Ord River Diversion Dam
Engineering Heritage Marker Ceremony

ORD RIVER DIVERSION DAM

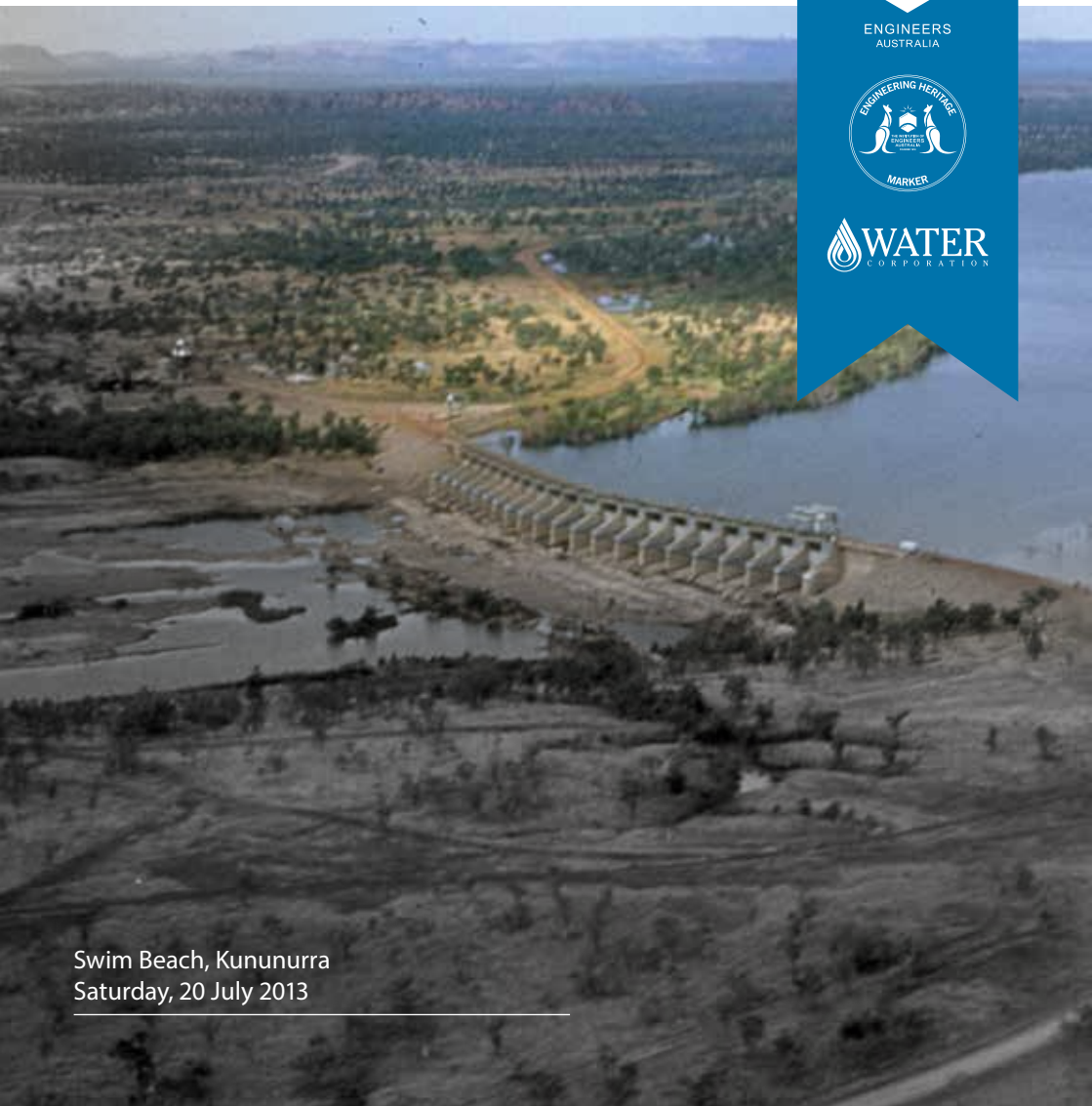
THE START OF A NEW ERA

Australian Government

ENGINEERS AUSTRALIA

ENGINEERING HERITAGE MARKER

WATER CORPORATION



Swim Beach, Kununurra
Saturday, 20 July 2013

Ord River Diversion Dam
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PROGRAM

Acknowledgment of Traditional Ownership of Land
Formal welcome, recognition of distinguished guests, apologies
Mr Don Young, FIEAUST, Past Chairman, Engineering Heritage WA

Introduction
by Mr Don Young of Mrs Helen Pedersen, FIEAUST CPEng,
President, Engineers Australia WA Division

Engineers Australia Engineering Heritage Recognition Program
Mrs Helen Pedersen

Introduction by Mr Don Young of Mrs Sue Murphy FIEAUST CPEng,
Chief Executive Officer, Water Corporation of Western Australia

Ord River Diversion Dam
Mrs Sue Murphy

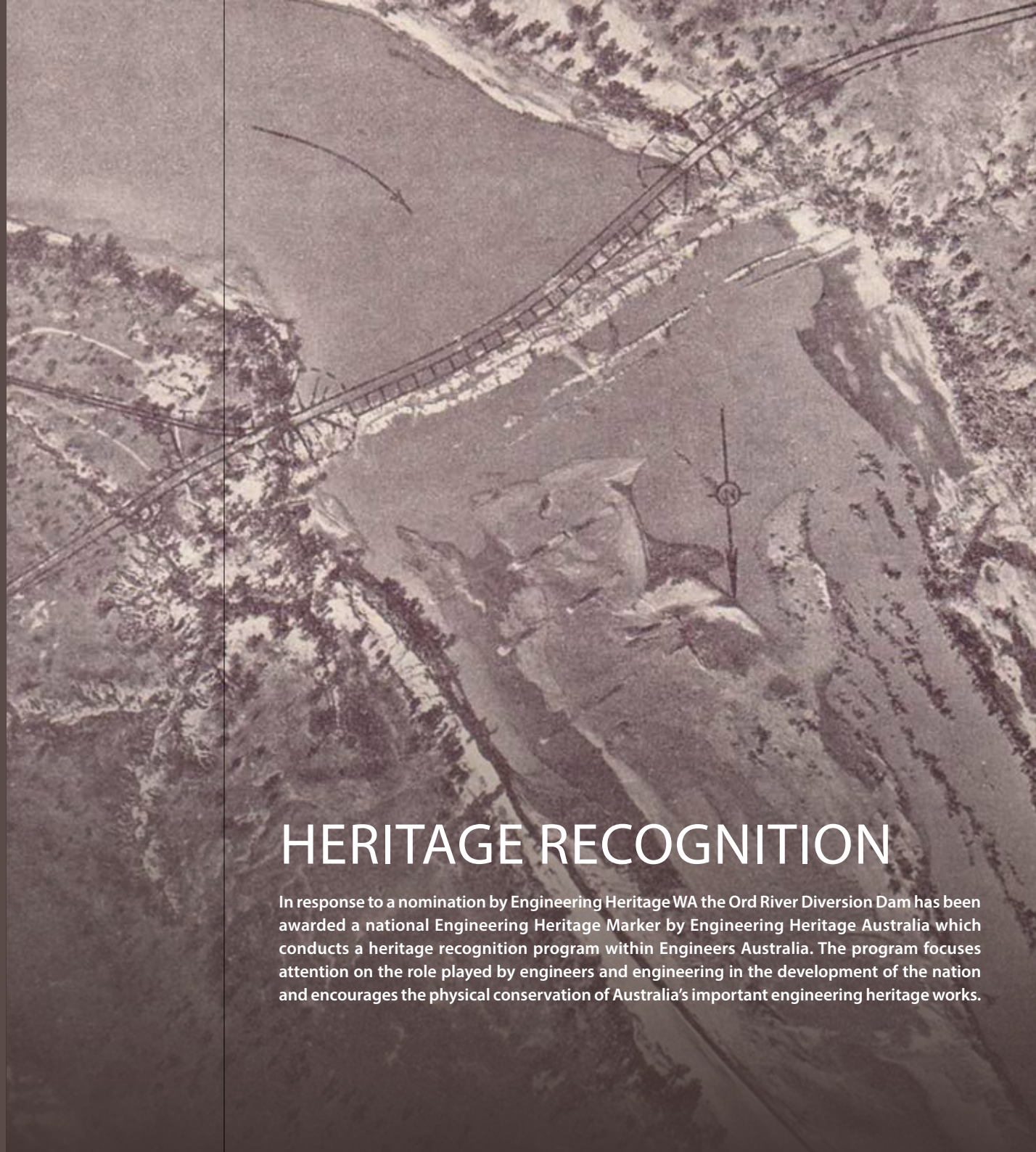
Unveiling of Interpretation Panel
Ms Eva Skira, BA (Hons), MBA, Chairman, Board of Water Corporation of Western Australia

Acceptance of Panel
Ms Eva Skira

Closing Remarks
Mr Don Young

Immediately following the ceremony there will be a conducted walk across the Diversion Dam followed by a light lunch at the Swim Beach venue.

Saturday, 20 July 2013



HERITAGE RECOGNITION

In response to a nomination by Engineering Heritage WA the Ord River Diversion Dam has been awarded a national Engineering Heritage Marker by Engineering Heritage Australia which conducts a heritage recognition program within Engineers Australia. The program focuses attention on the role played by engineers and engineering in the development of the nation and encourages the physical conservation of Australia's important engineering heritage works.

1. Transferring bulk cement into SS Dulverton at Fremantle wharf
2. 95 tonne radial gate being raised - 1962
3. Radial gates being trial assembled in Vickers Hoskins' Perth workshop.
4. Bandicoot Bar at commencement of excavation
5. Unloading cement at Wyndham wharf

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A NEW ERA BEGINS

When Prime Minister Sir Robert Menzies officially opened the Ord River Irrigation Scheme on 20 July 1963, he symbolically marked the end of a long period of dreaming and planning and the beginning of a new era of reality for an agricultural industry in Western Australia's far north. In his opening speech, the PM said the irrigation area was the 'most exciting place in Australia at this moment.'

For about 80 years the region had seen European settlers' cattle grazing on sprawling pastoral leases that were established in the grasslands in the 1880s by explorer and land agent Alexander Forrest.

Damming the Ord River was first mentioned officially in the early 1900s, and by the late 1930s the State Government was investigating the establishment of an irrigation scheme.

Amid scientific investigations of the land, Russell Dumas, the WA Director of Works and Buildings, spent three weeks in 1941 travelling on horseback along the Ord River course to assess the area and identify possible dam sites.

In the same year, a fledgling research station was established at Carlton Reach privately with support from the State Government, and five years later the Kimberley Research Station, a joint venture by the State and Federal Governments involving the CSIRO, was established on the black soil of the Ivanhoe Plain 16 kilometres downstream.

It is now the Frank Wise Institute of Tropical Agriculture.

Twelve years of research indicated that sugar cane, rice, cotton, safflower and other oil seeds were likely to succeed with a sufficient, reliable water supply. Work began in earnest on planning an irrigation scheme harnessing the huge volumes of water that tumbled down the Ord River during the summer wet season making it one of Australia's fastest flowing rivers.

FUNDING ARRIVES

In 1959 the Commonwealth Government made a grant of five million pounds (about $140 million at 2013 prices) to the Western Australian Government, most of which was for constructing irrigation channels, pumping stations, the Ord River Diversion Dam and the support town of Kununurra (derived from a word meaning 'big waters' in the local indigenous language).

In the initial stage about 10,000 acres (4,500 hectares) of land was cleared and graded for farms irrigated through the 25km main (M1) channel and more than 55km of subsidiary channels.

Overall responsibility for planning and supervision of the scheme passed to the state Public Works Department (PWD).

Limited funding dictated that the diversion dam be built before a main storage dam further upstream (completed in 1972) to provide protection from sudden huge inflows. This was not usual engineering practice, but the design of the diversion dam included large radial gates to prevent flooding.

Most of the detailed design of the dam's concrete, mechanical and electrical works was carried out by the PWD. John Lewis, the Chief Design Engineer, had the idea for the radial gates from a dam that incorporated four gates in Montana, USA, that he had visited on an earlier study tour.

WORK BEGINS

In July, 1960, Christiani Nielsen Clough, a joint venture by a Danish and a Perth based company, won a contract worth 2.9 million pounds (about $78 million at 2013 prices) to construct the dam. Another contract of 763,000 pounds (more than $20 million) was awarded to Vickers Hoskins of Perth for the prefabrication of the radial gates which give the dam its distinctive appearance.

Contractor offices, workshops, storage facilities, aggregate screening and concrete batching facilities were established on the river bank. The township of Kununurra had been established by the PWD 6 km from the dam site to house project administrative staff.

Scale model of dam in PWD Hydraulics Laboratory, Perth (Photo courtesy John Lewis)

Sir David Brand

Mr Leif Ott Nilsen

All construction materials except concrete aggregates were shipped from Fremantle to the port of Wyndham then transported 100 km by road to the dam site. The State Shipping Service vessel, SS Dulverton, was converted to carry bulk cement in 1,400 tonne loads, totalling 15,000 tonnes. A plaque commemorating the ship's role was placed by the crew on kerbing at the dam then later mounted on a stone monument.

The dam consisted of a barrage with a spillway 335 metres long incorporating 20 radial gates manufactured in Perth and assembled on site. These were each 15 metres wide and 11.3 metres high, weighing 96.5 tonnes and were installed between reinforced concrete piers on a concrete sill keyed onto a quartzite bar in the river, named Bandicoot Bar.

The radial gates were for many years operated automatically, but because of problems with the ageing control system, manual operation was introduced some 20 years ago. The gates are operated on most days of the year to adjust for varying flows from the hydro power plant at the main Ord Dam and for demand from the irrigation scheme. The opening rate is much higher in wet seasons due to rainfall inflows to the river between Kununurra and the main dam.

The dam also comprised concrete abutments and a precast prestressed bridge spanning the spillway carrying a 6.7 metres wide roadway.

A total of 41,000 cubic metres of concrete was used for the dam while 350,000 cubic metres of fill was used to construct 4.8km of levee banks and miscellaneous earthworks. Mobilisation and preliminary works were carried out before the onset of the 1960-61 wet season, and work began in earnest in March, 1961.

The dam's construction was considered a significant technical achievement, given the remoteness of the site, basic communications and difficult seasonal climatic conditions with sudden river flows.

It was the first major barrage with radial gates built in Australia and was the first major civil engineering project constructed by private enterprise for the PWD of Western Australia.

Sir Charles Court

Mr D.C. Munro

Mr H.E. Hunt

Mr J.G. Lewis

Mr R. A. Hamilton

ORD RIVER DIVERSION DAM DATA:

Owner:	Water Corporation
Construction project period:	1959-63
Purpose:	To divert water from the Ord River to irrigation land
Designer:	Public Works Department WA
Main contractor:	Christiani & Nielsen Clough joint venture
Manufacturer of radial gates:	Vickers Hoskins
Construction:	20 steel radial gates within concrete piers and spillway
Length of spillway:	335 metres
Dimensions of gates:	height 11.3 metres width 15 metres weight 96.5 tonnes
Average annual discharge of water through gates:	About 337 gigalitres (billion litres) including a permanent flow to support the down-river environment.
Annual water supply to irrigation scheme:	Nearly 145 gigalitres

PRINCIPAL PEOPLE ASSOCIATED WITH THE PROJECT:

Sir David Brand	Premier of Western Australia 1959-71
Sir Charles Court	Minister for the North West 1959-71 Premier 1974-82
Mr Don Munro	Project Engineer, Public Works Department WA
Mr Harold Hunt	Construction Manager, Public Works Department WA
Mr John Lewis	Engineer for Planning, Design and Investigation, Public Works Department WA
Mr Roy Hamilton	Resident Engineer, Public Works Department WA
Mr Leif Ott Nilsen	Manager, Christiani & Nielsen Australia

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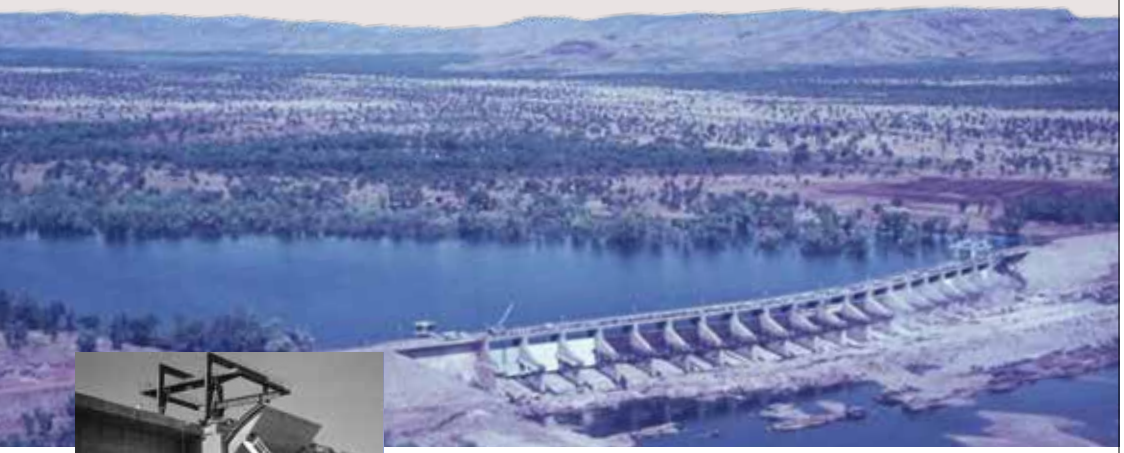

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A WORK IN PROGRESS

The pioneering Ord River irrigation scheme has seen chequered development in the 50 years since it was established, with its economic viability questioned at times.

It decentralised agricultural production in Western Australia, experiencing both crop failures and successes in the process. The first main crop, cotton, was abandoned in 1974 due mainly to insect pests and a drop in world cotton prices.

In 1972 the Ord River Dam was completed 48 km upstream to produce the massive storage reservoir, Lake Argyle, and maintain stable water levels at the diversion dam. It also enabled construction of a hydro-electric power station in 1995-96 supplying Kununurra, Wyndham and the Argyle diamond mine.

The two dams eventually provided water to almost 15,000 hectares of irrigation land producing more than 60 crop varieties including fruit, vegetables, rice, sorghum and sandalwood representing a $120 million annual economy.

The scheme is being greatly expanded under a $320 million stage 2 development project that began in 2010 and will more than double the irrigation area, mostly for a large scale sugar industry, and take the region closer to reaching its full potential as a world class agricultural production area.

1. Bandicoot Bar, late 1960.

2. East abutment and spillway sections formed ready for concreting after rock excavation, early 1961.

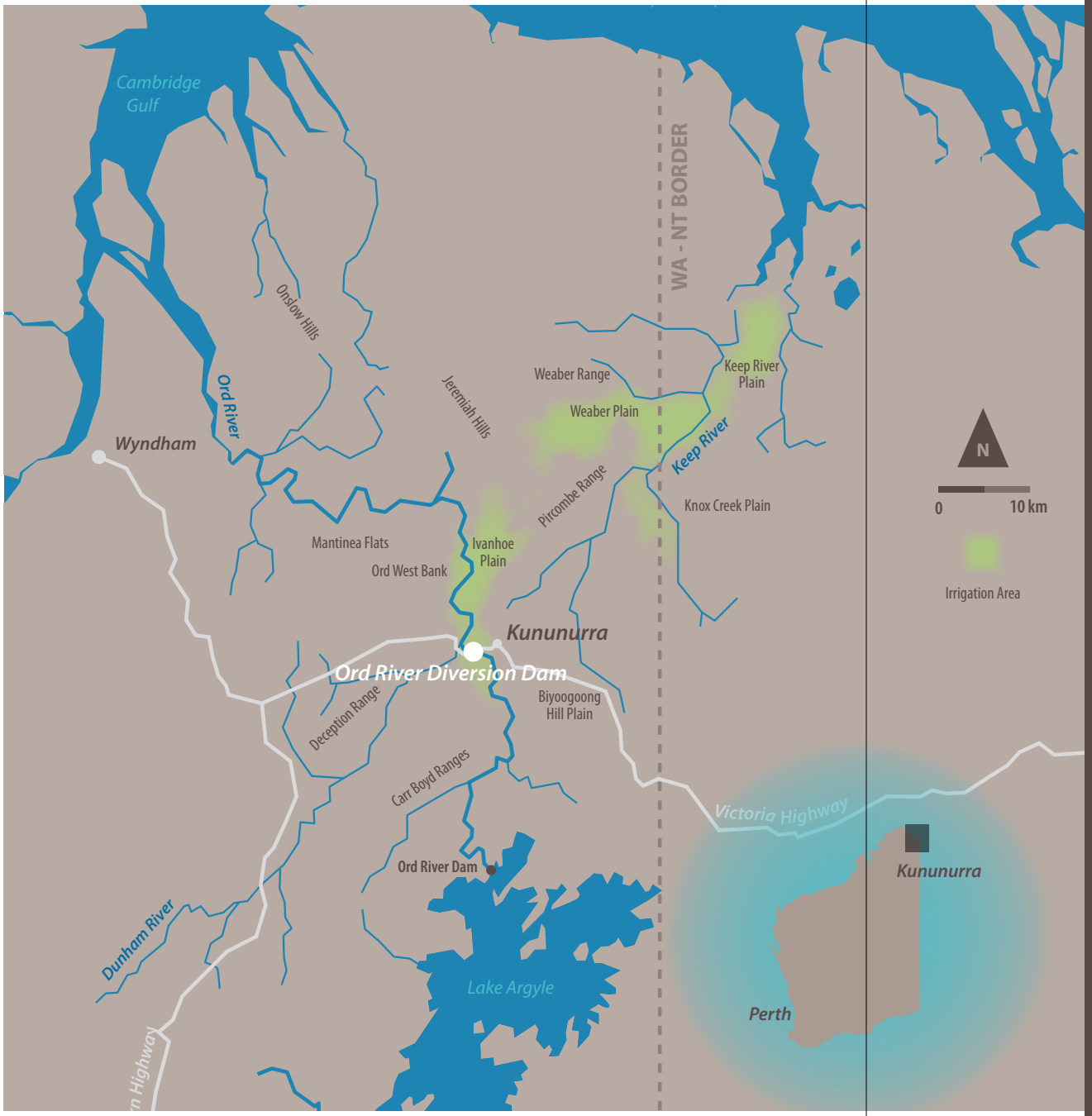
3. Pier and radial gate construction well advanced in mid 1962.

4. Radial gate being raised in 1962.

5. Early 1963, showing dam storing water and painting of gates in progress.

6. General Plan of Region1959.

7.8. Commemorative Plaques.



Acknowledgements:

Engineering Heritage WA wishes to thank the following for their assistance in preparing the nomination for a national Engineering Heritage Marker for the Ord River Diversion Dam:

Mr John Lewis, PWD WA Engineer in Charge of Planning, Design and Investigation at the time the Ord River Irrigation Project was being planned.

Mr Uffe B Hansen, Deputy Project Manager for Christiani Nielsen Clough 1960 – 1961;

Mr Birger Ott Nilsen, son of Mr Leif Ott Nilsen;

Mr Andrew Barker, President, Kununurra Historical Society, 2012 – 2013

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