HERITAGE COUNCIL OF WESTERN AUSTRALIA

REGISTER OF HERITAGE PLACES - ASSESSMENT DOCUMENTATION

11. ASSESSMENT OF CULTURAL HERITAGE SIGNIFICANCE

The criteria adopted by the Heritage Council in November, 1996 have been used to determine the cultural heritage significance of the place.

PRINCIPAL AUSTRALIAN HISTORIC THEME(S)

- 3.11.5 Establishing water supplies

HERITAGE COUNCIL OF WESTERN AUSTRALIA THEME(S)

- 301 Grazing & pastoralism & dairying
- 303 Mining (incl. mineral processing)
- 404 Community services and utilities

11.1 AESTHETIC VALUE*

Niagara Dam is valued for the form and proportions of the dam wall, in particular the elegant curved elements and iron balustrades, which inform of the period of its construction and minimal interference since that time, and for the picturesque reservoir within an otherwise arid natural environment. (Criterion 1.1)

Niagara Dam makes an important contribution to the natural environment, being a large body of water in an arid region devoid of such natural features. (Criterion 3.1)

Niagara Dam is a significant landmark element in the remote north-eastern goldfields. Its distinctive construction and formation of the reservoir and spillway form an important cultural environment. (Criterion 1.4)

11.2 HISTORIC VALUE

Niagara Dam was constructed as a result of an ambitious plan in 1897-98 by the Public Works Department to provide a water storage reservoir in the arid Western Australian Eastern Goldfields to serve the railway. (Criterion 2.1)

Niagara Dam is an important example of the determination of the colonial Government to maintain the viability of mineral exploitation in the area. (Criteria 2.2)

Niagara Dam provides evidence of a project that was quickly superseded, by the discovery of fresh water at Kookynie. (Criterion 2.2)

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* For consistency, all references to architectural style are taken from Apperly, R., Irving, R. and Reynolds, P. *A Pictorial Guide to Identifying Australian Architecture: Styles and terms from 1788 to the present*, Angus & Robertson, North Ryde, 1989.

Niagara Dam is associated with Premier John Forrest, who instigated its construction following his tour of the Eastern Goldfields in November 1895, contractor H. Nelson, and with Abdul Waid and his camel team who carted the cement casks, one of the many Afghan camel drivers who played an important role in the development of the early Eastern Goldfields. (Criterion 2.3)

11.3 SCIENTIFIC VALUE

Niagara Dam is an example of technical achievement for the scale of its construction in an isolated and inhospitable region. (Criterion 3.3)

11.4 SOCIAL VALUE

Niagara Dam has social value for local residents as a pleasant place to visit for a picnic or to camp in a region largely void of such natural amenities, and is frequented by visitors on bus tours and 4-wheel drive tag-along trips. (Criterion 4.1)

Niagara Dam contributes significantly to a sense of place for the local and wider community for its landmark quality and as a relic of the goldfield history of the district. (Criterion 4.2)

12. DEGREE OF SIGNIFICANCE

12.1 RARITY

Niagara Dam is the only gravity wall dam construction in the Eastern goldfields of Western Australia, where the predominant water source prior to the establishment of the Goldfields Water Supply Scheme was a series of wells, condensers and earth tanks. (Criterion 5.2)

12.2 REPRESENTATIVENESS

Niagara Dam is a fine and intact representative example of a concrete gravity dam constructed in the late 19th century, that is, a dam constructed using the weight of a solid mass of concrete to hold back water. (Criterion 6.1)

12.3 CONDITION

Niagara Dam is in fair to good condition. The structural adequacy of the dam has not been addressed.

12.4 INTEGRITY

Niagara Dam has been a water storage reservoir since its construction. Although water supply to the nearby town did not eventuate, the place has retained a high degree of integrity.

12.5 AUTHENTICITY

There is considerable evidence of the original fabric of *Niagara Dam*. It has a high degree of authenticity.

13. SUPPORTING EVIDENCE

The documentary evidence has been compiled by Irene Sauman, Historian. The physical evidence has been compiled by Laura Gray, Conservation Consultant.

13.1 DOCUMENTARY EVIDENCE

Niagara Dam is a water storage reservoir with a concrete gravity wall construction on a natural basin, with a capacity of approx. 40,000,000 gallons (182,400 kl). The place was constructed in 1898 to provide water for the Niagara district on the North Coolgardie goldfield. Its construction was instigated by Premier John Forrest and undertaken by H. Nelson under the supervision of the Public Works Department. *Niagara Dam* did not provide a reliable water supply and an alternative water source was located in the district shortly after the place was constructed. In 1983, *Niagara Dam* was vested in the Department of Conservation and Land Management (CALM) as a conservation area for flora, fauna and water. It is currently used for watering stock and as a picnic area.

Prior to the late 1880s, the State Government had minimal involvement in the supply of fresh water for the general population. It provided wells at intervals on main roads and stock routes as these became necessary, and water supplies for shipping were provided at ports such as Fremantle, Albany and Geraldton, but supply for the general population was the responsibility of the individual householder and business or property owner.[1]

One of the major users of water was the railway, where good quality water was required for the steam locomotives. After the completion of the second section of the Eastern Railway between Guildford and 'Chidlow's Well' in 1884, the issue of water supply came to the fore when water had to be carried long distances during the summer to service the route. The first railway dam was built at Clackline in 1887, to catch the water from the Clackline Gully and enable the service on the Eastern Railway extension to Toodyay.[2]

From 1892, the discovery of gold and subsequent development of the Eastern Goldfields placed the Government, and specifically the Public Works Department (PWD), under considerable pressure to provide even the most basic water supply to those areas.[3] The first water sources along the tracks to Coolgardie and Kalgoorlie were wells sunk at soaks. Other wells and bores that were sunk generally yielded water with a high salt content, requiring the installation of condensers to render the water suitable for human consumption. The amount of traffic, both human and stock, put considerable strain on the supplies, and the tracks were closed to traffic on occasion to allow the wells time to refill. At Coolgardie and Kalgoorlie, huge banks of condensers were installed and the purified water sold to consumers. Water was also used in the ore treatment processes, and the pack camels, horses and bullock teams which transported food, goods and equipment to the goldfields north of Kalgoorlie all needed water.

The PWD and the railway contractors constructed excavation and clay-plug lining tanks along the route of the goldfields railway line between Northam and Kalgoorlie, using the large granite outcrops as catchment areas wherever possible. In 1894-95, the PWD built twelve such tanks between Southern Cross and Kalgoorlie, and three to the north between Kalgoorlie and Goongarrie (the 90-Mile). The tanks all held water satisfactorily, but they had high evaporation rates and the rainfall and runoff was often not sufficient to

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1 LePage, J. S. H. *Building a State: the Story of the Public Works Department of Western Australia, 1829-1985*, Perth, WAWA, 1989, p. 263.

2 LePage, J. S. H., op cit, pp. 263-264.

3 LePage, J. S. H., op cit, pp. 263-264.

provide a reliable supply. Catchment areas for the tanks were designated water reserves where timber could not be cut, to prevent salt rising.[4]

Despite exceptionally heavy rains in April 1895, which filled all the tanks to overflowing, the amount of storage was not sufficient to meet the demand of travellers, rail construction and freight transport between Southern Cross and Kalgoorlie. The Goldfields Water Supply Scheme had been proposed and was in the planning process, but it was estimated it would take three years to complete. In November 1895, Premier John Forrest undertook a tour of inspection through the Eastern Goldfields 'to see the fields and learn of its wants'.[5] After a tour covering almost 1,000 miles, most of it on horseback or in a horse-drawn vehicle, Premier Forrest had confirmed that the most pressing want on the goldfields was water. He decided to take some short-term measures to immediately improve the situation. In what was referred to as 'the Premier's December Programme', construction was undertaken on numerous bores and tanks as well as a large dam on a watercourse in the North Coolgardie goldfield.[6]

The planned *Niagara Dam* was described in the PWD Annual Report, 1895-96:

> Niagara - 30,000,000 Gallon Reservoir. This is one of the few really good sites on the fields, the natural basin affording every advantage for the conservation of a great body of water. During the recent rain that fell at Niagara, 35,000,000 gallons were gauged as passing down the creek. Plans and estimates are nearly completed, and this will be one of the most interesting and important works, as well as probably the largest reservoir, on the whole of the fields.[7]

The dam was so named because of the waterfall, which was created when water flowed into the basin after heavy rain, and is an example of the wry humour of the Australian outback to name a generally dry waterfall after its gigantic and famous namesake.[8] The district and the nearby town both took their name from *Niagara Dam*. The town of Niagara was declared on 27 November 1896 and, by early 1897, the early hessian and canvas structures had begun to be replaced with buildings of sun-dried mud brick construction. The town was planned with seven streets but only two developed, Challenge and Waterfall streets, at the intersection of which were four hotels. Challenge Street was named for the main goldmine in the area, and Waterfall Street for the Niagara Falls. Wells and condensers provided potable water for the early residents.[9]

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4 LePage, J. S. H., op cit, pp. 265, 269-272; *Votes & Proceedings of Parliament*, Vol. 1, 1900, PWD Annual report for 1899-1900, Paper No. 11, p. 42.

5 Webb, Martyn & Audrey, *Golden Destiny: The centenary history of Kalgoorlie-Boulder and the Eastern Goldfields of Western Australia*, City of Kalgoorlie-Boulder, 1893, p. 428, quoting the *Kalgoorlie Miner*, 23 November 1895.

6 Webb, Martyn & Audrey, op cit, p. 428; PWD Plan 6865, 'Niagara Reservoir, elevation of concrete dam', 1899; PWD Plan 7318, 'Goldfields Water Supply Branch, Plan of catchment area for Niagara Reservoir', 1900; PWD Plan 7964, 'Menzies Leonora Railway, showing proposed pipe track from Niagara Reservoir', 1901, SROWA, CONS 1647, PWD plans on microfiche.

7 PWD Annual Report, 1895-96, quoted in Ball, Julia & Aris, Kelly, *Shire of Menzies Municipal Heritage Inventory*, 1996, Site 9.

8 Photograph showing the waterfall into Niagara Dam following heavy rain, Battye Collection, 3673B/1.

9 Cheetham, A., *An Historical study: Niagara, Western Australia*, Goldfields History Series, No. 1, September 1979, ~~op cit,~~ pp. 5-6;

A contract for construction of *Niagara Dam* was let on 20 January 1897 to H. Nelson, with a quote of £24,413-17-0.[10] Construction of *Niagara Dam* was supervised by F. E. S. Wilmott, who was engaged by the Government from 1 July 1897 to 30 June 1898, at a salary of £200 per annum. Cement for the dam wall was transported by rail to the railhead of the Eastern Goldfield line, which was under construction between Kalgoorlie and Menzies. The line reached Broad Arrow on 7 November 1897 and Menzies on 23 March 1898.[11] Cartage of the cement from the railhead to the construction site was undertaken by camel. Afghan camel driver, Abdul Waid, who owned some 400-pack camels, was subcontracted to transport the cement for the last section of the journey. The cement was imported in timber casks and these had to be sawn in half, with one half tied on each side of a camel.[12]

In December 1897, the *Coolgardie Miner* reported progress on the work:

> The Niagara dam is now rapidly approaching completion. A recent visitor to the scene describes the work in progress as astonishing. An enormous number of men are employed, and the whole locality presents an unusual air of bustle. To this work attention has lately been drawn by the visit of Mr O'Connor, the Engineer-In-Chief for Water Supply… The dam, which is situated some 2.5 miles south of the Niagara township, is the most extensive project of the kind on the goldfields. It is placed in the course of a creek, and has an enormous catchment. Unlike most works of the kind a natural basin is being utilised, to improve which a huge concrete wall is being erected for some distance. The capacity of the dam will be 40,000,000 gallons.[13]

Difficulties with the foundations delayed completion of *Niagara Dam* until well into 1898, and the cost blew out to £42,000. It was reported that the PWD had miscalculated the depth of the bedrock, with the result that the foundations had to be deeper than expected. This problem was most likely the reason for C. Y. O'Connor's reported visit to the site. The contractor was eventually forced to go to arbitration for due recompense of the extra cost.[14] When completed, the dam is believed to have had a circular valve house in the centre, similar to that on Mundaring Weir.[15]

Niagara Dam and catchment was gazetted Reserve 5062 for the purpose of water, on 6 May 1898. The Reserve had an area of 1,427 acres (577.486 ha). In 1900, the Reserve was vested in the Minister for Works.[16] The water from *Niagara Dam* was originally intended to service the Niagara townsite and surrounding district, as well as the proposed railway. Even though the railway line had not yet reached Kalgoorlie, there was an expectation that it would be extended north to service the rapidly developing goldfields.[17]

Soon after *Niagara Dam* was built, abundant fresh water was located underground at Kookynie, 7km north of Niagara. In 1901, a gravity-fed

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10 *West Australian Government Gazette*, 5 February 1897, p. 252. A. Cheetham gives the contractors as Robert Henderson and Bruce & Alec McGeorge. It has not been ascertained if another tender was later accepted for the work.

11 Gunzberg, A. & Austin, J., *Rails Through the Bush*, Light Railway Research Society of Australia, Melbourne, 1997, pp. 207 & 229.

12 Cheetham, A., ~~*An Historical study: Niagara, Western Australia*, Goldfields History Series, No. 1, September 1979,~~ op cit, pp. 19-20.

13 *Coolgardie Miner*, 7 December 1897, p. 4.

14 Cheetham, A., op cit, pp. 19-20.

15 Information provided by Ian Elliot, gleaned from early photographs.

16 DOLA, Reserves Index Enquiry, Reserve 5062.

17 Cheetham, A., op cit, pp. 5-6;

pipeline was proposed to provide water from *Niagara Dam* to Jessop's Well Siding, a few miles south of the Niagara township for the use of the railway.[18] Construction of the railway line from Menzies to Leonora had begun in February 1901.[19] When the line was opened through the Niagara district, the local press reported complaints from Niagara townspeople that the railway operation left little water for the town. *Niagara Dam* relied on rainfall and because of the arid nature of the region it often did not contain much water.[20]

From 1895-1900, Niagara was the centre of a district with a population of about 2,000, and probably had a town population of about 1,000. By 1900, the gold began to run out at Niagara, and the Challenge mine was the only one still operating in 1901. At nearby Kookynie, good gold finds had been made and much of the population and businesses of Niagara moved to there. The last hotel closed at Niagara in 1908, by which time little remained of the town.[21]

A report on *Niagara Dam* appeared in the *Daily News* in 1961:

> The dam has a wall 23ft. thick, 61 ft. high over the foundations, and 570ft. long. It can hold 38,750,000 gallons fed from a 792-acre watershed... It cost the infant State a sixth as much as Mundaring Weir, yet not a fraction of that amount has been recovered. Soon after the dam was built, abundant fresh water was found at nearby Kookynie. And the railways... decided it was more economical to draw water at Menzies... Until about 1916 a caretaker controlled the standpipe behind the dam, selling bulk supplies at 1/9 a hundred gallons. In 1915, the water was gravity-fed along a three-mile pipeline to Jessop Siding. The pipeline may have been a last desperate attempt to employ the dam water.[22]

A measure of the reliability of *Niagara Dam* as a water supply can be ascertained by the fact that although water overflowed from the spillway in 1975 and 1979, the previous such flow had been in 1957.[23]

In 1983, Reserve 5062 was vested in the West Australian Wildlife Authority (now CALM) for the purpose of conservation of flora, fauna and water.[24] *Niagara Dam* was given a Level 3 management category in the Shire of Menzies Municipal Heritage Inventory, adopted on 18 December 1996.[25]

In 2002, *Niagara Dam* is used for watering stock and as a picnic area.

13.2 PHYSICAL EVIDENCE

Niagara Dam is approximately 10 kilometres southwest of the town of Kookynie in the northeastern goldfields, although reference from the town of Menzies better describes access to the site. *Niagara Dam* is located off Kookynie Road, approximately 10 kilometres from the Goldfields Highway, at a turnoff that is 40 kilometres northeast of Menzies. From Kookynie Road, a gravel track weaves through the natural landscape for approximately 3 kilometres in a southerly direction, before arriving at the catchment end of

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18 PWD Plan 7964, 'Menzies Leonora Railway, showing proposed pipe track from Niagara Reservoir', 1901, op cit.

19 Gunzberg, A. & Austin, J., op cit, p. 207.

20 Cheetham, A., op cit, pp. 19-20.

21 Cheetham, A., op cit, pp. 5-6, 18.

22 *Daily News*, 4 May 1961, p. 20.

23 Cheetham, A., op cit, pp. 19-20.

24 DOLA, Reserves Index Enquiry, Reserve 5062.

25 Ball, Julia & Aris, Kelly, *Shire of Menzies Municipal Heritage Inventory*, 1996, Site 9.

the dam. At that point, the track splits with the one track going due south over base rock, past the debris trap across the east end of the dam, and around to the east side of the dam wall. The track is ill defined as it traverses rocky outcrops. The other track veers south west from the junction and follows the natural contours of the hilly outcrops, roughly parallel with the north and then west side of the catchment lake, around to the west side of the dam wall. Along the southwest track, there are several cleared areas for camping and parking vehicles. Those areas are relatively crude and informal with minimal impact on the natural environment.

The entire dam area and catchment is natural environment except for the dam wall construction. There are no other built elements in the area of the dam. The dam construction is a concrete gravity wall tapered outwards towards the base that is submerged by the catchment water on the north side, and curved out at the base on the spillway side. The dam wall extends across the catchment lake from west to east with graceful sweeping curves at the western and eastern ends in an otherwise straight wall. Central along the dam wall, on the catchment (north) side is a semicircular valve enclosure, and a separate stepped concrete element further on the west end of the wall on the catchment side.

'Gravity wall construction' refers to the use of a substantial mass to hold back the water. The principal factor in a dam of this nature's strength is its weight.[26]

The valve structure is a formed extension of the wall construction and tapers out in a curve around the top. The wall top balustrade extends around the circular valve element and, in that vicinity, there are two steel doors at floor level. Down the wall of the valve enclosure is a metal valve detail.

The dam has a narrow ledge, approximately 2ft. 6ins. (0.750 metres) wide, along the top of the wall. Steel balustrades along the north side of the walkway comprise vertical uprights at regular intervals and two horizontal pipe railings, with rounded knuckle joints.

The south side of the wall is curved out to the base at visible ground level. The spillway is central along the wall. It has low concrete vertical side walls and angled dry stone coursed walls on the battered banks from the top of the concrete walls. The spillway construction extends for approximately fifty metres south of the wall.

The catchment lake is a natural formation of rocks, predominantly cliff-like along the eastern side and much of the west side although the west side has several 'beaches' where the remains of campfires indicate frequent recreational use.

At the far east of the lake, there is a debris trap across the rocky outcrop. It is a series of vertical steel rails welded to a horizontal steel beam. It forms a horizontal element across the end of the catchment lake. Central in the debris trap, where the gullies are deeper, there is a low concrete wall supporting the steel structure to retain a level horizontal line along the entire length of several hundred metres.

Niagara Dam is generally in fair to good condition. The concrete wall evidences minimal maintenance and general weathering since its construction. In some places, the external surface of the concrete has

26 HCWA phone call to Paul Stradden, Water Corporation, 8 October 2002.

deteriorated to reveal the aggregate of the original concrete mix, and some non-structural cracks are evident. The metal elements are rusted.

Niagara Dam has retained a high degree of integrity due to its continuous function as a water catchment and dam. The place is mostly intact, and demonstrates a high degree of authenticity with no evidence of intervention to the original fabric.

13.3 COMPARATIVE INFORMATION

In comparison to other dams in the State, *Niagara Dam* holds approximately 182,000,000 litres of water (or 0.18 Gigalitres (Gl)), while Victoria Dam (1891) has a capacity of 9 Gl, Mundaring Weir (1903) 64 Gl, Canning Dam (1940) 90 Gl, Serpentine Dam (1961) 138Gl and South Dandalup Dam (1974) 205 Gl. *Niagara Dam* is of concrete construction, as are Victoria, Mundaring and Canning Dams, while Serpentine, South Dandalup, North Dandalup, Churchman's Brook and Wungong are earth or rock fill embankment dams. There is no other known concrete gravity dam in the Eastern Goldfields of the State. Most newer dams are now being constructed using a combination of earth and rock fill, and the use of solid concrete is no longer common,[27]

13.4 REFERENCES

13.5 FURTHER RESEARCH

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[27] Water Corporation website, www.watercorporation.com.au, 28 August 2002.