced crude oil ranging from 'a few drops' to 130 gallons/day ( $\approx$  600 litres/day). The oil bearing sand bed averaged 10 metres thick with an average depth of 375 metres. The low-pressure conditions in the aquifer meant that oil and water was extracted from the drilled wells by bailing and the heavy asphaltic crude oil dehydrated at the surface. Total crude oil production from the field up to 1938 was reported as 483 kilolitres.

With the onset of the second world war in September 1939 the Australian government took a more direct interest in the Lakes Entrance field that was still the only then known source of 'well oil' in Australia. Given the prevailing low-pressure conditions in the oil bearing sand horizon, government geologists floated the idea of drilling out horizontally from a conventional mine shaft. Advice was sought from the USA where there had been some experimentation with horizontal oil drilling. This resulted in Leo Ranney of the Ranney Oil Mining Co. NY being commissioned on the basis of his company having been one of the pioneers of the technique and Ranney being the author of a number of papers thereon. There were doubts expressed by some about the lack of good evidence of a successful implementation of the technique or that it would be applicable to the conditions at Lakes Entrance, nevertheless a decision was made to proceed.

A site for a shaft was chosen in the Lakes Entrance township. The Commonwealth and Victorian Governments formed an operating entity comprising representatives from both governments and the Austral Oil Drilling Syndicate. This was one of the private companies which had been involved with the oil well drilling in the area. The two governments made a collective loan of £50,000 (roughly equivalent to \$3.5 M today) to the new operating entity. After some protracted deliberation and negotiation an administrative structure was set up within the Commonwealth Department of Supply & Development to oversee the enterprise, and preliminary works were started at the shaft site.



## Mining for Oil – the Lakes Entrance Oil Shaft



Postcard showing the Austral Oil site in Lakes Entrance in circa the early 1940s SLV a09569.

Shaft sinking in earnest began in late 1942 by the Snider Construction Company under Mr Arthur Clarke, a qualified mine manager recruited from Bendigo. The shaft was concrete lined as it progressed downwards with an internal diameter of 12 feet (3.7 metres). A pilot bore was progressively drilled close by to provide advance information on the ground conditions and the likelihood of significant water inflows. By the end of 1944 the shaft had reached a depth of 280 metres after encountering several substantive groundwater inflows necessitating the establishment of intermediate pumping stations.

By mid 1945 the shaft had reached 340 metres deep, and in August the Victorian Mines Inspector decreed that for safety reasons the main shaft should not extend below the 352 metres level it had by then reached. As a fall

back, a timbered winze (shaft) measuring 5 feet x 4 feet (1.5 x 1.2 metres) was sunk from the floor of the main shaft a further 15 metres into the oil bearing sands. Short drives were then made from its base to the north and the south along with a 4 metre deep 'pothole'. Two holes were subsequently drilled out horizontally extending about 9 metres from the end of each drive to test oil flow. Unfortunately, only small and progressively depleting oil flows resulted, giving a disappointing prospect for further horizontal drilling.

By November 1945, with the war ended and the strategic driver removed, the two governments considered that the venture was unlikely to be economically viable and henceforth direct government involvement ceased. In March of the following year the enterprise was sold to the Austral Syndicate for the assessed residual value of the machinery. A new company, Lakes Oil Ltd, was created in May 1946 and soon after acquired the Austral Syndicate rights to the Lakes Entrance oil shaft enterprise.

A restart of operations was made in 1947 and a decision made to construct a 6 metre diameter by 9 metre high concrete chamber immediately above the north and south drives in line with Ranney's original concept. The chamber had 1.2 metre thick reinforced concrete walls with 48 'portholes' to facilitate horizontal drilling. By the end of the year a number of short horizontal holes had been drilled out to a distance of about 18 metres from the work chamber. All reportedly yielded a small quantity of oil and more horizontal holes were then drilled out from the chamber in 1948, but again the oil yield remained disappointing. A plan to drill much longer horizontal holes was pursued in 1949 and by December one hole extended outwards some 300 m. It showed a promising initial oil flow but again it was not sustained.

An unsuccessful appeal to the Commonwealth Government for a grant of £60,000 over two years saw further work at the shaft cease. The horizontal holes were cemented over, all valuable plant and equipment withdrawn and the shaft allowed to fill with water. Becoming



Surviving relics of the Lakes Oil site in Lakes Entrance.

Ph: Miles Pierce, Nov. 2016



A drilling rig at Lakes Entrance, possibly in the 1930s. Ph: Earth Resources.

progressively derelict over subsequent years, most of the surface facilities were removed by the late 1960s and the shaft itself was sealed.

In the final analysis approximately 5000 barrels (600 kilolitres) of poor quality crude oil was produced from the epic oil shaft venture, with a total value of about £10,000 (roughly equivalent to \$0.7 M today). Long-hole horizontal drilling from vertical shafts into oil producing horizons never developed. It was superseded by later drilling technology that allowed horizontal holes to be drilled from the surface. Ultimately, the commercial reservoirs of crude oil and gas were found offshore in Bass Strait where deep-sea production wells have been in operation since the 1970s.

## The Author visits the Lakes Entrance Oil Shaft

In November last year the author attended a Probus Club 'getaway' based at Lakes Entrance and during 'free time' went looking for the surface remnants of the oil shaft enterprise. After a first unsuccessful sortie, contact was made with a member of the local historical society who pinpointed the location. The site is beside a small watercourse on land currently used for grazing but zoned 'General Residential' with new housing developments close by. The site and remnants comprising three vertical cylindrical concrete tanks and some other plant foundations are listed on the Victorian Heritage Inventory (not the Victorian Heritage Register) – see photograph.

In February 2017 the author wrote to the East Gippsland Shire Council reiterating the heritage significance of the site and the surface remnants and advocating preservation thereof along with future public accessibility and interpretation. Pleasingly, a letter in reply from the Shire Council gave assurance that, as a part of the development approval process for the residential growth, provision has been included for ongoing protection and the opportunity for future public access to the former oil shaft site. In parallel with the above, the author has exchanged correspondence with the Australasian Mining History Association who have since written separately to the Shire Council, reinforcing the heritage significance of the site and commending the positive response to my February letter.

By Miles Pierce

**Acknowledgement:** The above outlined history of the early search for well oil in and around Lakes Entrance, culminating in the epic oil shaft and attempted horizontal drilling therefrom, is based on the paper by Jim Enever: *Mining for Oil in Victoria – The Lakes Entrance Oil Shaft* as published in the *Journal of Australasian Mining History*, Vol. 8, Sep 2010. Readers interested in learning more about the subject are urged to refer to this informative 25 page paper, which is available at: <http://search.informit.com.au/documentSummary;dn=689737678678810;res=IELENI>

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## Something you must see at the 19th Australasian Engineering Heritage Conference Mildura, 9-13 October 2017.

As part of the conference, you will have a great opportunity to see the historic Chaffey-designed Tangye pumping engine lifting water from the River Murray into the Kings Billabong.

Mildura, a regional area in Victoria, Australia, became an irrigated oasis in the midst of an arid land due to irrigation pioneer George Chaffey and his brother William Benjamin (WB) Chaffey who built the Psyche Bend Pump Station in 1891 to meet the needs of the irrigation settlement. George Chaffey had selected Mildura as the site for an irrigation development because of its large tracts of Crown land, climate, soil types and its proximity to two major rivers, the Murray and the Darling.



A view along the Psyche Bend Pumping Station with a pump in the foreground and the Tangye engine beyond.

Photo from Keith Baker.

The need to raise water from the Murray to land approximately 28 metres above river level challenged George Chaffey to design his billabong system, which elevated water in four lifts by pumping water from the Murray River into Kings Billabong and then lifting water via a number of pumps. The system supplied an area of approximately 20,000 hectares and was the first stage of a grand scheme to irrigate over 100,000 hectares around Mildura.

To power the pumps, George Chaffey designed a triple-expansion steam engine coupled to centrifugal pumps. Tangye's of Birmingham, who manufactured the equipment, at first were reluctant to build the engine and then only manufactured it on the proviso that the name plate Chaffey's improved Pumping Engine made by Tangyes for Mildura Irrigation Colony was fixed to the engine. This was in case the engine failed and they were deemed liable for the failure. The engine and pumps were built in England and delivered in pieces from England and came by river from Echuca.

The Chaffey steam engine and pumps at Psyche Bend operated successfully until 1959, when electric pumps were installed nearby and the pumping station decommissioned. The original pump house still stands today but the above-ground assets, including two boiler houses, were removed and the boilers sold for scrap.

Text derived from information in <http://www.murrayriver.com.au/>



# Congratulations EH WA

## Engineering Heritage Western Australia Wins a State Heritage Award

On 26 May the twenty-fifth annual presentation of the Western Australian Heritage Awards was held in Perth at the WA Ballet Centre. The awards were presented by the Hon. David Templeman MLA, Minister for Heritage, and Anne Arnold, Chair of Heritage Council of WA.

One of winners was Engineering Heritage WA, in the category of “contribution by a public or private organisation”. The citation on the award certificate reads: **Since 1984, Engineering Heritage WA has taken an active role in the identification, promotion and conservation of Western Australia's significant engineering, industrial and technological heritage. Through its leadership and recognition program, it has broadened our understanding of, and the way we think about, heritage.** The other finalists in the same award category were the National Trust of Australia (WA) and the State Library of WA.

Winners in other categories included the former Dalgety Wool Stores in Fremantle, which have been conserved and adapted for re-use as apartments; Friends of Australian Rock Art; the Shire of Murray; the Monsignor Hawes Heritage Centre in Geraldton; and the Busselton Jetty Experience.



Members of EHWA at the WA Heritage Council offices for presentation of the Award.  
L to R: Peter Baxendale; Martin Silk; Karen Riddette (Chair EHWA); Bob Morrison; Mark Bush.

In June the national committee advised that the nomination for the North-West Shelf Gas Project had also been approved for an engineering heritage international marker. Other sites cover a range of disciplines including oil and gas, mining, public infrastructure, defence and communications.

In addition to the recognition program, EHWA provides advice to government and the community on engineering heritage significance and management options for various sites. It also has a program of oral history recordings with eminent engineers who have made significant contributions to the engineering profession, as well as civic, academic and business achievements. So far seven of these have been completed.

Recognising the need for training in heritage engineering, immediate past Chair Ian Maitland is preparing a one-day course for presentation in Perth in November. It is hoped this will attract people from several interest groups as well as engineers. The aim is to improve the knowledge and awareness of people involved in the restoration and conservation of heritage structures and other sites, as well as of owners and government agencies.

In accepting EHWA's award, current Chair Karen Riddette thanked the Heritage Council, saying she was delighted that the work of EHWA's volunteers, past and present, was being recognised.

EHWA is active in both engineering heritage and heritage engineering. To date some twenty-six sites in WA have been successfully nominated for heritage recognition. Three of these have previously been recognised as of international significance: Goldfields Water Supply (which includes the Kalgoorlie pipeline); NASA Space Tracking Station Carnarvon; and Pilbara Heavy Haul Railways.



# Ghosts of Bridges Past

*The civil works of Harold Beresford Irwin, 1882 to 1962.*



Harold Beresford Irwin, 1882 to 1962.

Imagine going into the bush without a mobile phone, chainsaw, concrete pump, nail gun or electricity and then building a major structure, with cutting edge technology, based on a rudimentary drawing? This is what my grandfather did and some of his bridges are still standing after almost 100 years. Today all you need is a mobile phone and a bank account to build a bridge. Not so in the 1920's.

Harold Beresford Irwin died in 1962 at the age of 80 leaving behind a legacy of work of little interest to others. Most people take civil works for granted, few think about the construction of a bridge as they rush across it. Amongst my grandfather's endowments were two small photo albums and one modest framed display of his work. These gathered dust from 1962 until they landed on my desk in 2016.

Within the decaying bindings was a treasure trove of bridge construction images recording a world almost unimaginable to us. A world of draught horses, working men in jackets and waistcoats, of traction engines and ingenious improvisation. The album led us a merry chase.



Our starting point: a Photograph Album.

Take the image below for instance, the only clue was "Waverley Road, Malvern".

Where did Malvern end then?

What was the crossing? When was it built? What happened to the bridge?  
Where is the photo facing? Slowly we put together all the pieces.



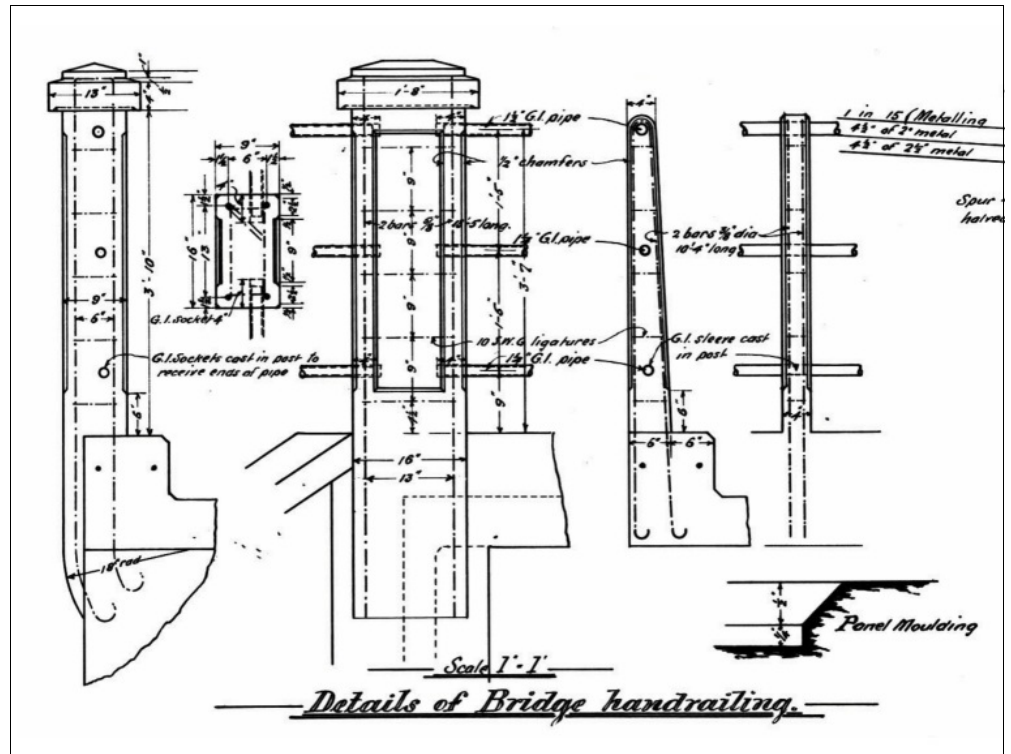
"Waverley Road, Malvern" — but what, where and when?

We unearthed original drawings and contract records and visited every viable site. Mention must be made of the invaluable assistance of the VicRoads archive section and VicRoads engineer Andrew Boak. Gradually we filled in the gaps for every location. A book has evolved with a chapter dedicated to each major project. The fun part was the discovery process, starting with a few vague images and gradually unravelling, appreciating and understanding the life of each project.

## Ghosts of Bridges Past

Original drawings were beautiful examples of drafting, often well detailed but sometimes lacking in key technical information such as joint placement. In the 1920's you had to be concise, documentation was expensive to produce and replicate. A major bridge would be built from three or four drawings.

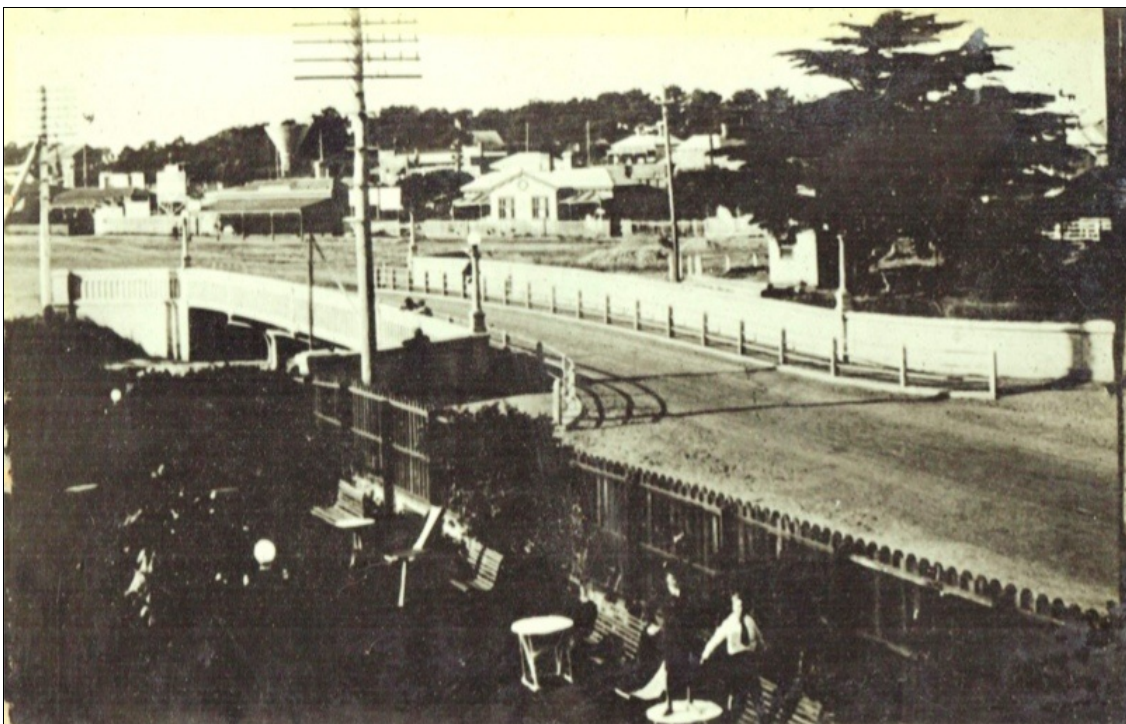
My Grandfather grew up in Ballarat in the immediate aftermath of the gold rush and trained, somewhat over optimistically as it turned out, as a mine manager. He missed the gold rush but was in the right place at the right time for the bridge boom. In the 1920s early timber bridges were giving way to the latest technology reinforced concrete structures to serve the new-fangled and equally exciting motor vehicles.



Original Drawings — nice drafting, but minimal engineering content.

Victoria's first reinforced concrete bridge was the Morell Bridge over the Yarra River (originally the Anderson Street bridge) at the north end of Anderson Street in South Yarra. The engineers were Monash and Anderson, construction was by Carter and Gummow. Work was completed in 1899. After that, the rush was on.

The first major reinforced concrete bridge built by Harold Irwin was the Mordialloc creek crossing of the Nepean Highway. Opened in 1919 it replacing a shaky old timber bridge. It was demolished in 2008. I inspected the bridge in 2007 – the piles had suffered but most of the original concrete work was in surprisingly good condition. This was a difficult construction with deep piles and pile caps on the stream bed. Below we see the finished job, photographed by Harold from the balcony of the pub, which still stands.



The Mordialloc Bridge, photographed on its completion in 1919.

## Ghosts of Bridges Past

Technical difficulties meant money was lost at Mordialloc. Harold was pushed to a creditors meeting where agreement was reached to trade on and trade out. Trade on he did, throwing up bridges all over the countryside. Unbeknown to Harold at the time, he developed a knack of choosing bridges later obliterated by road works. The Hume Highway crossing at Violet Town in 1921, destroyed in 1976 when the freeway went through. The Reynards Road, Coburg crossing of the Merri Creek, built in 1922, destroyed in the 1960's when the Tullamarine Freeway went in. In 1923 he built the Midland Highway bridge at Clarendon, just south of Buninyong. This was replaced by a culvert in the 1980s. 1924 saw the construction of the Waverley Road crossing of Scotchman's Creek in Malvern, buried when the Monash Freeway crossing was built in the 1980's.



The Pyrenees Highway Bridge over Tullaroop Creek at Carisbrook, photographed in 1925



The Pyrenees Highway Bridge over Tullaroop Creek at Carisbrook, photographed in 2016.

In 1925 he finally picked a stayer, the Pyrenees Highway bridge over the Tullaroop Creek (or Deep Creek if you're a local) at Carisbrook some 7 km east of Maryborough in Western Victoria. Here (above) we see the bridge as he left it, and (left & below) as it appears today. Although the roadway has been widened, all of Harold's original work survives except the railings.

Today at Carisbrook, the original work is easy to see. The quality of the concrete has stood the test of time. Locally won materials, marginal rock crushing, and minimal mechanical vibration did not make ideal beginnings for longevity. Surprisingly, little maintenance and restoration has been required. Clearly Harold and his men had a strong ethic of good workmanship.

Right: Detail of the 1925 concrete work on the Carisbrook Bridge  
Photographed in 2016.



## Ghosts of Bridges Past

Images of works in progress capture the difficulties of construction in stream, at night, and the horrendous labour intensity of concrete works before mechanisation. There were at least ten timber barrows of concrete to handle for every cubic metre placed. Pours were slow and plagued by cold joints.



Steel Fixers Picnic.



Concrete handling the hard way!

Also in 1925 Harold completed the James Patterson Bridge (right) in Charlton, a five-span reinforced concrete bridge on the Calder Highway over the Avoca River 110 km north west of Bendigo. This bridge also stands today and has withstood many major floods. Below we see concrete batching for that project.



Concrete mixing 1920s style.



In-stream Pile Head Works, pre OH&S.

There was no chance of an OH&S problem as there was no OH&S. Despite this, as far as we know there were no significant accidents on Harold's sites.



James Patterson Bridge in Charlton, photographed in 2010. All original work below the balustrade.

My grandfather was a pioneer, of construction, and of concrete technology. He had a keen sense of opening up the country and of its possibilities and a genuine love of the Australian countryside, its flora and fauna. How he and his men endured the site conditions and how on earth he ran the projects without even a viable office can only be wondered at. A great deal must have been simply done on trust. It's just as well that pioneering only has to be done once – I'm not sure we'd be up for it again.

Harold Irwin's projects didn't stop at the bridges recorded in his albums – we have unearthed at least another six bridges, at least one dam, major channels for irrigation in the Wimmera and a major water race in the Rubicon Hydro electric scheme, also in the roaring 20's. Certainly he was a busy man.



Our book *Apart from the Bridges and the Aqueducts* will be available in 2017. It promises to be one of the smallest selling and least read books of the year but it has been great fun to put together.

*Patrick Irwin & Andrew Boak*

Left, building the water race & right, the village store at the Rubicon Hydro Electric Scheme.



# Woolloomooloo Finger Wharf

## The rise, decline & amazing resuscitation from near death of a Sydney icon (part 3 of 3)

By Margret Doring, former Engineer Specialist in the Heritage Branch of the NSW Department of Planning.

I started writing this story for the July 2016 EHA Magazine. Saving the Finger Wharf, and the contemporary Walsh Bay Wharves in Sydney from the demolishers took up a large part of my attention for a number of years while I worked at the Heritage Branch. I didn't remember how much until I started going through bookshelves and boxes of old papers – chucking many and archiving some. One box was all Finger Wharf – reports, correspondence, tender documents (3 volumes), an environmental impact statement (2 volumes), newspaper cuttings. Picking through it all I became fascinated and realised there was a great story there which had never fully become public.

I began with some notes on the history and development of Woolloomooloo Bay, then the history of the wharf's design and construction, a description of its most notable features, the story of its working life and its slow decline in the 1970's and early 1980's. I had got to around 4,000 words and had barely started! Thus that became Part 1 of the story. If you are interested, and don't have a copy, Part 1 can be found (at present) in pages 8-13 of the July 2016 Magazine at:

[https://www.engineersaustralia.org.au/sites/default/files/resource-files/2017-01/eha\\_magazine\\_vol2\\_no3\\_july\\_2016\\_0.pdf](https://www.engineersaustralia.org.au/sites/default/files/resource-files/2017-01/eha_magazine_vol2_no3_july_2016_0.pdf)



Aerial view of the Finger Wharf in 1987. The Art Gallery is on the lower left of the photo. The Navy Carpark is bounded by two white rings on the upper right side of the photo. Image: part of Exhibit 3.2 of the 1987 EIS.

Part 2, on pages 18-23 of the January 2017 EHA Magazine, documented changes in the area up to the building of the multi-storey concrete Navy carpark on the shore opposite the Finger Wharf – pointing up the dilapidated state of the Wharf in comparison to the carpark's fresh whiteness. The Maritime Services Board (MSB) proposed redevelopment of the Bay, leading to a call for tenders, a winning tender and a subsequent Environmental Impact Statement (EIS) which horrified all supporters and admirers of the Finger Wharf. The Wharf would be demolished to make way for a huge marina, packed with yachts and cabin cruisers and filling most of the Bay which wasn't already the domain of Navy ships.

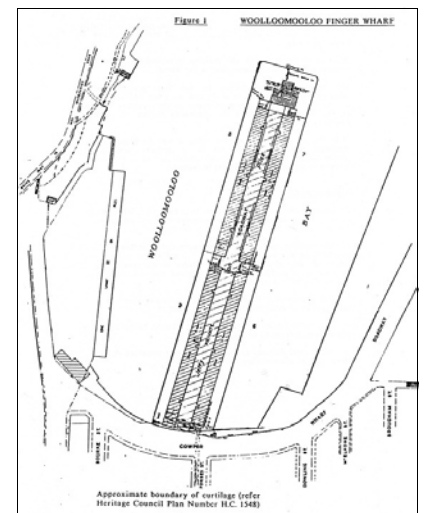
The public and community organisations expressed their outrage, loudly and forcefully, *culminating on 29th November 1987 in an announcement by the Premier, Barrie Unsworth, that he had instructed the Minister for Planning and Environment, Mr Carr, to apply the Heritage Act to retain the Finger Wharf.*<sup>1</sup> Part 2 ended on 17<sup>th</sup> February 1988, with the announcement of the making of a Permanent Conservation Order (PCO) over the Finger Wharf. If you would like to read Part 2 of the story find it at:

[https://www.engineersaustralia.org.au/sites/default/files/resource-files/2017-07/EHA\\_Magazine\\_Vol2\\_No5\\_January\\_2017.pdf](https://www.engineersaustralia.org.au/sites/default/files/resource-files/2017-07/EHA_Magazine_Vol2_No5_January_2017.pdf)

or on the AICOMOS website at: [http://australia.icomos.org/wp-content/uploads/EHA\\_Magazine\\_Vol2\\_No5\\_January\\_2017.pdf](http://australia.icomos.org/wp-content/uploads/EHA_Magazine_Vol2_No5_January_2017.pdf)

One wonders if the then Premier genuinely wished to save the Finger Wharf from demolition, or if it was but a desperate ploy to save his government from demolition. Either way, the PCO was a done deal only just in time from the point of view of wharf supporters. At the State election only a month later, the Unsworth Labor Government was defeated in a landslide, and we had a Liberal Government and a new Premier – Nick Greiner – and a whole new set of attitudes and opinions to learn about.

Meanwhile, the Department of Planning (DofP) Heritage Branch was busy preparing Conservation Guidelines and a Conservation Policy for the MSB to include as a mandatory part of what we supposed would be a new set of tender documents. We put together a recording brief for the wharf, and another brief for the preparation of a Conservation Management Plan, all of which we hoped would be ready for the new tenderers. But it was not to be – all our preparations were blown away by the wind of the election, and only one of the documents was ever published. In early March 1988 the MSB published the *Woolloomooloo Finger Wharf Heritage & Conservation Guidelines*, including a plan of the Heritage Council curtilage of the Finger Wharf (at right).



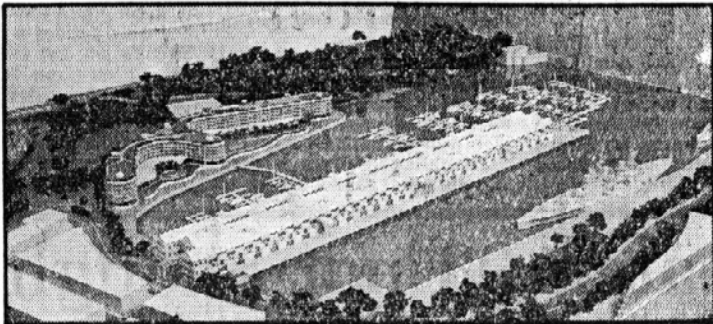
<sup>1</sup> From *Woolloomooloo Finger Wharf part 2*, by M. Doring, in EHA Magazine, January 2017.

## Woolloomooloo Finger Wharf

There were no new tenders, and no new tenderers. The Sydney Morning Herald (SMH) of 24th September 1988 explained it all thus: *Although the Labor Government [had] signed an agreement with Pivot for its proposal, it then turned around in November 1987 and put a conservation order on the wharf, effectively stopping Pivot's development. But Pivot's agreement still stood, and it is this problem that the Liberal Government has been trying to resolve. Calling new tenders for the project would have opened the possibility of a damages action by Pivot, even though the scheme was subject to the final approval of authorities such as the City Council and the MSB.*

The Pivot Group, the principal part of a consortium named Woolloomooloo Bay Pty Ltd, had won the MSB's original tender with a proposal to demolish the Finger Wharf and replace it with a huge marina. That proposal had been endorsed by a subsequent EIS, and Pivot refused to back down or go away when the PCO was gazetted. The Pivot Group maintained that the Deed of Agreement with the MSB, signed in May 1987, still held firm. It had the MSB over a barrel, and busily embarked on an entirely new vision, which saw the Finger Wharf retained, restored and recycled, a much reduced marina between the Wharf and the west shore of the Bay, and (unfortunately for their future aspirations), a huge new hotel backed up against the Domain along Wharf 11, located on the bay shoreline west of the Finger Wharf.

In April 1988, the Pivot Group was ready to present their plans to the DofP. Their architect explained that the Finger Wharf would be retained in its entirety and generally in accordance with the Conservation Guidelines. It would have a 200 room hotel at the north end, car parking at the south (shore) end, and serviced apartments, shops and offices in between. That all seemed pretty satisfactory to the Heritage Branch representative, but that was only part of the proposal. The other part of the project involved building a 400+ room, 4-star hotel that would start at 4-storeys high at the south end of Wharf 11 and snake its way along the Wharf rising to 14-storeys at the north end. In between the Finger Wharf and Wharf 11 would be a marina. The architect was confident that the 14-storey hotel would present no problems. Optimism unbounded!



A model of the proposed development of Woolloomooloo Bay.

*five storey hotel proposed for Wharf 11, which it believes will have an adverse impact on the [Finger] Wharf itself as well as parts of the Domain, Botanic Gardens & the vista from the Art Gallery, which constitute a very significant part of the heritage of Sydney Harbour with the Domain & Gardens being the most important open space areas of heritage significance in Australia.*

The EIS went on public exhibition on 18<sup>th</sup> January 1989, a few days after I left for a term of secondment to the Historic Buildings Council in Victoria, so I never saw it and sadly, it doesn't form part of my collection. My partner and a few colleagues attempted to keep me in touch, sending me some newspaper cuttings I still have, but I don't even know if the EIS was subject to the usual examination by the Director of the DofP – I wasn't there to write it this time. Probably it was not, because Woolloomooloo Bay Pty Ltd and the Pivot Group were shouting VICTORY three days later, with full page display ads in the newspapers and atrocious puns – **WOOLLOOMOOLOO BAY SOON TO BE ENJOYED BY EVERYONE. NOT JUST BUOYS & GULLS.** – with an appropriate photo of the north end of the Finger Wharf.

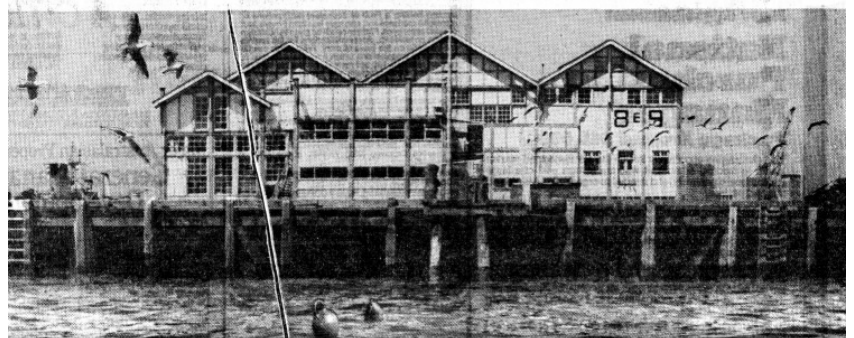
At right: Part of the Pivot ad. in the SMH, on 21/01/1989.

He might have been right. Although the Government was opposed to the high rise hotel, and wanted new tenders to be called, it was stymied by that 1987 Deed of Agreement. Meeting after meeting between Pivot, MSB, DofP, City Council and other interested parties over many months gradually whittled that contentious hotel down, from four stories at one end and 14 at the other to 5-storeys all the way along – barely acceptable but agreed to with a new EIS.

At left: Photo of model with 5-storey hotel on Wharf 11 – from SMH, 19/01/1989.

By November 1988 the Heritage Council was advising the Minister that it was: . . . *concerned about the development of a*

**WOOLLOOMOOLOO BAY.  
SOON TO BE ENJOYED  
BY EVERYONE.  
NOT JUST BUOYS & GULLS.**



## Woolloomooloo Finger Wharf

Suddenly, when the worst controversies seemed to be over, and the refurbishment of the Finger Wharf might at last happen, Mr Keating, then the Federal Treasurer, inserted himself into the fray, apparently at the request of the leader of the Labor opposition in the NSW parliament.<sup>2</sup> In an SMH story of 4<sup>th</sup> February 1989 it was reported that: *For three years the Federal Treasurer, Paul Keating, has harboured a secret plan to save Woolloomooloo Bay from the developers.* He was not only opposed to the hotel on Wharf 11 – he also wanted the Finger Wharf gone, and the whole waterfront of Woolloomooloo Bay reclaimed for public use – *Land to which the people of the western suburbs could take their children to see the main harbour and picnic on the foreshores. He remains determined to have the bay returned to its natural shape. . . .* He discovered he could stop the development by deferring foreign investment approval. *To help finance the project, Pivot has brought in the Japanese Nara group and, under foreign investment guidelines, the project has to be approved by the Treasurer.*

The NSW Premier, Mr Greiner, was furious at the interference of the Treasurer. *Paul Keating's action in blocking the construction of a multi-storey office and hotel complex at Woolloomooloo's historic Finger Wharf was 'an absolutely flagrant abuse of foreign-investment powers'.*<sup>3</sup> Greiner believed Mr Keating had intervened because he happened to live in the area, at nearby Elizabeth Bay and thought the development was undesirable.<sup>4</sup> A few weeks later, Pivot's answer to Keating's threat was to cancel its partnership with the Japanese firm. The Treasurer's approval was not needed where there was no foreign investment.

There were doubts that Pivot could manage without the Japanese money, but they decided to go ahead anyway – until a month or so later, the SMH of 12<sup>th</sup> May 1989 reported: *The \$280 million Woolloomooloo finger wharf development was dealt a potentially fatal blow last night after the Central Sydney Planning Committee refused approval for a multi-storey hotel on the site. And in a further controversial move, the committee unanimously recommended that the Heritage Council reconsider the future of the historic wharf, saying that public access to the harbour foreshores was best served by its removal.* This set off another round of recriminations & meetings, Pivot insisting it could afford to rehabilitate the Finger Wharf only if it could build the hotel on Wharf 11, the Art Gallery people complaining that the hotel would ruin the view from its coffee shop (I always thought that people went to the Gallery to see what was inside it!), the nature purists wanting the bay restored to its 'natural state', whatever they thought that was, and the local residents just wanting the Finger Wharf restored to its former glory and left so they could walk along it and fish from it without trespassing on someone's private domain, but still find work in whatever businesses took up residence on it.

## Fate of Finger Wharf assigned to boondocks



The Finger Wharf .. a sad symbol of the fragility of heritage values in NSW.

Photo from an SMH article of 30<sup>th</sup> Sept 1989, expressing the disgust felt in much of the community at the removal of the PCO. This photo was republished in January 1992, when the Wharf seemed on the brink of demolition.

Eventually, in a letter dated 7<sup>th</sup> Sept. 1989, the Minister for Planning David Hay wrote to Mr Justice Hope, the Chairman of the Heritage Council of NSW asking that, at their meeting on the same day, the Heritage Council would consider whether the PCO on the Finger Wharf could be removed.<sup>5</sup> There was a choice between (one) preserving the Finger Wharf plus the large hotel plus a marina, or (two) demolishing the Finger Wharf, plus landscaping Wharf 11 plus a marina. The Government considered the second option preferable, necessitating removal of the PCO !

There was no real reason why the Minister could not revoke the PCO himself, but possibly he thought it preferable that the consequent opprobrium fell on the heads of the Heritage Council members – which of course it did, when they voted to

remove the order! The Heritage Council (and the DofP) became the objects of scandal and a widespread campaign of condemnation.

2 *The NSW opposition Leader, Bob Carr, has asked the Federal Treasurer, Paul Keating, to use restrictions on foreign investments to block the proposed multi-storey hotel near Woolloomooloo Finger Wharf. . . .* Canberra Times, Monday 13 February 1989, page 3.

3 Canberra Times, 2<sup>nd</sup> March 1989.

4 *ibid.*

5 Letter copied and published in *The Sydney Review*, October 1989, page 3.



## Woolloomooloo Finger Wharf

The next thing to happen was perhaps predictable – after the removal of the PCO in September 1989, soon after the Heritage Council meeting and the announcement by the Minister, the Pivot Group sued the Government for \$105 million for having been messed around for so long. They sued for costs and loss of profits and reputation. Less predictable, as the scandal and protests spread over the following months was the initiation, in early April 1990, of a *Commission of Inquiry into the removal of a permanent conservation order on the Woolloomooloo Finger Wharf*.<sup>6</sup> There were 24 separate submissions to the inquiry, mostly opposed to the revocation of the PCO, including from the Pivot Group and the National Trust. I don't know what part the DoF and the Heritage Council took in the Inquiry, because by that time I had resigned from my position in the Heritage Branch and embarked on a new career, as a heritage consultant. I still had newspaper cuttings to keep in touch, but my knowledge was mostly hearsay from then on, as most of my work happened far from Sydney.

### Battle for wharf takes artistic turn



Some of those at the front line of the battle for the Finger Wharf ... (from left) Mr Jack Munday, Ms Clover Moore and Mr Patrick Heron with a David Moore photograph of the wharf. Picture by PHILIP LOCK.

*said its removal would also 'enable increased urban landscaping adjacent to its western shoreline and permit increased public access and enjoyment in a visual and physical sense of the bay'*.<sup>8</sup> I was not the only one to be gob-smacked and horrified at this decision. The decision, on the same day, by the Supreme Court, to dismiss Pivot's claims with a token payment of \$1 to Pivot/Woolloomooloo Bay Pty Ltd by the MSB seemed trivial in comparison.

It naturally followed on Tuesday 13 November 1990 that the Premier, Nick Greiner said: *The historic Finger Wharf at Woolloomooloo Bay is to be demolished in a \$25 million plan to make way for a harbourside restaurant and recreational facilities . . . The lease for the 300 seat restaurant and coffee shop would be put out to tender and ferries would service the western side of the bay. The plan, which would include take-away food kiosks, would open up one of the world's most picturesque walkways, from Garden Island via the Opera House to Circular Quay, he said.*<sup>9</sup> Indeed? That was the last straw for some people, and five days later the Building Workers Industrial Union and key building unions placed an interim Green Ban on the wharf, preventing demolition. A few months later the bulldozers were all lined up ready to go when the Ban was lifted. I don't know what happened next – was the green Ban confirmed? Or did the Government just lose its nerve? I expect it was the former, because two years later the Finger Wharf was still there – empty and neglected but structurally sound, and the government was changing its tune.

Nothing much happened around the Wharf for the next six years. Lots of people had plans, but development approval didn't happen until 1994, and work didn't start until 1996. I knew very little of this process, being occupied with consulting work around the country and building a house in Victoria. I was delighted to discover that the conservation architect for the development work had written an account of it, in July 2000, which I could publish in the Magazine. So following my part 3 of the story is part 4,

*The Regeneration of the Woolloomooloo Finger Wharf*,  
by my old friend Ian Stapleton, of (now)  
LSJ Heritage Planning & Architecture.

The (so called) derelict Finger Wharf viewed from the north, a few days after the Green Ban halted demolition.

Photo: M Doring, 25/11/1990.



6 The Sydney Morning Herald, 5 April 1990, page 8.  
7 The Sydney Morning Herald, 6 April 1990.  
8 The Sydney Morning Herald, 18 July 1990.  
9 Canberra Times, 14 November 1990, page 20.

# The Regeneration of the Woolloomooloo Finger Wharf

By Ian Stapleton, of heritage architects Clive Lucas, Stapleton & Partners. CLS&P were the Heritage Architects for the Wharf from 1992.



The Finger Wharf in about July 2000, when all the recycling was complete. There is a new apartment building added on the north end, a small marina, and the planted-over roof of the building behind Wharf 11 and below the Art Gallery.

Photo: From Ian Stapleton .

The opening of W Hotel at the Woolloomooloo Finger Wharf in July 2000 brought to an end a conservation saga dating back 14 years. A building spurned by a prime minister, declared beyond economic use, even removed from the city's planning maps, has survived. But this has been achieved only with great change to both the Wharf itself and its setting, and the question should be asked: was it, in heritage terms, worth it?

The Woolloomooloo Finger Wharf, completed in 1915 and composed of four sheds (Berths 6-9) – each with a battened fibro office block and an ablutions block, set

around a cruciform street pattern – was highly architectural. The chequerboard pattern produced on the east and west sides by the composition of storey posts and various infills was widely praised as being a composition worthy of Mondrian.

There is too a whole history of embarkation and disembarkation of both people and goods, its 14 metre high roofed internal street giving it the title “a cathedral of commerce”.

Initially preservation looked sure enough when a 1987 scheme by the Pivot Group to demolish the Wharf and develop Wharf 11 to the west was quashed by the Heritage Council of NSW. In September 1989 the Council was asked to approve a scheme for a five level hotel on Wharf 11 or recommend the removal of the “Permanent” Conservation Order. Instead of doing neither it recommended the removal of the PCO, accepting that the Wharf was not savable without unfortunate supporting development.

Of the 4,700 piles in the building, 1000 were said to be rotten. Repair of the substructure alone would cost \$15M. This was the darkest hour for the old Wharf. From November 1990 only a BWIU (Building Workers Industrial Union) Green Ban protected the Wharf. In 1991 the new draft Local Environmental Plan for Sydney left the wharf off its planning maps, presuming demolition was imminent. About that time Prime Minister Keating, usually a heritage supporter, let it be known that he preferred the Wharf to go and the Bay be restored to its “natural state” (as if two hundred years of reclamation and development could be reversed!).

Subsequently the Maritime Services Board (MSB) submitted an application to the Central Sydney Planning Committee to demolish. At a meeting I attended with Clive Lucas and Colin Crisp, conservation engineer, we tried to argue the wait and see case: although crippled as a wharf it still had enough strength to support lighter commercial loads. In the end the Committee deferred the decision.

In 1992 developers Bill Shipton and Jose de la Vega, with the Walsh Bay Wharf Theatre architect Viv Fraser, revived interest in the recycling of the Wharf. In September 1992 three consortiums were invited to tender. The winning Fraser scheme was for a 106 room hotel and 140 apartments in the Wharf with parking, recreational centre and restaurants on Wharf 11 and 29 boat berths. The five star hotel included a projecting restaurant and pool at the north end of the Wharf.

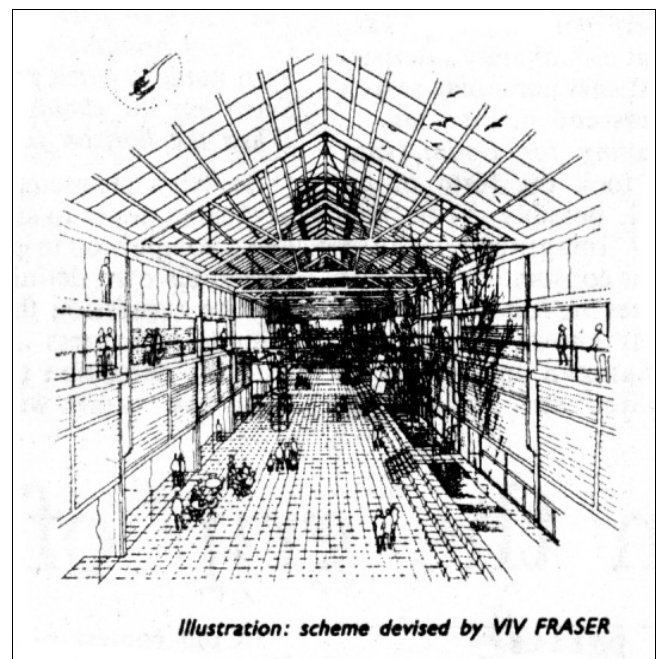


Illustration: scheme devised by VIV FRASER

An early sketch of Vivian Fraser's ideas for the Finger Wharf. From the SMH, 4<sup>th</sup> May 1990.

## The Regeneration of the Woolloomooloo Finger Wharf

It took another five months for a development agreement to be signed. In November 1993 Viv Fraser was replaced by a city firm Peddle Thorp and Walker, said to have “more grunt”. In the new year of 1994 a scheme developed which included 33 apartments on Wharf 11 along with 372 car spaces and the recreational centre. One of the main problems the developer and a committee of the Heritage Council, the National Trust and the City Council's heritage advisor Peter Romey had to deal with was to keep the aprons public yet provide some privacy to apartment dwellers. Moats, cut through the aprons, and then stepped aprons were considered.

Although development approval was granted in November 1994 it wasn't until mid 1996 that the final developers, Walker Corporation and Multiplex were in place. In a new design, a 273 room, 3 star hotel was located at the south end of the Wharf. To ensure commercial viability the former proposed hotel extension at the north end transmuted into an elegant steel framed apartment block – the equivalent of penthouse floors on a high rise.

With the success of a new Development Application, the design architects were changed again to The Buchan Group, from the Queensland Gold Coast, for the business of developing the designs to a level at which they could be marketed. The developers brought with them clever Queensland engineers, Robert Bird & Partners, who worked out with Multiplex the truly remarkable process of holding the structure up whilst replacing the piles.



Photo circa 1997, soon after the eventual developers, Multiplex, had started work. Note: the workshop sheds on the north end of the wharf had gone. From an article in Domain.com.au.



Knock off time in about 1997.

From Ian Stapleton.

In those days the central street, full of machinery, water and shafted light, had the character of some medieval purgatory which artist Jane Bennett recorded sitting on a stool in a hard hat and construction boots. For us conservation architects this was a heart rending time for all of the wharf shed and apron substructures were replaced except for the apron of Berth 6 (south east).

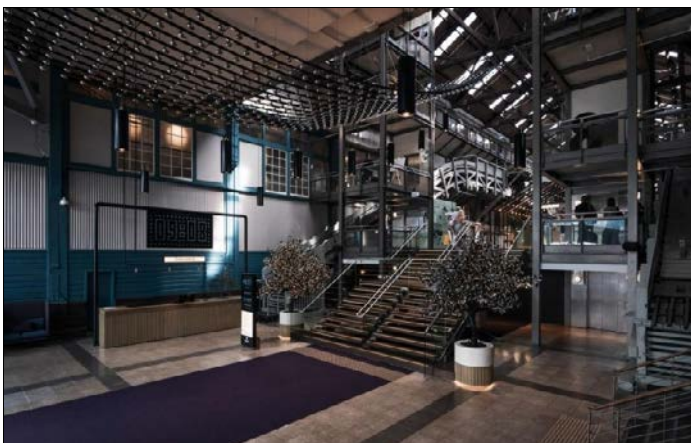
The scheme as built filled the four old sheds with hotel rooms and apartments but left three bays of the Berth 6 shed undivided as the hotel reception area and preserved one of the four goods lifts (now a dining room in the Otto Ristorante Italiano).

The original centre street structure, which had survived well on its original concrete encased timber piles, was built up one level with a new concourse floor giving a central basement level of car park. But on the south end and at the transept this floor was left cut away so the original cross section of the Wharf was preserved and evident. The eight pairs of huge timber latticed goods conveyors were retained with one of the eight machinery rooms. [See at right (Ph: K.Baker) & below (Ph: Buchan Group)]



Into the street space projected modern fire escape and service shafts, glass lifts and new bridges all in modern steelwork designed by the Buchan Group. On the upper levels apartment access was from a projecting walkway serving two floors. On lower levels, to avoid cluttering the space, the passage was made within the flanking wharf sheds. Along the street much of the old corrugated steel, fibro and multi pane sashes and wire cladding could be retained because the apartments look outwards.

[See above (Ph: K.Baker) & left (Ph: Buchan Group)]



## The Regeneration of the Woolloomooloo Finger Wharf



Wharf 9 (right) with awnings, wharf 8, and the new apartment building at the far end of wharf 8.

Ph: Keith Baker

What the public see of the outside of the Wharf is the characterful exteriors of the old shed office and ablutions blocks restored in Federation style. Whatever its architectural attributes, the northern building took the pressure off opening up the north facade for views and now signals the rebirth of the precinct.

Between the restored “bookends” the original robust timber frame has been infilled with

a new corrugated steel, glass and aluminium system and a colour scheme designed to provide the complexity of the removed Mondrian-like pattern. Making a glass wall look solid is not easy but has been achieved to some extent by the use of large blade louvres.



Third floor bedroom, complete with rivetted girder, in the (now re-named) Ovolo Hotel. Ph: Hotel publicity in Booking.com.

When apartment sales did so well in 1998, the hotel size was reduced. This resulted in the boutique W Hotel being installed.

The 1950s Retro work of interior designers Chadda Siembieda interacts particularly

well with the preserved robust interiors of the Wharf. Take a room on the third level and you will find a huge rivetted girder spanning the bed.



The south end and entrance to the central 'street' of the Wharves. The car park entrance is reached by travelling along the apron of Wharf 6 under the gantries. Photo: from Ian Stapleton

Just recently we fixed back the best of the original interior signs. Yet to be installed are some heritage interpretation sites to the design of Bill Nethery and archaeological displays of Anne Bickford's finds from a Wharf 11 dig.

Is the rebirth of the Woolloomooloo Finger Wharf a success? Let me venture this: it would be hard to say now that the former wharf does not remain a powerful land mark in Sydney Harbour helping to maintain its historical identity. And despite the changes it is difficult not to recognise the building, particularly on the east side, with its retained steel lattice platforms, as a recycled wharf. Inside, the reception and transept areas and the giant conveyors still testify to their past.



The Lobby of the W Hotel at the time of opening. Ph: from Ian Stapleton.



Our governments have got this from a developer largely for free in return for accepting the low-rise development of Wharf 11 and the northern building. Although it took about 14 years of governmental effort, the building is secure for more than another 100 years!

Left: The corner of the new apartment building on the north end of the Finger Wharf, then Wharf 8 apartments and in the far distance Wharf 9, with the awnings of the restaurants & hotel. Photo: Buchan Group website.

# Dalgety Bridge over the Snowy River, Dalgety NSW.

*An elegant wrought iron bridge, still in use after 130 years.*

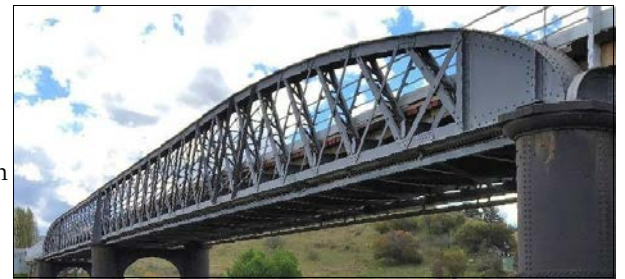


Photo: NSW Heritage Register.



Photo: NSW Heritage Register.

The small town of Dalgety in southern NSW almost became the National Capital in 1903, but it was passed over because it was “too close to Melbourne”,<sup>1</sup> an early example of the long-standing rivalry between Sydney and Melbourne. If Dalgety had become the National capital the bridge across the Snowy River at Dalgety might have become the equivalent of the Commonwealth Avenue Bridge in Canberra, or it might have disappeared in the process of building the new capital to the high standards we see in Canberra. Fortunately that didn't happen and the beautiful old bridge, built in 1888-1889, remains for us to enjoy today.



Detail showing the wrought iron trusses. Photo: Colin J Oberin.



A rebuilt timber trestle.

Photo: Colin J Oberin.

The Dalgety Bridge<sup>2</sup> is a lattice truss wrought iron and timber bridge set on iron columns, which crosses over the Snowy River on the Snowy River Way at Dalgety. The two iron spans are each 43 metres long and 4.6 metres wide between kerbs. The total length is 169 metres including 10 timber beam approach spans of 8 metres each, supported on timber trestles. It is still in use after nearly 130 years.

The bridge was designed by John A McDonald in the NSW Department of Public Works. He designed a series of seven wrought iron truss bridges between 1881 and 1893 which were similar in most respects except that the Dalgety Bridge has two spans and the other six bridges in the series each have three spans. Another difference is that the Dalgety Bridge is the only one in the series which has elegant curved ends. All these bridges were designed with a

continuous truss structure across the intermediate piers. A close inspection of the Dalgety Bridge confirms this feature.

NSW Roads & Maritime Services recently did extensive restoration and reconstruction of the bridge. The timber approach spans have been substantially reconstructed using similar materials whilst the wrought iron work appears to have been repainted. The treatment of the deck is unclear. It was originally timber running in the direction of the roadway but typical RMS practice would be to replace this with a new deck structure with a bitumen running surface.

*By Owen Peake.*



A beautiful bridge in its rural setting.

Photo: Colin J Oberin.

<sup>1</sup> As a matter of fact Dalgety is closer to Sydney than to Melbourne by about 20 km as the crow flies.

<sup>2</sup> NSW Heritage Register, Dalgety Bridge. Find it at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2410001>

# Point Nepean Quarantine Station

## a museum on the Mornington Peninsula in Victoria.

By Keith Baker.

*The writer visited Point Nepean and the Quarantine Station Museum in 2013 and was most impressed with its extensive heritage, particularly some rare intact technology. He recently had the opportunity to visit it again and write this article.*

Point Nepean is some 60 km south of Melbourne, forming the Eastern headland of the opening to Port Philip Bay. On the ocean side is the beach where Prime Minister Harold Holt disappeared, while the upmarket bayside settlement of Portsea is close to the point. Point Nepean is a bushland area encompassing significant natural, Aboriginal and European heritage.



The Administration Building at the Quarantine Station.

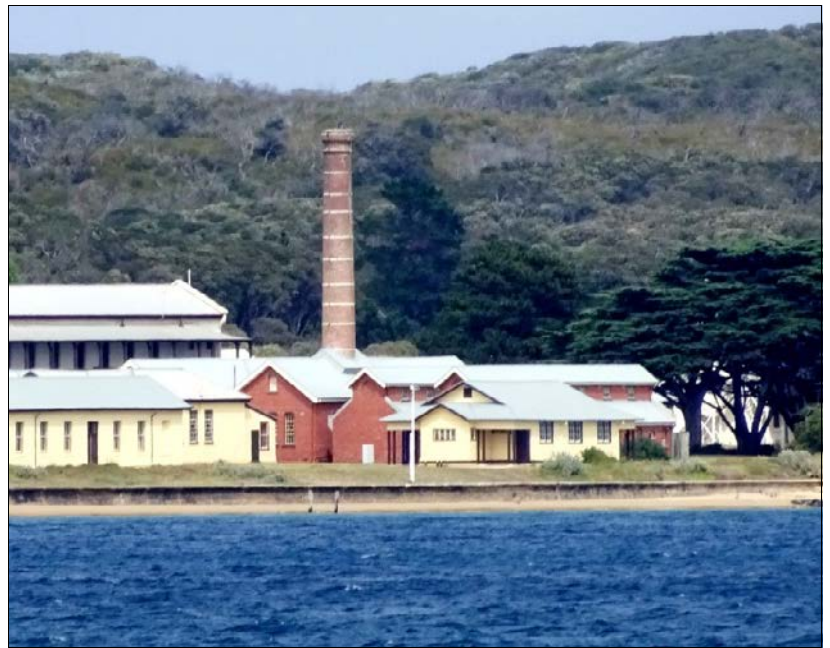
Photo: Keith Baker, 2013.

The European heritage dates from 1852 when the sailing ship *Ticonderoga* entered Port Philip Bay from Liverpool with around 300 cases of typhus, dysentery and measles on board. The ship was initially moored off Point Nepean and the headland was turned into a quarantine station by the newly formed Colony of Victoria. The cemetery and first buildings date from 1854. Closer to the Point, Fort Nepean was established for naval defences in the latter part of the 19th century. The guns and network of tunnels might be the subject of a future story, but I will concentrate for now on the quarantine station in this one, and in particular on the remaining hundred year old mechanical equipment in outstanding unrestored condition.

and luggage. Since passengers on ships were segregated by class, and they were required to be isolated for several weeks, segregated accommodation and dining facilities became a major part of the establishment. The facilities progressed from the simple buildings commenced in 1854 to an orderly processing of newcomers to minimise the transfer of infectious diseases and hospitalise those needing hospital treatment.

Construction of a passenger jetty and waiting room by 1860 was followed with more phases of construction and the use of a high level of technology for its time, as buildings were expanded or replaced in the early 20th century. These facilities are claimed to be the earliest of their type in Australia and served as a model for similar complexes built around the Commonwealth from 1912 after the Federal Government took charge of quarantine nationally.

Interpretation of the large site has been achieved with self-guided tour brochures, an audio program on smart phone largely covering snippets of social history, and a mixture of modern and more traditional signage. A panel in the Disinfecting Complex tells visitors that: *This building is being presented in an unrestored state but with interpretation that aims to tell the story about the history of the building and its uses. Point Nepean National Park is progressively developing to provide visitors with a variety of new experiences. A range of works will be happening in the coming years.*



The disinfecting complex at the Quarantine Station, viewed from the Queenscliff Ferry.

Photo: Keith Baker, 2017.

## Point Nepean Quarantine Station



Luggage on an elevated trolley about to enter the steam chamber. The door to the disinfecting chamber can be seen behind the luggage trolley. Ph: K. Baker.

Mechanisation started with a narrow gauge trolley way for luggage, from the jetty to the disinfecting complex. From the Foul Luggage Store, disinfection of luggage, clothing and bedding was facilitated by two parallel tracks through either a steam or chemical chamber, the steam track being slightly elevated while the track to the chemical chamber was at floor level.



Elevating turntable to raise and turn incoming trolleys to the level of the rails into the steam chamber (see image at left). Photo: Keith Baker.

Identification and interpretation of the disinfection chambers is somewhat ambiguous, so I can do no better than quote from one of the interpretation panels:

*The larger, circular apparatus is thought to be the disinfecting oven manufactured by the French sanitation engineering company, Geneste-Herscher that was installed at the Station in mid-1890 and probably moved here in 1900.*

*In 1915 drawings were produced for the installation of the 'Type Design Disinfecting Chamber' which is likely to be the smaller [ie shorter] rectangular apparatus.*

*There were two methods of disinfection:*

1) *The Formaldehyde Gas Method (for passenger's luggage and clothing)*

*A 20 inch vacuum was achieved in around 20 minutes. It took five minutes for Formaldehyde to fill the chamber and a further 35 minutes to process the articles and clear the gas.*

2) *The Steam Saturation Method (for bedding)*

*The chamber was sealed and a 20 inch vacuum achieved in about 20 minutes. The 15 pounds per square inch steam pressure was then raised. Treatment and subsequent cooling of the articles took a further 50 minutes. The articles would come out completely dry.*



Trolley tracks emerging from the two disinfection chambers after treatment. On the right the trolleys return to floor level via a curved ramp. Note the colour of the rail support blocks changes from red (entrance side) to green (exit side) – ie. from foul to clean. Ph: K. Baker

My earlier comment about ambiguity of identification and interpretation is because it is not stated specifically that the steam chamber is the cylindrical one and the rectangular one is the formaldehyde chamber, while an historical photo and caption show luggage about to be fumigated in the rectangular chamber. Yet the physical interpretation illustrates suitcases passing through the cylindrical (steam) chamber.

This is contrary to the other interpretation panel quoted which states that luggage was fumigated while bedding was steamed. This inconsistency might not diminish the experience of most visitors, but highlights the need for more complete research and engineering input to any subsequent interpretation.

## Point Nepean Quarantine Station



1916 under-fired, multi-tubed Trevor Boiler, which produced steam at 120 pounds per square inch until 1980 when the station closed. Ph: K.Baker.

The boiler provided steam for the two disinfection chambers and heated water for the laundry, baths and showers. It was also used to incinerate infected clothing and possessions. It was manufactured by The Trevor Boiler & Engineering Company of North Melbourne and installed around 1916 according to the interpretive signage, but in 1939 according to the 2007 Conservation Management Plan (CMP). It replaced an earlier boiler and operated until the station closed in 1980.

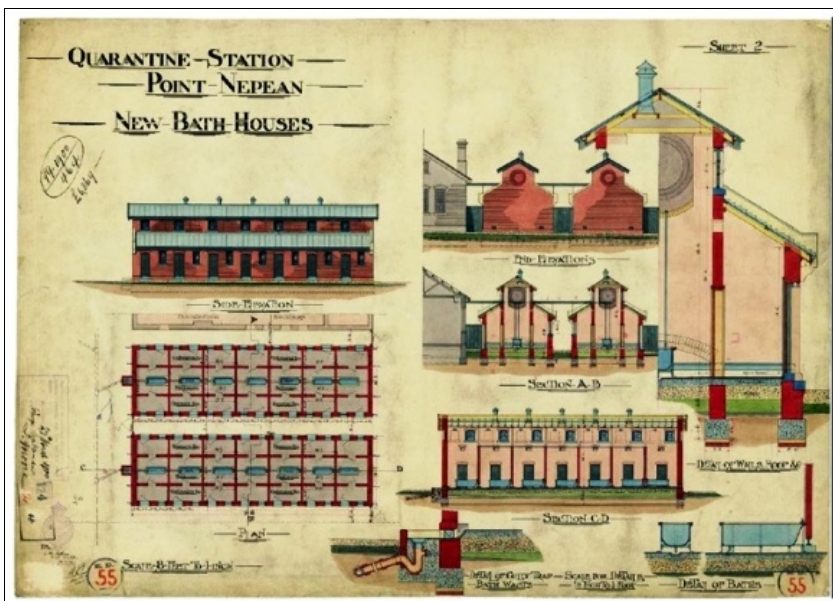
While luggage was handled and fumigated, passengers were taken from the jetty to a purpose designed bath house, where individuals would enter a cubicle from one side of the building, undress leaving their clothes on that side of the bath, have a disinfecting bath and leave in fresh clothing through an open corridor on the other side of the room. The twin solid brick bath houses from 1900 are well preserved and while entry is not generally available, design plans that are displayed enable a reasonable understanding of the processing involved. The interior of the rooms were converted to Army sleeping accommodation sometime after 1952, presenting a challenge for future improved interpretation of the original purpose.

The quarantine station is now part of a wider Point Nepean National Park, run by Parks Victoria, with daily access for self-guided tours. Interpretation of the highly intact century-old disinfecting installation is helpful in demonstrating the mechanical equipment using trolleys of luggage and information panels. More interpretation is proposed. The 2007 CMP places conservation value on the disinfecting complex and equipment at a national level. However the dates given in the CMP differ in some respects from the dates stated in the current interpretive material.

In the CMP the sterilising and fumigating equipment is only described in the most cursory manner as *two intact steel barrelled disinfectors, built in 1897 and 1915 respectively, remain in situ. In the adjacent boiler room a large multi-chambered boiler installed in 1939 survives.* One might have hoped for a little more description of such a rare and important component of the complex in a 289 page CMP. Maybe the data sheets that were appended to the report give more detail, but I was unable to find them on line.



The 1899 twin Bath Houses and the adjacent Boiler House with its chimney. Photo: Keith Baker.



Left: An 1889 design drawing of the Bath Houses, courtesy of the Nepean Historical Society website.

I congratulate Parks Victoria on retaining the Disinfection Complex and equipment in an accessible way with the interpretation provided to date, while I hope that my article can inspire more thorough research and conservation from an engineering heritage perspective in the near future. And I invite readers to comment on this or any similar equipment they are aware of, particularly engineers with more in-depth knowledge of the equipment than this humble electrical engineer possesses.

### References:

Pt Nepean National Park Quarantine Station Self-guided brochure, various interpretive panels on site and the Point Nepean Quarantine Station Management Plan 2009.

Also: <http://parkweb.vic.gov.au/explore/parks/point-nepean-national-park/things-to-do/visit-the-quarantine-station> and <https://nepeanhistoricalsociety.asn.au/history/quarantine-station-the-fourth-phase-1900-to-1925/>



# A Wartime Journey – Stuart Highway Heritage Guide

A review of the book written by Howard Pearce and Bob Alford



The Stuart Highway stretching into the distance near Renner Springs, north of Tennant Creek. After a good summer (lots of rain), the Red Centre is mostly green. Photo: Owen Peake.

A single strand of galvanised steel wire, strung (initially) on poles cut from the bush, it traversed from Adelaide to Darwin, and completed the London to Adelaide telegraph link. This slender connection of the first digital revolution, changed communication speed between England and Australia from three months or more taken by a sailing ship to a few hours by the magic of the electric telegraph, via numerous relay stations.

The second event was the imminent threat of Japanese invasion in 1942 in the wake of the notorious Pearl Harbour attack, the fall of Singapore and the first bombing of Darwin. By then there were rail heads at Alice Springs and at Larrimah, 500 km south of Darwin leaving a 1000 km gap in the rail connection. At that time the road between Alice Springs and Darwin, was little more than a goat track made by the linesmen who maintained the Overland Telegraph. The race to build up military capability in the Top End was on, and a decent road was a first priority – within just a few months the road was formed, later sealed, and the military convoys started to move at speed. This was achieved primarily by the combined efforts of Australia's state road authorities, with some help from Australian and United States military units and, in the Top End, whilst under periodic enemy fire.



The Fergusson River Railway Bridge (1919) alongside the more recent Highway bridge. This railway bridge from the old North Australia Railway is the only one to be incorporated into the new Standard Gauge Adelaide to Darwin Railway. Photo: Owen Peake.

The Stuart Highway is Australia's most fabled highway, running from Darwin in the Northern Territory to Port Augusta in South Australia – 2834 km from sea-to-sea. Pearce & Alford's book is about the northern section from Alice Springs to Darwin – 1496 km between The Alice and Darwin making the dramatic transition from the Red Centre to the tropics which Territorians call the Top End.

Two nation-changing events took place close to, or along, this highway, separated by seventy years and many legends. The first was the building of the Overland Telegraph Line, completed in 1872 by South Australia's Director of Posts and Telegraphs, Charles Todd.<sup>1</sup>



Engineering Heritage interpretation panel at the side of the Highway near the 'Joining Point', where the London to Adelaide telegraph link was completed in 1872. The site is 25 km south of Dunmarra Roadhouse and 1.6 km east of the actual Joining Point. Photo: Owen Peake

The road-rail "co-ord" allowed the Top End to be converted into a huge military camp – more than 250,000 Allied troops of all services. Primarily from dozens of hastily-built airstrips across the Top End, southern New Guinea and North Queensland the slow, painful push back against the aggressor gathered momentum.

The Stuart Highway, called 'The Track' by the people who live along it, was an important strategic link in the Allied fight in "The Islands" to our north.

As the book clearly depicts, the connection of the Stuart Highway with these two key nation-changing events is well recorded along the road. The names, places and relics along 'The Track' constantly remind travellers on the road of its powerful history. From the carefully restored and maintained buildings of the remaining telegraph stations to the occasional airstrip paralleling the modern road, this history cannot be easily ignored.

<sup>1</sup> The very first issue of the EHA Magazine, in December 2013, celebrated the joining of the telegraph wire in a story by Owen Peake on page 16. *The Editor.*

## A Wartime Journey – Stuart Highway Heritage Guide

Many of the names signposted along the highway bring back memories of historic events along the highway. Attack Creek marks the campsite where John McDowell Stuart came close to being killed by Aborigines. If he had died at Attack Creek we might never have known that there was a reliable and well-watered route across The Red Centre.

Iconic Alice Springs would have been called something else if the Overland had not been pushed through by the visionary engineer and project manager Charles Todd. The Alice in Alice Springs is Alice Todd, the beloved wife of Charles Todd.



The Historic Tennant Creek Telegraph Station – a reminder of the first digital revolution. Photo: Owen Peake.



Mock-up Kittyhawk & Spitfire fighter planes celebrate the Defence of Darwin at Strauss Airstrip at Noonamah, south of Darwin. Photo: Owen Peake.

Further north, Tindal, just south of Katherine, was a dusty World War II airstrip named after a Royal Australian Air Force (RAAF) officer who lost his life during the War. Today it is the home of RAAF 75 Squadron, whose seventy years of action has given the squadron legendary status.

Still further north, Livingstone, Strauss and Sattler are the names of fighter airstrips from where United States Army Air Force (USAAF) and RAAF Kittyhawks took on superior Japanese Zero fighters, and from where, later, RAAF and Royal Air Force (RAF) Spitfires eventually chased the Zeros from Australian skies. All these names, and hundreds more, flash past as you drive The Track.

Howard Pearce and Bob Alford have done a great job to bring together so many stories in a highly readable but modest sized book with copious illustrations. I purchased a copy at the Museum and Art Gallery of the Northern Territory, Bullocky Point, Darwin for \$29.95. The book is widely available in the NT.



A 'four dog Road Train' at a truck stop at Daly Waters on the Stuart Highway — huge trucks are part of the scenery on The Track. Photo: Owen Peake.

I read the book as my wife Helen and I drove down The Track in April 2017, passing through the country which the book brings alive. The Stuart Highway is a great drive, running through stunning Outback Country. This year it was at its best after a Big Wet and after a great deal of rain in The Red Centre during the summer.

The present day highway is well built and not heavily trafficked. Our Land Cruiser gobbled up the kilometres at a leisurely 130 km/h, legal in the Northern Territory, on cruise control, making for a pleasant and relaxed drive on our favourite highway.

Thanks for the book Howard and Bob, it brought more legends to life as we travelled The Track.

*Review & all Photographs by Owen Peake – a Territorian from way back.*



# Connections.

**A One Day Heritage Engineering Training Course in Perth WA,  
on Thursday 9<sup>th</sup> November 2017 at Engineers Australia WA, 712 Murray St, West Perth 6005.**



This is a one-day training session for structural engineers and other professionals wishing to contribute to the conservation of Western Australia's (WA) cultural heritage. There is currently no formal education in Heritage Engineering in the country. This will be THE FIRST. The course is aimed at ensuring our engineering heritage is properly understood and appropriately conserved, and at assisting engineers to do so. The course will include:

- What heritage is and why it is important.
- Roles of participants in the heritage community such as the State Heritage Office.
- Traditional forms of construction in WA.
- Conservation principles and practice – the Burra Charter.
- What is different about heritage structural engineering from design of new structures.
- Physical actions which affect the built environment.
- Structural design through the ages.
- Materials and their use in construction.

**Pre-register now by emailing:  
engineeringheritageWA@gmail.com**

## 2017 ICE Publishing Awards

The 2017 ICE Publishing Awards have now been announced and the papers are available for you to read at: <http://www.icevirtuallibrary.com/page/authors/awards-for-papers>

Each year, the **ICE Publishing Awards** acknowledge the best works published in the ICE journals at a ceremony held at the Institution of Civil Engineers head office in London, UK. The winning authors, from industry and academia in 16 countries on 5 continents, have produced work judged by their peers to be of **exceptional quality** and benefit to the international civil engineering and science community. Each paper is made free to view in perpetuity on ICE Virtual Library as part of the ICE commitment to furthering knowledge and best practice in civil engineering.



One paper that caught my eye was by Mike Chrimes MBE, former Director of Engineering Policy & Innovation at ICE, and well known author and joint author of books & papers on the history of engineering & construction. His prize winning paper is titled *Engineers and Conservation: two centuries and no progress?* Find it in Engineering History & Heritage at: <http://www.icevirtuallibrary.com/doi/pdf/10.1680/jenhh.16.00015>

**The organisers of the Heritage Engineering Training Course in Perth in November would do well to recommend Chrimes' paper as essential reading for attendees!**

## Online copies of UK magazines 'The Engineer' and 'Engineering'



Our colleague Miles Pierce tells us it has come to his notice that PDF file copies of individual issues of the above UK engineering magazines are available from Grace's Guide to British Industrial History [http://www.gracesguide.co.uk/Main\\_Page](http://www.gracesguide.co.uk/Main_Page)

Direct URLs to the magazines are:

*The Engineer* Vol 1, 1856 to Vol 229, 1969, and some later volumes up to Vol 258, 1984 see: [http://www.gracesguide.co.uk/The\\_Engineer\\_\(Bound\\_Volumes\)](http://www.gracesguide.co.uk/The_Engineer_(Bound_Volumes))

*Engineering* Vol 1, 1866 to Vol 223, 1983 see:

[http://www.gracesguide.co.uk/Engineering\\_\(Bound\\_Volumes\)](http://www.gracesguide.co.uk/Engineering_(Bound_Volumes))

Miles also tells us that both of these publications have a wealth of articles on engineering matters, inventions, machines, structures, etc., in the UK and around the world. References to articles in these two serial publications are common in engineering heritage literature. Most indexes, where available, apply just to individual volumes. *The Engineer Index 1856 to 1959* compiled by C E Procter and published by Morgan Bros, London, 1964, is the only general alphabetical subject and author index that Miles is aware of. It is a rather rare book. The University of Melbourne Engineering Library has a copy and the only other library copy listed in Trove is at the National Library of Australia.

**'The First 50 years of the School of Electrical & Information Engineering' at the University of Sydney has been published online at:**

<http://www.ee.usyd.edu.au/dokuwiki/eie-history/start>

This history of JPV Madsen's (at right) activities in Australian science & engineering covers the period 1900-1956, a time of extraordinary developments in all things electrical & digital. Madsen was a Lecturer at the School from 1909, then a Professor of the School from 1920. Until 1946 he was the first & only Professor of Electrical Engineering in any Australian University.



