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)

- 2.4.2 Migrating to seek opportunity
- 3.4.5 Tapping natural energy sources
- 3.6 Recruiting labour
- 3.11.5 Establishing water supplies
- 4.2 Supplying urban services (water)
- 8.1.1 Playing and watching organised sport

HERITAGE COUNCIL OF WESTERN AUSTRALIA THEME(S)

- 101 Immigration, emigration & refugees
- 106 Workers
- 404 Community services and utilities
- 405 Sport, recreation and entertainment
- 504 Depression and boom
- 507 Water, power, major transport routes

11.1 AESTHETIC VALUE*

Wellington Dam Precinct is important as a collection of functional industrial structures and more embellished recreational buildings, which exhibit elements of the Post War International Style such as planar walls, cantilevering flat concrete roofs, selected expression of structure and lozenge and trapezoidal shapes as well as some of the domestic variants of this style such as low pitched gabled roofs and contrasting planar feature walls. (Criterion 1.1)

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

For consistency, all references to garden and landscape types and styles are taken from Ramsay, J. Parks, *Gardens and Special Trees: A Classification and Assessment Method for the Register of the National Estate*, Australian Government Publishing Service, Canberra, 1991, with additional reference to Richards, O. *Theoretical Framework for Designed Landscapes in WA*, unpublished report, 1997.

Wellington Dam Precinct is important as an example of a large engineering project which has dramatically changed the natural landscape by damming the Collie River to create a large artificial water body and as a part of the project, landscaped the surrounds to create a scenic attraction for visitors. (Criteria 1.2 & 1.3)

Wellington Dam Precinct is important as a large example of the Bush Garden Landscape Style where a dramatic man-made landscape has been enhanced by slightly manipulating the natural form of the adjacent valley wall, reinforcing natural vegetation with endemic plants and flowering native shrubs and using natural material obtained from the site to create organic shaped paths and terraces. (Criterion 1.2)

The Quarry is a good example of a late 20th century recreational parkland of informally arranged trees and visitor facilities and contributes to the larger landscape by providing a contrasting experience within the surrounding bushland. (Criterion 1.3)

Together the man made landscapes, buildings and natural landscape of *Wellington Dam Precinct* combine to form a significant recreational landscape. (Criterion 1.3)

11.2 HISTORIC VALUE

Wellington Dam was built in 1933 to form the headworks of the Collie River Irrigation Scheme, one of the largest users of water for irrigation in Western Australia, while the raising of the wall in 1960 provided a reservoir to supply the Comprehensive Water Supply Scheme for southwest towns and their ongoing development. (Criteria 2.1 & 2.2)

The Hydroelectric Station was the first such power facility constructed by the State in Western Australia, and was one of only two operating hydro power stations in Western Australia, the other being the Ord River station in the North West. (Criteria 2.1 & 2.2)

The construction of the place provided direct employment for a large number of men under the sustenance program of the 1930s Depression and was a major employer of immigrant labour, particularly southern Europeans, in the 1950s. (Criterion 2.1)

Wellington Dam made possible the development of the Collie Irrigation area and provided a reliable water supply for an increasing number of towns in the region from 1953 to 1990. (Criterion 2.2)

Wellington Dam is associated with Sir Russell Dumas, Chief Engineer, Director of Works and Buildings and Chief Hydraulic Engineer of the Public Works Department during his career with the department between 1925 and 1953, as well as various hydraulic engineers, including John G. Lewis, Victor Munt and Roy Hamilton. (Criterion 2.3)

Wellington Dam Precinct is associated with landscape architect John Oldham, who was responsible for the grounds and public facilities of this and other dam precincts including Mundaring Weir and Serpentine, Canning and Ord River dams. (Criterion 2.3)

The design and construction of Wellington Dam was a technical achievement in a time of economic hardship, requiring extensive use of manual labour due to the terrain. (Criterion 2.4)

11.3 SCIENTIFIC VALUE

The Hydroelectric Station has value as a demonstration site, being a rare example of such a facility in Western Australia. (Criterion 3.1)

Wellington Dam Precinct has the potential to yield archaeological information relating to the workers encampments of the 1930s and 1950s, equipment and machinery used, and construction processes. (Criterion 3.2)

11.4 SOCIAL VALUE

Wellington Dam Precinct is highly valued for its associations with farming in the region since 1933, its attractions as both a passive and active recreation venue in the beautiful natural setting of Wellington National Park, and for the spectacle of the artificial dam wall and its body of water, made even more spectacular on the irregular occasions when the dam overflows. (Criteria 4.1 & 4.2)

Wellington Dam Precinct is the site of the Australian Rowing Championships, and also hosts whitewater rafting down the rapids. (Criterion 4.2)

12. DEGREE OF SIGNIFICANCE

12.1 RARITY

The Hydroelectric Station is rare as one of only two hydro power stations constructed for the State, the other being the Ord River station in the North West. (Criterion 5.1)

Wellington Dam Precinct is the only example in Western Australia of a combination of water supply facilities for irrigation, domestic use and hydroelectric power coupled with a solid gravity dam. (Criterion 5.1)

12.2 REPRESENTATIVENESS

Wellington Dam Precinct and its various components are a representative example of water supply facilities with a landscaped public recreation site. (Criterion 6.1)

Wellington Dam Precinct is a fine representative example of a solid concrete gravity dam of considerable size in the south west of Western Australia. (Criterion 6.2)

The landscaping of *Wellington Dam Precinct*, with its use of Australian native plants in informal arrangements, dry stone walls and free form meandering paths and granite steps is a representative example of late Twentieth Century Bush Garden style influenced by the work of Edna Walling. (Criterion 6.1)

The landscaping in the Quarry is representative of the open parkland landscapes popular in the 1960s, which consisted largely of informal arrangements of trees set in rolling lawns. (Criterion 6.1)

12.3 CONDITION

Wellington Dam Precinct is generally in good condition and has benefited from regular maintenance.

The buildings and structures within the precinct are in good condition although there are minor patches of fretting brickwork at the Caretaker's Quarters & Kiosk and the No. 1 Pumping Station and associated buildings have suffered from vandalism since they were decommissioned. The original equipment in the

Hydroelectric Power Station is in fair to poor condition and will require repair and refurbishment to bring it back to working order.

The landscaped areas are generally in good condition although there are some senescent plants from post 1960s plantings around the Caretaker's Quarters & Kiosk. While landscaped areas have been regularly maintained, when the more labour intensive beds of flowering native shrubs have senesced, they have been replaced with larger, lower maintenance shrubs.

There are a number of places around the site that have the potential to reveal archaeological material such as the site of the works camp near the Kiosk. There are a number of relics of abandoned equipment around the precinct, which are slowly deteriorating with time and exposure, such as the steel and timber items located along the track leading from the Kiosk to the Reservoir.

12.4 INTEGRITY

Since its development the *Wellington Dam Precinct* has remained constantly in use for water supply, firstly for irrigation and then for irrigation and domestic use and since 1990 for irrigation only due to the increasing salinity of the water. The landscaping works carried out in the 1960s including the Lookout, the picnic areas in the Quarry and the Kiosk continue to fulfil their original intended purpose as facilities for visitors viewing the Dam.

Currently there are proposals to return the Dam to a domestic water supply, which will affect the public use of the reservoir and the water catchment area.

The No. 1 Pumping Station and Hydroelectric Power Station have moderate integrity as the former has been decommissioned and the latter is not in working order. The No. 1 Pumping Station may be used again if the plan to desalinate the Dam water is put into effect. Options for returning the Hydroelectric Power Station to working order are currently being studied.

12.5 AUTHENTICITY

Generally, *Wellington Dam Precinct* has a high level of authenticity. While the Dam has undergone several campaigns of development, it has remained largely unaltered since it was last modified in the 1960s. The visitor areas developed in the 1960s, including the Kiosk, Lookout and Quarry also remain largely unaltered except for some minor changes made soon after their construction. These minor changes, such as the addition to the Caretaker's Quarters & Kiosk and the No. 1 Pumping Station and the modification of the Lookout handrail, are difficult to distinguish because they closely match the original work.

Generally the landscaping to *Wellington Dam Precinct* has a high level of authenticity, and is largely intact apart from the loss of the displays of small flowering shrubs, which died from old age and were not replaced. The built elements such as paths, walls, garden beds and picnic shelters plus the mature exotic and native trees, path networks, road layouts and scenic lookouts are largely unaltered allowing the original scheme to be read.

13. SUPPORTING EVIDENCE

The documentation for this place is based on the heritage assessment completed by Irene Sauman, Historian and Alan Kelsall and Gena Binet of Kelsall Binet Architects, in February 2007, with amendments and/or additions by HCWA staff and the Register Committee.

13.1 DOCUMENTARY EVIDENCE

Wellington Dam Precinct comprises Wellington Dam, a solid concrete gravity dam constructed in 1933, and enlarged in 1945 and 1960, the No. 1 Pumping Station, Chlorine Store and Chlorinator (1953, 1963), 2kW Hydroelectric Station (1956), Caretaker's Quarters & Kiosk (1966), landscaped Quarry, and roads, landscaping and facilities for public use and recreation. The structures exhibit elements of Post War International Style.

Prior to World War I, the Government priority for agricultural infrastructure was centred on the provision of railways. Following the establishment of the Harvey Dam and drainage system in 1915-16, the emphasis gradually shifted to drainage and irrigation: damming rivers to prevent winter rain flooding the coastal plains and storing it for use in the dry summer months. The growing population of Perth demanded increased water supplies, and the Wungong and Canning pipehead dams and Churchman Brook Dam were constructed in the 1920s to fulfil that need. Further development was prevented by the onset of the Depression, but by 1930, with an estimated 10,000 unemployed men receiving government assistance, the decision was taken to employ them on public works in return for their sustenance payments. The public works undertaken generally involved road works and drainage and irrigation projects, which included the raising of the Harvey Dam, construction of the Drakesbrook Dam, and construction of Wellington Dam.[1]

Sir Russell Dumas, who had joined the Metropolitan Water Supply Sewerage & Drainage Department in 1925, worked on the Churchman Brook Dam before transferring to the Public Works Department (PWD), where he worked on the designs of Drakesbrook Dam and Wellington Dam under hydraulic engineer B. S. Crimp. Dumas was appointed Chief Engineer of the department in 1932, and Director of Works and Buildings and Chief Hydraulic Engineer in 1941. He believed in large-scale development for Western Australia and was involved in many projects, among them the Ord River scheme and the development of *Wellington Dam* over a twenty-year period until his retirement in 1953. He was appointed CMG (1950), KB (1959) and KBE (1964).[2]

On 3 November 1931, the Public Works Department (PWD) began a survey for the proposed construction of Wellington Dam, which was to dam the Collie River for irrigation of the land below the scarp.

> Trial holes were sunk and the dam was fixed about November 23rd, having two straight wings 240 feet and 280 feet long, and the centre curve 261 feet long of 300 feet radius. Excavations for the foundation and plant erection were expedited as it was necessary to advance as far as possible across the stream bed before the winter floods.[3]

In December 1931, there was considerable correspondence about the design. No flood records or flow information was available for the Collie River, so estimates had to be made based on various formulas calculated on the 1,000 square mile catchment area above the Dam site. PWD correspondence noted that 'somewhat generous proportions have been allowed for overflow on account of lack of data which had it been available might have enabled economies to be

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

2 *Australian Dictionary of Biography*, 1940-80, MUP, 1996, vol. 14, pp. 46-47.

3 Le Page, op cit, p. 449.

made'.[4] Further amendments were made to the design during construction, and included the raising of the abutment wall to allow a 12-foot overflow instead of the originally calculated 10 feet, and provision of a shaft and tunnel to allow access to the valve room in all conditions of overflow.[5] The Dam was a solid concrete gravity type and the shape of the Dam wall, with a small curved section in the centre and straight abutments each side, was due purely to the natural rock foundation, a gravity dam being dependent on the strength of its foundation.[6]

By 26 November there were 108 men employed. All except the skilled labourers were obtained through the Sustenance Department. For the greater part of the time earnings were limited to Sustenance rates plus £1, but this was later changed to a period on full time and a period on Sustenance.[7]

The sand and stone for the concrete for the Dam wall were obtained from the immediate area. The sand came from a pit 5.5 miles from the construction site, and the stone came from a 'bald, granite face about 40 feet high' located only 100 yards downstream. Two contractors carted the sand in 2-ton trucks, while another contractor quarried and crushed the stone. Part way through the project, the contract system was replaced with day labour.[8]

> The concrete chuting plant consisted of two fabricated steel towers: one 130 feet high at the bins, completed 300 feet of wall, and the second 175 feet high placed on the wall 285 feet away, completed 400 feet of wall. The towers carried an overhead cable from which the chuting was suspended. The concrete was hoisted to the tower hopper by an automatic tipping bucket and discharged down the chuting. The concrete was discharged into timber studded and sheeted boxes, which in the initial stages of the job were 8 feet wide and 6 feet high and ran the full 50 feet between expansion joints, each alternate one being 3 feet higher or lower than its neighbour.[9]

The Official Opening of Wellington Dam was held on 9 December 1933.

> Wellington Weir, on the Collie River, was officially opened on Saturday by the Minister for Works (Mr A. McCallum)... Intense cultivation of the 120,000 acres of coastal flats from Pinjarra to Dardanup is the ultimate objective of a scheme, in which the irrigation made possible by the Wellington Weir is the preliminary step… The Wellington reservoir will irrigate 34,000 acres and the irrigation channels will have a total length of 93 miles. Without the majestic height of the dam at Mundaring, Wellington Weir has a sweep of 734ft. at the crest of the wall and is 68ft high. The scheme will not be complete until 91 miles of drainage have been laid down. These drains are intended to release for production the areas that used to be flooded in winter.[10]

Wellington Dam cost £137,000 to build. It had a Dam wall some 800 feet long and 62 feet high and held 6,900 million gallons, which was estimated to be almost twice the capacity of Mundaring Weir at that time, although the Dam wall was only half the size. In 1936-37, 168 farms were supplied with an average of 2.7

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4 Correspondence, December 1931, PWD Water Supply, Collie River irrigation: Wellington Dam design and general, SROWA, WAS 3035 Cons 1109 Item 1931/1169.

5 Correspondence, December 1931 - December 1932, PWD Water Supply, Item 1931/1169, op cit.

6 Lewis, John G., *Investigations and design for the raising of Wellington Dam*, unpublished typescript courtesy of the author, [1951], p. 40.

7 Le Page, op cit, p. 449-50.

8 Le Page, op cit, p. 449-50; PWD plans, Wellington Dam construction, SROWA, WAS 399 CONS 4481 Item 28096.

9 Le Page, op cit, pp. 449-50.

10 *Western Mail*, 14 December 1933.

waterings for the year. In 1940-41, this had been increased to 3.68 waterings over 5,279 acres.[11]

When Wellington Dam was designed, provision had been made for the installation of 3-foot high moveable shutters to be installed along the crest of the wall at a later date when capacity needed to be increased. It was noted, however, that a masonry wall would be more economical and efficient. The added height was considered necessary by November 1941 as the Collie Irrigation Area continued to develop, but because of lack of funds and labour for such projects during the war years it was late 1945 before work began, and a 3-foot masonry wall had been decided on by that time. On 1 December 1945, seven men were sent to the site to begin work. This number was increased to fourteen men a week later.[12]

Quarrying and delivery of stone went to schedule, but it was soon discovered that two of the 'alleged' stonemasons could not lay stone. Attempts to train them produced work that was solid but 'looked shocking' and their output was only three feet a day. The Department took a stonemason from work on the Stirling Dam and he, with one trainee, was able to lay stone at twelve feet plus a day. The slowness of the work done by the original untrained masons added to the cost and time for the work, which was scheduled to be completed March 1945.[13]

Raising the wall presented no issues with possible flooding of land beyond the boundaries of the area already resumed for the 1930s construction. The increased wall height brought the storage capacity of Wellington Dam to 8 thousand million gallons.

In 1946, the decision was made to further raise Wellington Dam by around 40 feet and to raise the wall of Mundaring Weir by 32 feet. The work at Mundaring was undertaken first, and provided a process for the work that was to follow at Wellington Dam. The project at Mundaring was the responsibility of hydraulic engineer Victor Munt, who worked on the plans for the raising of Wellington Dam.

A 40-foot raise at Wellington Dam was considered sufficient to supply irrigation needs for some considerable time, but when the State Electricity Commission requested to install a small hydroelectric station to utilise the increased irrigation flow that would result from the raised storage capacity, the PWD began to consider increasing the wall height by 50 or 60 feet.[14]

> With our chronic shortage of stored water, I think it wise to place more in kitty than may seem economically correct in the first place, and the installation of a hydro-electric power plan – operating only when water is available – would appear to be a means of liquidating the extra initial capital outlay involved in a comparatively short time.[15]

For the PWD, a height of 50 feet was optimum, this being the level that offered the best economic returns from the hydroelectric station in the shortest period.[16]

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11 PWD file, Wellington Dam: Raising of Wall 3 ft, WAS 3035 CONS 1109 Item 1941/1098.

12 PWD file, Wellington Dam: Raising of Wall 3 ft, Item 1941/1098, op cit.

13 PWD file, Wellington Dam: Raising of Wall 3 ft, Item 1941/1098, op cit.

14 PWD file, Wellington Dam - Hydroelectric power, correspondence 22 Dec 1948, WAS 3035 CONS 1869, Item 1949/0121.

15 PWD file, Wellington Dam - Hydroelectric power, Item 1949/0121, op cit.

16 PWD file, Wellington Dam - Hydroelectric power, Item 1949/0121, op cit.

For the SEC, the economics of the station were based on savings in coal fuel for the Collie power station.[17]

While work went on at Mundaring, another project associated with the planned raising of Wellington Dam was put in motion. The Wellington Dam to Narrogin Pipeline was part of the Comprehensive Water Supply Scheme, and involved the construction of a 30-inch diameter steel pipeline 80 miles in length, with two pumping stations, regulating tanks and the construction of smaller branch mains from Narrogin along the Great Southern Railway, north to Brookton and south to Katanning, with another two pumping stations and tanks. Cost of the Wellington Dam to Narrogin Pipeline and ancillary structures was expected to be around £2,650,000, with the Commonwealth to assist on a pound for pound basis. The work began with the ceremonial laying of the first two sections of pipe on 19 August 1949, by the Minister for Works & Water Supplies, Victor Doney, MLA.[18]

The No. 1 Pumping Station for the Narrogin Pipeline was located at Wellington Dam. It delivered water a distance of 5.5 miles to the Worsley Regulating Tank, from where it was gravity fed some 22 miles to the No. 2 Pumping Station, which pumped to the Coolakin Regulating Tank another 19 miles distant. From Coolakin, the water flowed by gravity to the Narrogin Storage Reservoir. Construction methods for the Pipeline followed the standard practice for continuously welded mains that was developed on the Goldfields Main Conduit.[19]

The No. 1 and No. 2 Pumping Stations were each fitted with two electrically-driven pumps, one being a standby, which would come in automatically should the working pump fail. The pumps were 8”-10” horizontal split casing double suction volute type centrifugal pumps designed, manufactured and installed by Kelly & Lewis Ltd of Springvale, Victoria. The Pumping Station buildings, constructed by the PWD, were concrete with asbestos roofs, and measured 85ft by 22ft. One end wall was of brick to enable the buildings to be extended when the system needed to be expanded. Associated with the No. 1 Pumping Station was the Chlorinator, which was located about 50 feet above the Pumping Station. Chlorine was injected into the suction main and automatically controlled by the pumps. Another building, the Chlorine Store, stored the extra bottles.[20]

The Pumping Stations were identical except for a small difference in capacity, with the No. 2 station having the smaller output. The Pumping Stations were fully automatic and controlled by float switches at the Regulating Tanks. A 10-pair underground PMG cable carried operating and safeguard signals through the system.

The raising of the wall at Mundaring was completed in December 1951, but preliminary work at Wellington Dam had commenced several months earlier, in August. In June 1952, camp accommodation was erected but soon after work was suspended due to lack of funds, caused by the development of Cockburn Sound for the proposed oil refinery.[21]

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17 PWD file, Wellington Dam - Hydroelectric power, correspondence 26 Jan 1949, Item 1949/0121, op cit.

18 *The Wellington Dam to Narrogin Pipeline Souvenir*, op cit, pp. 5-6; PWD file, Comprehensive Water Supply Scheme, No 1 & 2 pumping stations Wellington Dam official opening ceremony, SROWA, WAS 3035 CONS 1578 Item 1953/0626.

19 PWD Plan, No 1 Pumping Station for Narrogin Pipeline, 1952, SROWA, WAS 399 CONS 4481 Item 32654; *The Wellington Dam to Narrogin Pipeline Souvenir*, op cit, pp. 8-17.

20 *The Wellington Dam to Narrogin Pipeline Souvenir*, op cit, pp 18-20.

21 Le Page, op cit, p. 495-500.

The No. 1 Pumping Station was officially opened on 18 December 1953 by Minister for Works and Water Supply, John T. Tonkin MLA. At that time the Pumping Station was supplying water only to Collie. Although the Pipeline was planned to be completed in three years, the shortage of steel plate in the post-war years restricted pipe manufacture and the Pipeline did not reach Narrogin until 1956. The Hon John Tonkin opened the completed Pipeline on 10 February that year at a ceremony held at the Narrogin Storage Reservoir. Other members of the official party at the opening ceremony included: T. N. Hogg, Mayor of Narrogin; L. W. Hamilton MP, Parliamentary Under Secretary representing the Commonwealth Government; Sir Ross McLarty MLA, Leader of the State Opposition; Victor Doney, MLA for Narrogin; and, A. F. Watts MLA, State Country Party leader.[22]

In 1954-56, the construction of a 2,000 kW Hydroelectric Station was underway, located 1,400 feet below Wellington Dam. John G. Lewis was the hydraulic engineer who oversaw the project.[23] In its 1954-55 *Annual Report*, the PWD noted that:

> Foundations were completed and a building erected for the Hydro-Electric Station at Wellington Dam. The installation of equipment by a private contractor commenced, the 1200 foot length of twin 53¼in O.D. steel penstock pipe to supply water to the Hydro-Electric Station was completed with the exception of one anchor block. The offtake from the dam and the building of the trash rack were also completed.[24]

Perth firm Hartland Engineering was the private contractor who provided the machinery for the Hydroelectric Station. The Station was to operate on the irrigation water which would flow through the place and then on to the irrigation channels, but 'until the dam wall is raised this unit can be used only during the winter overflow months, and then at a reduced load of 1,600 kW'.[25] The Station was commissioned on 3 July 1956. It was completely automatic in its operation, and was managed from the Collie power station, to which it was connected.[26]

Wellington Dam Hydroelectric Station was planned to take on the load of the Collie Mines. It was not expected to make a large profit but was considered valuable experience if the proposed Ord River scheme and its hydroelectric station were to go ahead.[27]

At the completion of the 1954-55 irrigation season Wellington Dam was emptied in preparation for the work on raising the wall. Work was carried out on the concrete lining of the Offtake pipes through the existing Dam wall. The pipes were extended to allow for the enlarged Dam wall and new control valves were fitted. Guide rails were fitted to the upstream face of the Dam to provide for the new emergency control gates.[28]

In the 1955-56 year a construction plant was installed including the concrete mixing and bulk cement handling facilities. The plans for the conveyors, trestles,

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22 *Souvenir of the opening of Pumping Station No. 1 on the Wellington Dam to Narrogin Pipe Line*, 18 December 1953, 4 pages.

23 PWD file, Wellinton Dam: operation and maintenance, SROWA, WAS 3035, CONS 1109 Item 1958/0664; Lewis, John G., op cit, pp. 24-26.

24 PWD, *Annual Report*, 1954-55, p. 55. The 1955 SEC Annual Report is missing from the Battye collection.

25 PWD Water supply, Item 1958/0664, op cit; West Australian, 22 November, 1955; SEC, *Annual Report*, 1956-57, p. 16.

26 PWD Water supply, Item 1958/0664, op cit; Lewis, John G., op cit, pp. 24-26.

27 Lewis, John G., op cit, pp. 24-26.

28 Le Page, J.S.H., op cit, p. 495-96.

crushers and mixer bin, etc, were those previously used at Mundaring. A concrete testing laboratory was also built. The following year excavations were carried out and concreting commenced in January 1957 using methods similar to those successfully adopted at Mundaring Weir. At Mundaring, the PWD had followed the concreting practice observed in other gravity dams, including the Aswan Dam in Egypt and the O'Shaughnessy and Alpine Dams in California.[29] This involved a particular practice in order to keep the new section of wall as free as possible from the old wall during the settling period:

> ... to allow movement to take place without shearing the new or old concrete and without increasing the tendency of the new concrete to crack in unpredictable directions, to keep the heat of the new concrete as low as possible, and to minimise heat flow to the old wall. The method adopted was [to have] a lubricated rib at the ends and centres of each monolith to be filled in after the new concrete had become sufficiently stabilised.[30]

The problem then was how to fill the deep narrow spaces created by the ribs (or slots). After tests with experimental boxes with slots covered in glass in order to observe the process, the grouted aggregate method was eventually used, whereby the slot was filled with crushed metal and a free running grout pumped in to fill the voids. In October 1958 the new concrete wall at Wellington Dam was bonded to the old by the grouting process, the two masses being equal in temperature by that time. The placing of mass concrete on the extended wall was completed on 4 March 1960. The Resident Engineer at Wellington Dam was Roy Hamilton, who took over responsibility for the project from Victor Munt following his death in 1953. Hamilton later worked on the development of Kununurra and the Ord Irrigation Scheme.[31]

In the 1940s, both skilled and unskilled workers were scarce and the majority of workmen at Mundaring were newly arrived migrants. Up to 500 men were employed at Mundaring.[32] The situation at Wellington Dam was little different, with labouring work on projects in rural areas often the only work available at this time to migrants from a non-English speaking background, the majority of whom were from Southern Europe. The Snowy River Hydroelectric Scheme was another example of this employment pattern.

Figures relating to the 50-foot raised Wellington Dam wall included 40,790 million gallon storage capacity, 112-foot wall height, 1,203-foot overall wall length, 85,000 cubic yards of concrete, 3,982 acres of water surface area and a 1,115 square mile catchment area. The raised Dam was opened on 21 October 1960 by Minister for Works and Water Supply, G. P. Wild MLA.[33] The Collie Irrigation Area had grown to around 10,000 acres by the time the wall was completed.

In 1960, landscape architect John Oldham was engaged to design a landscaping scheme for *Wellington Dam Precinct* to enhance public use, which had been steadily growing during the 1950s with the increasing popularity of motor vehicles. Particular attention was paid to the Quarry, where the stone for the Dam wall had been sourced, as this was a hazard for children and competed with the Dam for attention.

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29 PWD file, Wellington Dam raising 50 feet, 1947-1956, SROWA WAS 399 CONS 4482, Item 32438, Book 2; Le Page, J.S.H., op cit, p. 496-97.

30 Le Page, J.S.H., op cit, p. 497.

31 Le Page, op cit, p. 498-500.

32 Le Page, op cit, p. 498-500.

33 *Wellington Dam official opening of the raised dam on 21st October 1960*, 8 pages, PWD, 1960.

> We screened and protected the quarry by a natural stone wall around the top – this guide visitors toward a new lookout designed to project from the hillside pointing firmly back at the dam. The walls of the quarry were scaled down. It was back filled with good soil, planted with lawn and trees, furnished with shelters and barbeques and became a hazard free picnic area.... the lozenge shaped shelters deliberately echo the viewing platform and Dam in shape and materials. Most trees in the quarry are deciduous to let the sun through in winter. The quarry was popular from the start – it came into use immediately after completion.[34]

Other aspects of the landscaping design included a Lookout at the top of the Dam site and a new zigzag road that took visitors below the Dam. The parking area was designed to follow the contours and prevent removal of trees, and the toilets blended into the bushland. Plantings were native species except in the Quarry. Flowering species included some 570 kangaroo paw (*Anigozanthos* sp.) of various colour, *Crowea dentata*, black wattle (*Acacia decurrens*), a groundcover (*Lescenaultia biloba*), and bottlebrush (*Callistemon* sp), as well as 70 karri (likely the Karri Hazel *Trymalium spatulatum*).[35] The No. 1 Pumping Station building, Chlorine Store and toilet buildings were cement rendered to improve their appearance.[36]

In 1961, water was impounded for the first time behind the raised section of Wellington Dam, providing the full head of water required for the hydroelectric station to operate at maximum capacity.[37]

By 1963, the No. 1 Pumping Station urgently required upgrading to deal with increased delivery to the Comprehensive Water Supply Scheme. Two more pumps similar to those already installed were supplied by Kelly & Lewis, making a total of four, with three pumps to be operational and one as standby. The Pumping Station building was enlarged to take the fourth pump, having been designed to hold three with a capacity for extension at the end with the brick wall. A Wallace & Tiernan 'V'-notch chlorinator replaced the existing MD-types that were relegated to standby. R. A. & V. Bolt of Innaloo won the contract to enlarge the Chlorine Store, which was a brick and concrete building with panels of glass bricks and a steel-framed Spandex-sheeted door.[38]

The upgrade of the pumping system was expected to keep the Water Supply Scheme operating sufficiently until at least 1970, while other supply options, such as the proposed Harris River Dam, were investigated. Space at Wellington Dam was severely limited. Excavations had already been made into massive granite rock to install the existing No. 1 Pumping Station and delivery main. It was considered that 'it is, to all intents and purposes, impracticable to equip this Station otherwise than as designed'.[39] Another issue was growing salinity of the Wellington Dam catchment due to clearing.[40]

In 1966, Caretaker's Quarters & Kiosk was constructed, following requests for more public facilities. The State Housing Commission oversaw the work. The

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34 Oldham, John, 'Landscape of water resources', unpublished speech, HCWA Library.

35 PWD file, Wellington Dam, landscaping & buildings, SROWA, WAS 3035 CONS 1869, Item 1960/0424; Oldham, op cit, list of native plants sourced from Yilgarnia Nursery.

36 PWD file, Wellington Dam, landscaping & buildings, Item 1960/0424, op cit.

37 SEC, *Annual Report*, 1961, p. 10.

38 PWD file, Wellington Dam Pumping Station, purchase & installation of additional pumping units, 1963-1966, SROWA, WAS 3035, CONS 1618, Item 1963/0359.

39 PWD file, Wellington Dam Pumping Station, Item 1963/0359, op cit.

40 Mauger, G.W., et al., *Salinity Situation Statement Collie River*, Water and Rivers Commission, WRT Report 29, Oct 2001.

place was generally occupied by a married couple, with the wife running the Kiosk while her husband was in regular employment elsewhere. The Kiosk provides cafe facilities with drinks and meals as well as camping and fishing supplies, barbeque packs, canoe hire and sale of arts and crafts, and caters for group functions. Caretaker's Quarters & Kiosk was enlarged at an early time, with the addition in keeping with the original construction.[41] The place has been unoccupied at various times since it was built. It is currently leased from the Department of Environment and Conservation and managed by the lessee as 'Wellington Dam Bush Café'.[42]

The landscaping of *Wellington Dam Precinct* is an example of a Bush Garden landscape style within a Nature or Forest Reserve. The Reserve is a managed landscape used for recreation and wildlife habitat within an area in the vicinity of Wellington Dam that has been designed with native and some ornamental species and rustic rock walls and paths.[43] There are a number of walk trails in the Wellington National Park in the vicinity of Wellington Dam, and camping areas at Potters Gorge and Honeymoon Pool.

The waters of the Dam have been the venue for rowing's Australian Championship and King's Cup Regatta since before the War, on the occasions when Western Australia has been the host State.[44] The occasions of the Dam overflowing draws hundreds to view the spectacle, particularly as it doesn't occur every year.[45]

In 1976, clearing control legislation was applied to the catchment to limit salinity.

In 1990 Harris Dam replaced Wellington Dam as the source for the Great Southern Town Water Supply Scheme, which supplies 32 towns in the Upper Great Southern. Harris Dam is situated on a tributary of the Collie River and operates as a two-dam system with Wellington Dam. Saline water is released from Wellington Dam through the scouring release at the base of the wall and is replaced with low salinity water from Harris Dam. This reduces the salinity levels in Wellington Dam and results in better quality water for irrigation.[46] A trial to divert 2GL of the worst water into a disused coal void has cut salinity to 980mg/l (500mg/l is considered drinkable). Griffin Coal was reported as wishing to increase the diversion to 14GL, treat the water at a $65 million desalination plant and sell it back to the Water Corporation for potable use.[47]

Wellington Dam Hydroelectric Station was shut down for a time in the 1980s and was recommissioned again in 1992.

Wellington National Park has become increasingly popular with campers, fishermen, holidaymakers, hikers, climbers, canoeists, picnickers and day-trippers. School and community groups regularly use the Quarry cliff for abseiling. Approved and tested anchor bolts are provided for this purpose along

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41 PWD Plan, Wellington Dam, caretaker's quarters & kiosk, SROWA, WAS 3035 CONS 1869, Item 1963/1243.

42 Correspondence, Department of Environment & Conservation to HCWA, 25 June 2008.

43 Ramsay, Juliet, op cit, pp. 10, 22.

44 *Australian Rowing*, May 1995, p. 9; wellingtondamcafe.mysouthwest.com.au.

45 Water Corporation, *Flowing Forward*, 17 October 2005, pp. 1, 3.

46 Mauger, G.W., et al., *Salinity Situation Statement Collie River*, Water and Rivers Commission, WRT Report 29, Oct 2001.

47 *West Australian*, 28 Nov 2006

the ledge of the cliff top.[48] The public use of the *Precinct* has put pressure on the forest environment and existing facilities. A management plan for Wellington National Park, offering a balance between tourism and the environment, was prepared in 2005.

In 2007, Wellington Dam continues to dam the waters of the Collie River. The No. 1 Pumping Station and associated Chlorinator and Chlorine Store have not been in use since 1990. The Hydroelectric Station has recently been put into care and maintenance by Verve Energy and is not operational. The Caretaker's Quarters & Kiosk is occupied and in use for its intended purpose. The Quarry continues to provide a barbeque and picnic spot for visitors.

13.2 PHYSICAL EVIDENCE

Wellington Dam Precinct comprises Wellington Dam, the Hydroelectric Station, No. 1 Pumping Station, the Quarry and Caretaker's Quarters & Kiosk.

Wellington Dam Precinct is located approximately 195 km south of Perth and 30 km west of Collie on the Collie River, within the Wellington National Park. Wellington *Dam* is part of a network of dams stretching along the western edge of the Darling Plateau, which provide important supplies of water for irrigation, industry and domestic use. Other dams and weirs in this network include Harris Dam, Stirling Dam, Harvey Dam, Brunswick Reservoir, Serpentine Dam and Mundaring Weir.

Wellington Dam Precinct is contained within the boundaries of Wellington National Park. The 16,790ha Park is largely covered with endemic native vegetation. The Dam is situated on the Collie River, which rises in the Darling Plateau and runs west past the town of Collie, down the scarp and across the flat coastal sand plains, before entering the Indian Ocean near the town of Bunbury.

The Dam Wall, a mass concrete structure, spans a narrow section of the Collie River Valley between two large granite outcrops. Behind the Dam Wall the Reservoir has flooded back along the river network of the Collie Basin towards the Collie Townsite. The reservoir, which has a capacity of 186 gigalitres, is the largest body of water in the South West.

Immediately to the north of the Dam Wall is the Lookout, a small concrete structure with sweeping views across the Dam Wall and Reservoir.

The Quarry is situated to the north west of the Lookout. The Quarry, which was the source of the stone for the Dam Wall, has a flat, landscaped floor, surrounded by a massive horseshoe- shaped vertical cliff of natural granite. The mouth of the quarry faces south-west across the Lower Collie River Valley. Above the Quarry there is a car park with interpretation and a gazebo with views down into the Quarry and also across the Reservoir. Stepped paths provide pedestrian access between this car park and the Lookout and Quarry. A pair of stone and concrete toilet blocks stand on the western side of the car park.

The Caretaker's Quarters & Kiosk, a single-storey brick and iron, Post-War International Style building set in simply landscaped grounds, is located to the north of the car park. Recently a second car park, for the Kiosk, and a toilet block have been constructed to the north of this building.

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48 Correspondence, DEC to HCWA, 25 June 2008. In 1997, the Quarry face was rap-bolted for climbers by members of the Climber's Association of WA. The fence surrounding the base of the Quarry is designed to restrict visitor access to a potentially unstable area of the cliff face.

To the east of the Caretaker's Quarters & Kiosk are the remnants of the 1950s construction camp, which are scattered amongst the regrown marri and jarrah trees.

The main vehicular access to the Dam is provided by Wellington Dam Road, which runs from the Coalfields Highway southwards to the Kiosk and Quarry car park. A one-way loop road leads from the Kiosk, under the Lookout to the Quarry floor before returning to the Kiosk area. Falcon Road joins the loop road and switchbacks down the hillside to the base of the Dam wall. About 150m before the road reaches the base of the Dam it passes the now abandoned No. 1 Pumping Station, Chlorine Store and Chlorinator. A large water pipe runs westward from the northern end of the base of the Dam wall to the Pumping Station and then continues off to the north-west.

A single-lane concrete bridge crosses the river downstream from the centre of the Dam wall and Lennard Drive then follows the south bank of the Collie River through the Lower Collie River Valley to River Road.

The former Hydroelectric Station stands about 300m from the Dam wall on the bank of the Collie River. Two large water pipes (penstocks) run from the southern end of the base of the Dam wall to the Hydroelectric Power Station.

The section of Collie River below the Dam flows through a scenic area known as the Lower Collie River Valley. The numerous granite outcrops in this area, combined with the steeply descending topography, have created a chain of rapids and several large still pools. The release of water for irrigation from the Dam in summer ensures that these pools do not stagnate or dry out making this a popular area for camping, swimming, kayaking and fishing.

Wellington Dam Precinct is geographically located on the western edge of the Darling Plateau and the western margin of the Jarrah forest. Vegetation is dominated by Jarrah (*Eucalyptus marginata subs. marginata*), Marri (*Corymbia calophylla*) and, on deeper valley soils, Swan River Blackbutt (*Eucalyptus patens*). Within the area there is variation in the plant community resulting from variations in climate, topography and soil type.

The landscape around the Caretaker's Quarters & Kiosk, the Quarry and the Lookout comprises laterite soils with isolated granite outcrops. The ground slopes at a moderate to steep incline towards the Dam reservoir. The vegetation in this area is characterised by an open forest of Jarrah, Marri and Swan River Blackbutt with an understorey of Bull Banksia (*Banksia grandis*), Sheoak (*Allocasuarina fraseriana*), Waterbush (*Bossiaea aquafolium*) and Snottygobble (*Persoonia longifolium*) as well as Grasstree (*Xanthorroea preissii*) on hilltops.

Below the Dam, in the Lower Collie River Valley, the vegetation changes due to the deeper soils and the cool damp microclimate of the valley. Marri and Swan River Blackbutt dominate the woodland, with Flooded Gum (*Eucalyptus rudis*), Swamp Paperbark (*Melaeuca rhaphiophylla*), Peppermint (*Agonis flexuosa*) and River Banksia (*Banksia seminunda*) growing on the more fertile river margins. An understorey of Karri Hazel (*Trymalium spatulatum*) and *Chorilaena quercifolia*, plants more typical of the southern Karri forests, can also be found on these river margins. On the riverbank there is a narrow fringe of sedgeland plant community

dominated by Sheath Twigrush (*Baumea vaginalis*) with some Sword Sedge (*Lepidoserma effusum*).[49]

Wellington Dam

Wellington Dam forms a 367 metre long barrier between the north and south abutments of the Collie River. Upstream of the Dam, the valley sides are timbered to the waterline and are largely undisturbed. The valley sides downstream of the Dam are predominately granite outcrop with scattered small trees. The valley floor downstream of the Dam is an extensive bare rock outcrop and is frequently flushed by the flood overflows and water releases from the Dam.

Wellington Dam was built in three stages; the first Dam was completed in 1933 and was around 15 metres in height. In 1945, the Dam was raised 900 mm. It was then raised a further 15 metres, this work being completed in 1960. Only the 1960 stage of the works can be seen when the Dam is viewed from the west and from the north and south abutments. The vertical, upstream, face of the earlier Dam aligns with the vertical face of the later additions and can be viewed from above or from the east, depending on the level of the reservoir.

Wellington Dam is a utilitarian structure largely designed to conform to the functional requirements of water storage within the constraints of the site and the materials readily available. Wellington Dam was fortunate in regard to materials. A pit of excellent sand was located only 9 kilometres away and there was an exposed face of solid granite just downstream of the Dam site. It made a good quarry from which rock could be obtained to feed the crushing plant.

Wellington Dam is a concrete gravity dam. Gravity dams depend for their stability on their weight and this provides such dams with a characteristic cross section that approximates to a right angle triangle, in which the vertical face is on the upstream side of the wall and the sloping face forms the downstream side of the Dam. The gradient of the sloping face of Wellington Dam changes at around its mid point. The upper half has a 6 in 10 slope and the lower half a 7 in 10 slope. The slope curves on a six metre radius at the base. The crest of the spillway has an ogee profile, designed to obtain optimum discharge.

The off-form concrete finish of the wall is given a strong banded effect by 'V' shaped horizontal joints set at 1500 mm centres. Less noticeable are the vertical construction / contraction joints that are set at 15 metre centres.

Wellington Dam stands on a granite outcrop in the Collie River which, as part of the original works, was exposed across the riverbed and remains visible on the downstream side of the Dam. A sound foundation for the Dam was obtained with only a minimal amount of excavation to the higher parts of the abutment.

In plan, Wellington Dam comprises a central spillway with a curve scribed by a 90 metre radius set between non-overflow sections formed by two straight wings. The two straight wings project at right angles from their abutments. The curved plan shape of the Dam was to a degree determined by the width and profile of the granite outcrop, which made it possible to select a pleasing aesthetic alignment for the wall of the Dam. Wellington Dam has a 218m long uncontrolled overflow crest type spillway.

All modern major gravity dams have internal passages known as inspection galleries. The galleries provide access into the structure to enable its

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49 Conservation Commission of Western Australia, Wellington National Park and Westralia Conservation Park Draft Management Plan 2005, pp. 28-30.

performance to be closely observed while the Dam is in service. In addition, the galleries provide a drainage way for any water percolating through the upstream face or seeping through the foundation and for the drainage of cracks that may occur between the face of the new and old concrete. Wellington Dam has two galleries, the Upper Drainage Gallery which is set just below the top of the original Dam and the Lower Drainage Gallery at the base of the original Dam. The location of these galleries can be gauged from the two lines of arched openings on the west face of the Dam.

Offtakes are pipes that deliver water through the Dam. The flow of water from the Offtakes is controlled by sluice valves mounted on the downstream face of the Dam and by emergency gates that can be dropped in front of the upstream end of each Offtake pipe.

Wellington Dam has three separate Offtakes located near the base of the Dam wall: the Comprehensive Water Supply Offtake, sited at the end of the north non-overflow section of the Dam, the Irrigation Offtake, located centrally within the Spillway and the Hydro Offtake, at the end of the south non-overflow section. The pipe from the Comprehensive Water Supply Offtake is 750mm in diameter it connects to Pump Station No. 1; the pipes from the Hydro Offtake are twin 1300mm diameter. These serve the Hydroelectric Station, while the Irrigation Offtake discharges into the Collie River. All the Offtake pipes are made of mild steel.

The pedestrian walkways on top of the two straight wings extend from the abutments to the spillway where the ends are widened to form access areas for the gantry cranes. These control the steel emergency gates which close the upstream openings to the Hydro Offtake and the Comprehensive Water Supply Offtake pipes. The steel gates are raised on guide rails fixed to the upstream face of the wall.

An access area for the Central gantry is located at the centre of the spillway. This area is usually only accessible by boat. The central gantry controls the emergency gates to the Irrigation Offtake.

The Irrigation Offtake Valve House contains the sluice valve used to turn off the water flow and also the regulating valve (treacle valve), which controls the flow of water from the Offtake.

Concrete walls, called Training Walls, connect to the Dam at the base of the Spillway to direct the overflow water towards the centre of the riverbed to prevent erosion of the riverbanks.

Wellington Dam Hydroelectric Station

The Hydroelectric Station stands on the downstream side of the Dam about 700 metres from the Dam on the south side of the river.

The building is a simply composed, purely utilitarian building designed to fulfil the functional requirements of housing the hydropower equipment. It is not characterised by any particular architectural style.

The building is of steel framed and timber construction clad in corrugated asbestos cement sheeting. The steel frame stands on an off-form concrete plinth, approximately 1.5 metres high, that serves as a bund wall. It is partly covered by the wall lining.

The building has an ‘L’ shaped plan that is formed by a wing that projects from the north east corner of the main body of the building, and which runs in a north /

south direction. The roof form reflects the plan with the main body of the building being covered by a gable roof whose ridge also runs in a north / south direction. The projecting wing is covered with a lean-to roof that is integral with, and at the same pitch as, the main roof. The roof is covered in corrugated asbestos cement sheeting.

The main roof contains twelve fixed roof lights and two rotating roof vents. The ridge and verge caps, the guttering and downpipes and the wall corner flashing are all proprietary asbestos cement components. There is a large sliding service door located centrally in the south face of the building. The door is steel framed and faced in corrugated iron sheeting. The inner part of the door opening is filled with a removable steel one metre high water barrier. There is an oversized corrugated iron faced door in the south wall of the projecting wing.

The building is entered through a door opening at the south end of the west face of the building. The threshold of the doorway sits on the top of the bund wall. The doorway is reached by a set of brick and concrete steps with tubular steel balustrading. The door is timber framed with a ripple iron faced central panel.

The interior of the building is not sub-divided and the walls and roof are not lined. The steel structural frame consists of tubular steel posts which support tubular steel roof trusses. The wall and roof cladding is fixed to a timber framework fixed to the steel structure. A gantry supported on a steel structure of universal columns and beams runs for the length of the main body of the building.

No. 1 Pumping Station

The No. 1 Pumping Station stands at the downstream side of the Dam about 500 metres from the Dam on the north side of the river. It was built to serve the Comprehensive Water Supply Scheme. It is fed by the 30" (750mm) mild steel pipes (suction main) that connect to the off-take near the north embankment of the Dam.

The No. 1 Pumping Station is part of a group of three buildings consisting of the Pump Station, a Chlorine Store and a Chlorinator. The building is situated between the Suction Trench on the south side, which contains the suction main from the Dam and the Delivery Trench that contains the delivery pipe which connects to No. 2 Pumping Station.

The No. 1 Pumping Station is a simply designed utilitarian concrete building in which the careful control of proportions and symmetry, and the repetitive rhythm of elements that divide the building both horizontally and vertically, impart to the structure a certain Stripped Classical character.

The building is rectangular in plan. The long axis runs in an east west direction. The repetitive horizontal elements are a result of the off-form concrete walls being divided into approximately 900mm high bands delineated by V-shaped construction joints, which give the walls a form of rusticated character. The size of all the openings in the walls is designed to relate to this horizontal module. The repetitive vertical elements derive from the structural grid that is expressed externally by the roof trusses, which extend beyond the wall to form the eaves. Every second truss aligns with the centre line of the subsumed concrete piers that are only expressed in the equivalent of the upper two bands, which contain fixed obscure glass windows.

The west and east facades form the gable ends of the building. The top of the concrete walls align with the bottom chord of the roof trusses. The gables are faced in fibrous cement sheeting. The west façade contains a roller door opening.

The inner edge of this opening aligns with the ridge. The north and south facades are divided into six equal bays; the eastern-most bay is not original but is a good match to the others. The building has a medium pitched gable roof with wide eaves and minimal verges covered in corrugated asbestos cement sheeting.

The interior of the building was not accessible.

Wellington Dam Quarry

The Quarry, a large man made gorge landscaped with a parkland of lawn and exotic trees, has been excavated out of a natural granite outcrop located approximately 50 metres downstream from the northern abutment of Wellington Dam.

The Quarry is roughly horseshoe shaped, with the mouth of the horseshoe facing south-west towards the Lower Collie River Valley. Regrowth Marri and Jarrah now obscure views of the Dam wall. The massive rough-hewn walls of the Quarry are almost vertical and create an intimate and secluded setting. The surrounding Marri and Jarrah woodland can be seen above the Quarry walls and contribute to the sense of enclosure. A dry stone wall set back from the edge of the lip of the Quarry can also be seen from below but the stonework blends well with the natural granite outcrop.

The floor of the Quarry is largely level. There is a bitumen car park in the southern corner adjacent to the Loop Road that runs past the mouth of the Quarry. As elsewhere, the edge of the car park has a kerb of granite stonework. There is a circular garden bed at the entry to the car park. A low granite wall surrounds the bed, which contains weeds, a straggling senescent Bottlebrush (*Callistemon sp.)* and a Eucalyptus sp. sapling, possibly self sown. While it is known that the landscape designer, John Oldham, used *Callistemon speciosa* in his planting schemes at the Quarry, it is unlikely that this bottlebrush is from his scheme as bottlebrushes have a limited lifespan. It is probable that this garden bed contained a display of smaller flowering shrubs or Kangaroo Paws.

Most of the Quarry is open parkland with grass and exotic trees. Oldham evidently chose to use deciduous trees in the Quarry to allow sun to penetrate into the space in the winter. It would also appear that he selected the tree species for their vibrant autumn foliage. The species used in the Quarry include Liquid Amber (*Liquidamber styraciflua*), Lombardy Poplar (*Populus nigra 'Italica'*), European Ash (*Fraxinus excelsior*), Wych Elm (*Ulmus glabra*) and London Plane (*Platanus x hispanica*). These trees are now substantial mature specimens; some are as high as the walls of the Quarry. There is considerable variety in the habit of the trees as well as in the colour and shape of their leaves. The colour and form of these trees contrasts with the darker grey greens of the surrounding Eucalypts. Several stumps suggest that some of the original trees are missing.

Behind the Liquid Amber tree a timber post and wire mesh fence has been erected to prevent public access to the area adjacent to the cliff face. The enclosed area is approximately two metres wide and twenty metres long and is densely populated by a mix of indigenous native and exotic species. The dominant species include a mature stonefruit tree (*Prunus sp.*) as well as a number of saplings of Peppermint tree (*Agonis flexuosa*), Lombardy Poplar and Marri. It would appear that these plants are self sown. Signage indicates that this area has been fenced off due to concerns about rock falls from the cliff face. For the entire remaining section of the Quarry wall a series of low white timber posts have been erected to indicate the area where rock falls could occur.

Picnic facilities for visitors have been provided under the spreading tree canopies. There are three stone and concrete shelters as well as three timber picnic tables and three brick construction gas barbeques. The picnic shelters are part of the original landscaping scheme but the tables and barbeques are recent additions, possibly replacing earlier items.

As with other structures constructed in the park at this time, the picnic shelters make use of the local granite and exhibit elements of the Post War International Style. The shelters consist of a central planar wall element of random rubble granite stonework, which supports a flat concrete roof that cantilevers outwards in two directions. The roof tapers at the edges so that it is lozenge shaped in plan like that on the Lookout. There is a cantilevered concrete seat on either side of the wall. The floor of the shelter is a concrete slab.

Lookout

The Lookout is a dramatic, sculptural concrete structure influenced by the Post War International Style. The structure bridges the Loop Road and then cantilevers over the steeply sloping valley hillside to afford unobstructed views of the Dam Wall, the Reservoir, the Spillway and the Lower Collie River Valley. The documentary evidence suggests that the form of the building was also intended to give visitors travelling by car a 'sense of arrival' as they passed below the bridge. The Lookout is situated slightly downstream of the Dam wall and is clearly visible from there as well as from the spillway area.

The pedestrian path leading to the Lookout would also appear to have been carefully considered. The path approaches from higher ground so that visitors can view the structure from above before descending a set of granite spiral steps to the deck of the structure. A dry stone granite retaining wall at the base of the steps originally contained a plaque dedicated at the opening of the Dam, but this is now missing leaving only a scar on the stone.

The lozenge shaped concrete deck spans from the hillside to a pair of splayed tapering concrete piloti positioned about one metre in from the widest point of the deck. These legs continue up through the deck and support a smaller trapezoidal concrete roof slab above. At the outer edges of the deck and the roof slab, the underside tapers upwards to create a more slender, lighter looking edge profile.

A simple painted steel balustrade contains the outer edges of the entry steps and viewing deck. The balustrade consists of a rectangular plate top and bottom rail and matching vertical balusters. The documentary evidence indicates that extra intermediate balusters were added after construction but the later material is difficult to detect as it closely matches the original work. Interpretation panels have recently been fixed to the inner face of the piloti at deck level.

Car park, Toilets and Paths above Quarry

To the south of the Caretaker's Quarters & Kiosk there is a large bitumen car park. The edges of the car park are lined with kerbs of rough-cut granite rock surrounded by laterite paths.

Separate male and female toilet blocks are located on the west side of the car park. The design of these simple rectangular structures shows the influence of the Late Twentieth Century International Style in the way the flat concrete roofs float over the massive planar random rubble granite walls of the buildings below. The concrete roof is supported on slender posts leaving a wide ventilation gap above the walls. These buildings do not have doors; instead, the opening is concealed by a screen, which is a continuation of the planar building walls. The

interior of the toilets would appear to have been refurbished recently with tiles laid on the concrete floors, and the installation of laminex toilet cubicles and stainless steel sanitary fixtures. The interior of the stone walls have been rendered and painted.

The southern end of the car park is located on the crest of a hill with views across the Dam, the Reservoir, the river valley and the Quarry. Interpretation panels describing the history and ecology of the area have recently been installed in this area. A number of the panels are mounted in a hexagonal gazebo, a timber structure with a corrugated galvanised steel roof.

Near the new interpretation gazebo a flight of steps leads down to a series of stepped paths. The steps and paths are organic in shape and meander across the site following the contours of the land. The steps are constructed from random rubble granite stones and the paths are of laterite gravel with granite kerbs. In places galvanised pipe handrails have been installed.

The eastern path winds down the hillside and across the Loop Road beside the Quarry. At the base of this path there is a flight of granite steps cut into the hillside. The natural ground levels are retained by dry stone walls. A small mosaic made of black and white pebbles depicting four black swans is set in the retaining wall facing the road.

The western path follows the edge of the Quarry walls. A 1200mm high dry stone granite wall has been constructed several metres back from the lip of the Quarry to prevent visitors wandering off the path and straying too close to the edge. There are excellent views into the Quarry from this path as well as views across the Quarry to the Dam, the Reservoir and the river valley.

The lower section of the path, closer to the Quarry lip, has been fenced off to prevent unrestricted public access. This area is used occasionally by people abseiling down the walls of the Quarry.

Landscaping around the Caretaker's Quarters & Kiosk

The landscaping around the Kiosk is very simple and consists of hard elements such as garden beds and retaining walls which have been used to terrace the gently sloping site, and hardy robust plants which have survived from a number of different landscaping schemes. The loss of earlier plant material is probably due to the natural aging of the plants, as well as to periods of neglect when the Kiosk was uninhabited.

The Kiosk site is roughly divided into public and private zones. The public areas are located on the east and south sides of the building facing the main entry road, Wellington Dam Road, and the original car park. These areas have been landscaped for visual display and public use. The western side of the building may originally have formed part of this public landscape but it has now been largely abandoned except for a small area reclaimed by the current tenants for vegetable gardens. The north side contains service areas for the kiosk and private areas for the attached residence. The nature of this area has changed recently with the construction of a new car park and toilets to the north of the Kiosk.

An asymmetrically shaped painted concrete slab terrace surrounds the glazed kiosk room at the eastern end of the building. This terrace is screened from the private gravel driveway to the north by brick planter boxes. These planter boxes also serve as retaining walls to terrace the site and are part of the original scheme. The boxes are now planted with a collection of currently popular ‘water

wise' flowering plants such as Showy Hebe (*Hebe speciosa*), African Iris (*Dietes iridoides*) and Kangaroo Paws (*Anigozanthos sp.*). (Note: these Kangaroo Paws are not part of the 1960s Oldham landscape scheme but later cultivars.)

To the east and south of the concrete terrace is a large flat lawn surrounded by granite retaining walls. This lawn extends westwards to the west façade of the Kiosk building. The only planting in the lawn is a mature Liquidamber tree which stands near the south-west corner of the lawn. A large map advertising the Collie area has recently been erected to the east of this tree.

A garden bed with foundation plantings lines the south side of the building. This bed has a plain concrete kerb and would appear to have been added later, possibly by residents of the Kiosk. The bed contains a number of mature Hydrangeas (*Hydrangea macrophylla*) interspersed with more recent plantings of Lavender (*Lavandulla dentata*) and Agapanthus (*Agapanthus praecox*).

A garden bed with a similar concrete kerb lines the retaining wall on the western edge of the lawn. This bed is planted with Bearded Iris (*Iris germanica*) and Cape Daisy (*Osteospermum osteospermum*).

A recently constructed concrete path leading from the new car park passes to the east of the Kiosk along the edge of the lawn. A timber balustrade has been erected where the path is higher than the lawn. A small concrete path connects the concrete terrace beside the Kiosk to the new path. The new path then continues, following the edge of the curvilinear granite wall, which retains the southern edge of the lawn, around to a point opposite the entrance of the original car park.

The concrete path runs roughly parallel to the main access road. On the east side of the Kiosk, in the strip of land between the path and the road, there are numerous mature Marri trees. The trees are scattered in clumps and it is difficult to ascertain if they are retained from the original landscape or if they have self seeded since construction. The closeness of the individual trunks suggests that they were not all planted although some could be reinforcement plantings. At the southern end of these trees there is a clump of variegated Century Plants (*Agave Americana var. stricta*). The strip of land between the path and the road on the south side of the Kiosk has been mulched recently but is not planted.

The only remnants of the original landscape scheme on the west side of the Kiosk are the granite retaining wall on the western edge of the area and a raised circular garden bed also constructed from granite stones. The garden bed is built against a naturally occurring granite boulder and it stands roughly in the centre of the 'garden'. The bed contains a jumble of plants spilling out and obscuring the stone walls. These plants include several Grevilleas sp. a Jacaranda sapling (*Jacaranda mimisifolia*), Fishbone Fern (*Nephrolepis cordifolia*), Ice Plant (*Lampranthus spectabilis*), Couch Grass (*Cynodon dactylon*) and Potato Creeper.

A foundation bed on the west face of the Kiosk, with the same concrete kerb as the south bed, has recently been planted with vegetables. Tomato vines have been trained up the building on mesh.

Adjacent to the round stone garden bed is a large vegetable garden bed constructed from timber sleepers.

A large weeping Bottlebrush (*Callistempon viminalis*) stands on the Loop Road to the north west of the Kiosk. It does not appear to be part of a designed scheme and may be self sown.

There is a strip of garden bed running along the northern side of the Kiosk. The western section of this bed, adjacent to the courtyard wall and carport, has a weathered timber sleeper edge. The only substantial plant in this bed is a large multi branched Aloe sp. at the western end.

The larger eastern section of this bed is bounded on the south by the gravel driveway that leads to the carport at the Caretaker's Quarters & Kiosk, and on the north by the new bitumen driveway that serves the freestanding steel garage. This garden bed is constructed from random rubble granite stonework and it terraces the site by retaining the upper level of the bitumen driveway. The bed is bisected by a set of steps that lead down from the bitumen drive to the gravel drive. The planting in this bed is mixed and includes several roses, which have reverted to their rootstock, a large Weeping Bottlebrush, a mature Tea Tree (*Melaleuca sp*.) and several smaller shrubs such as Bottlebrushes and Melaleucas.

Caretaker's Quarters & Kiosk

When the Caretaker's Quarters & Kiosk was constructed, the building was roughly rectangular in plan, with the longer facades facing north and south. Additions have been made to the north west corner of the place.

The building is simply planned and designed with plain smooth wall surfaces and face brickwork. Slight projections such as the porch on the north side of the building remain within the eaves line of the single rectangular low-pitched gable roof. The building exhibits some of the characteristics of the Post-War International style. The style is perhaps more clearly expressed in the Kiosk section of the building, situated at the eastern end of the structure, where the north and south walls are fully glazed with full height aluminium framed units. These units consist of upper and lower panels of fixed glazing and a central panel of horizontal sliding sashes, set between the expressed structural frame of steel portals.

The walls of the Caretaker’s Quarters section of the building display less transparency, as the windows are set in openings in the brick walls. On the south side, where the windows are glazed units consisting of fixed glazed lower panels and horizontal sliding sashes, the building remains consistent with the style

The Kiosk consists of an internal area for tables and seating, a servery and storage area and a verandah. The seating area is in the transparent part to the building described previously. The south wall of this area is set back from the main face of the building in order to form a subsumed verandah. The posts at the outer edge of the verandah align with the eaves line of the building. The exterior of the east wall has a ‘feature’ pattern of projecting brick headers.

The ceilings of both these areas are lined on the rake. The servery area is set at the west side of the seating area and is more enclosed, with a counter and access opening connecting the two areas. The servery has a flat ceiling that forms a clear finished timber boarded bulkhead above the counter. The walls of the servery are edged with a combination of new stainless steel benches and original timber cabinetwork. The floor of the kiosk is sheet vinyl on a concrete slab. The verandah is grano paved.

A door in the west wall of the servery area connects with the entry lobby of the Caretaker’s Quarters. The Caretaker’s Quarters can be read as a State Housing Commission house attached to the Kiosk.

Again, the Caretaker's Quarters is simply planned. The house is entered from a shallow porch on the north face of the building, which leads to the entry hall which in turn opens onto the living room. The living room is a large, almost square room. The south wall of the room is almost completely glazed. The floor is timber, the walls plastered and the fibrous plaster ceiling is flat. The skirtings are 75mm high bullnose timber. The dining / kitchen area is entered through a wide opening in the north wall of the living room.

A door in the north end of the west wall of the living room opens onto the passageway that runs past the two bedrooms that occupy the south side of the house. The bathroom is entered from the west end of the passage. A door at the west end of the south wall of the passageway leads to the laundry. The toilet opens off the laundry. The laundry originally occupied the north west corner of the house but the house has been extended and the former back (laundry) door now connects with the addition that extends from the west end of the north side of the building.

The master bedroom occupies the south west corner of the building. Both bedrooms have the same finishes as the living room. The rooms that occupy the north side of the house, that is the entry hall, the kitchen / dining room, the laundry and the bathroom, all have concrete slab floors finished with vinyl tiles, whereas the rooms on the south side of the house have timber floors covered with carpet. The kitchen / dining room is a long rectangular room, with the kitchen at the west end. The kitchen cabinetwork appears to be mostly original. The bathroom contains a bath and a separate shower recess. The tiling and fittings appear to be original.

Former PWD Works Camps

To the east of the Caretaker's Quarters & Kiosk are remnants of the 1950s construction camp, which are scattered amongst the regrown Marri and Jarrah trees. These remnants include concrete floor slabs, a bitumen tennis court and remnants of earlier exotic plantings such as a Loquat Tree (*Eriobotrya japonica)* and clumps of Century Plant (*Agave americana var. striata*).

A dirt track near the former camp leads down to the Reservoir. Along this track are a number of items left over from the construction of the Dam. These items include sections of steel pipe, timber sleepers, small square steel tanks and other steel artefacts. Site works, such as concrete bases of buildings, steps and concrete lined drainage channels exist near or in the alignment of the track and may be at risk of demolition from roadworks. From the evidence on site it would appear that the 1950s access road and car park were superimposed over the 1930s camp remains with scant regard for the earlier material. As such some of the 1930s fabric has been destroyed or obscured.

To the north of the kiosk, landscaping and car park is the site of the former c.1950s Workers' House and Single Men's Quarters (now demolished). This area is of little significance and has low archaeological potential.

13.3 COMPARATIVE INFORMATION

Wellington Dam is one of a number of dams built across rivers in the southwest of the State. These dams are of either concrete or earthfill construction. Wellington Dam is a concrete construction dam and because earthfill dams are more economical to build, there are fewer concrete dams now being constructed.

The dams, include Mundaring Weir (concrete gravity dam, completed 1901, raised 1951), Harvey Dam (concrete gravity dam, completed 1916, raised 1932,

decommissioned 2002), Drakesbrook Dam (earthfill dam, completed 1931), Canning Dam (concrete gravity dam, completed 1940), Samson Brook Dam (earthfill dam, completed 1941), Stirling Dam (earthfill dam, completed 1946), Serpentine Dam (earthfill dam, completed 1961), Logue Brook Dam (earthfill dam, completed 1963), Waroona Dam (earthfill dam, completed 1966) and Harris Dam (earthfill dam, completed 1990).[50]

Mundaring Weir is a solid concrete gravity dam, completed in 1903 as the supply reservoir for the Goldfields Pipeline. The wall was raised in 1951. Mundaring Weir holds 63.6 million cubic metres with a catchment area of 1,471 square kilometres. It has a wall length of 308 metres and a height above the riverbed of 40.23 metres. The Lower Helena River Weir downstream supplies water back to Mundaring Weir. The Mundaring Weir Hotel, built for visitors and workers when the dam was under construction, was restored in 1984. The original pumping station for the Pipeline has been converted into a museum of water resources, and the area has barbeque and picnic facilities and walk trails. The landscaping plan was undertaken by John Oldham.[51]

Serpentine Dam is an earthfill embankment dam completed in 1961, following the construction of the Pipehead Dam in 1957. It was built to supply the new Kwinana industrial area and the growing population of Perth in the post war boom period. It has a 137.7 million cubic metre capacity with a catchment area of 664 square kilometres. The base of the dam wall is 350 metres long and height above the riverbed is 55 metres. John Oldham undertook the landscaping and design of public facilities as part of the overall construction process. It caters for thousands of visitors a day compared to the ability of *Wellington Dam Precinct* to cater for hundreds, indicative of the population of the surrounding region of each place.[52]

The Canning Dam, begun in 1933 and built during the Depression years, was completed in 1940. The supply of water to Perth from the Canning River began in 1924 with the completion of the Canning Pipehead Dam. The Canning Dam is a concrete dam with a capacity of 90.5 million cubic metres and a catchment of 730 square kilometres. The wall is curved, and is 66 metres high and 466 metres in length.[53]

The Hydroelectric Station was the first such facility established in Western Australia by the State Electricity Commission. There is understood to have been an earlier privately established hydroelectric facility in the State, but the location of this plant is not known at this time. The Ord River Dam hydroelectric station, completed in 1995-96 is a 30MW facility that is privately owned and operated and supplies Argyle diamond mine and the town of Kununurra with power.

Because of the restrictions that apply to dam catchment areas, all dams are set within largely unaltered bush settings. Typical of all dams is that the areas adjacent to the dams are landscaped to provide facilities required for the working and maintenance of the Dam and also to provide limited amenities such as car parking, kiosks, viewing platforms, toilets and information boards for visitors. Characteristically, the landscaping for these areas sought to minimise the impact that these additions make on the existing landscape and for this reason were landscaped in a form of the bush garden style which sought to complement the

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50 Le Page, J. S. H., op cit; HCWA database.

51 Water Corporation - Our Dams brochures.

52 Water Corporation - Our Dams brochures.

53 Water Corporation - Our Dams brochures.

existing flora by introducing informal planting arrangements of native plants which were not necessarily always indigenous to the particular area.

Landscaping

The use of Australian native plants in informal arrangements, dry stone walls and free form meandering paths and granite steps used around the Quarry, Lookout and Kiosk areas are reminiscent of the late Twentieth Century Bush Garden Style popularised by Edna Walling. Similar work can been seen in the Botanic Garden that was developed in Kings Park in the 1960s where a network of serpentine paths thread through 'organic' shaped garden beds retained or edged with dry stone granite walls.

The exotic plantings to the floor of the Quarry bear some similarity to the diverse mixture of exotic plants favoured by Oldham in some of his schemes, such as the Narrows Bridge Freeway Interchange. The Quarry, however, differs from that scheme in that it does not mix native Australian plants with the exotic species and because there are no palms or sub-tropical species. In this scheme Oldham used only deciduous trees so that the winter sun could penetrate the space. His choice of trees would also suggest that they were selected for their striking autumnal foliage, which would produce a better display in Collie's cooler climate than in Perth.

The sparseness of the planting in the Quarry is suggestive of the open rambling landscapes popular in the 1960s, which sought to escape the confines of the more formal traditional parklands with a strong horticultural emphasis on elaborate bedding and display.

Wellington Dam Precinct contains a fine example of a solid concrete gravity dam with associated water supply structures and public facilities, with sympathetic landscaping.

13.4 KEY REFERENCES

Public Works Department files and plans held at State Records Office, as referenced.

John G. Lewis, Investigations and design for the raising of Wellington Dam, unpublished typescript [1951] courtesy of the author.

13.5 FURTHER RESEARCH

There are a number of sites in *Wellington Dam Precinct*, which contain remnants of earlier structures, plant equipment and buildings, which were used in the 1930s works and the 1950s-60s works. These sites include an area to the east of the Kiosk which contains a bitumen tennis court and several concrete slabs, a track from the Kiosk to the Reservoir which contains various fragments and materials and an area to the north of the Pump Station which contains retaining walls and concrete bases from removed equipment. Further research is required to determine how these sites were used and the era of development to which they belong.