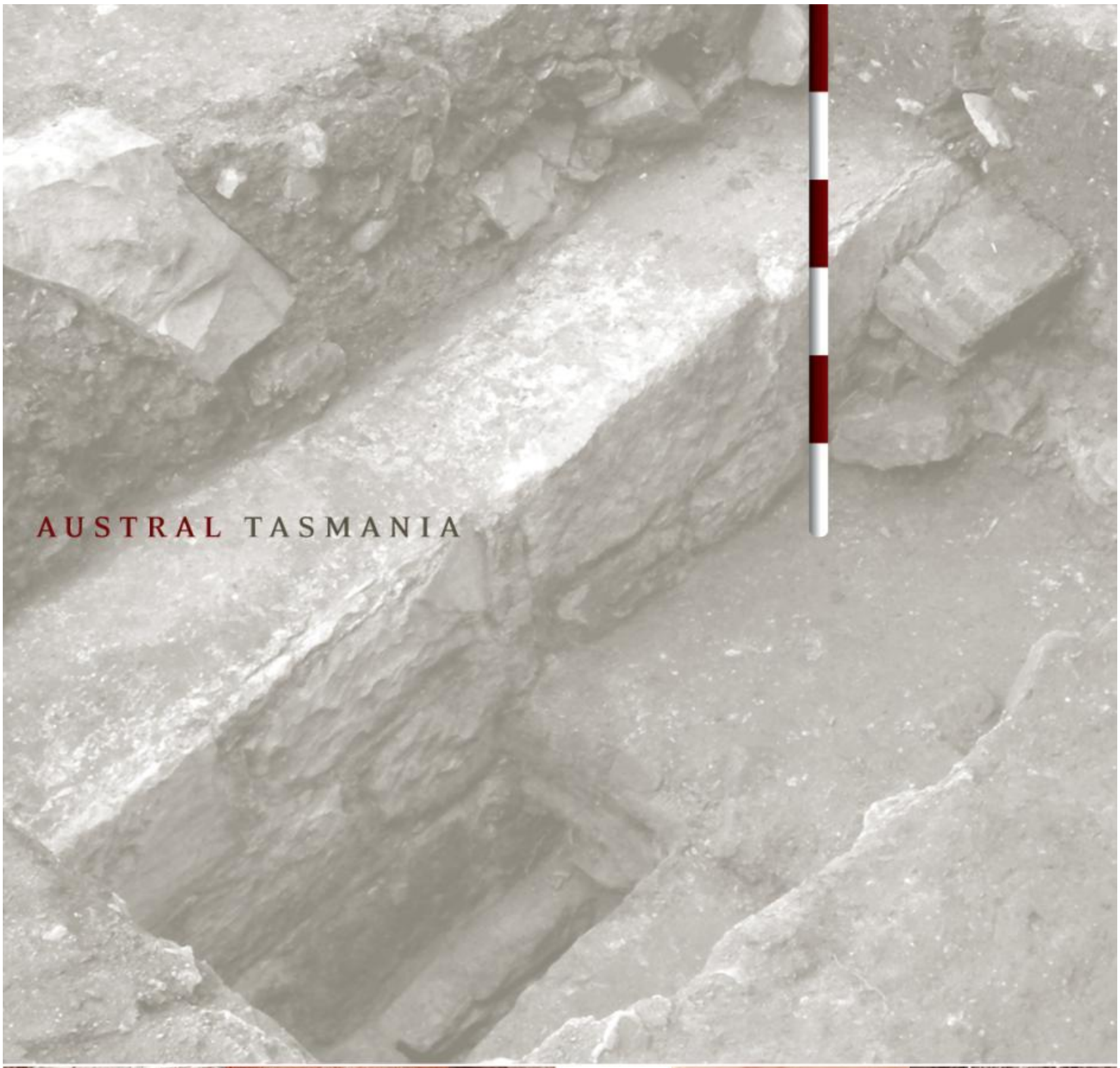

Tungatinah Power Station

Conservation Management Plan Review

Final Report prepared for Hydro Tasmania

AT0221

17 January 2018

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EXECUTIVE SUMMARY

This report has been prepared for Hydro Tasmania by Austral Tasmania Pty Ltd and is an updated and revised version of the Tungatinah Power Station Conservation Management Plan (CMP) 2007. Since the completion of the original report a number of changes have taken place to the fabric of the place, including a modernisation project involving the replacement or refurbishment of turbines and valves. This updated report is necessary to document these changes, document several new site locations and assess the role of the original conservation management plan (CMP) in shaping cultural heritage management outcomes.

In addition to numerous minor changes that have taken place, the principal changes that have occurred include:

- Modifications to the exterior of the Power Station, with a roof access ladder and new signage installed.
- Refurbishment of the valves and upgrade of the interior of the Valve House.
- The replacement or refurbishment of Turbines 1, 2 and 5 as well as modifications to the Main Bay of the Power Station and the modernisation of the control system.
- The transformation of the Gasket Room, Gasket Room Store and associated hall way to an office and locker room.

The 2007 CMP covered the power station, penstocks and valve house. This 2017 version of the CMP has been expanded to include the headworks, tunnel, as well as sites the picnic area and the remains of the concrete batching plant adjacent to the Power Station. The switchyard was excluded from the previous and current investigations, as it is not owned or operated by Hydro Tasmania.

Generally the management of cultural heritage at the Tungatinah Power Station, and the external sites included in this CMP, have been undertaken in accordance with the policies of the 2007 CMP and Hydro Tasmania's own heritage management framework. Sympathetic and considered implementation of necessary changes has been the norm rather than the exception and this is indicative of the broad success of both heritage management frameworks. However, in some instances issues have arisen because of the lack of prior preparation of Heritage Impact Assessments and the absence of a site specific movable/redundant heritage policy.

The CMP has been effective in conjunction with broader Hydro Tasmania policies in protecting the heritage significance of a site which is also a functioning power station. Where Heritage Impact Assessments have been completed prior to the undertaking of works they have been effective in managing and mitigating harm to the heritage values of the site. Nevertheless, possibilities for improvement still remain and this review has identified three key points relating to the effectiveness of the CMP and its implementation:

- Incomplete coverage by the Heritage Impact Assessment process.
- Lack of a site specific movable/redundant heritage strategy.
- The retention of only the suite of features associated with Turbine 3 as the sole representative of the original configuration of the turbine system.

These issues are addressed in the updated conservation policies presented in Section 5 and Section 6 of this report. The key activities that should take place within 12 months of the final conservation management plan being submitted should be:

- Endorse this conservation management plan as the guiding document for future management and conservation of the place.
- Although not included on the Tasmanian Heritage Register, as a place of State level significance, it would be desirable for copies of this document to be lodged with Heritage Tasmania. It would also be desirable for TasNetworks to be provided with a copy of this CMP to assist with management of the adjacent switchyards.
- Ensure that the policies in this CMP are known and understood by relevant Hydro Tasmania staff, the relevant planning authorities and any contractors or others engaged to undertake any works at the site. It is imperative that this document is circulated to all management staff on site or associated with the day to day operation of the site. Responsibility for notification of

proposals that may result in a heritage impact rests with the Upper Derwent Area Production Manager.

- The strategy for assessing and dealing with movable and/or redundant heritage items recommended in the original 2007 CMP has now become an urgent matter with some significant elements of the site having been lost or destroyed. It is critical that a strategy for dealing with movable/or redundant heritage items is developed as a priority.

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Background

This report has been prepared for Hydro Tasmania by Austral Tasmania Pty Ltd and is an updated and revised version of the Tungatinah Power Station Conservation Management Plan (CMP) 2007. Since the completion of the original report a number of changes have taken place to the fabric of the place. This updated report is necessary to document these changes, document several new site locations and assess the role of the original conservation management plan (CMP) in shaping cultural heritage management outcomes.

Tungatinah Power Station is located on the Nive River and is part of the Upper Derwent Hydro Scheme. It was commissioned from 1953 – 56 and was originally designed for attended operation (see Figure 1.1 and Figure 1.2). In 1978 it was automated for unattended operation by remote control from the nearby Tarraleah Power Station by a direct wire control.

In 2003 Paul Davies Pty Ltd was commissioned by Hydro Tasmania to undertake assessments of all heritage assets within the hydro-power schemes for the upper and lower Derwent catchments. Under the Cultural Heritage Program, an initial inventory was prepared that contained significance assessments of all assets within the catchment and made recommendations on those which required conservation management plans.

The *Tungatinah Power Station Conservation Management Plan* was subsequently prepared for the power station by Austral Archaeology Pty Ltd and Ian Terry in 2007. This current CMP is an update of the 2007 version. It assesses its role in the management of the cultural heritage values of the place and expands its scope to include additional assets which did not form part of the previous investigations.

1.2 Heritage Listings

The power station is not subject to statutory heritage listing at a local, state or national level.

1.3 Hydro Tasmania Heritage Management Procedure

As part of managing its Health, Safety and Environment responsibilities, Hydro Tasmania has a specific process for the management of cultural heritage, namely the Cultural Heritage Procedure HSEP0912. This procedure is intended to ensure that Hydro Tasmania 'effectively identifies, assesses, protects and conserves its Aboriginal and historic cultural heritage assets.'[1] This procedure applies to all activities that may have an impact upon the cultural heritage values of assets owned and managed by Hydro Tasmania, places covered by conservation plans and all places owned by Hydro Tasmania that are included on the Tasmanian Heritage Register.

The Cultural Heritage Procedure outlines processes specific to the management of Aboriginal and historic cultural heritage separately. In both cases a lengthy procedure of assessment and consideration is to be undertaken by a range of staff at various levels. The key procedures are outlined in two flow charts, one each for Aboriginal and historic cultural heritage although it is worth noting that there are several points where these procedures feed into the statutory heritage management framework.

1.4 Objectives

The objectives of the 2007 CMP are summarised below and remain relevant to the current project:

- To prepare a conservation management plan for the Tungatinah Power Station that meets Hydro Tasmania's needs as well as statutory and best practice heritage management requirements.
- To assess the cultural significance of the Tungatinah Power Station and to use this information as the basis for the philosophy of the management policies and strategies.
- To prepare conservation policies which are appropriate to the significance of the place.
- To recognize the power generation responsibilities of Hydro Tasmania. The CMP must acknowledge that ongoing use of the station is an essential element of its future survival as a

[1] HSEP0912

viable asset. The CMP must therefore be a pragmatic document that can accommodate the ongoing use requirements within its cultural heritage management guidelines.

- To undertake the work in accordance with the Australia ICOMOS Burra Charter.
- To prepare the CMP as a plain English document which will be clear and comprehensible to non-technical readers.

In addition to this, the updated report aims to:

- Assess how the heritage significance of the Power Station has been retained or diminished since 2007.
- Assess how practical the 2007 CMP has been as a management tool for Hydro Tasmania and make changes as necessary;
- Update the CMP to reflect the major upgrades which have taken place at the Power Station and to document assets which were not considered in 2007;
- Review and revise as necessary the conservation policies and strategies/actions for the place, and document those actions that have been completed (or not).

1.5 Study Area

The 2007 CMP covered the power station, penstocks and valve house. This 2017 version of the CMP has been expanded to include the headworks, tunnel, and the picnic area and the remains of a concrete batching plant adjacent to the Power Station. The switchyard was excluded from the previous and current investigations, as it is not owned or operated by Hydro Tasmania.

1.6 Authorship

This project was directed by Justin McCarthy and the report prepared by Alan Hay of Austral Tasmania. This 2017 CMP incorporates material from the previous version, prepared by Justin McCarthy, David Parham, Duncan Keenan (Austral Archaeology Pty Ltd) and Ian Terry (historian & heritage consultant) with input from Paul Davies (architect).

1.7 Limitations and Constraints

This report has been commissioned as a review of the existing 2007 CMP. The advice, representations and recommended actions contained in this CMP are aimed at conserving the cultural heritage values of the place. The responsibility for assessing risks (real and/or perceived) arising from implementation of the report or aspects thereof rest solely with the owners and managers of the place.

No legal liability whatsoever is accepted by Austral Tasmania Pty Ltd for any direct or consequential loss, damage or injury (including without limitation any costs incurred in connection with proceedings either legal or arbitration) suffered by any person or entity which arises as a result of implementation of heritage conservation related advice at or about the place.

This report includes information summarised from previous investigations. Full and direct reference to the original source material is recommended.

It should be noted that two elements recorded in the 2007 CMP have been removed without documentation. The remnants of an old steel tent frame and partially collapsed shelter were previously located in the vicinity of the penstocks. This area was surveyed in detail, with no trace of the two sites discernible.

Whilst every effort has been made to gain insight to the historic heritage profile of the study area, Austral Tasmania Pty Ltd cannot be held accountable for errors or omissions arising from such constraining factors.

1.8 Acknowledgments

The following persons are acknowledged for their assistance with the project:

- Helga Grant, Hydro Tasmania
- Robert Horne, Hydro Tasmania

- Mr Greg Jackman, Gondwana Heritage Solutions
- The staff of the Tungatinah Power Station

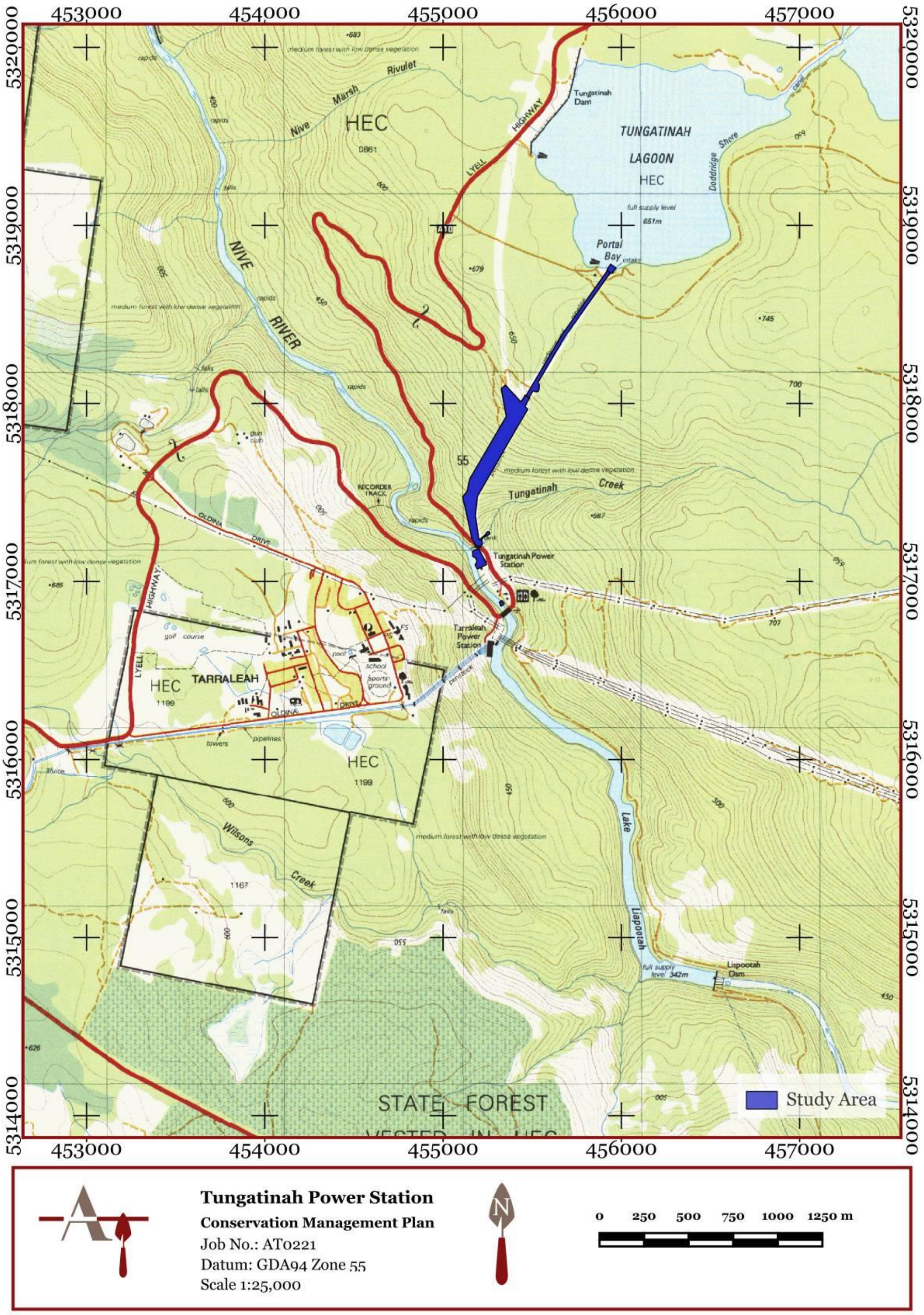

Figure 1.1: Location of Study Area.[2]

[2] Tasmap, 25,000 Series Tarraleah.

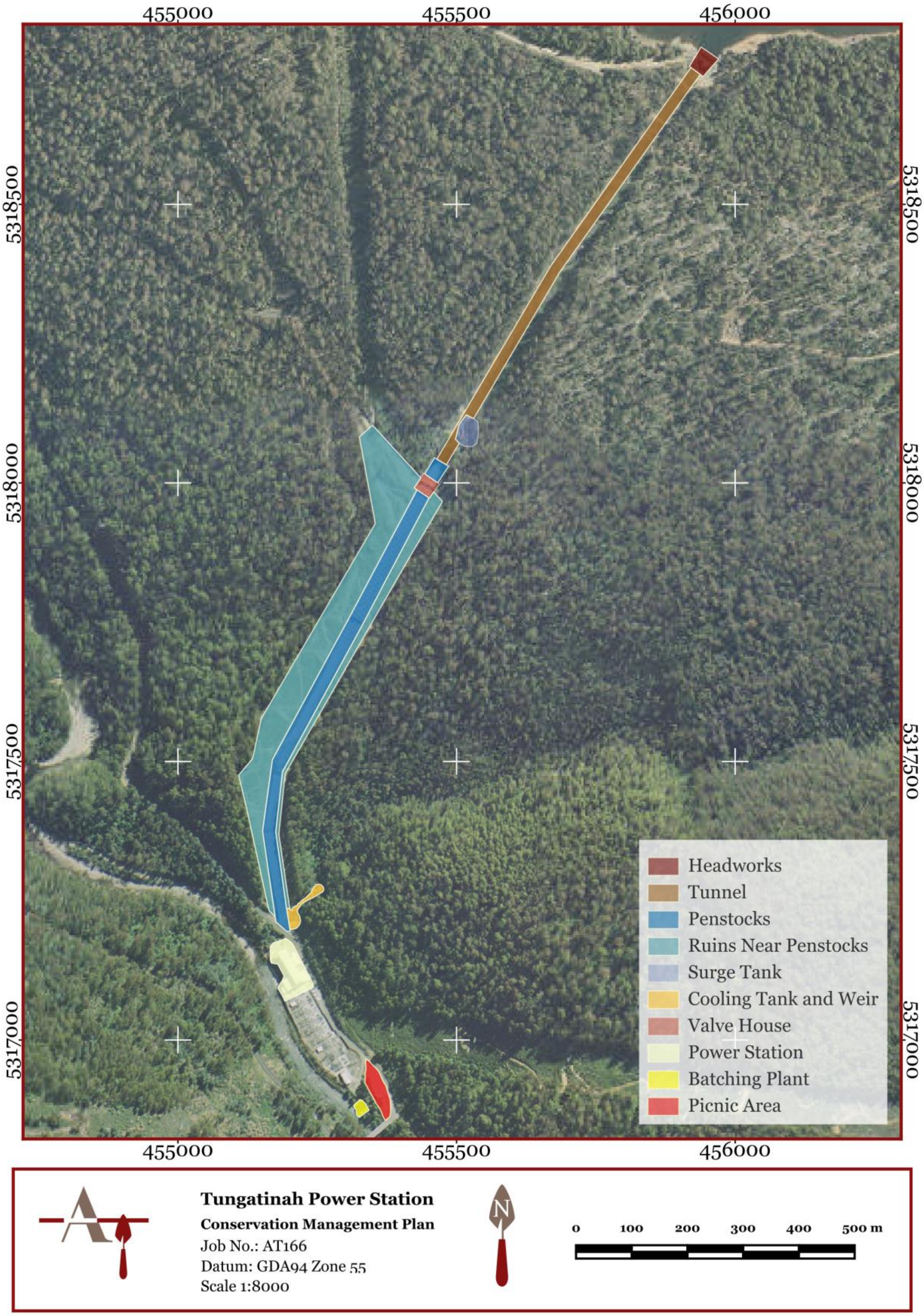

Figure 1.2: Aerial Overview of the key locations within the study area.[3]

[3] Listmap Orthophoto Composite

2.0 ILLUSTRATED HISTORICAL BACKGROUND

2.1 Abbreviations Used in the Historical Background

CCE	Chief Civil Engineer
CEE	Chief Electrical Engineer
CME	Chief Maintenance Engineer
DCME	Deputy Chief Maintenance Engineer
HEC	Hydro-Electric Commission of Tasmania
GEC	General Electric Company, England
PE	Power Engineer
PSS	Power Station Superintendent
SA	Supervising Architect
NEM	National Electricity Market

2.2 Background

As early as 1917, only three years after the war-time formation of the Hydro-Electric Department by the Tasmanian Government, Surveyor J. Leslie Butler proposed twin power developments bringing the waters of the Upper Derwent River and the Nive and Dee Rivers, via a storage basin at Lake Echo, to a single point on the Nive River.[4] Work on the Upper Derwent development, known as the Tarraleah Development, commenced in 1933 and the first three turbines were commissioned in 1938. The Second World War and resultant shortages in labour and materials delayed the commissioning of the fourth until 1943, the fifth until 1945 and the sixth and the completion of Clark Dam until 1951.[5]

Allan Knight, an innovative bridge engineer, was appointed the first Tasmanian head of the Hydro-Electric Commission in 1946. The Great Depression and then war-time shortages had left the system ill-prepared for the demand by Tasmanians for electricity, both domestically and in industry, that was just starting to accelerate. Drastic action needed to be taken to prevent the curbing of industrial development and halting of the nascent economic boom. This was of great concern to the Tasmanian Premier, Director of Public Works and Under-secretary, who met with Knight before he had officially taken up his new post.[6] Knight formed an ambitious plan to meet this demand by initiating large scale development of the system to meet the forecast, rather than current, demand.

2.3 Design & Construction

An HEC report on the 8th of April, 1947 noted that the developments of the system currently in hand, such as Tarraleah, when finished would only provide sufficient capacity until 1951.[7] While the difficulty of predicting future demand for electricity was acknowledged, it was thought that even the maximum possible construction HEC could undertake would only prove barely adequate. As it was considered that four years would be required for the construction of a new plant, a report to the Premier in September 1947 suggested the immediate commencement of the Nive Power Development, so that the first stage would be in operation by 1952.[8] The estimated cost was a total of £7,047,000, almost as much as the whole capital expenditure of the HEC up to that point. Some cost estimates for individual components are given in Table 1. The largest component by far was dam and waterways construction. When the Nive Power Development was approved by the Tasmanian Parliament in November, it was the largest expenditure authority the Parliament had ever approved.[9] The name "Tungatinah", a Tasmanian Aboriginal word meaning "shower of rain", was chosen for the power station.

[4] HEC 1947b: 3.
[5] Garvie 1962: 20, 57-59.
[6] Lupton 1998: 172-3
[7] HEC 1947b: 1.
[8] *Ibid*: 1.
[9] HEC 1955b: 4.

Component	Cost (£)
Dams and waterways	*4,089,700*
Power Station	357,500
Generating Plant	1,695,000
Pipelines (incl. Tunnel and Penstocks)	404,800
Transmission etc	*500,000*

Table 1: Estimated Component Cost for Nive Power Development. Components outside the scope of this study are italicised.[10]

This was a difficult time for the HEC to be building a power station. Revenue was too low to fund construction and there were difficulties in obtaining promises of finance that would be needed years down the track when ordered equipment would be delivered.[11] Knight was loathe to increase the cost of electricity for fear of making it less attractive to potential consumers, and it was a foundational principle of his plan that more consumers could not be attracted without first increasing the capacity of the system.[12] By 1952 the HEC was spending more on its current works that it had on the works of the preceding 35 years.[13] This was the peak period of spending on Tungatinah. In January 1951, payment incentives had been introduced to workers over a six month period in an effort to increase productivity and meet looming construction deadlines.[14] The resulting wage increases saw production rise by more than four times over the subsequent 12 month period. It was relying on the generosity of the Commonwealth Bank, having to cancel orders for needed equipment and having to slow the Lake Echo and Wayatinah schemes.[15] Starting First of July 1952, Knight tightened the procedures for over-expenditure on estimates, requiring detailed information on the overruns and directing that "Each Branch is required to keep a close control on expenditure. Officers-in-Charge are to be advised that expenditure during the year on any item must not exceed the amount authorised."[16] Any overruns were to be reported as soon as they were suspected. The same year the HEC was authorised to seek semi-government loans for the first time, and over the next four years it would raise £4.5 million in this manner.[17]

With the economic boom occurring in all the Allied countries due to post-war reconstruction, materials and labour were scarce in Australia and construction costs were rising, mainly as a result of increasing wage costs. Furthermore, the isolated location of Tungatinah was unattractive to many workers and yearly labour staff turnover rates were often above 75%.[18] By 1950 many Western nations were re-arming for the Cold War and materials shortages continued.[19]

The new approaches that were taken to solve these problems are indicative of the changes occurring in Australian society at the time. To solve the labour shortage the HEC decided to assist foreign workers to immigrate. In 1947, in line with the Australian immigration policy of the time, the Premier, Robert Cosgrove, stipulated that the HEC should give preference to migrants from Britain, followed by those of British stock, and then Scandinavians.[20] Initial effort focused on the first category. These workers, as British citizens, were not contracted but had a gentleman's agreement to work for two years, and there was a high rate of absconding, often to other Australian states.[21]. The limited numbers of British migrants who took up the offer, and the fewer who stayed their two years, forced the HEC to look elsewhere. Overtures made to members of the Polish White Army stranded in London proved more successful.[22] The Polish workers were bonded for two years, but many stayed on with the HEC after

[10] *Ibid*: 5.
[11] HEC 1952 :4.
[12] Lupton 1998: 182.
[13] *Ibid*: 189.
[14] The Mercury, Wed 23 April 1952: 6.
[15] HEC 1952: 3.
[16] HEC Memorandum Knight to CCE 4/04/1952.
[17] Lupton, *Op.cit*: 189.
[18] HEC 1947: 3, 1952: 8.
[19] HEC 1951: 5.
[20] Lupton 1998: 172, HEC 1947: 3.
[21] HEC 1949:3
[22] *Ibid* :177.

they had served their term. More surprisingly, in 1952 the HEC's Assistant Industrial Officer was sent to Germany to recruit workers, and many Germans and Italians were recruited before financial problems put an end to the scheme.[23] It is remarkable that seven years after their countries had faced each other across a battlefield, large numbers of Australians, Britons, Poles and displaced persons were working with Italians and Germans to build Tungatinah. Table 2 below gives the numbers of foreign workers recruited between 1947 and 1952.

Nationality	# Received 1947-1952	# Still Employed 30/06/1952
British	1176	95
Polish	796	161
Displaced Persons	432	146
Germans & Italians	853	671

Table 2: Number of Foreign Workers Recruited and Retained by HEC, July 1947-June 1952.[24]

The Nive Development was one of the first of many undertakings in this period that changed the formerly British-dominated ethnic makeup of Australian society for ever. The HEC's role in fostering the changing face of Australia was advertised when a naturalisation ceremony of four HEC workers from Latvia, Holland, Lithuania and Poland, who had all worked on Tungatinah Scheme, was held as part of a combined ceremony to mark both the completion of Pine Tier Dam and the coronation of Queen Elizabeth.[25] The ceremony, held on the 2nd of June, 1953, despite freezing conditions, was recorded on film and later telecast to a total audience of twenty million throughout the Commonwealth (Figure 2.3).

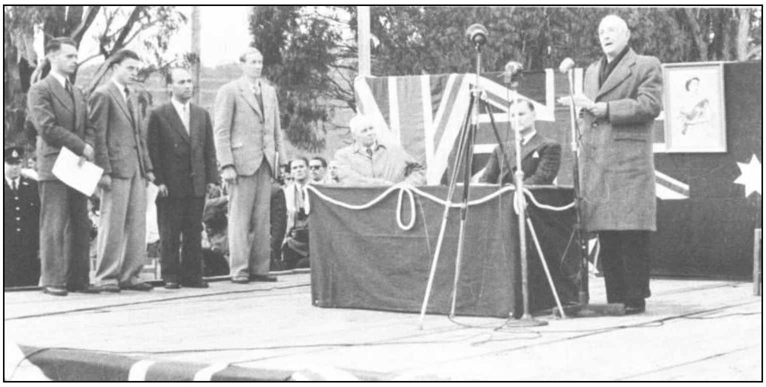

Figure 2.3: Naturalisation ceremony for Tungatinah Scheme workers 02/06/1953.[26]

Regarding Australia's foreign trade policy, the drastic measure of sourcing material from recent opponents Germany and, especially, Japan (see below) when British sources dried up foreshadowed the vast changes to occur in this area in the next few decades.

Anticipation of increased base demand for electricity by the Electrolytic Zinc Co. of Australasia led to the deferral of the Lake Echo portion of the Nive Development in favour of the main Tungatinah portion.[27] By June 1948 the final designs of the development had not yet been commenced, but already work had started on clearing of timber, and construction of a road and a temporary metal truss bridge over the Nive.[28] The village at Bronte, where those working on that dam would be housed,

[23] HEC 1952: 8.
[24] HEC 1952: 8.
[25] Garvie 1962: 64.
[26] *Ibid*: 64.
[27] HEC 1948: 11.
[28] *Ibid*: 11.

was also in the process of construction, although considerably hindered by the lack of materials.[29] The poor accommodation offered to the workers, often initially just tents, contributed to the turnover rates. By June 1949 the locations of dams and canals had been planned and construction was starting.[30]

Figure 2.4: The Power Station site towards the end of 1949. Note the concrete plant in the right of the photo and the wooden hut above it.[31]

A major difference between the construction of Tungatinah and that of Tarraleah across the river was the increased mechanisation of the process.[32] A selection of photos illustrating the equipment and infrastructure used during the construction phase can be found in Appendix A. A winch and haulageway conveyed concrete and pipe sections up the hill for the construction of the penstocks. Several different mobile cranes were used for moving materials, pouring concrete and loading the bogeys on the haulageway. A Stothert and Pitt concrete batching and mixing plant was located at the southern end of the site, next to the river (Figure 2.4 above). From here, trucks transported concrete to other parts of the site.

By 1951, with much of the labour intensive dam building completed using imported labour, materials shortages, especially steel, were delaying the project considerably, as the delivery of the generating sets, penstocks and building exterior was being held up. The Australian Government sought the intervention of their British counterparts to ensure access to the necessary materials, but without success.[33] At this time, the HEC was building or extending six hydro-electric schemes including Tungatinah and another large scheme, Trevallyn.[34] Making use of limited materials, Tungatinah was given priority over Trevallyn. This resulted in Tungatinah being only three to four months behind schedule as of the 30th of June 1951 as compared to Trevallyn's more than six.[35] Tungatinah continued to be prioritised over other schemes until a majority of its generating sets had been installed.[36]

Attempted strikes by construction workers were also seen in 1951, resulting in further delays to the scheme. In an effort to receive overtime payment, Hume Steel workers demanded a stop-work, which was eventually overturned by employees desperate to make ends meet during a period of financial hardship.[37]

By November 1951, the village at Bronte had expanded and was described by *The Mercury* as a "model town."[38] with excellent amenities, housing, school, kindergarten, civic centre, post office, theatre, hospital and sporting grounds. The Pine Tier Dam, located near Bronte Park was opened in June 1953

[29] *Ibid*: 11-12.
[30] HEC 1949: 9.
[31] HEC
[32] Garvie, *Op.cit*: 52.
[33] HEC 1951: 11.
[34] Lupton 1998: 183.
[35] HEC 1951: 10-11.
[36] HEC 1953: 3.
[37] The Mercury, Fri 30 Mar 1951: 4.
[38] The Mercury, Mon 12 Nov, 1951: 10.

as the starting point for the development, providing water to interconnected canals, man-made lakes, tunnels and finally the power station.[39]

The construction of four new interconnecting lakes as part of the Tungatinah power development - saw not only a vast improvement to energy production in the state, but had recreational benefits as well. The creation of Bronte Lagoon, Bradys Lake and Lake Binney all resulted from the scheme, and created new trout fishing locations for anglers (Figure 2.5). [40]

Tenders for the construction of three tunnels were issued in October 1951, due to a lack of skilled local workers and equipment (Figure 2.6). Experienced tunnelling contractors from the UK, America, Italy, France and Norway were all contenders for this contract, which was expected to take three and a half years to complete.[41] The final explosion connecting both ends of the Tungatinah tunnel was fired on Thursday 14 February 1952, resulting in the first tunnel of the scheme being opened in the record time of 56 weeks.

Figure 2.5: Overview of the Tungatinah power development in 1957, showing interconnected canals, pipelines, man-made lakes, dams and associated Bronte village.[42]

[39] The Mercury, Wed 3 June 1953: 9.
[40] The Mercury, Sat 26 Jul 1952: 24.
[41] The Mercury, Thursday 11 Oct 1951: 5.
[42] National Library of Australia, John Russell Ashton, Tungatinah Marshes with aerial of village, 1957, PIC/8393/1288 LOC Cold Store PIC ASH. http://nla.gov.au/nla.obj-147303887

Figure 2.6: The Tungatinah Tunnel, one of the three tunnels under construction.[43]

2.3.1 Valve House

The Valve House was one of the casualties of the tightening of expenditure in 1952. Originally designed as a concrete building, this was deemed too costly and the supervising architect, A.W. Voss, was instructed to design a new building from timber and corrugated galvanised iron, or other suitable materials.[44] It was to “have a pleasing appearance” and “harmonise generally” with the power station, despite the distance between the two.

2.3.2 Penstocks

A contract had been signed in early 1950 for the construction of four steel penstocks by Hume Steel Ltd.[45] However, Australian plate steel for the penstocks was not able to be obtained, nor was English steel easy to come by.[46] The HEC was forced to return to the old wooden construction for many of its low pressure pipelines on other projects.[47] By June 1951 only enough steel for one of the penstocks had been secured (Figure 2.7) and the surprising measure of ordering some of the thinner plate from Japan, only six years after the cessation of hostilities, had to be taken.[48] By late 1951, the HEC’s Deputy Chief Civil Engineer had been sent to England and Europe to try to find a solution.[49] Again, a supplier from the former Axis countries, this time a German company, Rheinische Roehrenwerke Mulheim, Ruhr, was eventually found to manufacture the high pressure steel for the penstocks. By June 1952 the outlet tunnel had been completed, but the penstocks were still not ready.[50] It was not until a year later that the first penstock had been completed and the second and third penstocks came into service in August and October 1953.[51] The fourth penstock was held up to allow works on the

[43] Archives Office of Tasmania, Photograph - Outlet from tunnel from Tungatinah Lagoon through the hill, five penstocks fit into this tunnel outlet, AB713-1-2117.
[44] HEC Memo CCE to SA, 6/08/1952.
[45] HEC 1950: 8.
[46] HEC 1951: 11.
[47] Lupton, Op.cit: 188
[48] HEC 1951: 10.
[49] HEC 1952: 4.
[50] Figure 6, HEC 1952: 4.
[51] HEC 1953: 7.

Trevallyn pipeline to be completed, and it was not completed till July 1954.[52] The fifth penstock was completed in October of the same year.[53]

Figure 2.7: Placing concrete in anchor for the Tungatinah penstocks.[54]

2.3.3 Power Station

The material for the power station building, originally intended to be Australian steel, had to be sourced from the UK owing to domestic shortages, and contractors undertook to complete it by February 1951.[55] According to HEC photographs, by March 1952 the foundations had been laid and the first of the steel columns was being erected. It was not until April 1953 that the shell of the building was complete.

In June 1949, 4 sets of generating machinery, comprising turbines supplied by Boving & Co. Ltd, alternators supplied by British GEC P/L and transformers supplied by Barlow & Retallack P/L, had been ordered (Figure 2.11).[56] Interestingly it has been pointed out by Hydro Tasmania staff that the name plates on the alternators as well as some records indicate that they were made by Brush. Most of the sets were manufactured in England, with only parts of the turbines to be manufactured in Australia (and some of these eventually had to be manufactured in England). The turbines ordered were to be the biggest Francis turbines ever manufactured in the United Kingdom (Figure 2.9).[57] The first sets had been expected by the end of 1951, however, the first set was not placed in operation until June 1953.[58] More sets were placed into operation in August 1953, in September 1953, and in July 1954.[59] The fifth was held up by the failure of its spiral casing during a pressure test at Tungatinah in late 1954/early 1955. This necessitated manufacture of a new casing in England, which then needed to be shipped to Australia. Its commissioning was delayed till mid-1956.[60] Transmission line towers, constructed to transmit power from Tungatinah to Hobart and Launceston, were manufactured in both England[61] and Italy[62], with the first 300 arriving from the UK in early 1951 (Figure 2.8).

In 1953 a tank, fed from a weir on Tungatinah Creek, was also constructed uphill from the station, near to the penstocks, to provide cooling water for the new alternators (Figure 2.13 below).

[52] HEC 1954: 11.
[53] HEC 1955: 14.
[54] Archives Office of Tasmania, Photograph - Tungatinah Power Station, placing concrete in anchor for Tungatinah penstocks, AB713-1-2121
[55] HEC 1951: 11.
[56] HEC 1949: 9.
[57] Unkn 1954: 476-477.
[58] HEC 1953: 7.
[59] HEC 1954: 3.
[60] HEC 1955: 15.
[61] Examiner, Thursday 18 Jan 1951: 3.
[62] Examiner, Thursday 15 Nov 1951: 13.

Figure 2.8: Transmission switchyard under construction.[63]

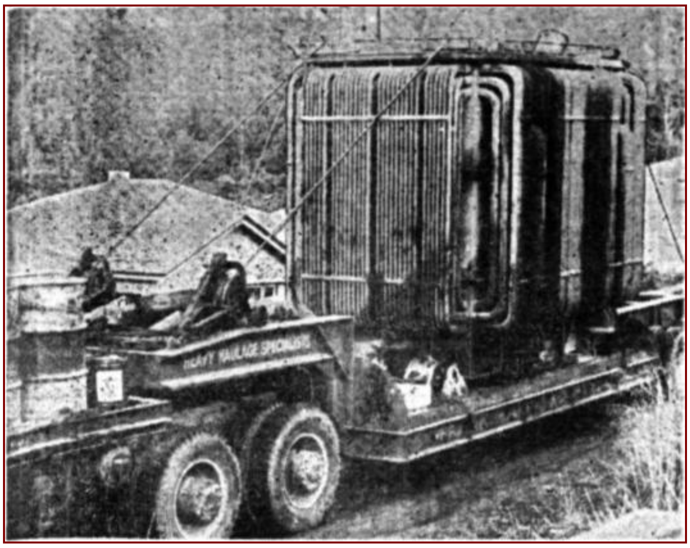

Figure 2.6: British-made transformer being transported for installation at Tungatinah power station.[64]

[63] Archives Office of Tasmania Photograph - Tungatinah Power Station, power yard under construction, AB713-1-2134.
[64] Examiner, Tuesday 18 May 1954: 5.

Figure 2.7: Power Station building steel frame under construction, 21/05/1952.[65]

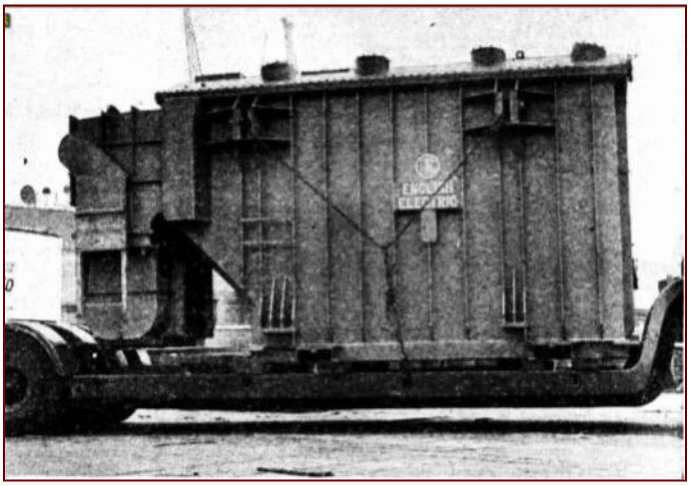

Figure 2.8: Regulating transformer en route to Tungatinah power station.[66]

Figure 2.9: The southern end of the Power Station building (09/02/1952). Note the single penstock under construction in the top right-hand corner.[67]

[65] HEC
[66] The Mercury, Tuesday 22 Dec 1953: 16.
[67] HEC

The scheduling of the opening ceremony for the 20th of May 1955 produced a flurry of activity by the supervising architect, A.W. Voss, as he saw to the removal of many minor blemishes and the general tidying up of the building and surrounds. The exterior of the building was painted a "Silver Grey" colour. Deciduous plantings had originally been intended for the area around the station, but there were concerns that leaves would cause problems in the cooling water tank and the switchyard. The revised plan called for Oregon pines on the hillside above the water tank, Pencil pines near the station and rhododendrons in the lawn. Roses and Azaleas also seem to have been included.

Figure 2.10: Tungatinah Power Station (24/04/1955, shortly before the official opening. Note the cooling water tank and penstocks in the foreground and the painting nearing completion.[68]

The station was opened by the Governor-General, Sir William Slim, and both the Premier, Robert Cosgrove, and the Opposition Leader, Rex Townley spoke.[69] Cosgrove had been intimately involved with the project, as both Premier and as Minister administering the Hydro-Electric Commission Act, from beginning to end. He had tried to expedite the project wherever possible and had personally fired the first blast on the tunnel and poured the first and last buckets of concrete at Pine Tier Dam.[70] The construction of Tungatinah had been an undertaking of great state, and even national, importance. It was also one of the many projects after World War Two that were the first steps in moving on from the war and re-establishing relationships between people and countries formerly on opposite sides of the conflict.

The final amount spent on the Nive Development was £12,682,443, far more than the £7,047,000 that was estimated (see Figure 2.14). Knight's tighter controls had been instituted too late and, given the circumstances, would not have been able to keep the project to estimate in any case. It also had taken far longer than the four years envisioned in 1947: it took six years to bring the first sets on line and seven and nine years, respectively before the fourth and fifth sets were completed. While the final station was bigger than originally planned, having five generating sets rather than four, this accounts for only a small part of the cost and time overruns. A discrepancy is understandable considering the material, labour and financial difficulties that had dogged the project.

[68] HEC
[69] HEC 1955: 3.
[70] Lupton, *Op.cit*: 193, 196.

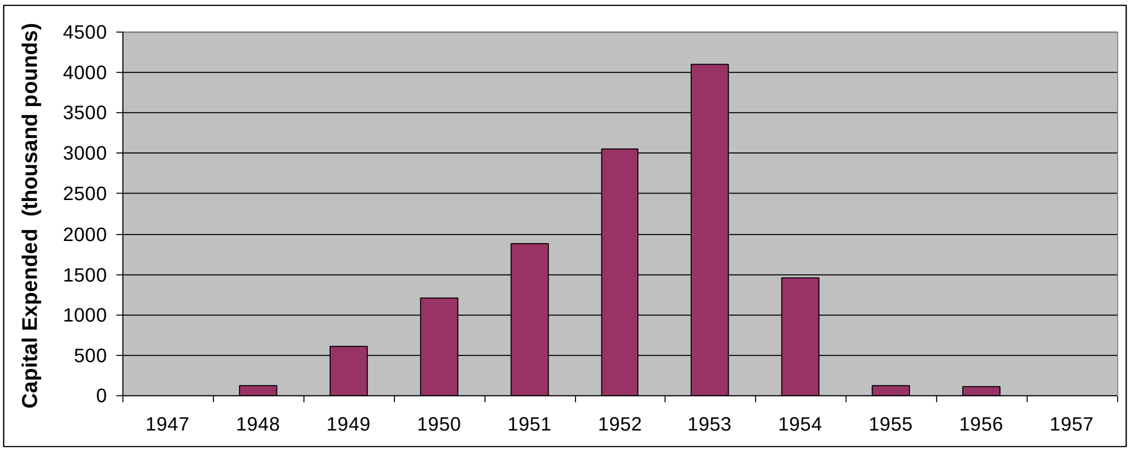

Figure 2.11: Capital Expenditure on the Nive Power Development by Year.[71]

The delay in the commissioning of Tungatinah had been a problem for the HEC. Demand for electricity had continued to grow quickly while the Nive development was being constructed (Figure 2.15). Between 1949 and 1955 demand grew 96%, an enormous figure that was significantly larger than the average rate of other developed countries at this time.[72] By June 1949 the limited capacity of the system while awaiting the completion of Tungatinah was already being felt and efforts were being made to top up the storage of existing stations to protect the system.[73] With water storage around 40%, rationing was introduced in March 1951, with normal consumers being limited to 75% of the previous year's amount, and industrial consumers 82%.[74] Strong public reaction forced a parliamentary inquiry, which set up a standing committee to regulate the matter.[75] Despite rationing the system was still being pushed to the limit: in the 1951/52 financial year it operated 2.5% above its theoretical capacity.[76] Greater discrepancies were to follow (Figure 2.15). Rationing was able to be eased in 1953 but still continued till 1955, when the opening of Tungatinah and Trevallyn enabled it to be lifted.[77]

[71] HEC 1947-57.
[72] HEC 1955: 5.
[73] HEC 1949: 4.
[74] HEC 1951: 4.
[75] Lupton, *Op.cit*: 187-8.
[76] HEC 1952: 5.
[77] HEC 1953: 3, Lupton

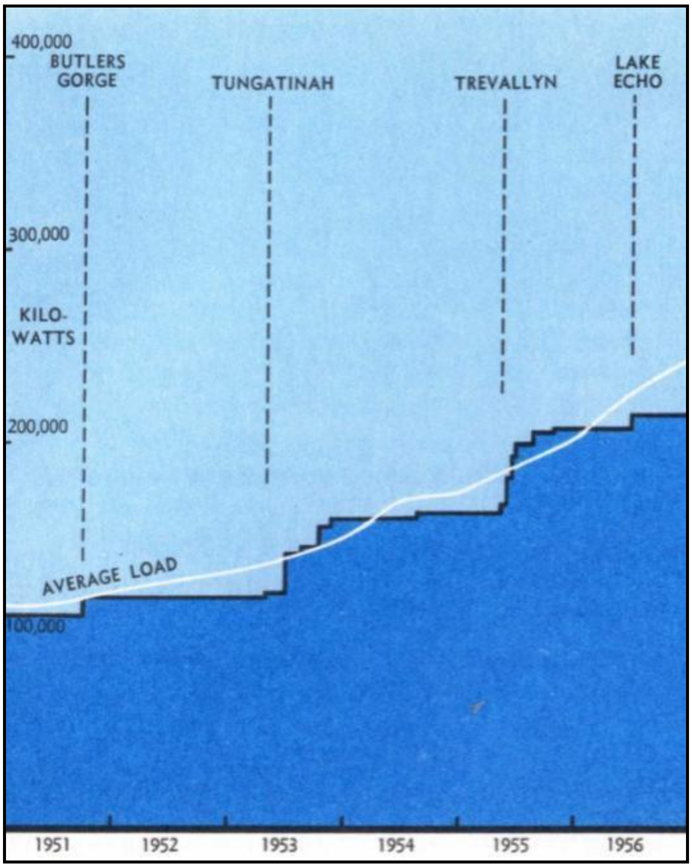

Figure 2.12: Average Load (White Line) compared to Average Capacity (Dark Blue) on the HEC system, 1951-1956. Note how capacity was lagging well behind load between the commissioning of Butler's Gorge (1951) and the first sets at Tungatinah (1953), despite rationing operating during this period.[78]

Upon beginning the Nive Development, the HEC estimated that by 1960 a 25% increase in the cost of electricity in 1946 would be required.[79] In late 1950, a partially disguised price rise was introduced by the lessening of early payment reductions.[80] There was a 20% increase in the general rate in 1952, a further 30% increase in 1953 and another 25% increase in 1955.[81] Despite these increases, the rate of increase in the cost of electricity was still lagging behind that of the basic wage and the price was still the lowest in Australia by a substantial amount, due to the economies of hydro-electric power.[82]

[78] Garvie 1962: 31.
[79] HEC 1947: 5.
[80] Lupton, *Op.cit*: 187.
[81] *Ibid*: 198, HEC 1953: 3, 1955: 4.
[82] Lupton, *Op.cit*: 200-1.

Figure 2.13: The completed station in operation, 02/08/1956.[83]

2.4 Operation

When the fifth machine was brought into operation in 1956, Tungatinah was the largest hydro-electric power station in Australia.[84] The statistics of its early operation show its importance to Tasmanian electricity supply. During 1952, the Tungatinah system resulted in the connection of more than 6,000 new domestic consumers state-wide.[85] Despite having one of the smallest water storages, Tungatinah had the highest energy output, maximum load and average load of all the Tasmanian stations from 1957 to 1964.

Figure 2.14: Tungatinah Turbine Hall c. 1961, showing exciters and original checked floor colour scheme.[86]

After this period, the importance of Tungatinah in the HEC system gradually decreased, with the opening of the larger Poatina (1964), Gordon (1978) and Reece (1987) stations, and Tarraleah and Trevallyn sometimes outstripping it in energy production. However, despite a gradual decline in the

[83] HEC
[84] Lupton, *Op.cit*: 197.
[85] Examiner, Mon 21 April 1952: 3.
[86] HEC

amount of energy it produces (Figure 2.18), it still remains in the top six of Hydro Tasmania's power stations for energy production.

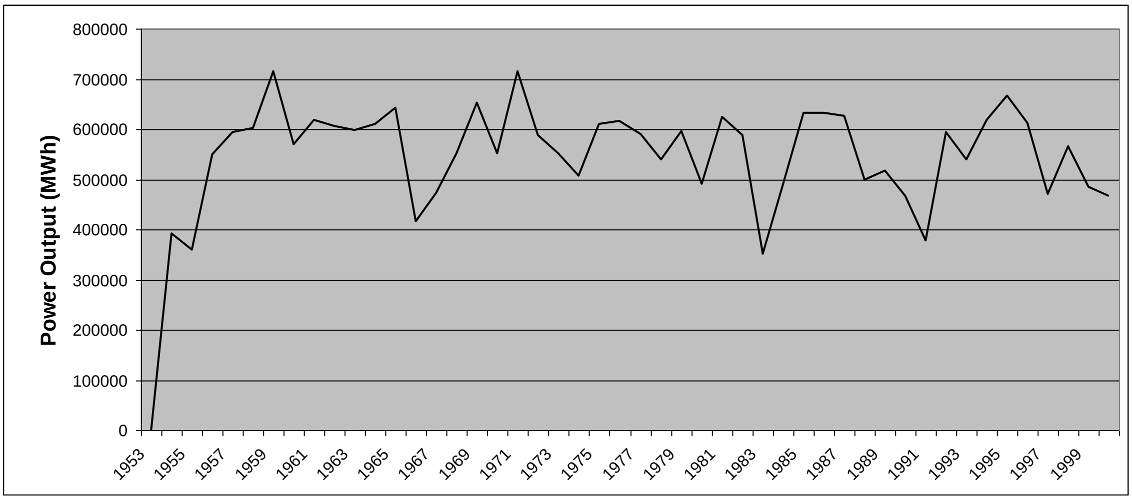

Figure 2.15: Tungatinah Yearly Power Output, '52/'53 – '99/'00. Note the gradual decline in mean output.[87]

Tungatinah was originally designed for manned operation, with a staff of 24, delineated as laid out in Table 3 below. This staff arrangement allowed for one Power Station Superintendent (PSS) covering both Tarraleah and Tungatinah, but as there were offices at Tungatinah for both the PSS and the Deputy PSS there may have been a dedicated Tungatinah PSS.

Position	Number at Tungatinah
Deputy Power Station Superintendent	1
Senior Station Engineers	5
Junior Station Engineers	5
Electrical Fitters	2
Mechanical Fitters	2
Fitters' Assistant	2
Painters	1
Canal Patrol	2
Station Assistant	1
Handyman	1
Storeman	1
Carpenter	1
Total	**24**

Table 3: Tungatinah Staff as envisioned March 1952.[88]

[87] HEC 1953-2000.
[88] HEC Internal Memo

By 1971 however, new stations, such as Gordon were being designed to be operated by remote control and the conversion of Tungatinah to remote control was planned for March 1974. By February 1971, concerns had been raised about the job futures of the staff at Tungatinah. The Power Engineer suggested they could be transferred to the Gordon Station control centre, which was to be located in Hobart.[89] It is not known if this occurred.

A proposal for modernising much of the equipment at Tungatinah and converting it to completely unattended operation was drawn up by mid 1972. The cost estimate of $137,300 was deemed too expensive and a new, substantially reduced proposal was put forward.[90] This allowed for visits to Tungatinah by control staff based at Tarraleah up to once per shift and for conversion of the existing station without modernising of plant equipment. The new proposal would cost a mere $42,000. The revision of the proposal has resulted in the unusually good preservation of original control equipment and panels found at Tungatinah.

Figure 2.16: Tungatinah Control Room (manned).[91]

By 1973, tenders were being sought for equipment,[92] but the work was not completed till 1978, partly due to many new control panels having to be rewired.[93] The final system allowed for control of Tungatinah from Tarraleah via a 24V DC wire. The system subsequently suffered from numerous minor bugs, which were still being ironed out six years later.[94] Experience gained by HEC during this project was used to help Electricorp in Christchurch, New Zealand with conversions to remote control in 1988.[95]

In the small hours of the morning of Sunday, 23rd of December 1979, a little more than a year after the conversion of Tungatinah to remote control, a fault at the station caused the worst blackout in the HEC's history.[96] A faulty earthing relay on the rotor of one of the generators caused a fault in the switchyards which both primary and secondary protection failed to clear. This caused over-current protection at the next station, Gordon, the largest generator of electricity in the system, to isolate the station from the network. With Gordon offline, each station along the grid was unable to shoulder the ever increasing excess load, which there had not been time to shed, and isolated itself also. Soon the entire island had lost power.[97]

Almost all the HEC's stations had been designed to connect to a live network, and starting from scratch was an unknown procedure. To compound matters, most stations were on remote control and their operators at home asleep. After several attempts, each station managed to start up one generator, enough to energise its own switchyard and then the grid, without any load. Then power was gradually restored, one area at a time, the first, a section of Hobart, being restored only an hour and a half after power had been lost. In the political context of the battles between the HEC and environmentalists at this time, it was fortunate that this occurred at one of the lowest load periods of

[89] Memorandum CEE to PE, 27/04/1971.
[90] Memorandum PEDE & CCDE to ?, 11/08/1972.
[91] HEC
[92] Memorandum PSDE to ?, 18/05/1973.
[93] Memorandum CEE to PE, 10/05/1976.
[94] Memorandum CEE to Commissioner, 12/09/1984.
[95] HEC letter to Electricorp, 09/06/1988.
[96] Lupton, *Op.cit*: 304.
[97] HEC 1980: 4.

the whole year: most industrial and commercial users were closed, most people were asleep and, being summer, little heating was being used.[98] Measures were taken to prevent such an event recurring.[99]

High load demand and poor water storage throughout the system in the late 1970s and early 1980s meant that much maintenance had to be postponed, as the down time could not be spared.[100] This may have contributed to the delay in remote control conversion and the relay fault at Tungatinah. Notwithstanding the occasional hiatus, regular maintenance of all sections of the power station has been carried out.

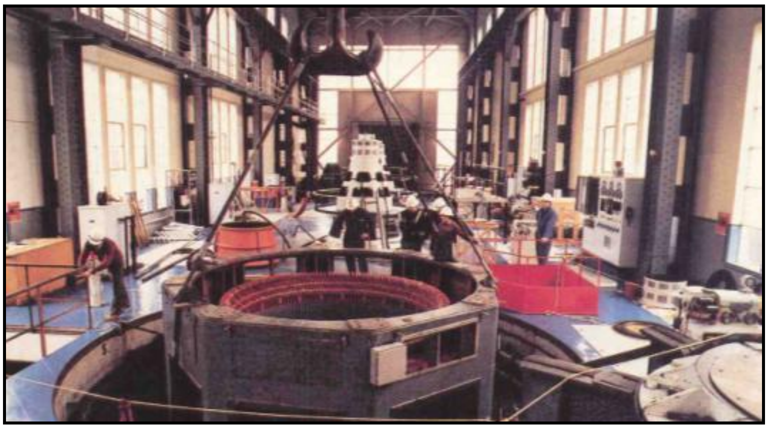

Figure 2.17: Maintenance on an alternator at Tungatinah, c.1985. Note the uniform blue floor.[101]

2.4.1 Power Station

In 1969 a major repainting of the exterior of the building was undertaken. Doors and window frames were painted "Gaylon" and other surfaces "Sun Beige" (Figure 2.21). At the same time some repairs and recaulking of windows was undertaken. Changes to internal colour schemes have included repainting the original dark grey and white chequer board turbine hall floor (Figure 2.17 above) a uniform blue colour (Figure 2.20 above) at some point between 1981 and 1987. Since that time the turbine hall floor has been repainted a uniform green.

The only addition to the building was made during the late twentieth century. A skillion-roofed lean-to addition was made to the west wing to house a welding shop (Figure 2.21).

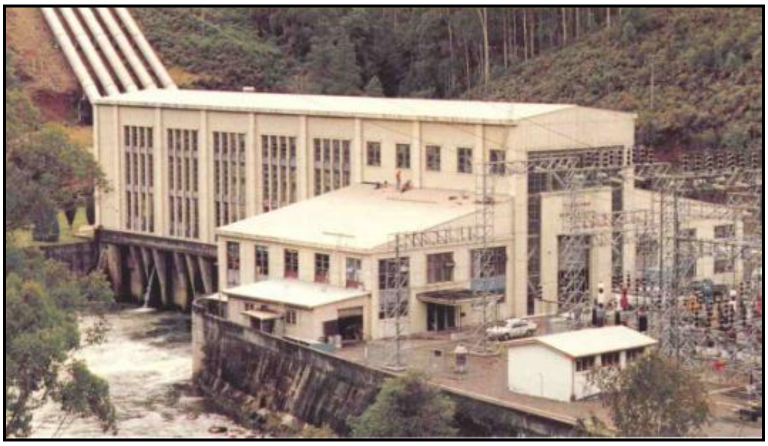

Figure 2.18: Tungatinah Power Station in the early 90s, showing Sun Beige paint scheme and lean-to addition.[102]

A major change in the fabric of the station occurred in 1992 when all the asbestos roofing and cladding was replaced with Zincalume. During the construction of the station, a directive had been made by the Chief Civil Engineer, G.T. Colebatch, that, where roof sweating needed to be avoided, asbestos roofing

[98] Lupton *Op.cit*: 304-5.
[99] HEC 1980: 4.
[100] HEC 1977: 9, Lupton, *Op.cit*: 336.
[101] HEC
[102] HEC

was to be used.[103] But with information on the health risks of asbestos having come to light in the intervening period, it now all had to be removed. This was a substantial undertaking due to the need to remove all asbestos fibres via isolation of work areas, vacuuming and the use of personal protective equipment. The eventual cost was in excess of $170,000.

2.4.2 Penstocks

All the penstocks were regularly internally reconditioned, one occasion being between 1970 and 1974.[104] Initially this was done manually, by workers crawling through the tubes (Figure 2.22). In more recent times it has been carried out by a robotic device that blasts the interior to remove corrosion.

Parts of the penstock drain and the relief valve were not included in the reconditioning of the penstocks or the turbines.[105] On the 28th of March, 1985, while draining Tungatinah Tunnel, the drain valve on the No. 4 penstock was opened one inch and soon failed.[106] High pressure water began spraying into the station where operators were working. The dewatering pumps could not handle the volume and the water rose quickly. To prevent the turbine halls being flooded, the operators quickly opened the by-pass, main and relief valves, risking damage to the penstock in the process. The No. 4 hilltop valve was then closed, which reduced the flow at the leak. Then operators attempted to close the penstock drain valve, but it would not move in either direction. The penstock continued to drain through the relief valve for a further 15 minutes. Due to the quick response of the operators, there was no injury to personnel, only wetting, and no damage to other equipment occurred. If this had occurred during the lightly staffed early morning shift, the turbine floors would have been flooded before help arrived from Tarraleah. Some repairs involving the valve from the No. 1 unit were improvised and it was recommended that no draining of any of the penstocks take place until a thorough examination had been made.

During the 1988 reconditioning of the No. 4 machine, the pipes in the relief and penstock drain valves were found to be heavily corroded, to the extent that after blasting there were pin holes in the pipes.[107] Similar corrosion may explain why the penstock drain valve had failed and become inoperative in 1985. In early 1989 all the penstock drains were redesigned and replaced.[108]

Figure 2.19: Inside penstocks, maintenance and construction, 1951.[109]

[103] Memorandum CCE to Supervising Architect et al., 11/05/1953.
[104] HEC 1970-1974.
[105] HEC Memo DCME to CME, 11/07/1988.
[106] HEC Memo PSS Tarraleah Area to CPE 1985.
[107] HEC Memo DCME to CME, 11/07/1988.
[108] HEC Memo CCE PE 06/02/1989.
[109] Archives Office of Tasmania, Photographs - Tungatinah Power Station, penstocks inside, AB713-1-2124.

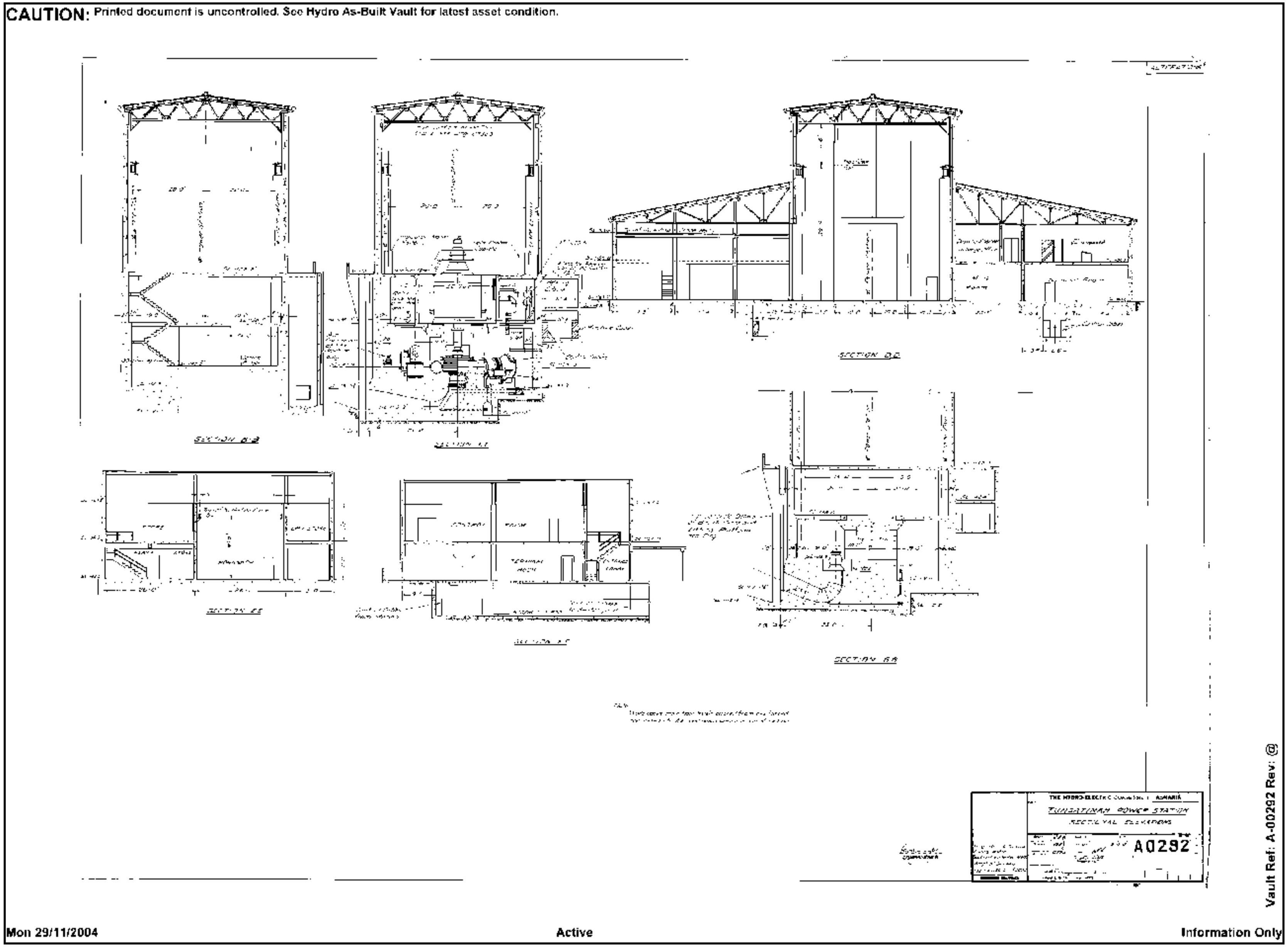

Figure 2.20: Sectional elevations of the Tungatinah Power Station (6 Jan 1953), showing the arrangement of the Alternator and Turbine Floors.[110]

[110] Hydro Tasmania.

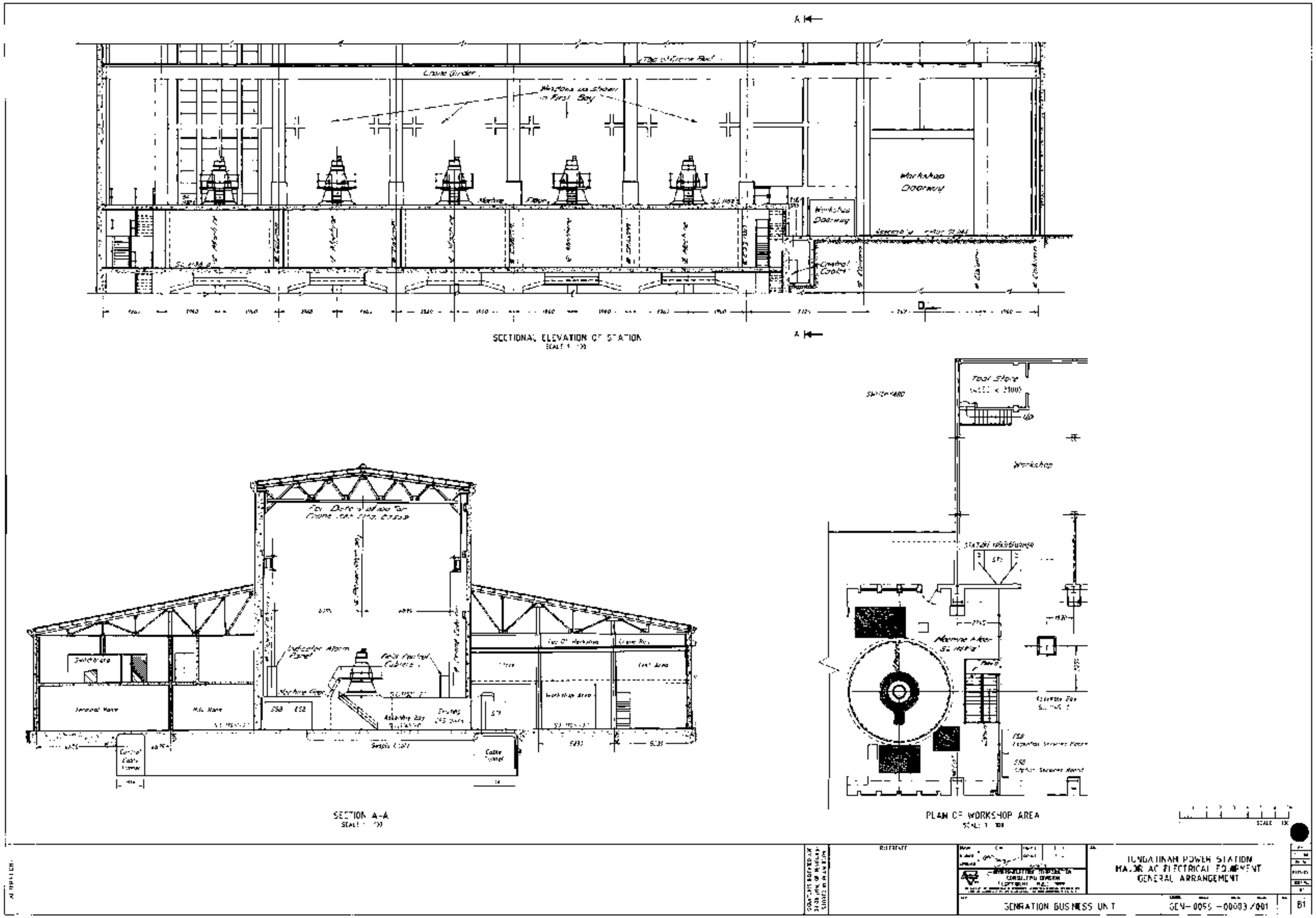

Figure 2.21: Sectional elevations of the Tungatinah Power Station 1999, showing the general arrangement of major electrical equipment.[111]

[111] Hydro Tasmania.

2.4.3 Headworks

In addition to the power station and hillside penstocks, headworks were also constructed at Tungatinah Lagoon. These consisted of an intake gate and trash rack at the mouth of the Tunnel leading to the portal and Valve House. The headworks gate was originally proposed as a vertical lift wheel gate to act as a bulkhead gate to dewater the Tungatinah Tunnel for inspection as well as an emergency shut off gate to protect the valve house and penstocks when needed.[112] However, owing to a lack of tenderers for this design, a counterbalanced sluice gate was instead sought and Ransomes and Rapier in England were awarded the contract in 1952.[113] This gate featured a Stoney Roller system, described by Robert and Waight as:

> The Stoney Roller concept was invented by F.G.M. Stoney who became the works manager at Ransome and Rapier Pty Ltd. of Ipswich England, where the gate was designed and built, in 1887. Stoney Roller gates consist of a large vertically oriented skin plate and open and close by vertical movement. Hydraulic forces are transmitted to vertical rails on each side of the gate by small rollers in a supporting cage. These roll at half the gate velocity in the manner of anti friction bearings.[114]

Over 1971 and 1972 a new 7 ½ half horse power motor and battery upgraded the original motor and a new control house was built, which contained a provision for tripping the gate remotely as well as battery charging equipment.[115] Tests and investigations were undertaken of the gate in 1963, 1975/1976 and 1980. The principal problem with the gate appeared to be the result of a length of diagonal bracing being forced into a plate giving the gate a twist and increasing stress on the rollers with risks of jamming. Owing to this and other issues with the operation of the gate it was decided in the early twenty first century, after consideration of a range of options, to construct a new radial gate anchored above the tunnel mouth.

The impact of this modification was minimal on the existing structure, resulting primarily in the removal of a handrail on the top stiffener and the construction of a new hoist platform attached to the back of the gate. At this time the access ladders, now non-compliant with safety standards, were replaced.[116] A maintenance platform was constructed below the new hoist platform allowing access from either side of the intake cut. The gearbox for the original hoist was retained and upgraded with a new motor. Together the new and old gates now function as a stoplog and radial gate.

As part of the construction of the headworks a trash rack was also built for the purpose of removing debris from the water before it entered the system. Primarily from historical images it can be understood that the trash rack is formed of a concrete foundation supporting seven concrete buttresses that in turn support a steel grill. The trash rack appears to have been constructed at the same time as the headworks gate, with the concrete being poured before the concrete for the gate towers had been completed. It initially appeared to be fitted with a pair of steel rails upon which a cart with trash claw was able to move parallel to the face of the rack. It appears to be set within the intake cut that broadens out from the tunnel mouth, although at its western end it returns to the foot of the bedrock with a concrete wall.

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[112] Thyer, G. Tungatinah Intake Gate Report on Design Appraisal of Existing Gate. Unpolished report prepared for Hydro Tasmania, 1993, pp1-2.
[113] *Ibid.*
[114] Robert, B. and Waight, S. Renewal of an Historic Intake Gate [online]. In: *9th National Conference on Hydraulics in Water Engineering: Hydraulics* 2008. Barton, A.C.T.: Engineers Australia, 2008 pp.323-330.
[115] *Ibid.*
[116] *Ibid.*

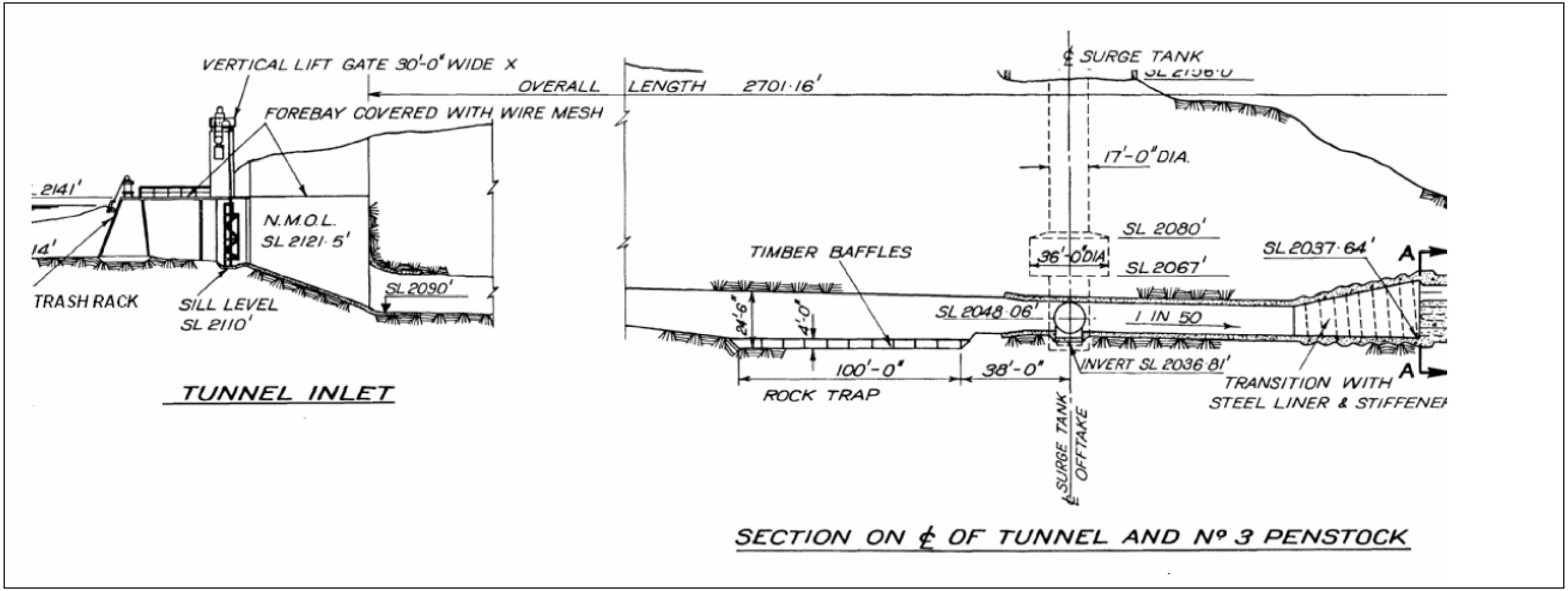


Figure 2.25 Plan showing an overview of the structure including a plan for the original intake gate and trash rack at the left of the image. [117]

[117] Robert, B. and Waight, S. 2003.

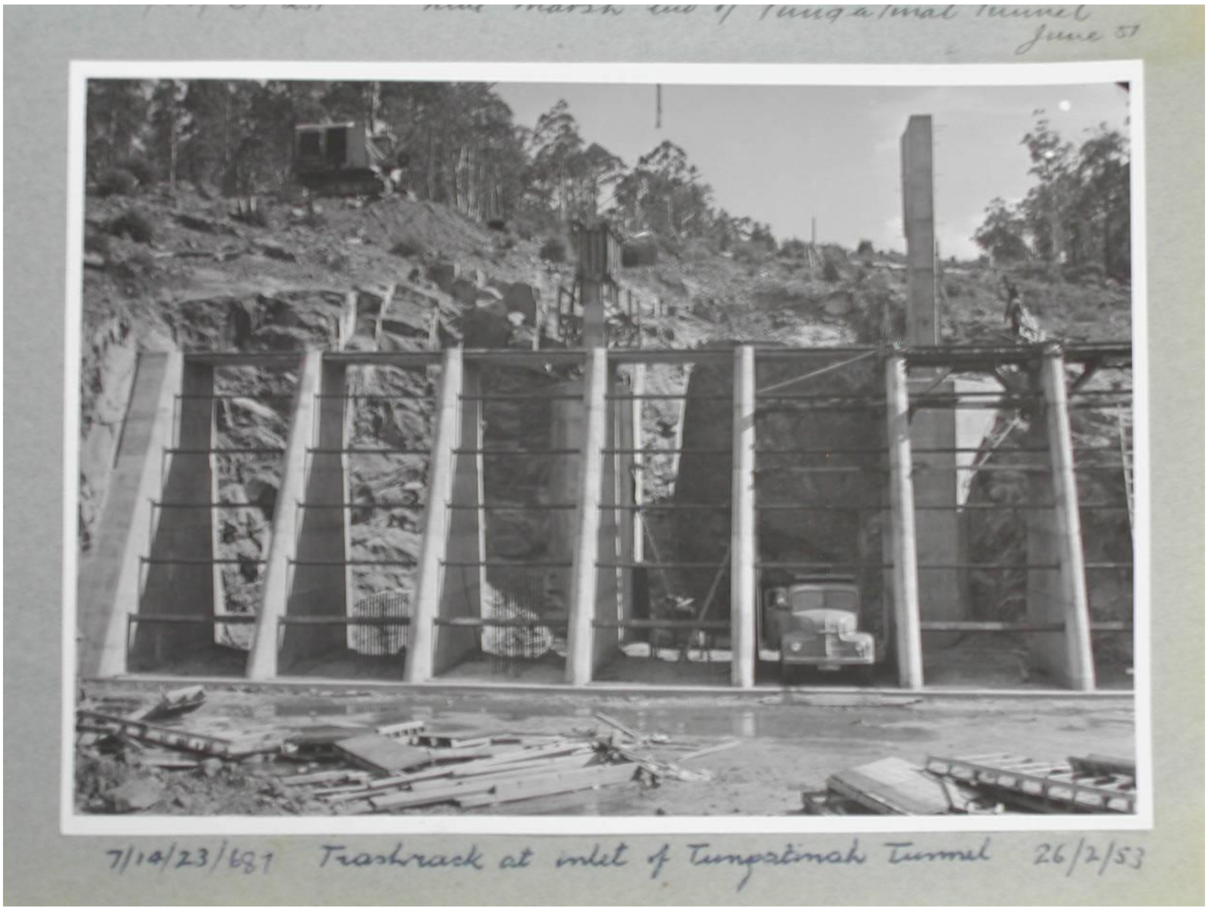


Figure 2.26 Photograph looking to the southwest showing the construction of the trash rack at the Tungatinah intake tunnel.[118]

[118] Hydro Tasmania

3.0 PHYSICAL DESCRIPTION - DATA SHEETS

3.1 Introduction

This section provides a physical description of the Tungatinah Power Station and aspects of the wider system, including the hillside penstocks, hilltop valve house and headworks.

The physical description also provides an indication of the significance of various elements that make up the complex.

This is compatible with other assessments prepared for Hydro Tasmania and allows for comparative analysis across studies. It also recognises that most aspects of the Hydro Tasmania system have some significance in the overall development of the State's power supply and that features are either significant (at varying levels) or detract from the [heritage] value of the system. The scale used is:

Very High Significance

A feature of exceptional significance within the development of the Tungatinah Power System as a key site in the evolution of the hydro system in Tasmania. All features identified as original elements of the power station and associated sites have been accorded very high significance.

A feature identified as having very high significance should be retained in its planned or intact form where possible.

Changes should generally only be made to recover the significant form or to make the building or element safe for occupation.

High Significance

An assessment of high significance indicates a place or feature is likely to be included on the Tasmanian Heritage Register under *Historic Cultural Heritage Act 1995*. These are places that are very important in telling the story of the development of Hydro Tasmania and which are to be retained in their significant form.

Medium Significance

An assessment of medium significance applies to features that represent the typical, standard, often utilitarian elements of the power station system. They may be elements added following the original construction of the power station and associated sites. While individually these features are not of high significance they contribute to the understanding of the development of the complex and should be retained wherever possible.

Medium heritage significance indicates that these features are typical or standard features that make up the majority of the system and which demonstrate the principal characteristics of hydro technology and construction.

A much higher level of flexibility can be exercised on these features in relation to upgrade requirements, maintenance or in some cases replacement.

Low Significance

These features contribute little to the overall understanding or appreciation of the Tungatinah Power Station system. Features of low heritage value are those that use technology or construction forms that are not unique to the Hydro system or this station. Modern features that have not been assessed as intrusive have frequently been accorded low significance. They may also be features that have been significantly altered, thus removing heritage value.

These features may be retained or removed to suit present or future operational requirements or to facilitate sympathetic adaptation of the place.

Intrusive

Intrusive features are those that reduce the heritage significance of the Tungatinah Power Station system.

Where the opportunity arises these features should be removed from the building and/or wider complex to facilitate recovery of a more significant form.

3.2 Tungatinah Power Station – External: including Wider System Elements

The external parts of the Tungatinah Power Station originally contained a number of elements, spread over some 1.8 kilometres. From the riverside setting of the power station with its dramatic backdrop of hillside penstocks and hilltop valve house, the system is essentially intact, accessible and readily interpretable. As of 2017 this conservation plan also includes the headworks at Tungatinah Lagoon, the tunnel to the penstocks, picnic area and the Lower Batching Plant near to the Nive River.

The following data sheets describe key elements in the system. These data sheets have been updated with descriptions of changes and new photos as of 2017. Text relating to changes occurring since the original CMP is italicised and elements that are no longer present have been given a significance rating of N/A but have still been included to provide an illustrated record of the changes that have taken place.

3.2.1 Portal, Surge Tank & Valve House

View to the northeast showing the Valve House.

Description

The valve house is a simple, timber framed, two storey, rectangular industrial building with a gabled roof; the rear wall is formed from the side of a massive concrete block manifold that hosts the penstocks supplying water from the tunnel portal.

The building is clad and roofed in corrugated galvanised iron and features a row of windows along its southern side.

The interior is accessed by a raised platform and ladder system that provides access to each valve set. There are five sets of Morison and Bearby Ltd 84 inch (213 cm) automatic self-closing butterfly valves. These were converted to hydraulic operation in 1972 and are currently undergoing further upgrading. New controls and control cabinets have recently been installed along with new cable trays and cabling. Unpainted "ghost" marks of the old cabinets remain.

The surge tank is located up the hill from the valve house. It consists of a large concrete tank with an overhead three legged gantry with attached pulley. The tank is protected by a chain wire mesh covering. A concrete foundation for a former winch is located nearby in alignment with the overhead gantry. A coil of discarded wire rope lies near the foundations.

Update 2017 *– As recorded by Waight and Dilger[119] modifications to the valve house had taken place after the 2007 conservation management plan. These modifications included the construction of a large gantry crane on the concrete block manifold that houses the penstocks, introduced to assist in the refurbishment of the valves but remaining in place. The whole of the roof had been replaced with new corrugated steel with small additions to the external cladding walls of the structure. During the refurbishment of the valves the old fittings had been left in place.*

A set of external stairs had been installed on the northwestern face of the structure and a new door opens above the earlier door. Through the new door a set of raised walkways has been added throughout the interior. A set of smoke alarms has also been installed along with new interior lights. A new distribution board has been installed on the second level of the northeastern wall of the interior, and oil accumulators and controls have been replaced. In addition to this a new fibreglass plate has been installed on the floor near to the lower entrance to the building. The concrete wall of the portal has a new steel stair installed on its face. There was no visible change associated with the surge tank, including the coiled steel rope which has been left in place.

New walkways and ladders were installed around the anti vacuum valves to the south of the Valve House and the

[119] Waight, S. and A. Dilger Tungatinah Power Station Modernisation Project: Heritage Impact Assessment Addendum. Unpublished report prepared for the Hydro Tasmania, 2011 (a).

old walkways and ladders removed as part of a Statewide Access Upgrade that was assessed in 2009 by HTC Consulting/Jackman[120]*. The new walkways are galvanised steel and differ in the layout from the earlier walkways in that they encompass the anti vacuum valves.*

Element	**Significance**
Setting	High
Portal	Very high
Valve House & valves (incl covers)	Very high
Surge Tank	High

[120] HTC Consulting/Jackman, G. 2009 Statewide Remote Access Upgrade 2008-2009 Cultural Heritage Issues Report. Unpublished report prepared for Hydro Tasmania.

3.2.2 Ruins & Relics in Vicinity of the Valve House & Penstocks

View to the northwest showing the batching plant and/or crusher footings

Description

A number of ruined structures and relics are still extant which relate to the construction phase of the power station and its infrastructure. These include:

- a concrete foundation for a small winch that operated the haulage way beside the penstocks;
- remnant rails, sleepers, winch cable rollers and drains associated with the haulage way;
- a partially collapsed shelter shed on the haulage way near anchor point F; ***Update 2017*** *- No evidence of this structure was observed to be present in 2017 despite careful field survey.*
- several sets of concrete foundations of a batch plant and / or crusher located toward the top of the hill near the Valve House;
- some small concrete foundations of unknown function located in the carpark area next to the Valve House;
- an old steel tent frame designed to fit over a penstock to allow work during inclement weather is located near anchor point H. ***Update 2017*** *- No evidence of this structure was observed to remain present in 2017 despite careful field survey.*

Element	Significance
Setting	High
Ruins associated with construction phase plant	Medium
Relics associated with construction & maintenance phase	Low to Medium

3.2.3 Hillside Penstocks

View to the north showing the penstocks (& cooling water tank)

Description

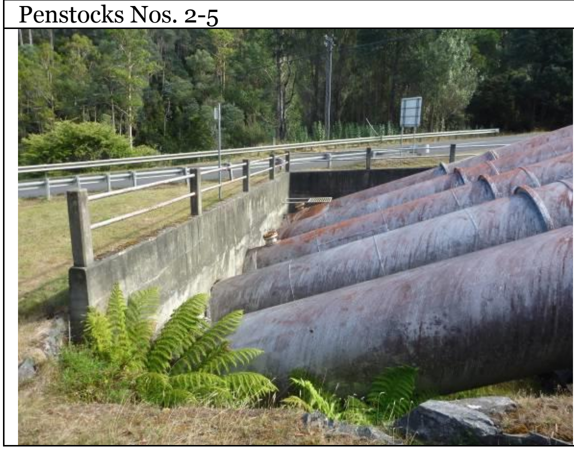
Water is diverted from Tungatinah Lagoon by a short tunnel with a surge tower and then drops 950 ft (290m) through five steel penstocks. The tunnel portal is connected to the Valve House via five penstocks which enter through a large concrete manifold block. Hydro staff have advised that Penstock No. 1 is different to the others and from any others in the system. It was hot-rolled in one piece with a longitudinal weld.

The penstocks taper from 7.5 ft to 5.5 ft (228 cm - 167 cm) and descend the hill with a total length of 3,376 ft (1028 m). The segments are secured by a series of concrete anchor points (blocks). These are identified alphabetically.

Intermediate anchoring is achieved by steel rocker plates on concrete piers or pedestals with cross bracing turnbuckles.

Update 2017 *– New movement monitors had been added to the anchor points to assess possible movement of the supporting blocks.*

Element	Significance
Setting	Very High
Penstock No. 1	Very High
Penstocks Nos. 2-5	High



3.2.4 Cooling Water Tank & Weir

View to the west showing the cooling tank.

Description

A weir and tank to supply cooling water to the power station is located across the road to the north of the power station. The trash rack at the weir appears to have been replaced and the old trash rack is located in the undergrowth to the north of the nearby clearing.

The weir consists of a low concrete wall across a small creek. A pipeline feeds water by gravity to a large concrete tank situated near the penstocks and the road.

The water is then piped under the road to the power station. Water is also pumped to the tank from the tailrace of the power station.

Conifers in the vicinity may be part of original landscaping.

Update 2017 *–New stairs and an additional platform have been added to the top of the stairs already attached to the northern face of the cooling tank. The conifers noted during the original investigation were still present.*

Element	Significance
Weir, pipeline & cooling water tank	High
Conifer plantings	High

3.2.5 Power Station - Exterior

View to the north showing the entrance to the Tungatinah Power Station

Description

The power station is of riveted steel frame construction and has a gabled Main bay and two side bays under skillion roofs (the Control and Workshop bays). The Main bay has corrugated galvanised iron and glazed side walls, solid end walls, plain galvanised iron barge and fascia boards and a zincalume roof. The steel frame incorporates and supports the main gantry crane. The floors and foundations are of concrete as are the walls of the two lower levels. Originally the building had a corrugated asbestos cement sheet roof bolted to the steel frame. This was replaced with zincalume in September 1992. The downpipes and gutters are made of copper. Doors and windows are steel framed. There are large steel roller doors at both ends of the building.

In 1955 just prior to the official opening, the exterior of the building was painted in a silver grey colour. In 1969 it was repainted using Taubman's enamel paint as follows: Walls, fascias, mullions and concrete surfaces: Sun Beige. Windows and transoms, steel roller doors and pedestrian doors: Gaylon.

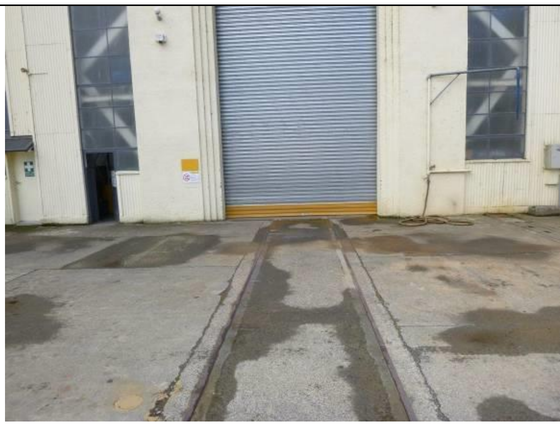
Update 2017 *– As was noted by Jackman[121] a roof access ladder has been installed onto the back, northwestern face, of the main bay of the building intended to connect to a rooftop walkway, and ventilation fans have been installed in the roof at the northwestern end of the main bay. Two large Hydro Tas signs have been installed on the external southeastern and northeastern faces of the main bay close to the roof line.*

In addition to this the tramway rails leading from the main bay into the forecourt have been infilled with concrete due to occupational health and safety concerns.

Element	Significance
Setting	Very High
Power Station (including tailraces, penstock inlets, riverside railing, etc)	Very high
Tramway rails	High
Front Porch	Low
Carpark	Low
Commemorative plaques	High
External flyscreens	High
Stone retaining walls	High
Zincalume roof	Low
Corrugated iron walls	Very high

[121] Jackman, G. Roof Access Upgrade Tungatinah, Butlers Gorge and Lake Echo Power Stations. Unpublished report prepared for Hydro Tasmania 2014.

External lights	High
Welding workshop extension	Medium
Crib room	Intrusive



3.3 Power Station—Internal Spaces & Elements

The internal elements and fittings of the Tungatinah Power Station are remarkable for their integrity as a fine example of a largely intact early post war hydro-electric power station. Many original elements survive to the present, ranging from the fine stained timber office fitout on the second floor to the original turbines and generating machinery that continue to produce power after some fifty years of service. The significance assessments in the following descriptions reflect the high integrity of the building.

3.3.1 Common Internal Features/Materials

The power station's various rooms and spaces have several features that are common throughout. These include window and door furniture (with a range of handles and door closers). There are also a variety of windowpane types with several different frosted glass panes being used through the building as well as clear glass panes. The following photographs provide an indication of the range of details found throughout the building's fitout.

Image	Description
	External window glass pattern in Control Room Bay, ground floor.
	External window glass pattern in Workshop Bay, ground floor.

Image	Description
	External window glass pattern in Workshop Bay, first floor (S15).
	Internal window glass pattern, first floor offices corridor.
	Internal window glass pattern, Control Room (S31).
	Typical window lock, Gasket Room (S16). These locks should be retained and conserved in working order.

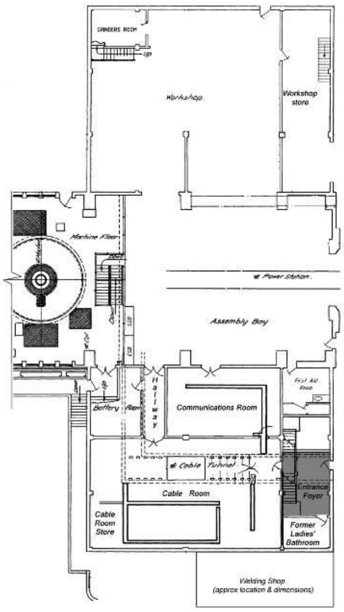
Image	Description
	Typical internal door — note chrome kick plate and finger plate (S32). Note also modern lock.
	Typical door furniture — original chrome handle and fingerplate, and modern lock (S31). This type of door handle and fingerplate should be retained and conserved where they occur. The modern lock is intrusive.
	Typical office door handle with snib lock (S28). This type of door handle should be retained and conserved where they survive.
	Typical brass door closer in power station (S31). This type of door closer is the most common throughout the power station and should be retained and conserved.

Image	Description
	Second type chrome door closer — this is the only one of its type in the building (S31-S32 door).

3.3.2 Ground Floor

Public and main staff access to the power station is via the main glass door into the entrance foyer. Otherwise the ground floor comprises entirely of working and circulation spaces. The internal fitout of these spaces is utilitarian in nature and future conservation should recognise this characteristic.

3.3.2.1 Foyer – S1



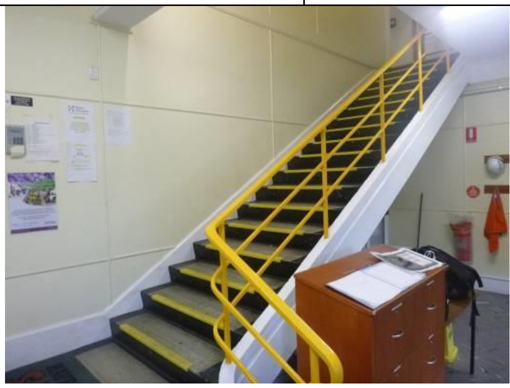
View to the south showing of the vestibule showing stairs, masonite walls, safety and attendance boards and late twentieth century cabinet.

Description

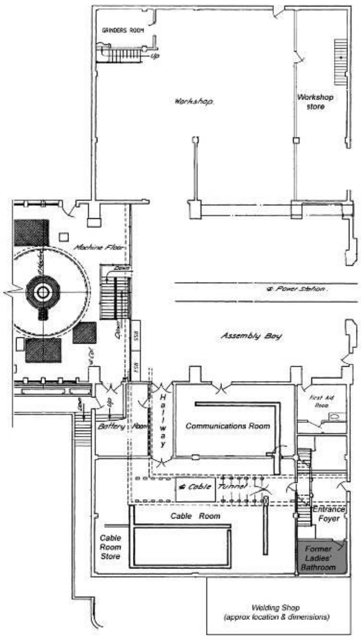
A small entrance space with a metal-framed door with two glass panels and a bottom metal panel provides access to the building. It has the original brass door closer and modern locks. It is flanked by two three paned metal framed sidelights and a top light across the three glazed openings. The space has masonite lining on the walls and ceiling, linoleum covered concrete floor, painted timber skirtings and architraves, two stained timber coat racks on the eastern wall and a concrete stairway with metal railings to the first floor offices. A stained timber and ply three-panel door provides access to the adjacent former ladies washroom. Furnishings in the space include a modern wood veneer cabinet, safety and attendance boards, a framed map of the Derwent Power Scheme and several modern fuse boxes and switchboards. The vestibule was planned to extend towards the road and include a second stairway to the first floor offices. It is not known whether it was constructed as planned and, if so, when the alteration to the present arrangement occurred.

Update 2017 *– Since the foyer was recorded in 2007 additional fire and security control panels have been installed beneath the stairs.*

Element	Significance
Overall Rating	High
Space configuration	Medium
Original walls	Very High
Eastern wall	Medium
Entrance door	Very High
Windows	Very High
Stairs	Very High
Ceiling	Very High
Floor	Very High
Door to S2	Very High
Map of power scheme	High
Coat racks	Medium
Modern door furniture	Low
Modern wall cabinets, fuse boxes, switchboards, etc	Low



3.3.2.2 Former Ladies Retiring Room – S2



View to the north of former ladies' retiring room, now used as a store for the Welding Shop.

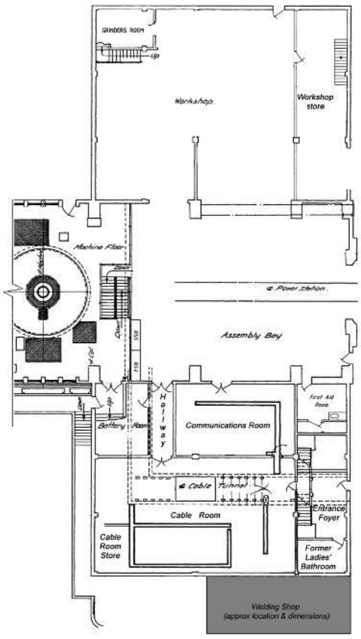
Description

A small space with masonite ceiling and wall lining, concrete floor, painted timber architraves and skirtings, modern fluorescent lighting, electrical switches and fittings, and an original painted timber door with modern door closer. There are metal-framed windows in the external wall and a remnant porcelain washbasin. There is no door to the Welding Shop. The space is used as a transitional and storage space.

Update 2017 *– No substantive changes to the space since 2007.*

Element	Significance
Overall Rating	Medium
Space configuration	High
Wall and ceiling cladding	Very High
Original windows	Very High
Fluorescent lights, electrical fittings, switches, etc	Low
Floor	Very High
Door to S1	Very High
Opening to S3	Low
Door furniture	Low
Washbasin	Very High
Painted timber work	Low

3.3.2.3 Welding Shop – S3



View to the west showing the interior of the welding shop.

Description

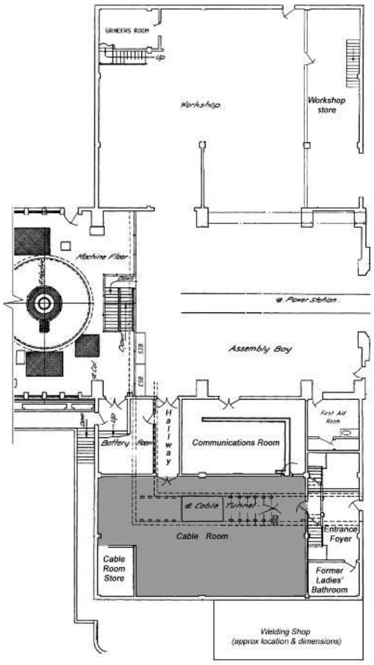
The welding shop is a skillion roofed corrugated iron clad addition to the original building and was erected during the late twentieth century.[122] It has metal framing, cement sheeting lining on the ceiling and three external walls, timber framed windows on the western wall, concrete floor, fluorescent strip lighting and modern electrical switches, cabling, etc. The shop has numerous workbenches, shelving, cable trays and pieces of machinery and equipment specific to workshop needs. Access is gained via an opening into the former ladies washroom (S1), a modern plywood door with upper glass panel and top-light and modern furniture to S4, a metal roller door to the power station forecourt and a timber door with modern furniture on the northern wall. The internal wall retains the original corrugated iron cladding and metal-framed windows of the main power station building.

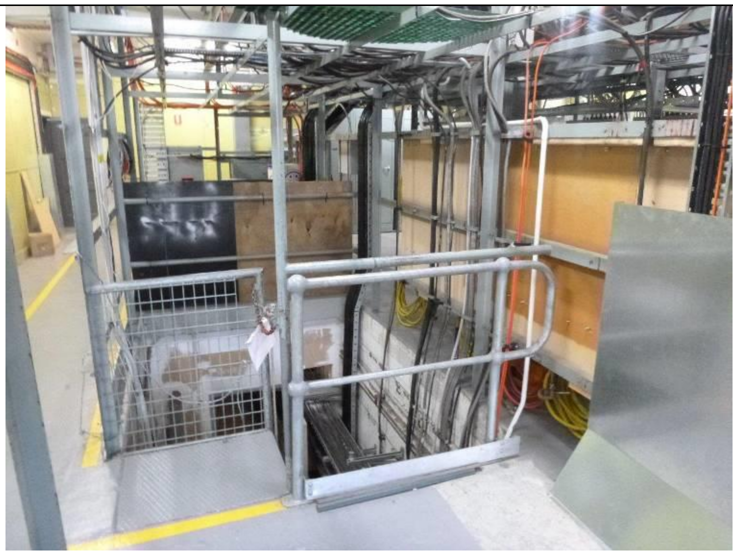
Update 2017 *– No substantive changes to the space since 2007.*

Element	**Significance**
Overall Rating	Medium
Space configuration	Medium
Metal framing	Medium
External walls and ceiling	Medium
Internal wall	Very High
External windows	Medium
Internal windows to S4	Very High
External doors	Medium
Door to S4 (including top-light)	Low
Opening to S2	Medium
Floor	Medium
Workshop furniture and equipment	Medium
Fluorescent lights, cable trays, electrical fittings, etc	Low

[122] Plans for gas reticulation to the power station and workshop, although undated, show imperial measurements, suggesting a pre early 1970s date - HT, Plan SKMHP84-39. Conversely, oral testimony within HT suggests that the workshop was constructed during the 1980s.

3.3.2.4 Cable Room – S4





View to the west through the centre of the Cable Room.

Description

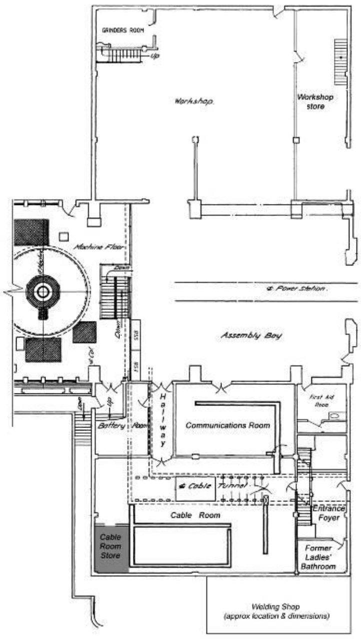
A large room located directly below the Control Room (S31), the cable room provides the space for cables to pass between the control room and the various machine floors and tunnels to the switchyard. The room has concrete floor and ceiling and masonite lined walls. The floor and ceiling have slots cut into them to allow cables to pass through. The room has been enlarged with the removal of a room on the river side with evidence of its walls visible on the floor. The cable room is dominated by a centrally located large metal frame over a concrete pit. This frame supports the cabling as it passes from S31 to the spaces below. Modern steel pipe barriers act as a safety barrier to the pit. The room contains various metal switchboxes and instrument boxes, fluorescent lights, modern electrical cabling and switches. There are two-pane metal-framed windows with frosted glass panes to the welding workshop and on the northern wall. These have centrally hinged hopper style top panes. Timber framed timber doors provide access to S2, S5 and S6. The doors to S6 are double swing doors with frosted glass top-lights.

***Update 2017** – The interior door to the ground floor hallway (S6) has been removed since the completion of the original conservation management plan.*

Element	**Significance**
Overall Rating	High
Space configuration	Medium
Evidence of former room in floor	Very High
Walls	Very High
External windows	Very High
Internal windows to S2	Very High
Doors to S2 and S5	Low
Doors to S6	N/A
Ceiling (including slots cut for cabling)	Very High
Floor (including slots cut for cabling)	Very High
Modern switchboxes, control boxes, electrical fittings, etc	Low
Fluorescent lights	Low
Metal framing for cabling	High
Pit to lower floors and cable tunnels	Very High
Safety barrier to pit	Low

3.3.2.5 Cable Room Store – S5



Detail view of Cable Room Store.

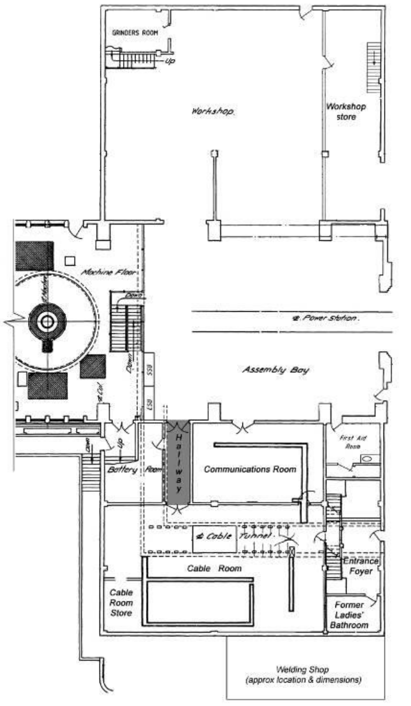
Description

A small storeroom off the cable room with concrete floor and ceiling, masonite walls, painted timber rail door with timber framing and metal framed two-pane windows with centrally hinged hopper style upper pane. The windows feature frosted glass and have reinforcing mesh fixed to the architraves. The room contains timber shelving along one wall with some silica gel canisters. There are other goods stored in the room. Electrical light fittings, cables and switches are modern and fluorescent tubes provide lighting.

Update 2017 *– No substantive changes to the space since 2007.*

Element	**Significance**
Overall Rating	Low
Space configuration	Low
External wall lining	Very High
Internal wall lining	Low
Windows	Very High
Reinforcing mesh over windows	Intrusive
Door to S4	Low
Ceiling	Very High
Floor	Very High
Timber shelving	Low
Fluorescent lights	Low

3.3.2.6 Ground Floor Hallway – S6



View to the northeast down the ground Floor Hallway.

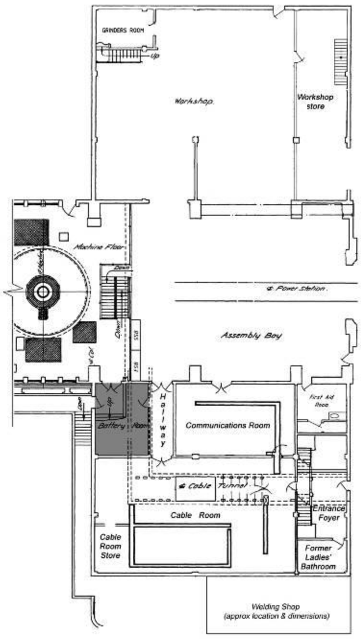
Description

The hallway provides access between the Cable Room (S40) and the Battery Room (S7) and the Assembly Bay (S8). It has concrete floor and ceiling, masonite walls, double painted timber swing doors with frosted glass top-lights to both S4 and S8. There is also a painted timber door with original brass closer to S7. There are painted skirtings. Electrical cabling, switches and fittings are modern and illumination is provided by fluorescent strip lighting.

Update 2017 *– No substantive changes to the space since 2007.*

Element	**Significance**
Overall Rating	Very High
Space configuration	Very High
Wall lining	Very High
Doors	Very High
Ceiling	Very High
Floor	Very High
Fluorescent lights, electrical cablings, switches, etc	Low

3.3.2.7 Battery Room - S7



Detail of Battery Room showing concrete block wall and stairwell.

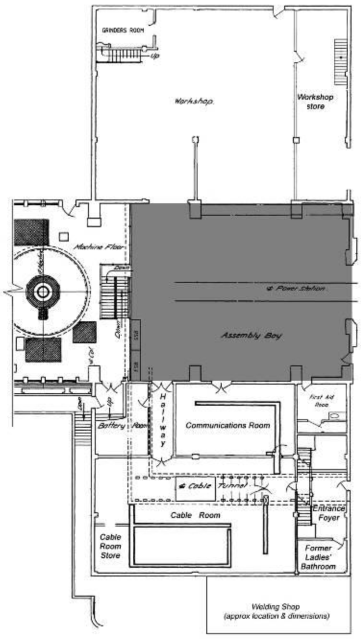
Description

A refurbished room with tiled floor, concrete and concrete brick walls and concrete ceiling with concrete stairwell from the First Floor Offices Corridor (S26) above. The room contains batteries to supply emergency direct current power. There are incandescent lights in round shades, modern electrical switches, cabling and fittings and modern metal shelves with banks of batteries (which replaced banks of large lead acid batteries that once filled the room). Access to the room is gained via a three-panel timber and plywood door to the corridor (S6), with a Danger sign on the outside. Natural light is via two-paned frosted glass metal-framed windows with centrally hinged hopper style top panes.

Update 2017 *– No substantive changes to the space since 2007.*

Element	**Significance**
Overall Rating	High
Space configuration	Very High
Original concrete walls	Very High
New concrete brick walls	Intrusive
Windows	Very High
Door to S6	Very High
Ceiling	Very High
Floor tiles	Intrusive
Modern furniture, smoke detectors, electrical fittings, etc	Low
Lights	Low
Battery shelves and batteries	Low

3.3.2.8 Assembly Bay – S8



View to the southeast showing the Assembly Bay.

Description

The Assembly Bay is a large space providing an interface between the Machine Floor, the main workshops and the power station forecourt. It has concrete floor and side walls and a glazed end wall dominated by a large steel roller door providing access to the building. Iron rails set into the floor provide tramway access between the bay and the switchyard. The bay is metal framed with one of the large iron posts also containing cupboard storage space.

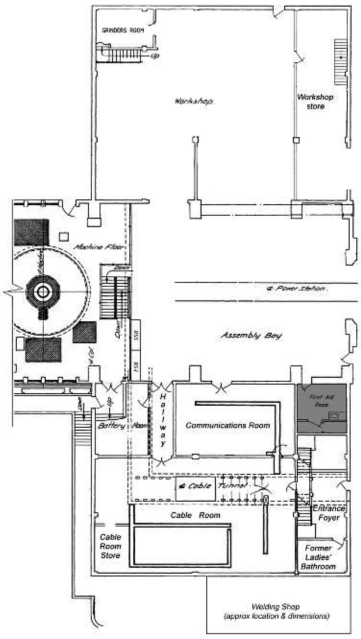
The western wall features timber framed hopper style windows providing views to the bay from the offices. A large opening in the eastern wall provides access to the workshop area. Concrete steps with metal railings lead to the Machine Floor while iron ladders provide access to the crane gangway and cranes, which are retained above the Assembly Bay when not in use. Large incandescent lights hanging from the roof provide lighting. Access to the bay is provided via doors from various spaces and a metal and glass door adjacent to the external roller door.

The bay contains various pieces of equipment and machinery. Both the floor and walls are painted in a two tone colour scheme. Electrical fittings, cables and switches are modern.

Update 2017 *– The iron tramway rails have been covered with concrete. Some areas of the floor appear to have been repainted. During the 2017 site inspection the area was being used for storage.*

Element	**Significance**
Overall Rating	Very High
Space configuration	Very High
Framing	Very High
Walls	Very High
Windows	Very High
Floor (including rail)	Very High
External doors	Very High
Roof	Low
Cranes	Very High
Lights	Very High
Electrical fittings, switches, cabling, etc	Low
Ladders and crane gangway	High
Stairs to Machine Floor	Very High

3.3.2.9 First Aid Room – S9



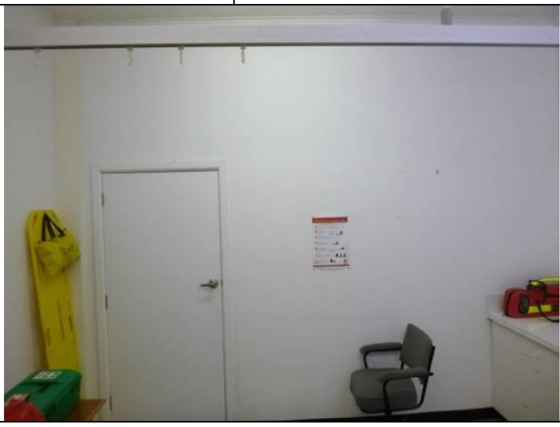
Detail of counter and sink in the first Aid Room.

Description

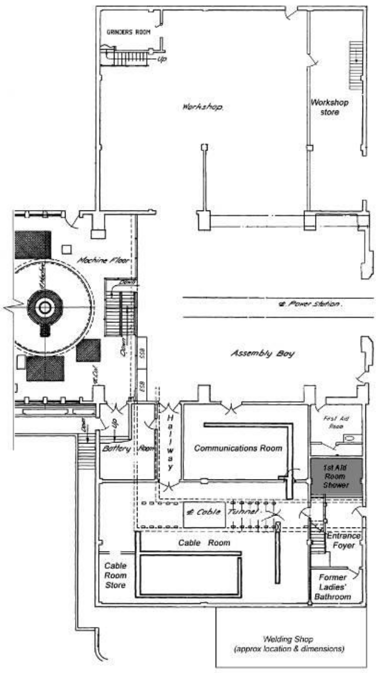
Originally built as a toilet and washroom for the Assembly Bay area the room was subsequently converted to a first aid room, although it is uncertain when this occurred. The room has plaster sheet lining on the walls and ceiling and linoleum on the floor. There are modern plywood doors to both 118 and S10. Lighting is fluorescent and electrical switches, cabling and fittings are all modern as is the furniture of desks, bed, chairs and sink. The original external windows have been covered over.

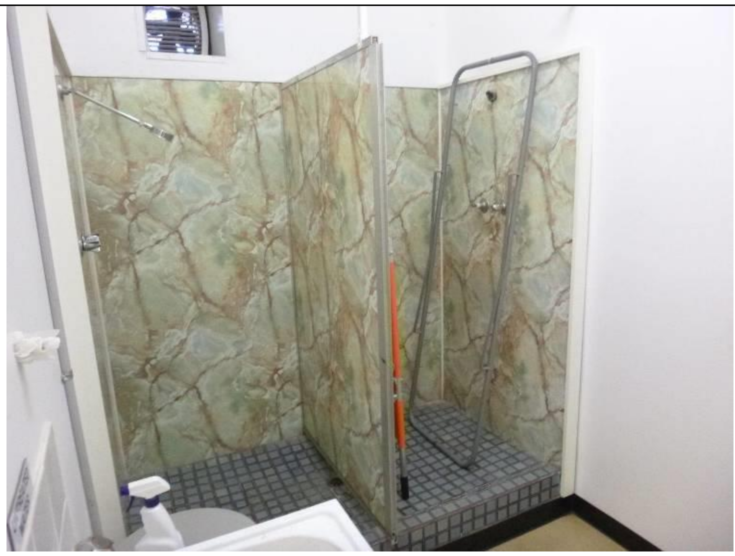
Update 2017 *– No substantive changes to the space since 2007.*

Element	Significance
Overall Rating	Low
Space configuration	Low
Wall and ceiling cladding	Intrusive
External window infill	Intrusive
Door to S8	Intrusive
Door to S10	Low
Floor covering	Intrusive
Modern furniture, smoke detectors, heater, electrical fittings, etc	Low
Fluorescent lights	Low



3.3.2.10 Shower Room – S10





Detail of shower cubicles in Shower Room.

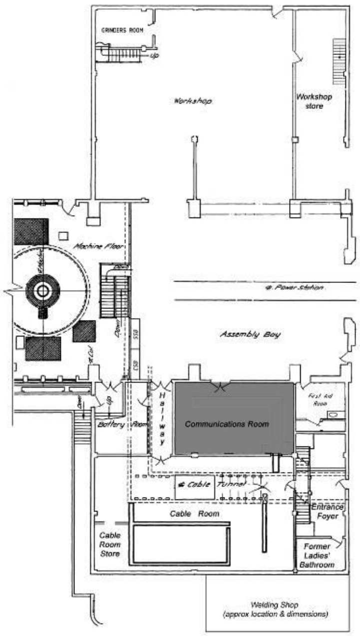
Description

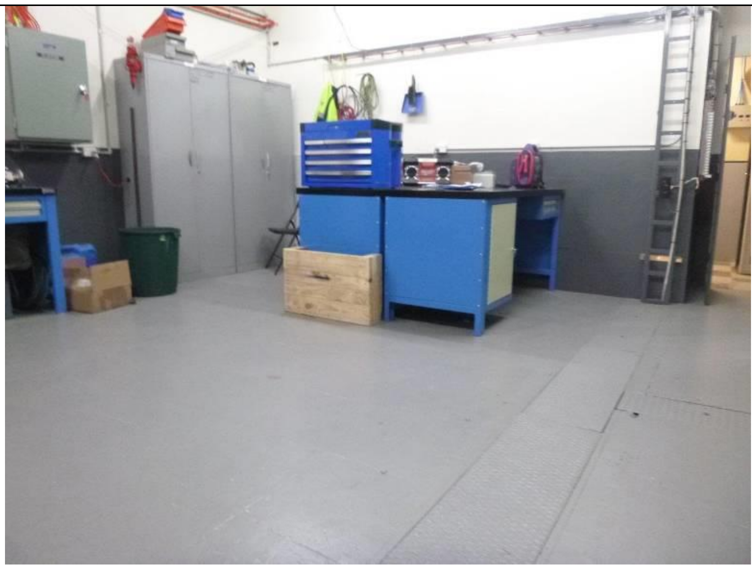
A now disused shower room that appears to have been created by reducing the size of the entrance vestibule (S1) although it is not clear when this occurred. The room has been divided into two shower cubicles with modern vinyl sheeting and plumbing. There are modern wall and ceiling linings, tiled floors to the shower recesses, a modern electrical extractor fan in the former window space and modern electrical switches, fittings and fluorescent lights.

Update 2017 *– An external door has been added to the southwest wall of the room.*

Element	Significance
Overall Rating	Intrusive
Space configuration	Intrusive
Wall and ceiling cladding	Intrusive
External window infill	Intrusive
Shower cubicles	Intrusive
Extractor fan	Intrusive
Door to S9	Low
Floor covering	Intrusive
Modern furniture, smoke detectors, electrical fittings, etc	Low
Fluorescent lights	Low
External door	Intrusive

3.3.2.11 Communications Room – S11





View to the west showing the Communications Room.

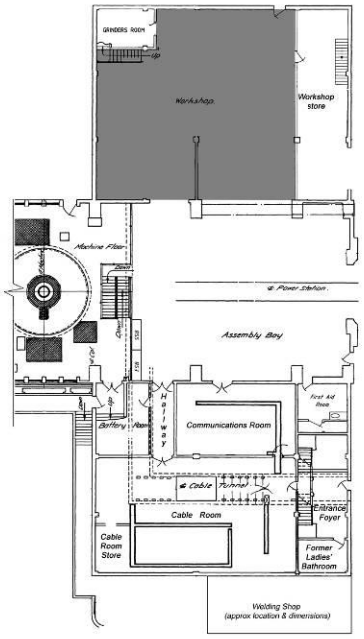
Description

The Communications Room (formerly known as the M.G. Room) has been enlarged from the original by the removal of internal walls. It is not clear when this occurred. The location of these walls is evident in the floor of the room. The walls and ceiling are clad in masonite while the floor is covered in original linoleum tiles. Access to the room is via double timber painted doors to the Assembly Bay (S8). These doors feature a four-pane frosted glass top-light. The room has modern electrical cabling, switches and fittings and fluorescent strip lighting. It has a large original switch panel on the northern wall as well as a variety of modern electronic equipment related to the operation of the power station. Various items of furniture are modern. There is also a long, narrow steel plate hatch cover on the floor.

Update 2017 *– The linoleum tiles had been painted at the time of the 2017 site inspection. The wall fan has been removed from this room. A small annex was present immediately to the northwest of this room and in this room the original floor tiles were still present.*

Element	**Significance**
Overall Rating	High
Space configuration	Medium
Wall and ceiling cladding	Very High
Door to S8 (including top-light)	Very High
Floor covering	Very High
Modern furniture, smoke detectors, heater, electrical fittings, etc	Low
Original switch panel on northern wall	Very High
Modern switchboards, communications equipment, etc	Low
Fluorescent lights	Low

3.3.2.12 Workshops – S12



View to the north showing the workshop (former electrical workshop).

Description

The main workshop is located in a wing east of the Assembly Bay. Access is gained by a large roller door and adjacent personnel door in the former general workshop space and a second smaller roller door in the former electrical workshop space. There are also timber doors to the grinder room (S13) in the north-eastern corner and to the workshop store (S14). A three pane metal door provides external access in the south-eastern corner of the general workshop area while a timber staircase provides access to the gasket room (S16) above. A sliding timber servery hatch provides access to S14. The workshop contains a light overhead electric crane and extensive equipment including: Hercus and Tonn drill presses; Macson and Dean Smith and Grace lathes; a bench press from Garter Industries in Victoria; shears from AP Lever mascot Sydney Model F Elliot; work benches; weighing machine; spanners and tools for turbine construction and maintenance; and lifting equipment for cranage.

The workshop has been reconfigured since the building's original construction with the amalgamation of the former general and electrical workshops into one large space with masonite lined walls. There is an exposed zincalume roof with metal framing in the general workshop and a lower concrete ceiling in the electrical workshop, two banks of metal framed windows on the eastern wall and two rows of glass tile bricks high on the northern wall of the electrical workshop. Rails set in the concrete floor provide machine access into the workshop space. The space is lit by high wattage incandescent lights with original shades in the general workshop area and fluorescent lights in the electrical workshop area. There are also modern electrical cabling, switches and fittings and cable trays.

Update 2017 *– This room now contains a relocated grinder that was previously present in the grinder's room (S13). The stairway to the former gasket room (S16) is still present but has been blocked off at ceiling level. Three lathes fabricated by either Macson or Dean Smith and Grace have been removed since 2007. They appear to have been replaced by a late model Morton Lathe.*

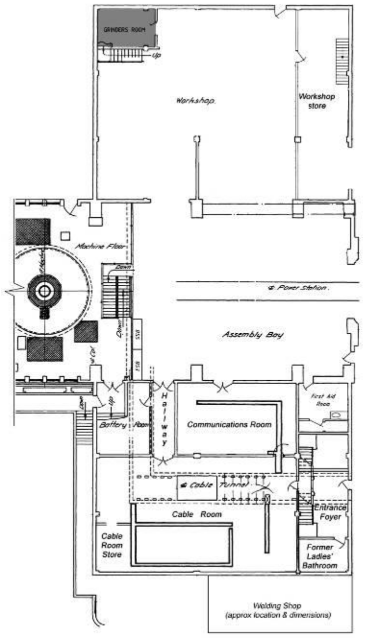
Element	Significance
Overall Rating	Very High
Space configuration	High
Walls	Very High
External windows	Very High
Glass bricks	Very High
Zincalume roof	Low
Concrete ceiling	Very High
Doors to S8	Very High
Doors to S13 and S14	N/A
External door	Very High
Flooring (including rails)	Very High
Incandescent lights and shades	Very High
Modern furniture, cable trays, electrical fittings, etc	Low

Workshop benches, tools, equipment, shadow boards, etc	Very High
Late model Morton Lathe	Low
Stairs to S16	Very High






3.3.2.13 Grinders Room – S13



View of Grinders Room, showing the timber cupboard under the stairway to the Gasket Room. Note the grinders have been removed.

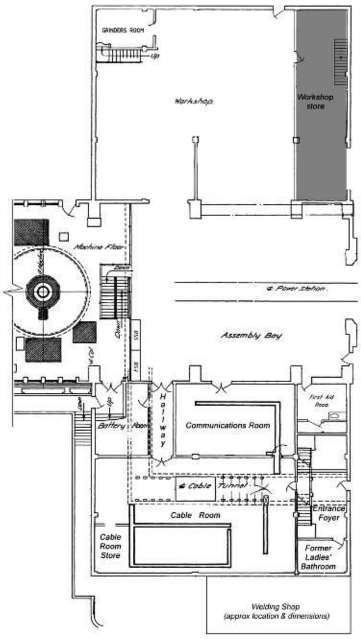
Description

A small room in the north-eastern corner of the workshop, the room was originally built as a gasket store. It is not clear when it was converted into a grinders room, although it appears that this has occurred in the last 10-20 years. It has concrete external walls and masonite internal walls, floor and ceiling, a cupboard with double timber doors and timber shelves under the stairs in its north-western corner, timber duck boarding on the floor adjacent to three electrically operated grinding machines. There are two-pane metal framed windows with timber architraves. The left hand window has a centrally hinged hopper style top pane with original furniture while the right hand window has an electric extractor fan in the top pane. Electrical cabling, switches and fittings are modern while the room is lit by fluorescent lights. Access is via a plywood door with modern furniture to the workshop (S12). A modern metal cable tray runs above and in front of the windows.

Update 2017 *– All of the grinders had been removed from this room and it was in use as a storage space at the time of the 2017 site inspection. The locations where the grinders were bolted to the floor were clearly visible at the time of the inspection.*

Element	**Significance**
Overall Rating	High
Space configuration	Very High
Walls	Very High
External windows	Very High
Extractor fan in window	Intrusive
Cable tray	Low
Door to S12	Low
Ceiling	Very High
Floor	Very High
Duck boards	Low
Under stair cupboard	High
Grinders	N/A
Modern electrical cabling, switches, etc	Low
Fluorescent lights	Low

3.3.2.14 Workshop Store – S14



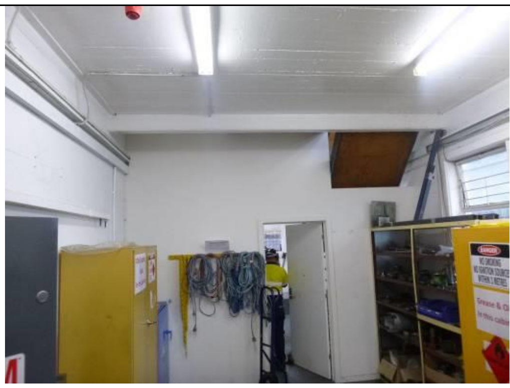
View of Workshop Store showing stairway to First floor workshop store S15.

Description

A storage space adjacent to the workshop with masonite ceiling, concrete floor, masonite internal walls with a timber sliding hatch to the workshop, two-paned steel framed windows on both external walls, metal roller door to the front of the building and timber door to the workshop. The space is lit by fluorescent lights. Furnishings and electrical fittings, switches, etc are modern. A metal stairway in the south-eastern corner provides access to S15.

***Update 2017** – A hardboard partition wall containing a door has been constructed and bisects the room from its external wall to interior wall.*

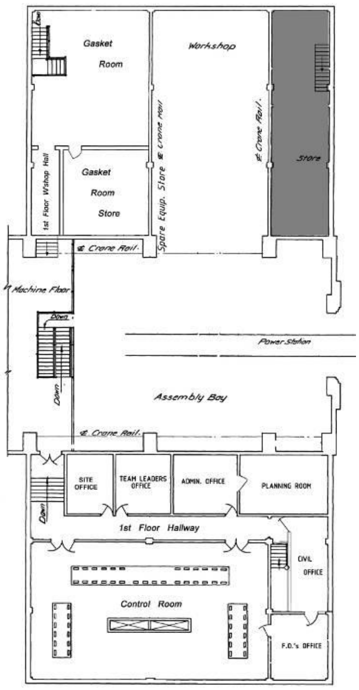
Element	Significance
Overall Rating	High
Space configuration	Very High
Walls	Very High
External windows	Very High
Hatch to workshop	Very High
Door to S12	High
Roller external door	Very High
Ceiling	Very High
Floor	Very High
Modern furniture, heater, electrical fittings, etc	Low
Fluorescent lights	Low
Partition wall and internal door	Intrusive



3.3.3 First Floor

The first floor workshop spaces are utilitarian in character and have all been altered since initial construction. This allows some further alterations as necessary within the constraints of the identified significance of various spaces and elements.

3.3.3.1 First Floor Workshop Store – S15



View north of First Floor Workshop Store.

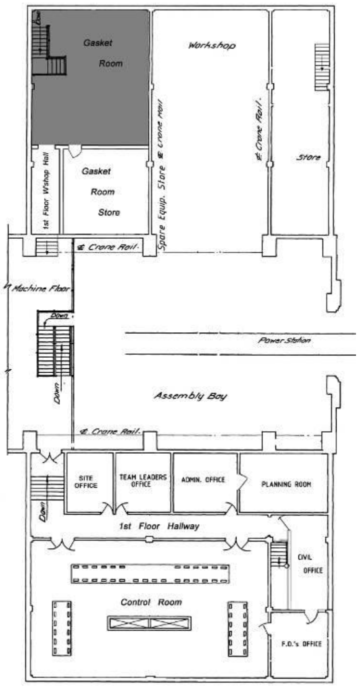
Description

This space was originally divided into a store and crib room but has since been converted into a single store space. Evidence of the original configuration of the rooms can be found in the concrete floor. Walls and ceiling are of painted panels, the floor is concrete and there are steel framed three-paned windows with centrally hinged vertically opening central casements on the eastern and southern walls. The stairs from S14 have been relocated along the external wall. The room is furnished with modern tables and metal shelves. There is fluorescent lighting and modern electrical fittings and switches, etc.

Update 2017 *– No substantive changes to the space since 2007.*

Element	Significance
Overall Rating	Medium
Space configuration	Medium
Wall cladding	Low
External windows	Very High
Stairway	Low
Ceiling	Low
Floor	Very High
Modern furniture, smoke detectors, electrical fittings, etc	Low
Fluorescent lights	Low
Evidence of former space configuration on floor	Very High

3.3.3.2 Gasket Room – S16



View north of Gasket Room looking towards the Gasket Room Store.

Description

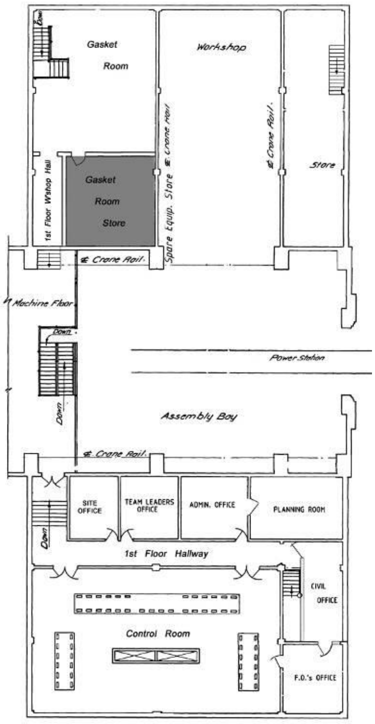
A large open space that was formally the electrical workshop. It has a concrete floor, exposed zincalume clad skillion roof and walls to S17 and S18, steel framed three-paned windows with centrally hinged, vertically opening central casements on the two external walls, fluorescent lighting and modern electrical fittings, switches, etc. Access to the workshop is gained by an original staircase in the north-eastern corner. The room is furnished with modern cutting tables, shelves, etc. The stairway to S12 is surrounded by wire mesh to provide a safe working space.

Update 2017 *– This room has been changed substantially since preparation of the original conservation management plan. The changes, as proposed, were considered by Waight and Dilger.[123] Now serving as an office, the earlier interior fittings, furniture and equipment have been removed. A new ceiling and new interior walls have been fitted with new lights, desks and other office furniture. The stairway to the gasket room mezzanine has been removed and the door through to the gasket storage room (S17) has been sealed. New services in this room enter through holes made in interior walls.*

Element	**Significance**
Overall Rating	Medium
Space configuration	N/A
External walls and wall to S12	Very High
External windows	Very High
Door to S17	Low
Stairway	N/A
Mesh around stairway	N/A
Roof	Low
Floor	Very High
Modern furniture, smoke detectors, electrical fittings, etc.	Low
Fluorescent lights	Low

[123] Waight, S. and A. Dilger Tungatinah Power Station Modernisation Project: Heritage Impact Assessment Addendum. Unpublished report prepared for the Hydro Tasmania, 2011(b).

3.3.3.3 Gasket Room Store – S17



View north of Gasket Room Store.

Description

A storage space created after construction with T & G timber flooring, masonite and concrete walls, exposed skillion roof, fluorescent lighting (attached to metal brackets fixed to the walls) and modern electrical fittings, switches, etc., stairs to a mezzanine (which extends over the ceiling of S18) and wire mesh separating the top of the internal wall from S16. The room contains rows of metal shelving storing a miscellany of items related to the operation and maintenance of the power station.

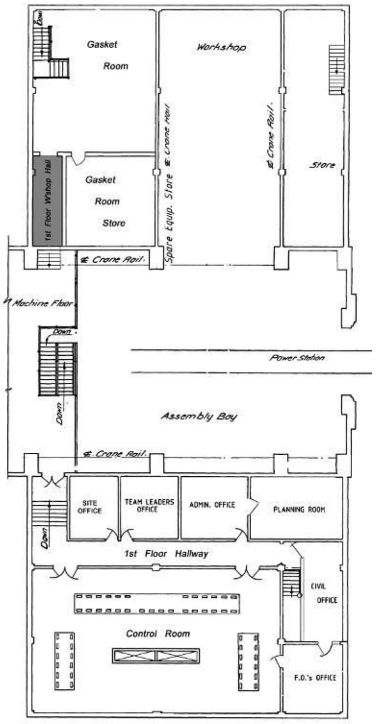
Update 2017 – *The gasket storage room been changed substantially since preparation of the original conservation management plan. The changes, as proposed, were considered by Waight and Dilger.*[124] *Now serving as a locker and change room, the earlier interior fittings, storage shelves and equipment have been removed. A new ceiling and new interior walls have been fitted with new lights, storage lockers and benches.*

The stairs to the ceiling space have been left in place but a suspended ceiling has been fitted at the floor level of the mezzanine. This ceiling is attached to the steel framing of the building with cables and bolts. New services in this room enter through holes made in interior walls.

Element	Significance
Overall Rating	Low
Space configuration	Low
Original walls (to workshop and Assembly Bay)	Very High
Mesh upper walls	Low
Door to S16	Low
Timber flooring	N/A
Roof	Very High
Modern electrical fittings, etc	Low
Fluorescent lights	Low
Shelving	Low
Mezzanine (including stairs)	Low
Modern ceiling	Intrusive
Locker room fit-out	Intrusive

[124] Waight, and Dilger 2011(b).

3.3.3.4 Gasket Room Hallway – S18



View northwest of Gasket Room Corridor.

Description

A small circulation space between the Gasket Room and the steps leading down to the Exciter Floor. The room has masonite ceiling and internal walls, concrete flooring, and floor to ceiling steel framed windows with centrally hinged central casements on the northern side. Lights are fluorescent and electrical fittings, switches, etc are modern. There is a painted four panelled timber door to the Machine Floor.

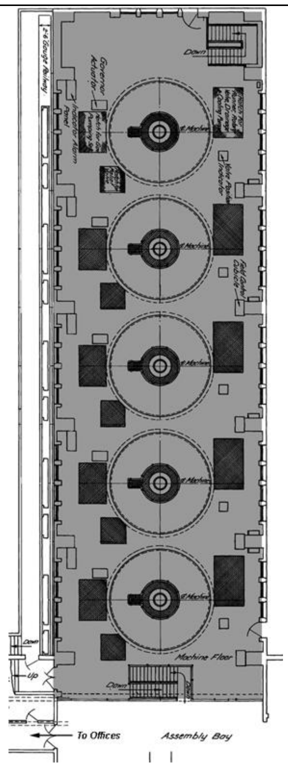
Update 2017 *–A hardboard partition has been constructed in this hallway near to the entrance from the main bay. A set of external stairs, which stand free of the building itself, have been constructed on the outside of this space and a new doorway has been cut into the exterior wall. The interior has been refitted and repainted and a new water service installed.*

Element	**Significance**
Overall Rating	Low
Space configuration	Low
External walls and walls to S16 and S19	Very High
External windows	Very High
Door to S19	High
Ceiling	Very High
Floor	Very High
Modern electrical fittings	Low
Fluorescent lights	Low
Paintwork interior timber work	Low
New exterior door	Intrusive
New interior partition and door	Intrusive

3.3.4 Generating Floors

The three generating floors form the working heart of the power station and contain a fine and modified collection of operating post-war power station machinery. It is of outstanding heritage significance and should be conserved where possible. The fitout of the floors is utilitarian in character. Major changes have occurred within this space since 2007. Four of the five original exciters have been replaced, and only TU3 remains intact. Some minor changes have also taken place, such as the creation of new storage spaces on the alternator and turbine floors. A physical description based on an archival source is included as Appendix C.

3.3.4.1 Machine Floor – S19



Looking northwest over the Machine Floor.

Description

A large open space with the industrial framing of the building strongly expressed in the walls and roof. It contains the power station's exciters and governors. The space features riveted steel framing with corrugated iron wall cladding and zincalume roof cladding, floor to roof steel framed windows (some with centrally hinged hopper opening panes) on the eastern and western sides, and a relatively uncluttered floor space dominated by the GEC exciters. The machine floor also includes actuators and other equipment and instrumentation related to the operation of the power station. The concrete floor itself has been painted green with the removable steel floor panels painted grey. There are steel framed glass windows with a steel and glass door at the northern end of the space. Steel ladders provide access to a steel gangway on the eastern side of the space and there are steel crane rails along both walls. A 100 ton crane and a 20 ton auxiliary crane are held above the Assembly Bay when not in operation. Modern steel railings act as safety barriers around the machines and around the concrete steps and drop to the Assembly Bay floor. Lighting is provided by high wattage shaded incandescent lights hanging from the roof framing and articulated ball lights on metal arms on the western wall. A stairwell at the northern eastern corner provides access to the lower floors while stairs at the southern end provide access to the Assembly Bay. Timber framed double swing doors in the south western corner provide access to the office spaces. These doors do not appear to be original. They have plywood panelling, glass upper panels and an in-filled timber framed four paned top-light. A metal-framed glass door opposite provides access to the eastern side of the building and the crib room.

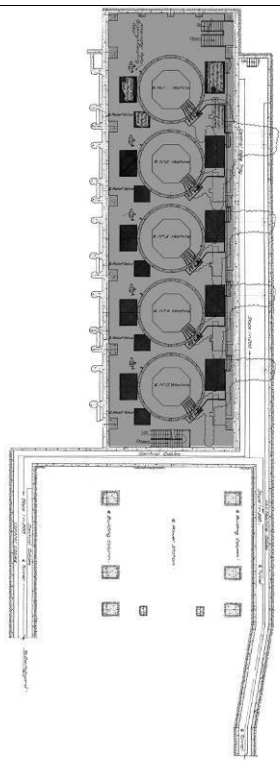
Update 2017 *– Changes to the access hatches appear to be present in the case of TU1, TU2, TU5, with the southern side of the access hatches enlarged and fibreglass panels installed. There are four new ventilator fans in the northwest portion of the roof. The ladder to the gantry crane has been replaced. The exciter covers for TU1, TU2 and TU5 have been replaced. Although the exciter cover for TU4 has not been replaced a new control panel has been installed. The only original control panel and governor actuator to remain are those associated with TU3.*

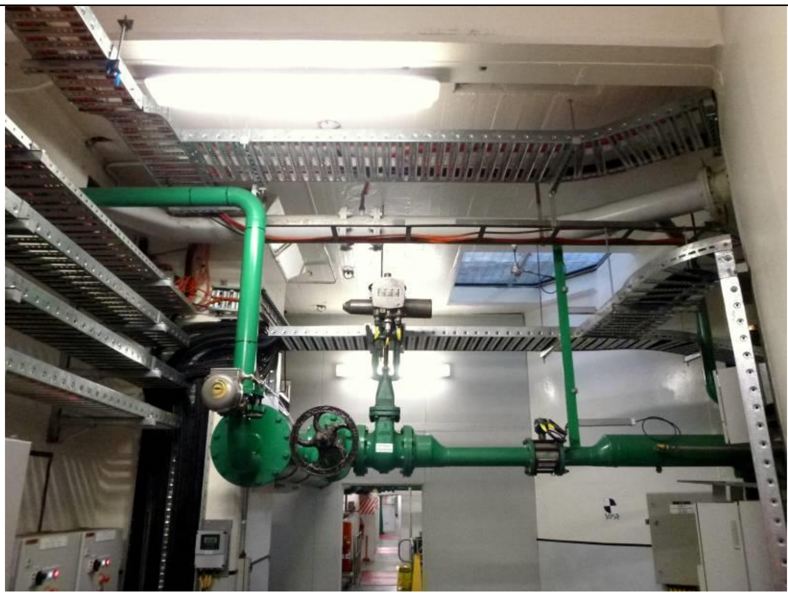
Part of a single exciter cover removed from a generator is displayed on the machine floor along with a single exciter that had also been removed. All of the main inlet valve controllers have been removed from this floor.

Element	Significance
Overall Rating	Very High
Space configuration	Very High
Walls (including framing), floor (including removable steel plates) and roof	Very High
Lights	Very High
Exciters TU3 and TU4	Very High
Exciters TU1, TU2 and TU5	Low
Governor actuator TU3	Very High
Governor actuators TU1, TU2, TU4 and TU5	Low
Windows	Very High
Steel and glass door at northern end	Very High
Doors to S26	Medium
External door to eastern side	Very High
Gangway	Very High
Ladders	Very High
Crane (including auxiliary crane)	Very High
Electrical cabling, switches and fittings	Low
Modern metal railings	Low

3.3.4.2 Alternator Floor – S20





View northwest from eastern end of Alternator Floor, the hardboard partition is visible in the centre of the photograph.

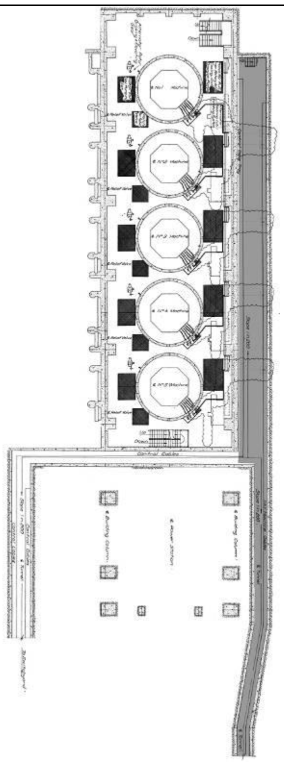
Description

A large space running the full length and width of the building and containing the alternators for the generators as well as oil and water cooling mechanisms and other original and modern equipment related to the operation of the generators. Walls, ceilings and floors are concrete with steel plate hatches providing access to both the machine floor above and the turbine floor below. Lighting is fluorescent and electrical cabling, switches and fittings are new. There is stair access to upper and lower floors at both ends as well as shorter stairways to the roadside tunnel on the eastern side of the floor. Stairways are concrete with steel railings. Modern metal railings have been added to minimise risk in the workplace.

Update 2017 *– Changes to the braking hydraulics, heat exchangers and hydraulic system have been made to TU1, TU2, TU4 and TU5. TU3 appears little changed from the original conservation management plan. Even though TU4 is unchanged on the machine floor above, it has undergone the same refit and refurbishment to exterior elements as the other heavily modified turbines. The stair rails have been repainted. The refurbishment partitions have been in left in place between each alternator TU1, TU2 and TU5, with the southern side of the access hatches enlarged and fibreglass grates installed.*

Element	Significance
Overall Rating	Very High
Space configuration	Very High
Walls, floor and ceiling	Very High
Fluorescent lights	Low
Steel plate hatches to alternator floor	Very High
Alternators TU3	Very High
Alternators TU1, TU2, TU4 and TU5	Low
Electrical cabling, switches and fittings	Low
Modern metal railings	Low

3.3.4.3 Roadside Tunnel – S21



View to the northwest of Roadside Tunnel.

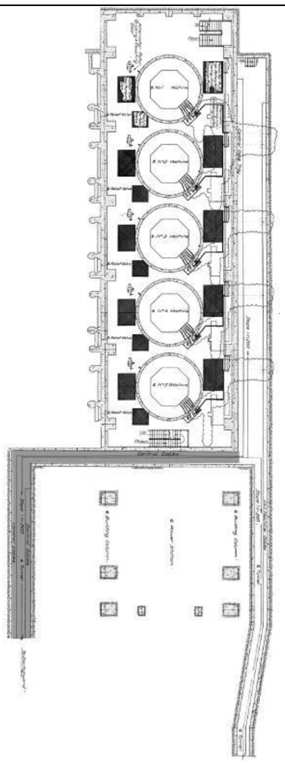
Description

The Roadside Tunnel is a long narrow corridor with concrete walls, floor and ceiling. Timber and metal cable trays carry power cables between the generators and the switchyard. Cables pass into the tunnel through holes cut into the walls and ceiling. The tunnel narrows in its southern half. Lighting is fluorescent. A shallow gutter on the eastern side of the tunnel drains the tunnel.

2017 Update *- New natural earthing transfers are present. There is evidence of some grouting in the small holes cut in the walls and ceiling. The timber cable trays noted in the original conservation management plan were not in evidence during the site inspection and appear to have been removed.*

Element	Significance
Overall Rating	High
Space configuration	Very High
Walls, floor and ceiling	Very High
Metal cable trays	Low
Timber cable trays	N/A
Fluorescent lights	Low
Gutters	Very High
Cable holes in walls and ceiling	Medium to Very High

3.3.4.4 Riverside Tunnel – S22



View to the northwest of Riverside Tunnel.

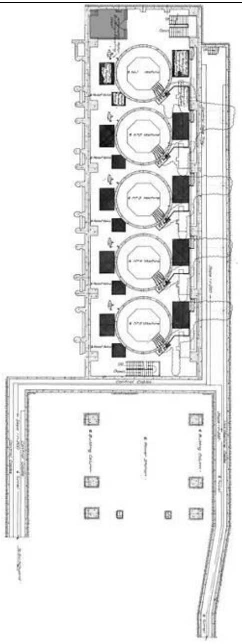
Description

The Riverside Tunnel is a long narrow corridor with concrete walls, floor and ceiling. Timber and metal cable trays carry power cables between the generators and the switchyard. Cables pass into the tunnel through holes cut into the walls and ceiling. For much of its length timber duckboarding is laid over the floor. Lighting is fluorescent.

Update 2017 *– No substantive changes to the space since 2007.*

Element	**Significance**
Overall Rating	High
Space configuration	Very High
Walls, floor and ceiling	Very High
Metal cable trays	Low
Timber cable trays	Very High
Fluorescent lights	Low
Timber duckboarding	Low

3.3.4.5 Rubber Room – S23



View to the southwest of Rubber Room.

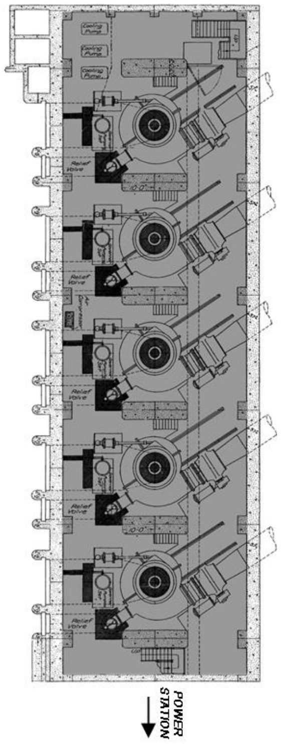
Description

A small room added after the original construction of the building. The room is located at the base of the stairs into the Alternator Floor. It has concrete external walls, floor and ceiling with timber framed masonite internal walls and a timber door. Timber shelving has been built along two walls. Lighting is fluorescent and electrical fittings, switches, etc. are modern. A pair of original galvanised pipes enter the space through the building's end external wall.

2017 Update *- A new free standing wooden shelf had been installed on the northwestern side of the room since completion of the original conservation management plan.*

Element	Significance
Overall Rating	Low
Space configuration	Low
External walls, floor and ceiling	Very High
Internal walls and door	Low
Timber shelving	Low
Fluorescent lights	Low
Galvanised pipes	Very High

3.3.4.6 Turbine Floor – S24



View northeast of Turbine Floor.

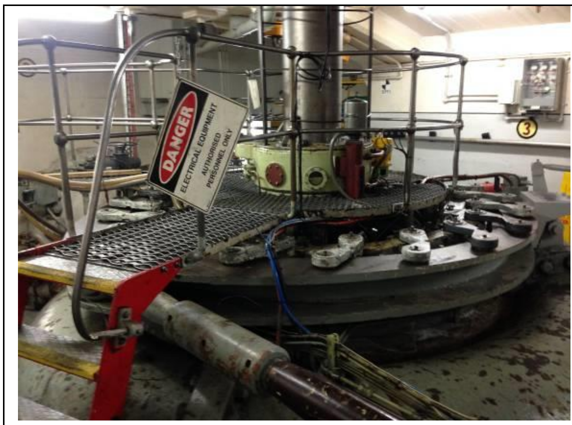
Description

A large space on two levels with concrete walls, floor and ceiling. The ceiling includes steel plate hatch covers providing access between the alternator and turbine floors. There is fluorescent lighting and modern electrical cabling, switches and fittings. There are also original round bunker style GEC lights located on the western wall. The floor includes the inlet valves from the penstocks to the turbines, the turbines themselves, and a variety of pipes and both original and modern equipment required to operate the generators.

***2017 Update**– On the turbine floor, new fibre glass floor grates have been installed, except in the case of TU3, new filters have been installed and the partitions built during the modernisation process remain in place. The new wire mesh and fibreglass floor grates are likely to be associated with the conversion of the sump into a bund. New access platforms have been installed throughout, except in association with TU3. The access platform of TU4 has been retained but the wire mesh floor has been replaced by fibreglass.*

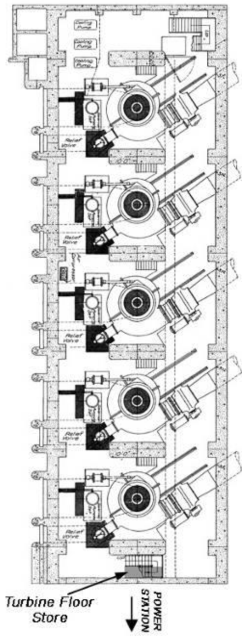
In addition, new motor starter panels, new accumulators and electronic governor control panels have been installed for all turbines. The spiral casings on TU3 and TU4 are intact and all others have been replaced. The servo motors for TU3 and TU4 have been retained, and all others are new. The upper cover for the guide vane and the guide links have been replaced or refurbished for TU4 even though the spiral casing appears to remain. New high pressure units were installed for Turbines 1, 2 and 5.

Element	**Significance**
Overall Rating	Very High
Space configuration	Very High
Walls, floor and ceiling	Very High
Turbines TU3 and TU4	Very High
Turbines TU1, TU2 and TU5	Medium
Fluorescent lights	Low
Bunker style round lights	Very High
Steel plate hatches to alternator floor	Very High
Electrical cables, switches and fittings	Low


DANGER
ELECTRICAL EQUIPMENT
AUTHORISED
PERSONNEL ONLY

DANGER

3.3.4.7 Turbine Floor Store – S25



View north of Turbine Room Store.

Description

A small under stair storage space at the southern end of the room. It has concrete walls, floor and ceiling and timber shelves storing a variety of items. Lighting is fluorescent and electrical fittings, switches etc are modern.

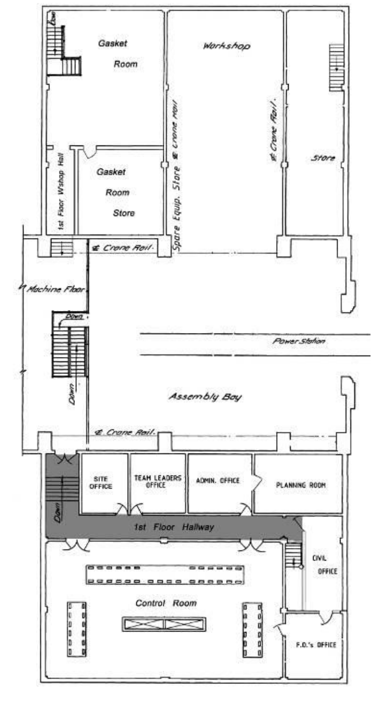
Update 2017 *– No substantive changes to the space since 2007.*

Element	Significance
Overall Rating	High
Space configuration	High
Walls and ceiling	Very High
Floor covering	Very High
Timber shelves	High
Modern furniture, electrical fittings, etc	Low
Fluorescent lights	Low

3.3.5 First Floor Offices

The first floor contains offices and the control room.

3.3.5.1 First Floor Offices – S26



Views to the southeast of First Floor Offices Hallway and door to the civil office.

Description

A long narrow hallway between the northern and southern stairwells providing access to the offices and Control Room. The hallway features caneite wall cladding, masonite lined ceiling with strip fluorescent lighting, linoleum floor coverings, stained timber architraves, skirtings and window frames throughout, a four paned top-light to the southern stairwell, and frosted glass windows to the Control Room and the Administration and Team Leader's offices. The window to the Administration Office has been modified to include a sliding servery to the hallway. Windows to the Control Room are all frosted glass while the windows to the offices are clear glass with frosted top lights. All internal windows are multi-paned. There are floor to ceiling external windows and a timber pigeonhole cabinet at the northern end. The space includes the northern stairwell with its concrete stairs and metal framed external windows, and double swing timber doors with frosted glass top-lights to the Exciter Floor. A metal-framed door with wire mesh reinforced glass panels at the bottom of the stairs provides access to the external riverside walkway. There are modern electrical fittings, fire extinguishers, smoke detectors, etc.

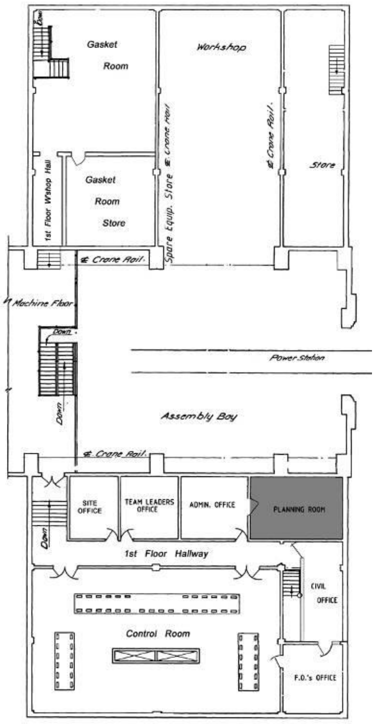
Update 2017 *– No substantive changes to the space since 2007.*

Element	Significance
Overall Rating	Very High
Space configuration	Very High
Wall cladding	Very High
External windows	Very High
Internal windows and lights to internal offices and control room	Very High
Top-light to southern stairwell	Very High
Ceiling	Very High
Floor covering	Very High
Modern furniture, fire extinguishers, heater, electrical fittings, lights, etc.	Low-intrusive
Stained interior timber work	Very High
Pigeonhole cabinet	High
Sliding window to S28	High
Northern stairwell	Very High
Door to S19	Medium


CG
GORDON
NG
NWG
SG
WG

FIRST AID

3.3.5.2 Planning Room – S27



View to the northeast of Planning Room.

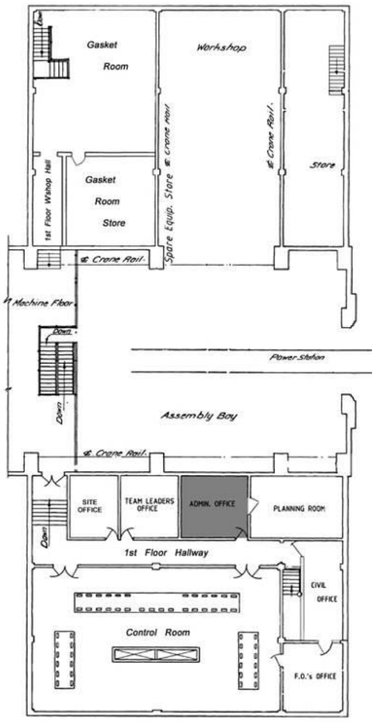
Description

A large office with access via the Administration Office. The office, like all offices on the floor, has plastered walls and ceiling with plaster cornices, checked grey and white linoleum tile floor covering, modern electrical fittings, lighting, switches and heating, and modern office furniture. Timber framed observation windows to the Assembly Bay have been double glazed with the addition of a second pane fixed to the inside of the frame. The room formerly opened onto the Hallway, although this opening has been filled in. Interior timber skirtings and architraves have been stained and the door is a stained timber door with modern furniture and a frosted glass upper panel.

Update 2017 *– No substantive changes to the space since 2007.*

Element	Significance
Overall Rating	High
Space configuration	High
Wall and ceiling cladding (including cornices)	Low
Windows to Assembly Bay	Very High
Stained interior timber work	Very High
Door (including furniture)	Medium
Floor covering	Very High
Modern furniture, electrical fittings, etc	Low
Fluorescent lights	Low

3.3.5.3 Administration Office – S28



View to the southwest of the Administration Office.

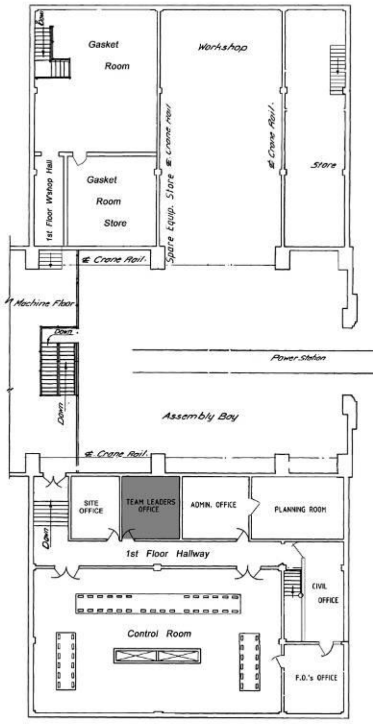
Description

An office space with plastered walls and ceiling with plaster cornices, original checked grey and white linoleum tile floor covering, modern electrical fittings, lighting, switches and heating, and modern office furniture. Timber framed observation windows to the Assembly Bay have been double glazed with the addition of a second pane fixed to the inside of the frame. The room features multi-paned clear glass windows to the hall with frosted glass top-lights and frosted glass panels to the door. Vertical blinds provide internal privacy to the office space. The window nearest the door is a clear glass metal framed sliding window with a timber shelf and vertical timber infill panelling below. It appears to have served as a reception or pay office window in the past. The door features both original and modern furniture, including original kick plates. All timber work in the office is stained. There is modern office furniture as well as modern electrical switches, lighting and heating.

Update 2017 *– No substantive changes to the space since 2007.*

Element	**Significance**
Overall Rating	High
Space configuration	High
Wall and ceiling cladding (including cornices)	Low
Windows to Assembly Bay	Very High
Windows and top-lights to hall	Very High
Sliding window adjacent to door	High
Stained interior timber work	Very High
Door (including original furniture)	Very High
Floor covering	Very High
Modern furniture, electrical fittings, etc	Low
Fluorescent lights	Low

3.3.5.4 Team Leader's Office – S29



View to the east of the Team Leader's Office.

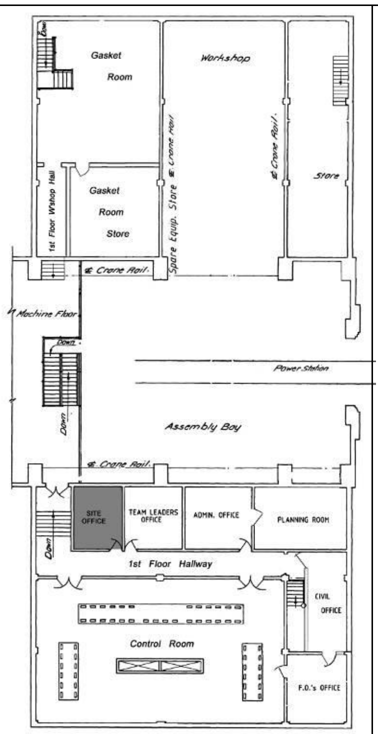
Description

An office space with plastered walls and ceiling with plaster cornices, original checked grey and white linoleum tile floor covering, modern electrical fittings, lighting, switches and heating, and modern office furniture. Timber framed observation windows to the Assembly Bay have been double glazed with the addition of a second pane fixed to the inside of the frame. The room features multi-paned clear glass windows to the Hallway with frosted glass top-lights and frosted glass panels to the door. Vertical blinds provided internal privacy to the office. The door features both original and modern furniture including original kick plates. All timber work in the office is stained. There is modern office furniture as well as modern electrical switches, lighting and heating.

***Update 2017** – No substantive changes to the space since 2007.*

Element	Significance
Overall Rating	High
Space configuration	High
Wall and ceiling cladding (including cornices)	Low
Windows to Assembly Bay	Very High
Windows and top-lights to hall	Very High
Stained interior timber work	Very High
Door (including original furniture)	Very High
Floor covering	Very High
Modern furniture, electrical fittings, etc	Low
Fluorescent lights	Low

3.3.5.5 Site Office – S30



View to the south of Site Office.

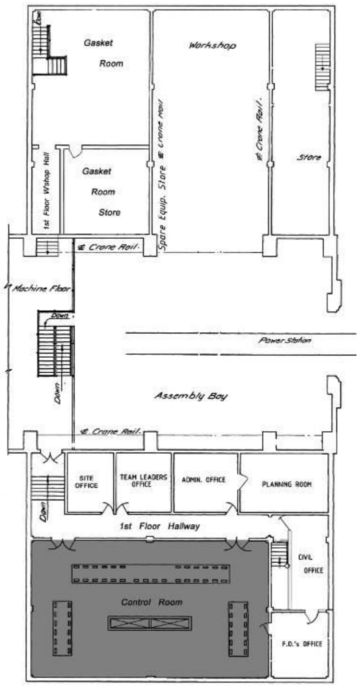
Description

A small office at the north end of the hallway. The office features plastered walls and ceilings with plaster cornices, original checked grey and white linoleum tiles on the floor, fluorescent strip lighting, modern electrical switches, original kick plate fittings, etc., and stained interior timber work. There are windows to the Assembly Bay with double panes of glass, as well as added windows to the northern stairwell. These are sympathetic in design and finish. The door is an unsympathetic modern veneer door. The room contains largely modern furnishings apart from a c.1950s safe.

Update 2017 *– The window to the assembly bay has been removed since the completion of the initial conservation management plan in 2007.*

Element	Significance
Overall Rating	Medium
Space configuration	Very High
Wall and ceiling cladding (including cornices)	Low
Windows to Assembly Bay	N/A
Windows to northern stairwell	Low
Stained interior timber work	Very High
Door	Intrusive
Floor covering	Very High
Modern furniture, electrical fittings, etc	Low
Fluorescent lights	Low
Safe	Very High

3.3.5.6 Control Room – S31



View southeast of Control Room.

Description

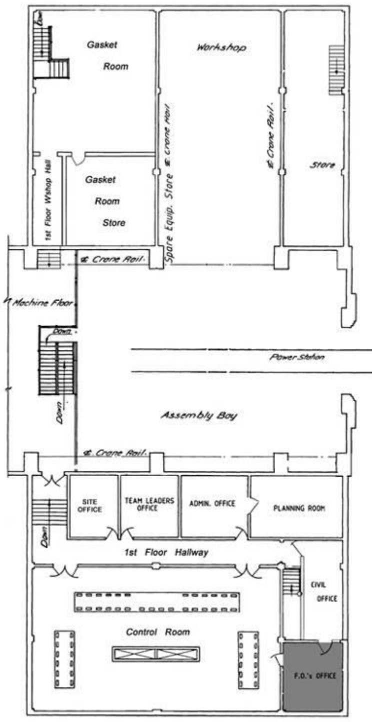
The largest space on the floor, the Control Room features caneite wall cladding, masonite ceiling, stained timber window frames, architraves and skirtings, stained timber doors with original and modern furniture, including handles, finger and kick plates, and original closers. There are two types of closers, both of which are early. There are multi-paned timber framed windows and top-lights to the hallway, all with frosted glass panes. Metal-framed centrally hinged hopper windows on the external wall provide light and views to the river. Recently installed vertical blinds provide privacy and temperature control to the Control Room. Metal and concrete control panels and boards dominate the room. Some of the dials and controls on the boards are now redundant and have been covered. There is also a metal key board, modern office furniture and modern lighting, electrical fittings, switches, etc. The floor is covered with linoleum.

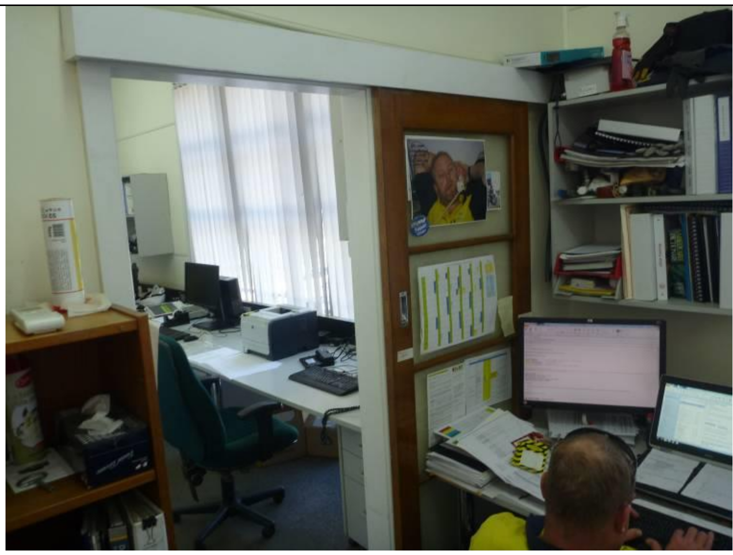
Update 2017 *– No substantive changes to the space since 2007.*

Element	**Significance**
Overall Rating	Very High
Space configuration	Very High
Original control panels	Very High
Modern control panels	Low
Wall and ceiling cladding	Very High
External windows	Very High
Internal windows and top-lights	Very High
Stained timber architraves, skirtings and window frames	Very High
Doors (including original furniture and closers)	Very High
Modern door furniture	Intrusive
Floor covering	Very High
Modern furniture, smoke detectors, heater, electrical fittings, etc	Low
Fluorescent lights	Low




3.3.5.7 Fitter Operator's Office – S32





View north of Fitter Operator's Office.

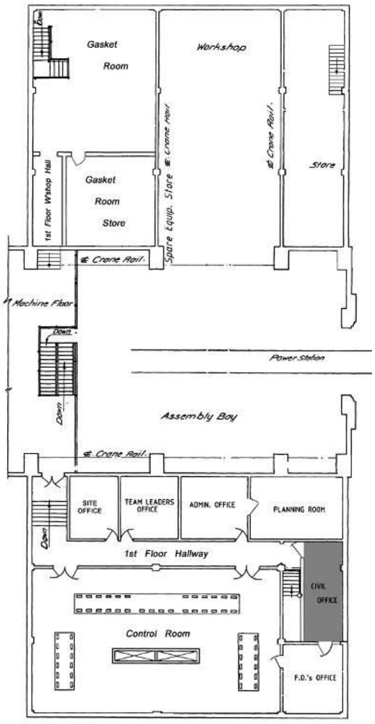
Description

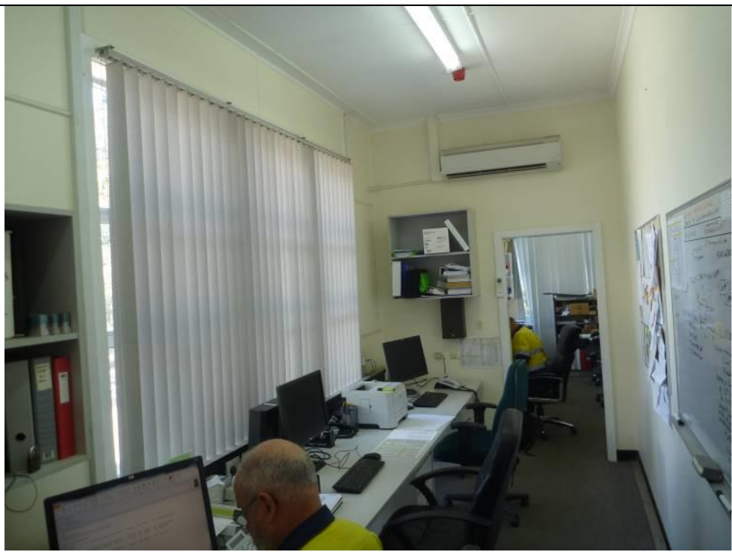
An office located in the south-eastern corner of the building with masonite ceiling, caneite wall cladding with plaster cornices, carpeted floor, modern electrical switches, fittings and air conditioners, fluorescent strip lighting and metal framed external windows on both external walls. These have three panes, the middle panes being centrally hinged hopper style windows. Interior timber skirtings and architraves have been painted while the doors remain as stained timber. The door to S31 has original and modern door furniture including original finger and kick plates. The door to S33 has been altered from a hinged door to a sliding door. This door is as originally configured with four frosted glass panels, although it features modern door furniture. Furnishings in the office are all modern.

***Update 2017** – No substantive changes to the space since 2007.*

Element	Significance
Overall Rating	Medium
Space configuration	Very High
Wall and ceiling cladding	Very High
Cornices	Low
Windows	Very High
Painted interior timber work	Intrusive
Door to S31	Very High
Door to S33	High
Sliding configuration of door to S33	Low
Floor covering	Low
Modern furniture, electrical fittings, etc	Low
Fluorescent lights	Low

3.3.5.8 Civil Office – S33





View south of Civil Office.

Description

An office located at the top of the southern stairwell. It has a masonite ceiling, caneite cladding with plaster cornices, carpeted floor, modern electrical switches, fittings and air conditioners, fluorescent strip lighting and metal framed external windows on the walls. The windows have three panes, the middle panes being centrally hinged hopper style windows, and are shaded internally by vertical blinds. Interior timber skirtings and architraves have been painted while the doors remain as stained timber. The door to S26 is a stained timber framed door with four frosted glass panels, and both original and modern door furniture. The door to S31 has had its original glass panels in-filled with plywood while the door to S32 has been altered from a hinged door to a sliding door. This door is as originally configured with four frosted glass panels, although it features modern door furniture. Furnishings in the office are all modern.

Update 2017 *– No substantive changes to the space since 2007.*

Element	Significance
Overall rating	Medium
Space configuration	Very High
Wall and ceiling cladding	Very High
Windows	Very High
Painted interior timber work	Intrusive
Door to S26 Including original furniture	Very high
Modern door furniture	Intrusive
Door to S32	Medium
Sliding configuration of door to S33	Low
Floor covering	Low
Modern furniture, electrical fittings, etc	Low
Fluorescent lights	Low

3.4 Batching Plant and Picnic Ground

3.4.1 Lower Batching Plant

View to the north of the concrete slurry waste of the lower batching plant.

Description

The visible portion of the lower concrete batching plant consists of concrete slurry waste along the river bank and two gantry footings. It is likely that additional materials are present at this site but they are likely to either be covered by the embankment for the nearby picnic area or the thick vegetation cover between the embankment and the river. The entire area can be considered as roughly rectilinear with sides measuring 20 x 15 metres, aligned east to west. Its setting is immediately adjacent to the Nive River, downstream from the Tungatinah Power Plant and upstream from the bridge.

The foundations of the site appear to rest on small boulders, which may either be a natural bed or redeposited for the construction of the batching plant. The foundations themselves are formed of rough concrete with large bluestone gravel inclusions. These foundations appear to have been poured into timber formwork boxes as the lines of the timber are still apparent in the surface of the concrete. The general outline of the footings was not readily apparent as they had largely been covered by concrete slurry during the operation of the plant.

These foundations contained two gantry footings, which have become mired in concrete slurry, both set at roughly 10m distance and perpendicular to one another. One of these footings is aligned perpendicularly to the course of the river and is positioned at the edge of the river bank in the rough east-west centre of the site. The other footing is located some 10m to the northwest and aligned parallel to the course of the river.

The riverside footing displays two sets of four threaded steel holding down bolts in its surface, with a strip of raised rough concrete running down the centre, which becomes a lower strip on the river side of the bolts. The two groups of bolts are surrounded by a very flat level, with a raised exterior lip of rough concrete that is clearly the impressions of a steel superstructure, since removed. Two of these bolts retain hexagonal steel nuts threaded on to them. The upright position of these bolts is indicative that the steel superstructure was removed cleanly rather than torn down. The southern end of the footing surface appears to be flanged outwards. The overall dimension of this footing is 1200 x 600mm.

The second footing is located in an area of thick vegetation and is covered in moss. It displays two sets of six holding down bolts in its surface, although contrary to the other footings these bolts are spaced widely apart and are not clearly associated with any distinct impressions in the concrete surface. The overall dimension of this footing is 2000 x 600mm.

Element	Significance
Overall rating	Medium
Gantry footings	Medium
Foundation	Medium
Concrete slurry	Low

3.4.2 Picnic Ground

Looking east over the landscaped picnic area.

Description

The landscaped Picnic Ground is situated to the south of the Tungatinah Power Station, immediately next to the Lyell Highway. It consists of a semi-ellipsoid grassed area extending approximately 60m along the length of the road and 20m in width at its widest point. The northern portion of the area serves as a carpark behind a row of low treated pine barriers. Across the grassed area are a number of picnic tables, three to the west of the amenities block and two to the east. Three bins are also present to the west of the amenities block. The block itself is formed of un-coursed sandstone in a dark mortar. It is covered by a corrugated iron roof on timber trusses supported by a range of rustic log supports set on to the low wall. The front area is divided into two rooms, one with waist high walls facing onto the road containing a picnic table and electric barbeque. A fireplace, sharing the same chimney as that in the room behind, is present and lined with firebrick. Behind this is a smaller room with fire place in the centre of its northern wall, the obverse of the chimney present in the other room. Present in this latter room is also a picnic table. The rear of the amenities building contains male and female toilet areas. The roof is a pastel green and the exterior timber battens and down pipe are painted a soft yellow colour.

The amenities block is connected by concrete slab foot paths to the car park. A single tree fern is present near to the northeastern corner of this structure. Parking signs face on to the car park.

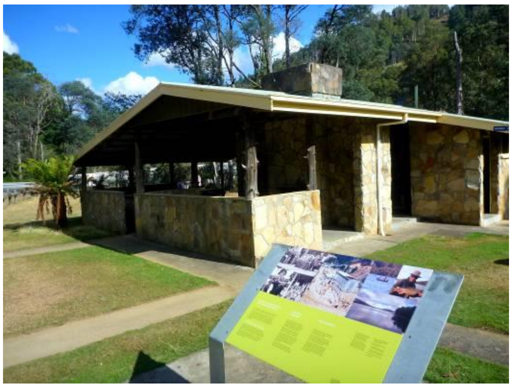
The whole area has been formed from substantial earthworks supported by an earthen revetment to the south, which leads down to the location of the batching plant.

The area retains none of the original species of planting that were planted at this location but instead is surrounded by a range of naturalised vegetation. A brass plaque fixed to a stone and facing on to the car park reads "THIS PLAQUE HAS BEEN ERECTED IN HONOR [*sic*] 'OF THE POLISH IMMIGRANTS WHO CONTRIBUTED 40 YEARS OF SERVICE TO THE HEC AND THE STATE OF TASMANIA ERECTED IN OUR BICENTENNIAL YEAR" while nearby is an interpretation sign explaining the construction and operation of Tungatinah erected by Hydro Tasmania (n.d.) is present.

Note that after the completion of the fieldwork the fireplace in the shelter was blocked off, in both rooms by a cover and the barbeque was upgraded.[125]

Element	**Significance**
Overall significance	Medium
Picnic tables	Low
Current Plantings	Low
Layout	Medium
Amenities block	Low
1988 plaque	Medium
Interpretation sign	Low
Car parking signs	Intrusive

[125] Helga Grant pers. comm. 14 November 2017

THIS PLAQUE HAS BEEN ERECTED IN HONOR OF THE POLISH IMMIGRANTS, WHO CONTRIBUTED 40 YEARS OF SERVICE TO THE H.E.C. AND THE STATE OF TASMANIA. ERECTED IN OUR BICENTENNIAL YEAR 1988	
	

3.5 Headworks

3.5.1 Intake Gate

View to the south showing the north eastern face of the intake gate.

Description

The intake gate is part of a composite structure that also includes the cutting for the intake of the tunnel and the trash rack. The gate itself is largely intact despite the substantial additions which have taken place around it, and in particular the construction of a new radial gate immediately behind it has had very little impact to the structure of the gate. The intake gate is a logstop in part of a working system, combined with the new gate, trash rack and tunnel. It is bounded by the trash rack to the north and the new gate to the south. It is accessed by the track leading from the Lyell Highway to Tungatinah Lagoon. The intake gate complex is secured by a gated wire mesh fence.

The structure is complex and has a number of individual components. The foundations take the form of the gate frame and sill. This is a concrete structure that fits the shape of the gate with concrete flanges that extend up on to the bedrock and on which the concrete gate towers are positioned. These reinforced concrete towers, poured in five segments, in turn support a steel platform that holds a modern DC electric motor, modern hoists, and powerbox. All of these items are present in the original housings, the motor housing displaying an original dial and handle to control the gate depth on its exterior; Thyer notes the hoist was originally powered by 5 h.p. A.C. motor.[126]

The date of the hoists is given as 2007 as well as their design, Hydro Tasmania, and manufacturer, Bullivants, along with the technical specifications of the hoists and wire ropes on a small plaque affixed to the base of the westernmost hoist case. These housings are marked with Ransomes and Rapier makers marks and the date of 1952. Thyer describes the hoisting mechanism in some detail:

> *The gate is suspended by two falls of 5¼" circumference 6 x 37 wire rope … Each rope is dead-ended on its overhead rope drum and has a turnbuckle for length adjustment at the gate.*
>
> *The gate is counterbalanced by a large counterweight suspended by two falls of rope at each end with a sheave mounted at each end of the counterweight. These ropes are also dead-ended from the rope down and at the hoist base frame there is an adjustable anchor.'* [127]

The hoist platform itself is constructed of two large girders stretching from either end of the gate towers, slotted into cast iron brackets, bolted to the towers, at either end. These girders support a number of smaller girders, which are bolted on to them, placed perpendicularly to the gate and additionally supported by steel braces, which are also bolted to the large beams. It has two pairs of the smaller girders at either end that directly bear the weight of the hoists, steel cables, counterweight and gate structure. The southernmost of the two large beams bears a Ransomes and Rapier Ltd maker mark plate riveted to its outwards facing surface. This plate gives the Serial number, OR. SH5955, place of construction Ipswich England, and date

[126] Thyer 2008, pp.4-6
[127] *Ibid.*

of fabrication, 1952.

The surface of the platform is covered with what appears to be the original steel mesh floor and is surrounded by pipe railings, the horizontal sections with collar joins and the uprights are bolted to the transverse girders. A series of lights are positioned on this rail and are on welded steel pipe frames attached to the railing. The lights, either flood lights or area lights, appear to be recent as are their plastic housings. The western access stair leading to this platform is new and is joined to the new hoist platform. The eastern access ladders are original.

The gate and counterweight themselves are original, the counterweight showing some corrosion. The gate structure is as described by Thyer:[128]

> *The gate structure consists of a 3/8 " skinplate on the upstream side stiffened vertically by 6" x 3" channel sections at approximately 0.54m centres (also 6" x 5" beams at skinplate joints).*
>
> *Water load can be applied to the full height of its skinplate, and is transferred from the skinplate to three horizontal main girders - open truss type with twin 12" x 4" channel sections as the inner chord and twin 9" x 4" x ¾" angle sections as the outer chord. The trusses are tapered toward the ends, and diagonally braced. The top girder is lighter in construction.*
>
> *In addition, there is diagonal bracing between the girders in the vertical plane, and light diagonal bracing at the back of the girders to prevent twisting of the gate.*

The 'counterweight box is steel, partially filled with concrete, and with loose concrete weights on top of the mass concrete.'

Thyer describes the roller trains and tracks of the Stoney Roller system:

> *The roller trains are now [2008] in fairly good condition. All components were replaced in 1976 - stainless steel pins and rollers in new assembly…*
>
> *The roller tracks were only in fair condition. Considerable rust scale was present, and there were signs of clogging of the spaces between rail and roller side plates with rust type-material. The rail tracks are pivoted on the embedded frames, but could not be moved.*

The major alteration to this relates to the removal of the hand rail constructed atop the top girder, which has been removed for the construction of the new gate.

The new platform for the hoists of the new gate is not attached to the old gate structure *per se* but instead rests on two concrete towers placed behind the original gate towers. However the original platform is now accessed from a stairway that reaches it and is attached to the eastern side of the gate and connects two the new platform, which is in turn connected to the original platform by a short ladder.

An access and maintenance platform for the new gate has been constructed behind the existing gate. It can be accessed from either side of the intake cut and is connected to the concrete foundations of the old gate, standing clear of the gate itself.

A cinderblock control house has been constructed at the base of the new gate.

Element	**Significance**
Overall rating	Very High
Original gate	Very High
Radial gate	Low
Gate towers	Very High
Counterweight	Very High
Western access stairs	Very High
Eastern access stairs	Very High
Electric motor and housing	Very High
Hoists and housing	Very High
Powerbox	Very High
Original hoist platform	Very High
Modern Lights	Intrusive
Cable ties	Very High
Control house	Intrusive
Modern platform hoists and motor	Intrusive

[128] Thyer 2008, pp.4-6


RAPIER
RANSOMES & RAPIER LTD
IPSWICH ENGLAND
OR S/H 5955

3.5.2 Trash Rack

Looking to the southwest over the trash rack.

Description

The trash rack is largely original and consists of the concrete foundations and buttresses of the rack, the iron grilles of its face, concrete sidewall, walk way, wire mesh netting, rails and overhead gantry trash collector. In addition to this, two water gauging sheds and a water gauging board are also present.

The trash rack consists of nine grilles set between seven concrete buttresses and supported by a series of steel girder crossbeams spaced down the height of the buttress near its outward face. The eastern extent of the trash rack is set against the bedrock part of the intake cut, while the western end is formed by a concrete sidewall that also bears a gauging board.

Immediately above the grills and buttresses, as well as along the western wall of the structure (the latter providing access from the entry point into the compound), is a narrow concrete walk way that is surmounted by a steel pipe hand rail, the uprights of which are bolted into the concrete surface of the walkway. Embedded within the northern section of walkway is a set of rails that supported the original trash collector as depicted in historical sources.

Two water level measurement devices are set within gauging sheds boxes and set atop hollow concrete piles, one within the bounds of the trash rack and the other a few metres distant from its eastern end. These structures have white painted walls and green painted roofs.

The overhead gantry style trash collector is clearly a novel addition to the trash rack. It is constructed of steel girders and accessed by a ladder and platform at the west end of the rack. The trash collector is powered by a small electric motor set in the housing of the collector. The collector itself is a claw with teeth narrowly spaced to fit within the rack but with fittings near to the tips of the teeth to prevent the collector hooking on to the steel girders behind the grill during action. In addition a platform is constructed on the ground at the eastern end of the gantry for the reception of trash and can be accessed by the track that curves around the site.

Element	**Significance**
Overall rating	Very High
Trash rack, including side wall buttresses and grills	Very High
Rails	Very High
Gantry style trash collector	Intrusive
Water measures	Very High
Wire mesh netting	Very High
New platform	Intrusive
Hand rail	Very High
Life Buoy	Medium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3.5.3 Tunnel

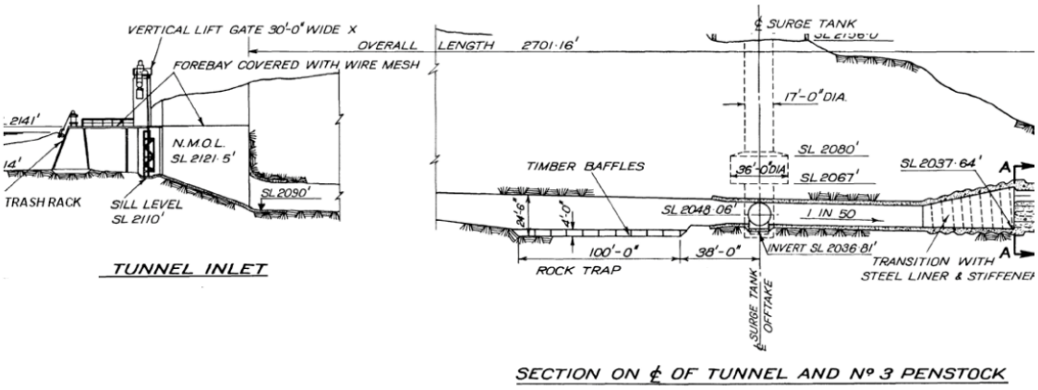
View to the southwest of the recent intake gate anchored to the top of the tunnel mouth.

Description

Very little of the tunnel was visible during the site inspection but it extends for close to 800m from the headworks to the southern portal. The southern mouth is completely obscured by the concrete of the portal while the intake on Tungatinah Lagoon is typically underwater. The surge tank includes the shaft into the tunnel from above in its construction. The forebay at either end of the tunnel was observable during inspection. They consisted of sheer, drilled rock faces with no finish at the upper lip of the cutting except in the case of that directly above the intake mouth entrance, where the surface had been levelled off. In addition to this a wire mesh fence with a concrete footing was present around the edges of the forebay; historical sources indicate that this was originally covered with wire mesh. The footing may have been original but the wire mesh fence is more recent. In the case of the cutting behind the intake gate, the anchor points for the modern radial gate has been installed directly above the tunnel mouth.

What is known of this item can be ascertained from the historical record. The tunnel was lined with a thick reinforced concrete tube and built by experienced tunnelling contractors. The final rock blast to connect both ends of the Tungatinah tunnel was fired on Thursday 14 February 1952, resulting in the first tunnel of the scheme being opened in the record time of 56 weeks. The historical sources indicate that there is also a rock trap with timber baffles within the tunnel.

Element	Significance
Tunnel interior	Very High
Northern forebay	Medium
Southern forebay	Medium
Fence around northern cutting	Low


VERTICAL LIFT GATE 30'-0" WIDE X
OVERALL LENGTH 2701·16'
FOREBAY COVERED WITH WIRE MESH
2141'
14'
N.M.O.L.
SL 2121·5'
TRASH RACK
SILL LEVEL
SL 2110'
SL 2090'
TUNNEL INLET
SURGE TANK
17'-0" DIA.
SL 2080'
36'-0" DIA
SL 2067'
SL 2037·64'
TIMBER BAFFLES
24'-6"
4'-0"
SL 2048·06'
1 IN 50
100'-0"
38'-0"
INVERT SL 2036·81'
ROCK TRAP
TRANSITION WITH
A
A
SURGE TANK OFFTAKE
SECTION ON ℄ OF TUNNEL AND Nº 3 PENSTOCK

4.0 CULTURAL SIGNIFICANCE

4.1 Introduction to the Significance Assessment Process

Cultural significance refers to a wide range of qualities that make some places especially important to the community. Understanding and articulating these qualities is the first step in the heritage management process.

4.2 Basis for Assessment

The assessment of cultural significance has been framed in terms of the criteria outlined in Section 16 of the *Historic Cultural Heritage Act 1995*. A place of State level significance must satisfy one or more of the criteria to be considered for entry in the Tasmanian Heritage Register. Entry in the Register is the trigger for protection of a place under the terms and provisions of the *Act*. Individual rankings of significance at element level are contained in the data sheets comprising Part 3.0 of this report.

Since the completion of the 2007 iteration of the CMP, 'aesthetic characteristics' has been added as the eighth criterion. This updated CMP includes this criterion as part of this assessment. All criteria are considered to apply in relation to the Tungatinah Power Station at a State level:

Criterion A: The place is important to the course or pattern of Tasmania's history.

- The development of Hydro-Electric Power in Tasmania is a very important theme in Tasmania's twentieth century history. Unlike the mainland states, it dominated the Tasmanian energy industry from the beginning and the Hydro-Electric Commission became Tasmania's biggest single employer. Tungatinah was the most important new power development occurring in the immediate post World War Two period and its completion was prioritised over other developments, such as Wayatinah and Lake Echo, which were put on hold during periods of materials scarcity so that Tungatinah could continue. State and National Governments took steps to ensure the completion of the project as quickly as possible, due to its importance. When fully completed, Tungatinah was the largest hydro-electric power station in Australia. Its operation provided vital power for new industrial projects that greatly benefited Tasmania's economy.

- Tungatinah demonstrates aspects of the cultural and economic transition that took place in Australia after World War Two. The austerity of the War period of an essentially anglo-centric nation gave way to a new chapter of prosperity and multiculturalism. The difficulties in securing the materials and manpower for its construction are demonstrated by the fabric of the building and its interior, particularly in comparison to the nearby Tarraleah station, built between the wars, and by the large amount of foreign labour that had to be procured (see Criterion E, below). The large size of the building and its five penstocks also demonstrate the anticipated rise in demand for electricity and hence standard of living and rate of industrial development that was such a feature of Tasmania in the 1950s. The commissioning of Tungatinah, which practically doubled the system output, resulted in the removal of electricity rationing. The use of foreign, non-British labour and sourcing of tenders and materials from areas such as Europe and, especially, Japan, foreshadowed the sweeping changes about to take place in Australian society, foreign policy and trade.

Criterion B: The place possesses uncommon or rare aspects of Tasmania's history.

- Hydro-electric power has played a prominent role in the economic development of Tasmania over a long period. To have two operational power stations (i.e., Tarraleah and Tungatinah) from different, early, periods in such close proximity is unique within Tasmania.

- The spiral casings are unique in that they are the only Francis type turbines in the HEC system that were fabricated using cast steel components rather than being fabricated from welded steel plate.

Criterion C: the place has the potential to yield information that will contribute to an understanding of Tasmania's history.

- The remains of plant and structures used in the construction of Tungatinah survive at the site – mainly on the steep hill slope adjacent to the Valve House and Penstocks. These relics provide vestigial evidence of the processes used in the construction period and demonstrate the increased mechanisation in construction techniques employed at Tungatinah compared to earlier Tasmanian schemes. Investigation of these remains is likely to reveal more information on the nature of construction techniques employed and elucidate the methods used to overcome post-war materials shortages and technical difficulties.

Criterion D: The place is important in demonstrating the principal characteristics of a class of place in Tasmania's history.

- The Tungatinah Power Station and associated sites are important in demonstrating the key characteristics of a hydro-electric power station from the post-World War Two era. Although modified and upgraded, the Station retains the ability to demonstrate the original 1950s design, machinery, equipment and processes of power generation. This includes the headworks, valve house, penstocks and station building, which all demonstrate to a high degree the original characteristics of the place. The external cladding of the Station building proper also demonstrates the scarcity of materials in the post-war period and strongly contrast with the nearby Tarraleah station,

Criterion E: The place is important in demonstrating a high degree of creative or technical achievement.

- The scarcity of materials at the time of Tungatinah's construction undoubtedly fostered innovative uses of available materials, many of which will have left no documentary trace. The construction of Penstock No 1 for example, which was hot-rolled in one piece with a longitudinal weld, shows innovation in design.

- During this period Hydro Tasmania sought to be at the cutting edge of hydro-electric technology worldwide. Advice on new developments was sought from, and provided to, similar organisations throughout the world, in person, in technical publications and by mail. New developments included the use of new high tensile penstock steel developed in Europe and Japan.[129]

- In many ways, Tungatinah represents a transition from medium to high-head power stations and from the Pelton turbine to the Francis turbine. Before Tungatinah, no Francis turbine power station had been built in Australia that was higher than 120 metres head. After Tungatinah, all power stations built with a head higher than 300 metres (with the exception of Poatina [1964] and Fisher [1973] in Tasmania, McKay in Victoria [1961 527 m], Kareeya in Queensland [1957] (with 4 Pelton turbines) and Barron Gorge in Queensland [1963, 286 m] and with two Francis turbines. At the time, Tungatinah's turbines were the highest head Francis turbines in Australia and were believed to be the highest head Francis turbines yet manufactured in the U.K.[130]

Criterion F: The place has a strong or special meaning for a particular community or cultural group for social or spiritual reasons.

- Tungatinah Power Station is testament to the hard work and dedication of a largely non-British workforce. Prominent among the labour force were Polish workers many of whom were ex-servicemen. Their contribution to the project is commemorated by a

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[129] Lupton 1998:188-189
[130] Unknown 1954:476-477

cairn at the riverside picnic area between the Power Station and the bridge over the Nive River. The memorial was erected at the request of the Polish Association of Hobart in October 1988 and demonstrates the strong links between the site and the Polish community.

Criterion G: The place has a special association with the life or work of a person, a group of persons, of importance in Tasmania's history.

- Completely Tasmanian educated, Allan Knight was an innovative bridge engineer before he was appointed the first Tasmanian born and bred Commissioner of the Hydro-Electric Commission in 1946. Tungatinah was the major component in his ambitious plan, undertaken from the very beginning of his tenure, to meet Tasmania's accelerating demand for electricity by initiating large scale development of the system to meet the forecast, rather than current, demand. Knighted in 1970, Allan Knight was Commissioner until 1977, the longest serving term to date, and was also Tasmanian tennis champion three times.

Criterion H: the place is important in exhibiting particular aesthetic characteristics

- Tungatinah exhibits the aesthetic characteristics of mid twentieth century Hydro Electric Commission architecture. Its austere minimalist form reflects both increased mechanisation of construction processes as well as a world wide scarcity of materials caused by the post-war reconstruction boom and the fact that many nations were re-arming for the Cold War. It is well positioned within its setting in a broader cultural landscape that also includes the Tarraleah Power Station and Tarraleah itself. Views from the Lyell Highway on both the northern and southern approaches contribute greatly to its value. The machine floor in the interior can be considered to have high aesthetic value as it strongly reflects the austere values presented on the exterior.

5.0 CONSERVATION POLICY AUDIT (2017)

5.1 Introduction

This section considers the effectiveness (or otherwise) of the 2007 policies as a practical management tool. It reviews each of the policies of the 2007 CMP and highlights areas where issues with implementation have occurred, or where implementation has been effective.

Several additional policies arising from the inclusion of new areas within this CMP as well as some resulting from the changes taking place to the site are noted in this section as well as being included in the conservation policies above. This section closes with an overall consideration of policy effectiveness and implementation where general trends in the heritage management of the site are deduced and corrective measures identified.

5.2 Specific Conservation Policy Issues

General Conservation Policies (Section 6.1) have been complied with and the policies remain relevant.

Ongoing Use Policies (Section 6.2) have been broadly complied with, although there were some of exceptions and the policies remain relevant. The key policy that requires further consideration is:

Policy 2.1 All proposed upgrades, changes or alterations other than emergency works will be subject to a Heritage Impact Assessment prior to implementation.

This did not take place in the case of the addition of signs to the exterior of the power station. This was clearly not emergency work as it is unreasonable to assume that the addition of signage would constitute a response to an emergency situation. Although an assessment was undertaken retrospectively by Jackman[131] the prior assessment of this action required in this policy was not complied with. In the future when alterations to the exterior of the building are proposed a Heritage Impact Assessment should be completed *prior* to undertaking the works. This is particularly relevant in that the signs have adverse impact on the cultural heritage significance of the site as described in Policy 3.7 and noted by Jackman (see below). The removal of several construction relics and interior plant have also taken place without an appropriate heritage impact assessment.

Changes to power station fabric and objects since 2007 that qualify for heritage impact assessments are summarised in Table 5.1 and considered in detail in Appendix D. The implication of changes since 2007 to heritage management policy settings are discussed below.

Power Station Interior Policies (Section 6.3) have been complied with and the policies remain relevant. The introduction of a partition to the Workshop Store has modified the layout of this space but may have been in order to maintain functionality of the place, as *per* the policy:

Policy 3.4 Do not introduce any new fabric or finishes unless it is required to maintain the functionality of the place or there is no prudent or feasible alternative.

As noted above, consideration should be given for a Heritage Impact Assessment for any proposed work as per Policy 2.1. Although the impact of this simple partition is far less than that which occurred in the Gasket Room and Gasket Room Store, their management through the Heritage Impact Assessment process would have allowed for a consideration of possible mitigation measures.

Further consideration should be given to the following policy and its associated actions should be carried out where practicable.

Policy 3.2 In the longer term, endeavour to reinstate the original paint and colour schemes where they have been over-painted.

[131] Jackman, G. 2014 Roof Access Upgrade Tungatinah, Butlers Gorge and Lake Echo Power Stations. Unpublished report prepared for Hydro Tasmania.

In the case of the communications room, the original linoleum has been painted over, and future consideration should be given to the reinstatement of this early finish either by the removal of paint and refurbishment of the tiles or their replacement.

Power Station Exterior Policies (Section 6.4) Generally these policies have been complied with successfully (for example cleaning of the exterior etc.), however as has been considered in response to Policy 2.1 above, the placement of signs on the exterior directly contravenes Policy 3.7 without apparent justification.

Policy 4.3	Maintain the exterior of the building. In the longer term, the original paint and colour schemes may be reinstated if desired. Replace any damaged or missing fabric on a like-for-like basis. Do not introduce any new fabric or finishes unless it is required to maintain the functionality of the place or there is no prudent or feasible alternative

The signs should be removed, and not replaced, at the first practicable and convenient opportunity. Jackman[132] suggests this could occur during a change in Hydro Tasmania branding or as part of the reinstatement of the original colour scheme.

Machinery and Components Policies (Section 6.5) Although modification to plant and equipment has been undertaken at a number of locations around the power station, this has been largely done in compliance with these policies and in line with the strategies and actions required. The relevant policies are:

Policy 5.1	Existing plant and machinery should be retained in use and the station should continue to operate in its existing form if possible.
Policy 5.2	Alterations to plant and machinery should only be considered where they are vital to the ongoing viability of the station.
Policy 5.3	Any superseded plant and movable items should be retained in situ unless it is unavoidable for operational reasons. Any such items that must be removed from their original location should be retained and appropriately re-located to another part of the site.

The detailed consideration of the changes that have occurred, for example to the turbines, were considered in a series of Heritage Impact Assessments in line with the general conservation policies for the site.

Although it is not the purpose of this conservation plan to re-state the recommendations of these assessments, an important recommendation from Jackman's[133] impact assessment of the turbine replacement needs to be qualified and reiterated here.

As part of the modernisation process it was originally noted that TU3 and TU4 were to remain unchanged and this has largely been the case. However, subsequent minor modifications to the accoutrements of TU4[134] means that TU3 is now the only turbine that contains a suite of *in situ* original material, such as the actuator governor and control panel. The impact assessment had considered the possibility of the retention of either of these two items:

> Notwithstanding the scope of the present modernisation project, the retention of at least one original machine and allied controls in operating condition is advocated as a minimum long term management objective for the Tungatinah Power Station.[135]

This recommendation is consistent with the broader policies of the conservation plan and the *Burra Charter* and now can only, and should, be applied to TU3 as it is now the sole turbine that retains its allied controls. This recommendation has been given the form of a policy in this CMP (see Policy 5.4). An additional strategy/action has also been added to reflect this inclusion.

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[132] Jackman, G. 2015 Tungatinah Power Station Modernisation Project Heritage Impact Assessment Addendum No.3. Unpublished report prepared for Hydro Tasmania.
[133] *Ibid.*
[134] Jackman, G. 2014b Tungatinah Power Station Modernisation Project Heritage Impact Assessment Addendum No.4. Unpublished report prepared for Hydro Tasmania.
[135] Jackman 2015

The removal of the lathes from the Workshop is an example of unassessed alterations (see Policy 2.1) to the site that has resulted in the potential loss of a significant item. These items were of significance and the impact of their removal should have been assessed prior to the fact in a Heritage Impact Assessment and provision made for their relocation. Similarly the removal of the grinders from the Grinders Room and their relocation elsewhere, although not causing as much adverse impact as the removal of the lathes, should have been considered in a Heritage Impact Assessment.

External Infrastructure Policies (Section 6.6) Generally these policies have been complied with successfully, with several exceptions, and these policies remain relevant. Generally, where modification has taken place, it has been accompanied by a prior Heritage Impact Assessment that has ensured that the alterations have been necessary and undertaken in a sympathetic manner. Examples of this can be seen at the Valve House and Cooling Tank. The exception to this is the removal of two items (shelter shed ruins and the collapsed tent frame adjacent to the penstocks), which contradicts:

Policy 6.2 All remnant evidence of the construction phase plant such as the low level ruins of the haulageway winch, tram track and shelter shed adjacent to the penstocks as well as the crusher and batch plant adjacent to the valve house, should be retained *in situ*.

Given the ruinous and ephemeral nature of these items it is understandable that they may have been inadvertently removed, for instance, during upgrade works. In the future, if remnants of the construction phase are to be removed, consideration should be given to retaining them in accordance with the moveable heritage policy of this plan. In addition to this, it becomes increasingly necessary for a site specific moveable heritage strategy to be developed.

The additional external infrastructure items included in this conservation management plan have been specifically mentioned in an amended policy statement:

Policy 6.1 All infrastructure external to the main power station building such as the penstocks, valve house, surge tank, intake gate, trash rack, tunnel and associated plant should be retained in use and should continue to operate in its existing form if possible.

An additional strategy/action has been added to reflect this inclusion.

Landscaping Policy (Section 6.7) This policy has been complied with and the policy remains relevant. It may also be considered to extend to the picnic area. An additional policy has been placed in this section.

Policy 7.2 If practicable the elements of medium and high significance in the landscaped picnic area to the east of the power station should be retained and maintained.

Movable Heritage &/or Redundant Infrastructure Policy (Section 6.8) This policy has not been complied with. If it is not complied with in a reasonable timeframe it is likely to lead to further adverse impacts on the heritage significance of the site. This policy is:

Policy 7.1 Hydro Tasmania should develop and implement a strategy for curation of items removed from operational contexts or that are part of the fitout of the station (e.g. artworks and plaques not 'in situ'). This should include items that have already been removed and are stored off site. In the interim, items of movable heritage (including plant, equipment, furniture and fittings) should be retained at the site with due regard to their conservation requirements and security.

The loss of the lathes from the Workshop as well as construction relics in the vicinity of the Penstock is a result of this lack of a movable or redundant heritage policy although the former might have been averted through a Heritage Impact Assessment.

Interpretation Policy Section (6.9) This policy has been complied with and the Tungatinah Power Station has been interpreted to the public. High quality interpretation has been installed in the existing picnic area beside the Lyell Highway. The strategy/action for this policy has been amended to reflect the ongoing maintenance of the interpretation.

5.3 Policy Effectiveness and Implementation – Key Issues

The 2007 CMP in conjunction with broader Hydro Tasmania policies has been broadly effective in conserving the heritage significance of the site while also maintaining its fundamental role as a functioning power station. Where Heritage Impact Assessments have been completed *prior* to the undertaking of works they have been effective in managing and mitigating harm to the heritage values of the site. Nevertheless, possibilities for improvement still remain and this review has identified three key points relating to the effectiveness of the CMP and its implementation:

- Incomplete coverage by the Heritage Impact Assessment process.
- Lack of a site specific movable/redundant heritage strategy.
- The retention of only the suite of features associated with Turbine 3.

The lack of a site specific movable/redundant heritage strategy and the lack of heritage impact assessments for all works affecting significant elements of the site have together had a cumulative impact on the heritage values of the site. If either of these policies had been completely implemented, it is likely that the harm arising from the removal of the lathes or relics adjacent to the penstocks would have been avoided. It is emphasised that in instances where Heritage Impact Assessments have been prepared prior to proposed works being undertaken, they have been effective in mitigating harm. This highlights the need for such assessments to be undertaken across the site so that changes are managed in accordance with the terms of this CMP.

It is likely that the impacts arising from a lack of assessment have occurred inadvertently. In order to make sure that the Heritage Impact Assessment process is triggered effectively it is essential that this CMP is provided to those who have the responsibility for the day to day management of the site.

In addition to this, the presence of some elements associated with the former turbines removed during the modernisation process and retained *ad hoc* on the machine floor, is strongly indicative of the need for a formal strategy to manage these items. What is more, the absence of the other elements of the turbines, including the highly significant turbine spiral case housing and blades and exciter covers, also indicate the need for a formal management strategy. The significance of the removed elements of the turbines, such as exciter covers, is still high and, if anything, their interpretive potential is higher. Advice should be sought from those who have responsibility for the day to day management of the site in the formulation of a site specific movable/redundant heritage strategy.

As a result of the modernisation process, Turbine 3 is now the sole representative of the original configuration of the turbine system, although the essential parts of Turbine 4 are also original. Turbine 3 should now be given primary consideration as an element of historic fabric of the highest significance which is representative of the core historic operation of the site.

Table 56.1 Physical Changes, relevant assessment and conformance status.

Wider System Elements				
Item	**Changes since 2007**	**HIA reference**	**Conformance**	**Comments**
Valvehouse and penstocks	Gantry crane installed above valve house.	Waight and Dilger 2011	May not conform	Temporary gantry still remains.
	New external steel stairs and second story door.	Waight and Dilger 2011	Conforms	
	Internal steel valve access platform.	Waight and Dilger 2011	Conforms	
	Steel access stair on portal face.	Waight and Dilger 2011	Conforms	
	Smoke alarms and lighting.	Not Assessed	May not conform	No evidence of assessment in statewide fire upgrade document.
	New distribution board.	Not Assessed	May not conform	
	New fibreglass floor plate installed.	Not assessed	May not conform	
	Anti vac valve access platform installed and reconfigured, previous platform removed.	Jackman 2009	Conforms	
	Oil accumulators and controls replaced.	Jackman 2015	Conforms	
	Minor modifications to external cladding.	Waight and Dilger 2011	Conforms	
	Movement monitors fitted to penstocks.	Not Assessed	Conforms	
Cooling Tank	More stairs and an additional platform added to the top of the existing stairs.	Not Assessed	Does not conform	

Ruins in the vicinity of Penstocks	Steel tent frame or partially collapsed shelter No longer present.	Not Assessed	Does not conform	
Power Station Exterior	Roof access ladder installed onto the northwestern face of the main building.	Jackman 2014a	Conforms	
	Two large Hydro Tasmania signs installed on the southeastern and northeastern ends of the main bay of the building.	Jackman 2015	Does not conform	Assessed after installation had taken place, judged to be intrusive.
	Rails leading from the main bay have been concreted over but left in place.	Not assessed	May not conform	Minor impact only.
	New office building constructed to the northeast of the main bay of the power station and new stairs in association with new office space in east wing of the building.	Not assessed	May not conform	Minor impact only.
Generating Floors and Assembly Bay				
Item	**Changes since 2007**	**HIA reference**	**HIA conformance**	**Comments**
Machine Floor (s19)	Changes to the access hatches of TU1, TU2, TU5. Southern side of the access hatches having been enlarged and fibreglass panels installed.	Jackman 2015 Waight and Dilger 2011	Partially conforms	Changes to TU4 not considered.
	There are four new ventilator fans in the northwest portion of the roof.	Jackman 2015	Conforms	
	The ladder to the gantry crane has been replaced.	Not assessed	May not conform	Minor impact only.
	The exciter covers for TU1, TU2 and TU5 have been replaced.	Jackman 2012 Jackman 2014b	Conforms	

Machine Floor (s19)	New control panels has been installed for TU1, TU2, TU4 and TU5.	Jackman 2014b Jackman 2015	Partially Conforms	Changes to TU4 not considered.
	All of the main inlet valve controllers have been removed from this floor.	Waight and Dilger 2011	Conforms	
Alternator Floor (s20)	Changes to the braking hydraulics, heat exchangers and hydraulic system for TU1, TU2, TU4 and TU5.	Jackman 2012 Waight and Dilger 2011	Conforms	
	Refurbishment partitions remain.	Jackman 2015	Conforms	
Turbine Floor S24	New fibre glass floor grates and new filters for TU1, TU2, TU4 and TU5.	Jackman 2015	Partially Conforms	Changes to TU4 not considered.
	Refurbishment partitions remain in place.	Jackman 2015	Conforms	
	New access platforms have been installed for TU1, TU2 and TU5.	Jackman 2012 Waight and Dilger 2011	Conforms	
	The access platform of TU4 has been retained but the wire mesh floor has been replaced by fibreglass.	Jackman 2012 Waight and Dilger 2011	Conforms	
	New motor starter panels, new accumulators and electronic governor control panels for all turbines.	Jackman 2012 Waight and Dilger 2011	Conforms	
	The spiral casing for TU1, TU2, and TU5 have been replaced.	Jackman 2012 Waight and Dilger 2011	Conforms	
	The servo motors for TU1, TU2, and TU5 have been replaced.	Jackman 2012 Waight and Dilger 2011	Conforms	

Turbine Floor S24	The upper cover for the guide vane and the guide links have been refurbished for TU4.	Jackman 2012 Waight and Dilger 2011	Conforms	
	New high pressure units were installed for TU1, TU2, and TU5.	Jackman 2012 Waight and Dilger 2011	Conforms	
Assembly Bay (S8)	The iron tramway rails have been covered with concrete.	Not assessed	May not conform	Minor impact only.
	Some areas of the floor have been repainted.	Not assessed	May not conform	Minor impact only.
Roadside Tunnel (S21)	New natural earthing transfers are present.	Not assessed	May not conform	Necessary or minor impact only.
	Small holes cut in the walls and ceiling have been grouted.	Not assessed	May not conform	Minor impact only.
	The timber cable trays have been removed.	Not assessed	Does not conform	
Rubber Room (S23)	A new free standing wooden shelf has been installed.	Not assessed	Conforms	
Power Station West Wing				
Item	**Changes since 2007**	**HIA reference**	**HIA conformance**	**Comments**
Foyer (S1)	Fire and security control panel has been installed beneath the stairs.	Jackman 2015	Partially conforms	Fire control not assessed, security control assessed.
Cable Room (S4)	The interior door to the ground floor hallway (S6) has been removed.	Not assessed	Does not conform	
Site Office (S30)	The window to the assembly bay has been removed.	Not assessed	Does not conform	

Shower Room (S10)	An external door has been added in the southwest of the room.	Not assessed	Does not conform	
Communications Room (S11)	The floor surface has been replaced or repainted.	Not Assessed	Does not conform	
	The wall fan has been removed from this room.	Not Assessed	Does not conform	
Power Station East Wing				
Item	**Changes since 2007**	**HIA reference**	**HIA conformance**	**Comments**
Grinders Room (S13)	All of the grinders had been removed from this room.	Not Assessed	Does not conform	
Workshop Store (S14)	A hardboard partition, with door, has been constructed.	Not Assessed	Does not conform	
Gasket Room (S16)	Previous interior fittings, furniture and equipment have been removed.	Waight and Dilger 2011	Conforms	
	A new ceiling and new interior walls had been fitted with new lights, desks and other office furniture.	Waight and Dilger 2011	Conforms	
	The stairway to the gasket room mezzanine has been removed and the door through to the gasket storage room has been sealed.	Not Assessed	Does not conform	
	New services in this room enter through holes made in interior walls.	Waight and Dilger 2011	Conforms	
Gasket Room Store (S17)	The earlier interior fittings, storage shelves and equipment have been removed.	Waight and Dilger 2011	May not conform	No specific reference to the removal of these items in the assessment document.
	There is a new ceiling and interior walls that have been fitted with new lights, storage	Waight and	Conforms	

Gasket Room Store(S17)	lockers and benches.	Dilger 2011		
	Suspended ceiling has been fitted at the floor level of the mezzanine. It is attached to the steel framing of the building with cables and bolts	Waight and Dilger 2011	Conforms	
	New services in this room enter through holes made in interior walls.	Waight and Dilger 2011	Conforms	
Gasket Room Hallway (S18)	A hardboard partition has been constructed in this hallway.	Not Assessed	Does not conform	
	A set of external stairs have been constructed on the outside of this space	Waight and Dilger 2011	Conforms	
	New doorway has been cut into the exterior wall.	Waight and Dilger 2011	Conforms	
	The interior has been refitted and repainted and a new water service installed.	Waight and Dilger 2011	Conforms	
Workshops (S12)	This room now contains a relocated grinder.	Not Assessed	May not conform	Not specifically adverse to heritage values.
	The stairway to the former gasket room is still present but is blocked off.	Not Assessed	May not conform	Part of an assessed activity not specifically assessed.
	Three Macson and Dean Smith and Grace lathes have been removed.	Not Assessed	Does not conform	

6.0 CONSERVATION POLICY

The purpose of the conservation policies is to state how the conservation of the Tungatinah Power Station may best be achieved both in the long and short term, and is based on an understanding of the cultural significance of the place (refer to Section 4.0).

The policies cover all aspects of the conservation of the place; these range from recognition of the significance of the power station, to its physical conservation needs and ongoing operational requirements. The policy statements are accompanied where necessary by a short explanatory paragraph or definitions. These are followed by the strategies and actions that should be carried out in order to implement the policy. Note that policy numbers are not directly related to the section of the report.

This conservation policy has been updated in 2017 as part of the review of the CMP.

Terminology: Much of the terminology used in conservation practice is standardised. The meanings of key terms used in this document are summarised below. These are shown in **bold** where they appear in conservation policies or explanatory statements to indicate the specific terms of reference which apply. The definitions are taken from the *Burra Charter*: *The Australian ICOMOS Charter for Places of Cultural Significance, 2013* (the *Burra Charter*).

Place	means a geographically defined area. It may include elements, objects, spaces and views. Place may have tangible and intangible dimensions.
Fabric	means all the physical material of the **place** including elements, fixtures, contents and objects.
Related Place	means a **place** that contributes to the **cultural significance** of another **place**.
Associations	means the connections that exist between people and a **place**.
Setting	means the immediate and extended environment of a **place** that is part of or contributes to its **cultural significance** and distinctive character.
Conservation	means all the processes of looking after a **place** so as to retain its **cultural significance**.
Cultural Significance	means aesthetic, historic, scientific, social or spiritual value for past, present and future generations**.**
Maintenance	means the continuous protective care of a **place** and its **setting**. **Maintenance** is to be distinguished from repair which involves **restoration** or **reconstruction**.
Preservation	means retaining a **place** in its existing state and retarding deterioration.
Restoration	means returning a **place** to a known earlier state by removing accretions or by reassembling existing elements without the introduction of new material.
Reconstruction	means returning a **place** to a known earlier state and is distinguished from **restoration** by the introduction of new material.
Adaptation	means changing a **place** to suit the existing **use** or a proposed **use.**
Use	means the functions of a **place**, including the activities and traditional and customary practices that may occur at the **place** or are dependent on the **place**.

Compatible use	means a **use** which respects the **cultural significance** of a **place**. Such a **use** involves no, or minimal, impact on **cultural significance**.
Interpretation	means all the ways of presenting the **cultural significance** of a **place**.

6.1 General Conservation Policies

Policy 1.1 *The Tungatinah Power Station with its associated elements and* ***related places*** *of the wider Upper Derwent Hydro-Electric Scheme should be conserved as a* ***place*** *of high* ***cultural significance****.*

Policy 1.2 *The facility should be retained in* ***use*** *and operated as a power station.*

Policy 1.3 *The* ***place*** *should be conserved and managed in accordance with the guidelines and philosophy of the ICOMOS Burra Charter.*[136]

Policy 1.4 *The introduction of new materials, plant or machinery into the existing buildings should be undertaken only where it is essential for the* ***conservation*** *of* ***cultural significance*** *or to maintain the functionality of the place.*

Policy 1.5 *The role of the Tungatinah Power Station as part of the wider Upper Derwent Hydro-Electric Scheme should be recognised and maintained. The Station's association with Tarraleah Power Station and Village is especially important and should be maintained, for example, through interpretation.*

Policy 1.6 *The context and* ***setting*** *of the Power Station should be conserved; this includes the landscaping, views and visual catchment.*

Policy 1.7 *All identified significant structural remains (ruins etc.), superceded plant and movable items should be retained in situ unless removal is unavoidable for operational reasons. In the absence of a Hydro Tasmania movable cultural heritage strategy, any such items that must be removed should be retained and appropriately re-located to another part of the site.*

Policy 1.8 *Elements of the Power Station site including the switchyard were excluded from the Brief for this CMP because they are not in Hydro Tasmania ownership or control. It should be noted that any alterations or changes to these places may well affect heritage values associated with the Power Station and should be carefully considered before implementation. TasNetworks should be provided with a copy of this CMP.*

<u>Reason for Policy</u>

These policies apply to the key areas of the site including the power station, penstocks, valve house, headworks and surrounds of each including the cultural landscape. It also includes any *in situ* remnant structural fabric from the construction phase (such as the batching plant site) and/or superceded plant or equipment. Functionality and continuity of use of the power station are seen as the key to the survival and maintenance of the station's heritage values into the future.

Tungatinah Power Station is one of the State's most significant industrial heritage assets.

The main power station building and outbuildings are central to the **cultural significance** of the **place** and are largely in original or as-built form. The buildings primarily require catch-up maintenance and then regular on-going cyclical maintenance.

Although parts of three of the five turbines were replaced during the recent modernisation process, much of the plant is original and has been continually maintained, and judiciously upgraded, on an ongoing basis. Other parts of it (especially the instrumentation, control panels and the control room) have been upgraded as the need arose, with redundant equipment left in place.

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136 See Appendix D

The station's significance is such that provision should be made for active and ongoing **conservation** of its physical attributes (i.e., **fabric**) and **setting**. Functionality and continued operation of the power station is seen as a **compatible use** and the key to the survival and maintenance of the station's heritage values into the future.

Strategies & Actions

Strategy/Action to be carried out	Period
Endorse this revised conservation management plan as the guiding document for future management and conservation of the place.	Within 12 months.
Provide copies of this CMP to Heritage Tasmania, DPIPWE and TasNetworks.	
Ensure that the policies in this CMP are known and understood by relevant Hydro Tasmania staff, the relevant planning authority and any contractors or others engaged to undertake any works at the site.	Within 12 months.
Hard copies of this CMP should be available on site. Datasheets for each space/room should be printed and laminated and kept in each area as a ready reference for staff.	Within 12 months.

6.2 Ongoing Use Policies

Policy 2.1 *Actions that enable the ongoing use of the power station are supported provided they are planned and implemented with a view to* ***conserving*** *(as functional items) as much of the original* ***fabric****, spaces, fitout, machinery and components as practicable.*

Policy 2.2 *All proposed upgrades, changes or alterations other than emergency works will be subject to a Heritage Impact Assessment prior to implementation in accordance with Hydro Tasmania's Cultural Heritage Procedure.*

Reason for Policy

In achieving this it is noted that **preservation**, **maintenance** and **restoration** are the most appropriate actions as these will generally apply to the machinery and components. **Adaptation/s** should adhere to the philosophy of changing 'as much as is necessary and as little as possible'. Changes should be designed to be sympathetic to the identified heritage values (i.e. they should be non-intrusive). Where there is no prudent and feasible alternative to redundancy of original machinery and/or components, these should be retained 'in situ' if possible and maintained. Preparation of a Heritage Impact Assessment will ensure that any heritage values put at risk from proposed changes are identified early. This will allow either modification of the proposed change or development of another strategy to accommodate heritage requirements. The primary purpose of a Heritage Impact Assessment is to explain how the heritage values of any given place, site, item or feature of significance are to be conserved by any proposal. A Heritage Impact Assessment will generally not be required for routine and or cyclical maintenance activities (provided these are carried out in accordance with stated conservation policies).

Strategies & Actions

Strategy/Action to be carried out	Period
Maintain buildings, plant and equipment to a high standard to ensure they remain viable into the future.	Ongoing.
Where changes, alterations or upgrading is required, ensure that a Heritage Impact Assessment is prepared. Sufficient lead time should be built in to implementation schedules to enable heritage impact evaluations to take place and to avoid critical path complications.	As required (& as early as possible).

Strategy/Action to be carried out	Period
Where it is essential (i.e. no prudent and feasible alternative) to update plant or equipment to maintain viability or efficiency (especially control panels, meters and instruments), retain any redundant items in situ. Design and locate any new infrastructure sensitively and sympathetically (i.e. in a non-intrusive fashion).	Ongoing.
Ensure that upgrades of fire and/or alarm systems are of appropriate and sympathetic design and that installation is carried out sensitively (i.e. with respect to the existing fabric and systems).	Ongoing.
Endeavour to fit any required new functions into existing vacant spaces in the power station (i.e. do not erect new buildings around the power station).	Ongoing.
Consider the requirements of the Building Council of Australia (BCA) in undertaking any future works. Due to the very high heritage significance of the place it will be necessary to provide engineered or alternate solutions for some parts. Areas of the BCA that require compliance include egress for personnel, fire safety systems to provide early warning and fire separation between the offices and the machine floor.	As required with proposed future works

6.3 Power Station Interior Policies

Policy 3.1 *All significant interior* ***fabric*** *(including fixtures and fittings) should be* ***conserved****, primarily through* ***preservation****,* ***maintenance****, skilled* ***restoration*** *and, in certain - specified - instances, through skilled* ***reconstruction****.*

Policy 3.2 *In the longer term, endeavour to reinstate the original paint and colour schemes where they have been over-painted.*

Policy 3.3 *Replace any damaged or missing fabric on a like-for-like basis.*

Policy 3.4 *Do not introduce any new* ***fabric*** *or finishes unless it is required to maintain the functionality of the place or there is no prudent or feasible alternative.*

Reason for Policy

All sound and intact **fabric** should be retained and actively maintained to preserve as much of the surviving integrity of the interior as possible. Note, for example, that much of the interior paint scheme is original. In selected instances recovery of significant elements through removal of accretions is advocated. Similarly, the replacement of intrusive items is recommended in some (but not all instances) to achieve a more sympathetic treatment. In all instances where this is advocated, sufficient evidence exists (in either physical or documentary form) to inform the process of **reconstruction** which should seek to replicate the original specification of the element in question. All work, particularly that which involves **restoration** and **reconstruction** should be undertaken by suitably skilled trades people experienced in heritage related work and in accordance with Hydro Tasmania's HSEP0912 Cultural Heritage Management procedure. Conjectural reconstruction (i.e., introduction of new fabric and/or fittings based on guesswork) is not appropriate.

Strategies & Actions

Strategy/Action to be carried out	Period
Develop and implement a cyclical cleaning routine for the interior of the building including the walls, windows, ceilings, timber work, lights etc.	Ongoing
Maintain and / or reinstate the original internal paint scheme to the internal walls and floors of the Exciter, Alternator and Turbine Floors[137].	As opportunity arises.

[137] Paint schemes are shown in photographic evidence in Section 2 Figures 2.9, 2.12 and 2.13 and listed in Section 3.7.

Strategy/Action to be carried out	Period
Maintain the original internal paint scheme to the internal walls of the Control Room.	Ongoing.
Re-glaze any damaged windows and glass doors using like materials as appropriate (e.g. bubble glass) where possible/feasible.	Ongoing.
Retain Caneite® wall cladding and ceilings to offices and Control Room where still extant.	Ongoing.
Maintain timber architraves and joinery to all the offices in its varnished (i.e. unpainted) state.	Ongoing.
Offices that have had wall and ceiling fabric replaced may be painted and decorated as desired.	Ongoing.
Retain any original light fittings in operational condition. If supplementary lighting is required ensure that it is of sympathetic design.	Ongoing.
Retain *in situ* all fixtures and fittings to store rooms such as shelving, benches and signage if possible. If these rooms are to be adapted to a new use that requires their removal, ensure that they are recorded prior to removal and stored or relocated on site. If they cannot be stored on site they should be listed on a central inventory, adequately labelled with permanent labels then stored in an appropriate off site facility.	Ongoing.
Consider the requirements of the BCA in undertaking any future internal works. Due to the very high heritage significance of the place it will be necessary to provide engineered or alternate solutions for some parts. Areas of the BCA that require compliance include egress for personnel, fire safety systems to provide early warning and fire separation between the offices and the machine floor.	As required with proposed future works

6.4 Power Station Exterior Policies

Policy 4.1 — *All significant exterior **fabric** should be **conserved**, primarily through **preservation** and **maintenance**.*

Policy 4.2 — *Damaged **fabric** should be replaced on a 'like-for-like' basis. New **fabric** or finishes should not be introduced unless required to maintain the functionality of the place or where no prudent and feasible alternative exists.*

Policy 4.3 — *Maintain the exterior of the building. In the longer term, the original paint and colour schemes may be reinstated if desired. Replace any damaged or missing **fabric** on a like-for-like basis.*

Policy 4.4 — *Conserve the **setting** and important public views of the Power Station. New buildings or works that may adversely impact upon the **setting** and views should be subject to a Heritage Impact Assessment.*

<u>Reasons for Policies</u>

Preservation and **maintenance** of the existing form and curtilage of the power station is central to the retention of cultural significance. A professionally prepared cyclical maintenance plan, predicated on a clear appreciation of the heritage sensitivity of the place, will provide guidance on actions to preserve the existing fabric. Draft recommendations arising from any cyclical maintenance plan should be reviewed through the Heritage Impact Assessment process and against the policies outlined in this CMP to ensure compatibility with heritage conservation aims and objectives.

Strategy/Action to be carried out	Period
Thoroughly clean the exterior of the building including the walls and	Within 12

Strategy/Action to be carried out	Period
windows on a regular basis (i.e. cyclical maintenance plan).	months/ongoing.
Retain the existing external paint scheme or reinstate the original paint scheme if desired.	Ongoing.
Re-glaze any damaged windows using 'like' materials as appropriate (e.g., match glass patterns as shown in inventory where possible/feasible).	As required/ ongoing.
Ensure that gutters, downpipes and drains are in sound condition and good working order.	Annual assessment/ ongoing/ as required.
Ensure that riverside walkways are free of moss.	Annual assessment/ ongoing/ as required.
Ensure that roof is clean, securely fixed in place and free of leaks.	Annual assessment/ ongoing/ as required.

6.5 Machinery and Components Policies

Policy 5.1 *Existing plant and machinery should be retained in* ***use*** *and the station should continue to operate in its existing form if possible.*

Policy 5.2 *Alterations to plant and machinery should only be considered where they are vital to the ongoing viability of the station.*

Policy 5.3 *Any superceded plant and movable items should be retained in situ unless it is unavoidable for operational reasons. In the absence of a Hydro Tasmania movable cultural heritage strategy (see policy 8.1) any such items that must be removed from their original location should be retained and appropriately re-located to another part of the site.*

Policy 5.4 *Turbine 3 is now (2017) the sole turbine that retains its original actuator governor and control panel. The retention of this turbine and its allied controls in their current form and in operating condition must be considered as a long term management objective for the Tungatinah Power Station.*

Reason for Policies

Much of the Tungatinah Power Station plant is original and has been continually maintained, and judiciously upgraded, on an ongoing basis. Other parts of it (especially the turbines (TU1, TU2, TU4 and TU5) machine floor instrumentation, control panels and the control room) have been upgraded over time. The intention of this policy is to allow sufficient flexibility for continued operation, **adaptation**, and where necessary upgrade of plant and equipment (where **adaptation** based on a philosophy of 'as much modification as necessary and as little as possible is advocated) whilst **preserving** and **maintaining** 'as is' the current configuration of generators. The policy for superceded plant and machinery should be read in conjunction with Policy No. 8.1.

Strategies & Actions

Strategy/Action to be carried out	Period
Maintain plant and equipment to a high standard to ensure they remain viable into the future.	Ongoing.
Where modification or upgrading is required, ensure that a Heritage Impact Assessment is prepared. Sufficient lead time should be built in to implementation schedules to enable heritage impact evaluations to take place and to avoid critical path complications.	As required (& as early as possible).
Where it is essential (i.e. it can be demonstrated that there is no prudent and	Ongoing.

Strategy/Action to be carried out	Period
feasible alternative) to upgrade plant or equipment to maintain viability or efficiency, seek advice from the Cultural Heritage Program staff regarding applicable curatorial requirements/arrangements.	
Design and locate any new infrastructure sensitively and sympathetically (i.e., in a non-intrusive fashion).	Ongoing.
Retain all of the original control panels in the control room.	Ongoing.
Retain all of the main features of Turbine 3 including the control panels, and actuators as a long term management objective.	Ongoing.

6.6 External Infrastructure Policies

Policy 6.1 *All infrastructure external to the main power station building such as the penstocks, valve house, surge tank, intake gate, trash rack, tunnel and associated plant should be retained in use and should continue to operate in its existing form if possible.*

Policy 6.2 *All remnant evidence of the construction phase plant such as the lower batching plant site, low level ruins of the haulageway winch, tram track adjacent to the penstocks as well as the crusher and batch plant adjacent to the valve house, should be retained in situ.*

Reason for Policies

Tungatinah Power Station is a complex of interrelated elements that have been described as a highly significant grouping of Hydro assets in the State. It is imperative that wider aspects of the system remain in evidence as these have the ability to demonstrate the means by which power is generated and the technical challenges involved in construction, maintenance and continued operation. The removal of the shelter shed ruins has occurred post-2007 and is regrettable, and similar actions should be avoided in the future unless documented in a Heritage Impact Assessment.

<u>Strategies & Actions</u>

Strategy/Action to be carried out	Period
Maintain penstocks and valve house to a high standard to ensure they remain viable into the future.	Ongoing.
Most of the original control panels in the valve house have been removed and replaced with modern cabinets but some evidence (such as paint shadows and remnant wiring) of the location of former panels remains. This evidence should be retained.	Ongoing.
Retain valve covers removed to allow installation of new valve operating equipment in the valve house.	Ongoing.
Surviving rails and winch cable guide rollers on the haulageway should be retained and subject to cyclical maintenance.	Ongoing
Retain and maintain the cooling water tank, pipeline and small weir. Salvage the discarded weir trash rack from the bush and relocate to open ground near the weir.	Ongoing/Within 12 months.
Stoney Roller intake gate to be retained *in situ* but not maintained in operating condition.	Ongoing

6.7 Landscaping Policy

Policy 7.1 *The landscaped area around the northern and eastern sides of the power station should be maintained and retained.*

Policy 7.2 *If practicable the elements of medium and high significance in the landscaped picnic area to the east of the power station should be retained and maintained.*

<u>Reason for Policy</u>

While the site is predominantly industrial in nature, it is set in a rugged, heavily vegetated and verdant gorge on the banks of the Nive River. The manicured grassed area and carefully ordered exotic plantings around the immediate northern and eastern sides of the power station building represent an extension of order on the natural environment and provide a carefully controlled setting for the power station when viewed from the road.

The picnic area is representative of the long history of Hydro Tasmania in shaping cultural landscapes and in particular of the consideration given to leisure activities and the provision of amenities for the local community and visitors. The proximity of this location not only provides a location from which to admire Tungatinah but also highlights the determinative role Hydro Tasmania has taken in shaping space around their industrial installations.

<u>Strategies & Actions'</u>

Strategy/Action to be carried out	Period
Maintain grassed areas with conifers, lilacs and rhododendrons.	Cyclical maintenance plan.
Historically this area contained more conifers across the north west wall of the power station. If landscaping works are being undertaken then new plantings should be established based on historical evidence.	As work is undertaken.
Maintain the amenities building, plaque honouring the Polish workers and general layout of the picnic area where possible.	Ongoing.

6.8 Movable Heritage &/or Redundant Infrastructure Policy

Policy 8.1 *Hydro Tasmania should develop and implement a strategy for curating items removed from operational contexts or that are part of the fitout of the station (e.g. artworks and plaques not 'in situ'). This should include items that have already been removed and are stored off site. In the interim, items of movable heritage (including plant, equipment, furniture and fittings) should be retained at the site with due regard to their conservation requirements and security.*

<u>Reason for Policy</u>

Movable heritage is an important element of the place. Industrial buildings and sites that have been stripped of their movable heritage are often characterless and difficult to understand in terms of their original function. The presence of plant, equipment, furniture and fittings make the place whole and more easily understood. A strategy for dealing with movable heritage and/or redundant infrastructure that cannot be retained '*in situ'* is urgently required.

<u>Strategies & Actions</u>

Strategy/Action to be carried out	Period
As a priority develop a process for assessing and dealing with movable and/or redundant heritage items as part of a broader Hydro Tasmania movable heritage strategy	Within 12-18 months.
In the interim, retain all existing movable heritage at the site.	Ongoing until strategy in place & active.

Strategy/Action to be carried out	Period
Endeavour to determine that movable heritage is located in its original or most valid location.	Ongoing until strategy in place & active.
Do not move items around the site unless there is adequate justification to do so.	Ongoing.
Maintain a register that documents any movement of items and the reason for their relocation.	Ongoing.
Endeavour to relocate missing items and return them to the site, subject to the movable heritage strategy that is to be developed.	Ongoing.

6.9 Interpretation Policy

Policy 9.1 *The Tungatinah Power Station should continue to be interpreted to the public. The high quality interpretation in the existing picnic area beside the Lyell Highway should be maintained.*

Reason for policy

The picnic ground includes an interpretive panel on the power station and a commemorative plaque recognising the important contribution of Polish immigrants to Tasmania and the Hydro. It provides an excellent location for interpretive material. Hydro Tasmania does not currently support public access to the Power Station. If in the future this changes an Interpretation Plan should be prepared. Such a plan would consider the broader context for interpretation and be aligned with the Hydro Tasmania Cultural Heritage Interpretation Strategy and other relevant business plans and strategies. It would provide specific guidelines for interpretive themes, content, actions and indicative costs of implementing the plan.

Strategies & Actions

Strategy/Action to be carried out	Period
Maintain quality interpretation of the Tungatinah Power Station within the existing picnic area beside the Lyell Highway.	Ongoing.
Prepare an Interpretation Plan, should public access to the Power Station building be proposed for the future.	As required.

6.9 Review Policy

Policy 10.01 *This conservation plan will be reviewed 5 years after its endorsement, and earlier if required.*

Reason for Policy

Conservation Management Plans should not be static documents but be regularly reviewed to ensure they remain relevant. Reviews are generally undertaken between five and ten years after adoption.

Strategies & Actions

Strategy/Action to be carried out	Period
This CMP should be reviewed after five years, or earlier if major changes to the place are proposed that are outside the scope of this CMP.	Five years.

7.0 2017 REVIEW AND IMPLEMENTATION STRATEGY

7.1 Introduction

The Cultural Heritage Program provides support for managing heritage assets owned or controlled by Hydro Tasmania. Generally the management of cultural heritage at the Tungatinah Power Station, and the external sites included in this CMP, has been undertaken in accordance with the policies of the 2007 CMP and Hydro Tasmania's own heritage management framework. Sympathetic and considered implementation of necessary changes has been the norm rather than the exception and this is indicative of the broad success of both heritage management frameworks. However, in some instances, issues have arisen with the lack of prior preparation of Heritage Impact Assessments and the absence of a movable/redundant heritage policy leading to a loss of significant fabric or elements of significance.

It is considered that the circulation of this document to those who have responsibility for the day to day management of the site would enable them to include its policies in the management of the site. In addition to this, it is critical that a site specific movable/redundant heritage policy be developed in the near future. This will require further detailed planning and assessment by an appropriately qualified practitioner with experience in collections management and curation.

7.2 Co-ordinating Management Actions

It is essential that once this revised CMP has been approved and adopted by Hydro Tasmania, it becomes a reference document for all Hydro Tasmania personnel who have management responsibilities at the Tungatinah Power Station. The conservation philosophy and actions prescribed in this CMP represent a starting point from which effective heritage management may occur. Proposals that may have a heritage impact should be developed in consultation with the Cultural Heritage Program Coordinator and, in most cases, will require formal assessment and sign off as part of the organisation's Heritage Impact Assessment protocol. The responsibility for notification of proposals that may result in a heritage impact that should be considered within a Heritage Impact Assessment process rests with the Upper Derwent Area Production Manager.

It is also imperative that all on-site Hydro Tasmania employees and contractors are aware of the heritage significance of the place and the requirements of the CMP or relevant Heritage Impact Assessment.

It seems likely that some actions undertaken outside of the policies recommended in the original CMP, that have had an adverse impact on heritage values, were the result of not having ready access to this plan. Therefore it is essential that those who are responsible for managing the site on a day to day basis have access to and are familiar with this CMP.

The onus is on Hydro Tasmania, as site owners, to ensure that any upgrading works that take place at the site are approved and authorised and comply with the CMP. In terms of day to day management, the issues are likely to be such things as repairs or alterations to existing fabric or plant (mainly maintenance), upgrading works required for National Energy Market compliance or to improve efficiency, or removal of redundant fabric or plant ('cleaning up').

The following activities, recommended in the general conservation policy section of Part 6, are to be carried out within 12 months of the final conservation management plan being submitted:

- Endorse this conservation management plan as the guiding document for future management and conservation of the place.
- Although not included on the Tasmanian Heritage Register, as a place of State level significance, it would be desirable for copies of this document to be lodged with Heritage Tasmania. It would also be desirable for TasNetworks to be provided with a copy of this CMP to assist with management of the adjacent switchyards.
- Ensure that the policies in this CMP are known and understood by relevant Hydro Tasmania staff, the relevant planning authorities and any contractors or others engaged to undertake any works at the site. It is imperative that this document is

circulated to all management staff on site or associated with the day to day operation of the site. Responsibility for notification of proposals that may result in a heritage impact rests with the Upper Derwent Area Production Manager.

- The strategy for assessing and dealing with movable and/or redundant heritage items recommended in the original 2007 CMP has now become an urgent matter with some significant elements of the site having been lost or destroyed. It is critical that a strategy for dealing with movable/or redundant heritage items is developed as a priority.

8.0 BIBLIOGRAPHY

Davies, P. 2005 Hydro Tasmania Heritage Impact Assessment: Tungatinah Power Station Modernisation. Unpublished report prepared for Hydro Tasmania.

Entura/Jackman, G. 2013. Statewide Fire safety Improvements 2013 HIA. Unpublished report prepared for Hydro Tasmania.

Garvie, R.M.H. (1962) *A Million Horses: Tasmania's Power in the Mountains*. The Hydro-Electric Commission, Tasmania.

HEC (1945-2004) "Annual Reports".

HEC (1947b) "Report on the Nive Power Development to the Honourable The Premier, Minister Administering the Hydro-Electric Commission Act, September 1947"

HEC (1955b) "Tungatinah: Opening by His Excellency The Governor-General Field Marshall Sir William Slim G.C.B., G.C.M.G, G.C.V.O., G.B.E., D.S.O., M.C., 20th May, 1955".

HEC 1980 *Report for the Year 1980, No 88*. T.J. Hughes, Government Printer, Tasmania.

HEC internal memoranda, order forms, receipts, letters, photographs.

HTC Consulting/Jackman, G. 2009 Statewide Remote Access Upgrade 2008-2009 Cultural Heritage Issues Report. Unpublished report prepared for Hydro Tasmania.

Jackman, G. 2014a Roof Access Upgrade Tungatinah, Butlers Gorge and Lake Echo Power Stations. Unpublished report prepared for Hydro Tasmania.

Jackman, G. 2014b Tungatinah Power Station Modernisation Project Heritage Impact Assessment Addendum No.4. Unpublished report prepared for Hydro Tasmania.

Jackman, G. 2015 Tungatinah Power Station Modernisation Project Heritage Impact Assessment Addendum No.3. Unpublished report prepared for Hydro Tasmania.

Lupton, R. (1998) *Lifeblood: Tasmania's Hydro Power* Focus Publishing, Sydney.

Robert, B. and Waight, S. Renewal of an Historic Intake Gate [online]. In: *9th National Conference on Hydraulics in Water Engineering: Hydraulics 2008*. Barton, A.C.T.: Engineers Australia, 2008 pp.323-330.

Thyer, G. Tungatinah Intake Gate Report on Design Appraisal of Existing Gate. Unpublished report prepared for Hydro Tasmania, 1993.

Unknown (1954) "Tungatinah Power Plant", *Water Power*, December 1954, pp. 471-478.

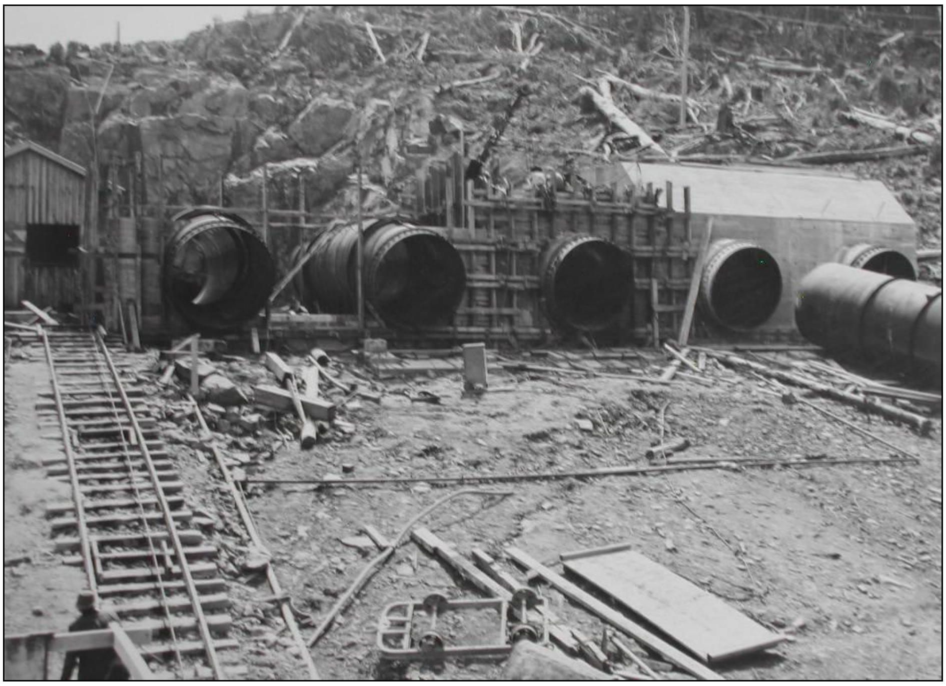
Waight, S. 2009 Tungatinah Power Station Modernisation Project: Heritage Impact Assessment. Unpublished report prepared for the Hydro Tasmania.

Waight, S. and A. Dilger 2011 Tungatinah Power Station Modernisation Project: Heritage Impact Assessment Addendum. Unpublished report prepared for the Hydro Tasmania.

APPENDIX A: CONSTRUCTION PHASE PHOTOGRAPHS

All photographs and plans are from the HEC archives.

Penstocks & Haulageway



A1/1 - Haulageway at the top of the Penstocks, 22/11/1951

A1/2 - Haulageway Junction, 20/11/1952

A1/3 - Bottom of the Haulageway, 27/08/1952

Note that the haulageway did not extend to the road but the wagons were filled by crane.

A1/4 - Bottom of the Haulageway at end of Construction Phase, 1956

A1/5 - Bottom of the Haulageway, 22/02/1985

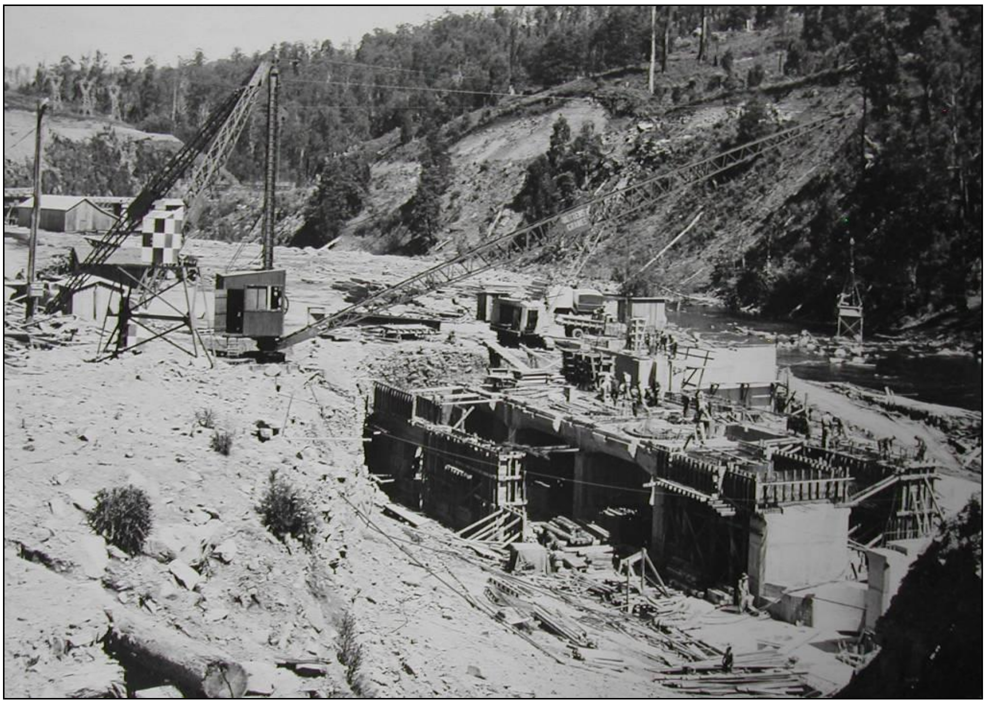
The Haulageway appears to have been extended closer to the road since 1956, to what end is unknown.

Penstock Batch Plant

A1/6 - Unloading Penstock section, 20/11/1952

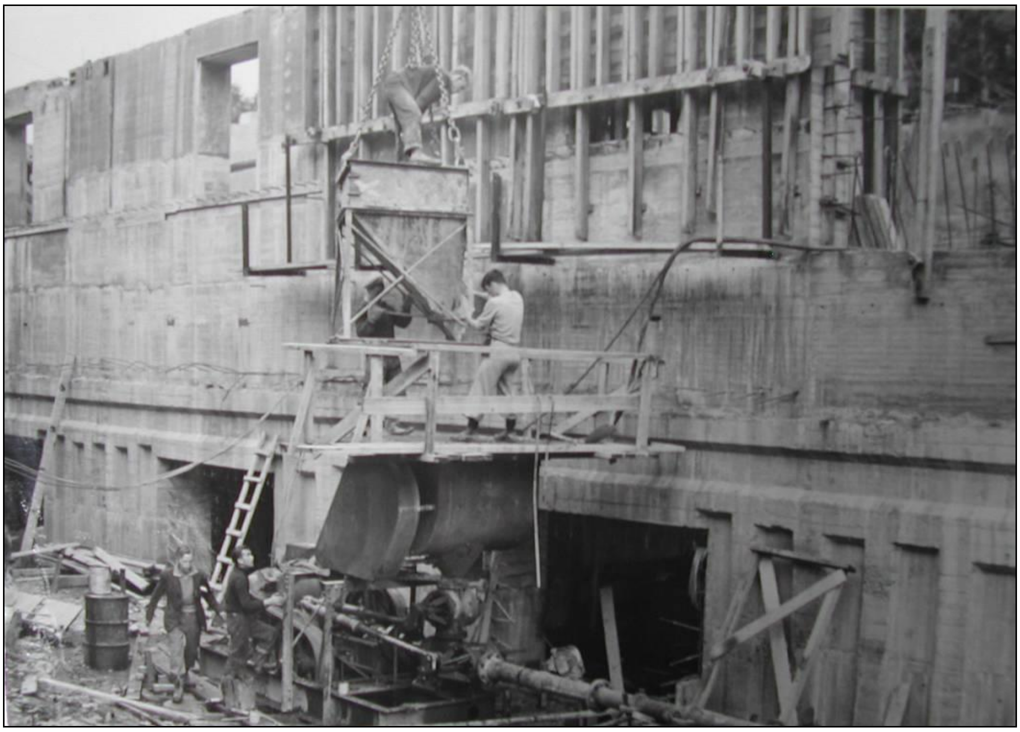
A1/7 - Concrete mixers and haulageway branch line, 04/01/1952

Power Station



A1/8 - Construction phase, facing south, 14/12/1951

Note the various types of crane in use. For more examples see Figure A1.3 above.



A1/9 - Concrete pump, March 1952

Stothert & Pitt Concrete Batching and Mixing Plant

This mixing plant had been in this location since 1949. There are two wooden huts evident in these pictures, apart from the ones that are part of the mixing plant. The one to the north east is long and narrow and faces the road into the site. It is the older of the two, having been erected at some point in 1949. The one to the north has a brokenback roof and was erected in 1950 or early 1951. It is also visible in A1/3 and A1/8 above.

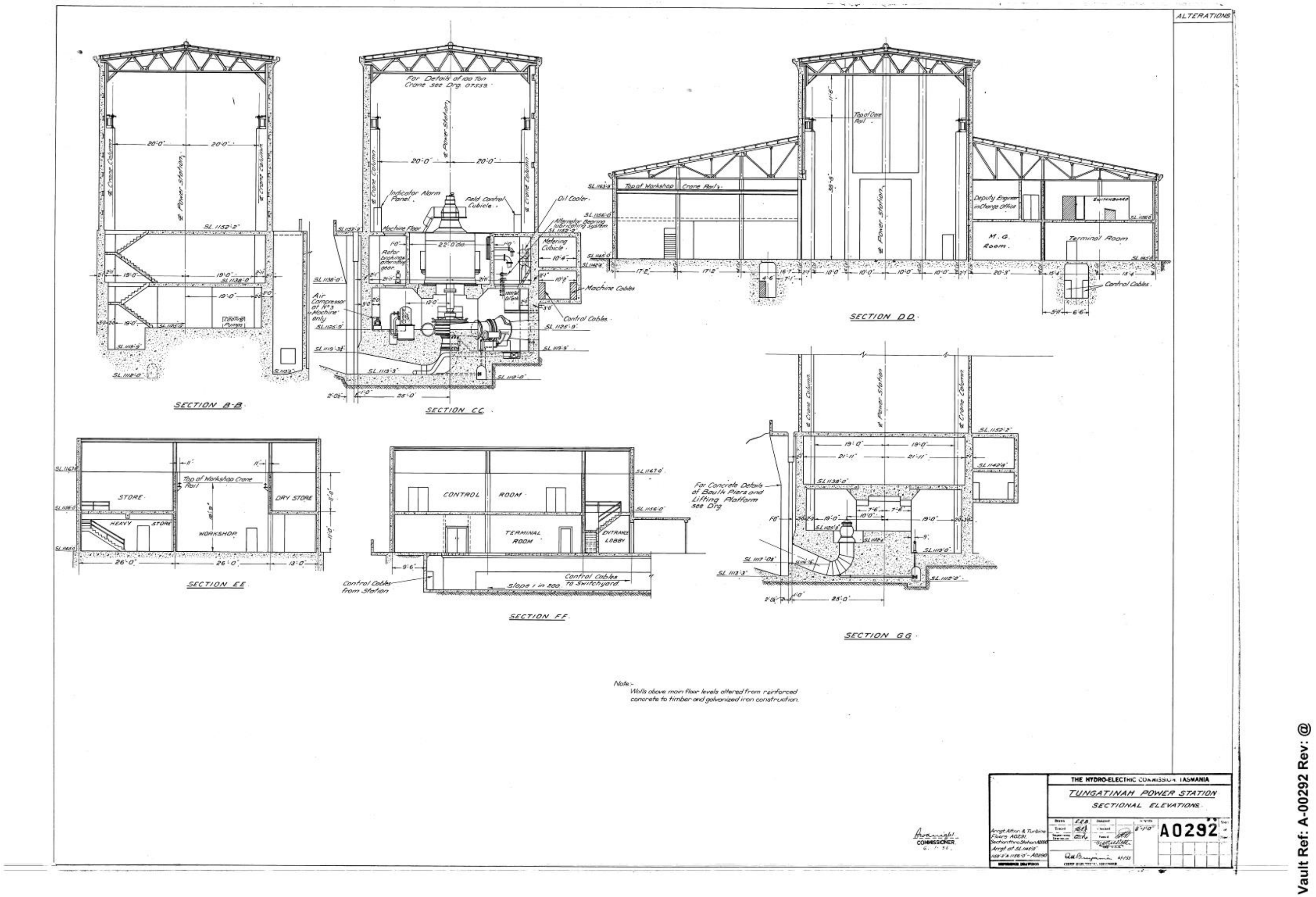
A1/10 - Mixing Plant, facing south, 16/05/1951

A1/11 - Mixing Plant, facing north, 16/05/1951

A1/12 - Mixing Plant facing north east, May 1952

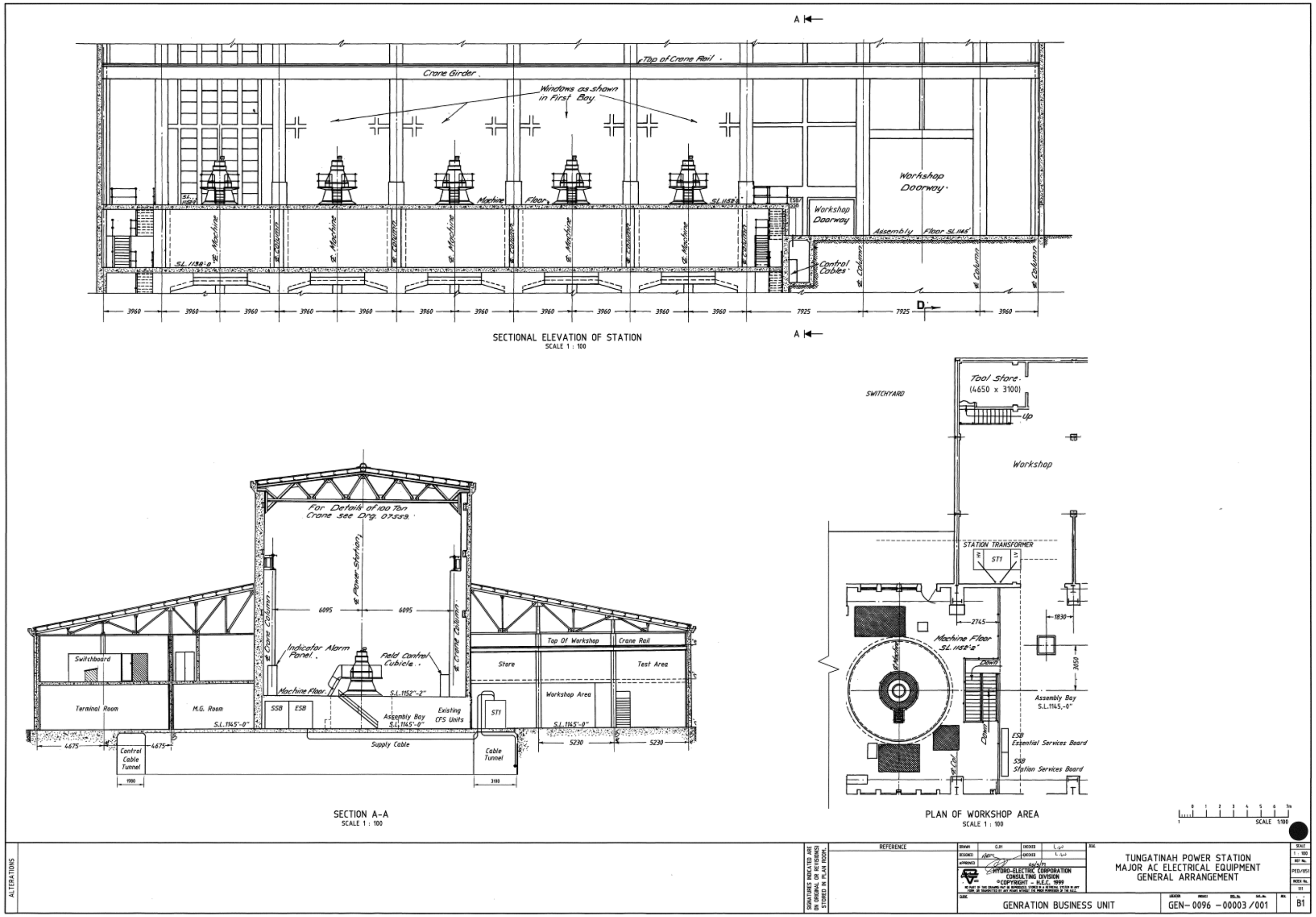
A1/13 - Mixing Plant in operation, facing north, 09/12/1952

CAUTION: Printed document is uncontrolled. See Hydro As-Built Vault for latest asset condition.



Mon 29/11/2004 Active Information Only

A1/14 Sectional elevations of the Tungatinah Power Station 6 Jan 1953 showing the arrangement of the Alternator and Turbine Floors. (Hydro Tasmania).



A1/15 - Sectional elevations of the Tungatinah Power Station 1999 showing the major electrical equipment general arrangement. (Hydro Tasmania).

APPENDIX B: CONSTRUCTION CHRONOLOGY

This chronology has been compiled from HEC photographs, annual reports, memos, receipts etc. Months given are generally approximate. Where no month is given the information has generally been taken from an annual report and thus the event occurred during the financial year that ended in June of the year given. These tables do not show all maintenance and work that has been carried out on the station.

Valve House

Year	Month	Event
1952	August	Designing of timber and cgi valve house begins
1972	February	Valves converted to hydraulic operation

Penstocks

Year	Month	Event
1948	March	Clearing of penstock route has commenced.
1953	June	20th: No. 5 penstock completed.
	July – August	No. 4 penstock completed.
	July - October	No. 3 penstock completed.
1954	July	No. 1 penstock completed.
	October	No. 2 penstock completed.
1970		No. 5 penstock was internally reconditioned.
1971		No. 4 penstock was internally reconditioned.
1972		No 3 penstock was internally reconditioned
1974		Nos 1 & 2 penstocks were internally reconditioned
1985	March	28th: No. 4 penstock drain fails, causing some flooding of the power station.
1989	February	Replacing of all 5 penstock drains with a new design commenced.
1999		No. 5 penstock internally reconditioned

Power Station

Year	Month	Event
1948		Clearing of the site began.
1949	November	Excavation began.
1951	April	Construction of foundations began.
	December	Pouring of floor slabs began.
1952	March	Erection of the first steel columns.
	June	Erection of Girders and Roof begins.
	August	Placing of external wall covering and roof covering began. Erection of eastern wing commenced.
	December	Erection of western wing had commenced. Main Entrance installed on southern side of building.
1953	April	Exterior of building substantially completed but unpainted.
	June	30th: No. 5 machine commissioned.
	August	No. 4 machine commissioned.
	October	No. 3 machine commissioned.
1954	July	No. 1 machine commissioned. Construction of plant spare store commenced.
1955	February – April	Exterior painted silver grey. The main entrance to the Assembly Bay was plastered. Concrete plinths poured around bases of external wall columns.
	May	Bronze Lettering ("Tungatinah Power Station") set up over main entrance. 20th: Official opening of the Power Scheme.
	July	Bulk store and carpenter's shop planned for southern end of switchyard.
	August	Landscape plantings substantially completed.
1957	May	No. 4 machine overhauled (incl. regrinding of brake ring and modification of rams)
1960	May	Carbon dioxide protection provided for alternators
1969	October - ?	Repairs, including recaulking of windows and removal and repair of one window. Repainting of exterior in Sun Beige and

Year	Month	Event
		Gaylon.
1970	March - ?	Bronze lettering polished.
1972		No. 4 machine had major overhaul.
1974		No. 1 machine had major overhaul.
1976		No. 3 machine had major overhaul
1978	?	Change over to remote control from Tarraleah station completed.
1979	December	A faulty earth relay on a generator causes the rupture of a circuit breaker and precipitates the worst blackout in the HEC's history.
1981	May	No. 5 machine guide bearings modified.
1985		No. 1 machine had major overhaul.
	March	28th: No. 4 penstock drain fails, causing some flooding of the power station.
1986		No. 2 machine had major overhaul.
1987	April	Emergency stop buttons installed for cranes.
1988	April	No. 3 machine had major overhaul.
	July	No. 4 machine had stator windings replaced and a major overhaul.
1992	September	Asbestos roofing and cladding on power station and outbuildings replaced with Zincalume corrugated sheeting.
2013-2015		Modernisation project, upgrading TU1, TU2, TU4 and TU5 and controls

APPENDIX C: 1954 DESCRIPTION

The following technical description of the plant (Sections 3.1 – 3.4 below) is taken from *Water Power*, December 1954. Imperial measurements have been retained for the sake of historical accuracy. Colour photographs in this section were taken in December 2004.

Power Station

The power station at Tungatinah is of steel frame and corrugated-iron construction and is situated on the left bank of the Nive River about 400 yards upstream from, and on the opposite bank to, the Tarraleah Power Station. The generator floor at RL.1152 ft 2in. is at the top of the generator stator and an intermediate floor is provided at RL.1138 ft. The turbine floor, in line with the centreline of the spiral casing, is 26ft 5in. below the generator-floor level. To facilitate removal of the runner, a fourth floor is provided at RL.1119 ft. 9 in at the junction of the removable suction cones with the suction linings. The vertical distance from the generator-floor level to the bottom of the draught tubes is 38 ft 11 in.

In order to provide an open and unobstructed setting, and in particular, to avoid enveloping the turbines in a massive concrete support, the generators are supported on reinforced concrete walls placed between each turbine. The concrete could thus be placed before erection commenced, which made an uninterrupted erection programme possible, once the units were on site.

Hatchways each 10 ft 6 in. by 6 ft. are provided for each unit on the upstream side of the station, through which were lowered the inlet valves and turbine parts. Smaller hatchways each 8 ft. 6 in. by 5 ft. 6 in. are also situated on the downstream side to enable the turbine pumping sets to be placed in position. In this way a very neat layout is obtained, only the exciters, turbine governor actuators, instrument panels and cabinets being visible above the generator-floor level.

Generators

The generators consist of five vertical shaft hydro-alternators manufactured by The General Electric Co. Ltd., England, and supplied by its Australian representatives, the British Electric Co. Pty Ltd. Each machine is continuously rated in accordance with B.S.S.266 for the following duty:

Output	25,000 kW / 31,250 kVA
Normal speed, rpm	600
Runaway speed, rpm	1,050
Voltage	11,000
Frequency, cycles per second	50
Phases	3
Flywheel effect lb-ft^2	1,040,000

A3/1 - GEC name plate on exciter.

Mounted above and directly coupled are the main exciter, pilot exciter, and permanent magnet governor alternator, the whole assembly forming a self-contained unit. To comply with transport requirements, the alternators, which weigh over 175 tonnes, were constructed in such a manner that the weight of any single part was limited to 35 tons. The stator was split and despatched in two halves; the poles with their field coils were removed from the magnet wheel; the exciter armatures and permanent-magnet alternator rotor formed a self contained assembly; and the radial arms supporting the top thrust-bearing housing were also dismantled and shipped separately.

The stator frame is a fabricated structure of octagonal shape, built in two halves which are bolted and dowelled together. The construction of the core follows standard practice, segmental stampings being secured by dovetailed keys bolted to longitudinal ribs with the frame. For these machines, a two layer diamond type winding was used, the insulation being of mica and micanite throughout. End windings are strapped to Permail supports fixed to the core-clamping plates, the connections being brought out through an insulating plate situated near the bottom of the frame. Aluminium guards provide adequate protection of the end windings and serve to guide the cooling air through the machines.

Six thermo-couples, embedded in the stator, enable the temperatures of the core and windings to be recorded on a remote temperature indicator mounted on the turbine gauge panel.

The rotor is designed for a safe overspeed of 75 per cent ie. 1,050 rpm. Shaft and coupling are forged in one piece; twelve plates are shrunk and keyed on the shaft to form the rotor body into which the laminated poles are T-slotted and secured by taper keys. Each winding pole is subjected to heat and hydraulic pressure to form a solid coil in which risk of movement of individual turns is eliminated. Circumferential movement is prevented by duralumin wedges fitted between adjacent pole windings and secured to the rotor body. Copper rods in the pole faces are brazed into copper plates which are connected together by duralumin rings to form the squirrel-cage damping winding.

Two centrifugal fans, one at each end of the rotor, circulate the cooling air through the machines, the lower fans embodying the braking ring. The rotor is supported by a thrust and guide bearing of the Michell type which is designed to carry a total load of 270 tons, representing the weight of the rotor and the external thrust produced by the water turbine. The housing is spigoted and bolted to the thrust-bracket assembly which is bolted to the stator frame and located by tapered dowels. Doors in the housing give access to the thrust pads for maintenance purposes. The bottom guide-bearing housing is centralised and located by jacking screws, no spigot being used. In order to obviate any risk of current circulating through the rotor shaft, the thrust and guide bearings are insulated from the supporting structure.

The armatures of the main and pilot exciters, the rotor of the permanent magnet alternator for supplying power to the turbine governor motors, and the centrifugal overspeed device are mounted on a forged steel shaft which is solidly coupled to the main alternator shaft. The main exciter is separately excited with a counter shunt winding, while the pilot exciter is compound wound, initial adjustment of the field current of this machine being effected by a shunt field regulator.

The brushgear of both exciters, and the alternator sliprings is mounted within a fabricated stool situated between the two exciters, the brushgear being supported on adjustable yokes. The cupro-nickel slip-rings are mounted on an insulated hub which is pressed on and keyed to the shaft, while adequate creepage is given by an insulating barrier fitted between the rings. Doors and a stool give easy access to a raised platform which surrounds the exciter assembly.

The cooling system forms a closed air circuit in which cool air is drawn from the alternator pit and forced through the machine, the warm air being returned to the pit through the cooler which is arranged in eight sections mounted around the shell of the machine. Temperature detectors in the air inlet and outlet are connected to a Cambridge instrument on the turbine gauge panel. In addition, two Budenberg mercury-in-steel thermometers, fitted with adjustable maximum contacts, operate alarms if the inlet and outlet air temperatures exceed predetermined values, the thermometer dials being mounted on the turbine gauge panel.

A3/2 - Alternator cooling system

The coolers were designed and manufactured by The Premier Cooler and Engineering Co Ltd, each cooler section forming a self-contained unit and comprising a nest of tubes around each of which a heat transfer element is wound. Cooling water is supplied from a 7 in diameter ring water main situated at the top of the alternator pit. With a cooling water inlet temperature of 27^{o} C and a rate of flow of 616 gallons per minute, the complete cooler assembly will reduce the temperature of 63,000 cu. ft. of air per min from 56^{o} C to 35^{o}C. The capacity of each section is such that any seven of the eight units are capable of dissipating the full load losses (approximately 700 kW) so that any one section can be isolated for maintenance purposes with the machines running at full load.

Flow lubrication is used for the guide and thrust bearings of the alternator. Oil from a 1,000 gallon tank is circulated by a motor-driven pump through an Auto Klean strainer and Serck oil cooler to the bearings, whence it returns by gravity to the storage tank.

A3/3 - Auto-klean oil filter

The pump has a capacity of 180 gallons per min. at 75 lb per sq. in. pressure, and is driven by a 20 hp 415 volt squirrel cage motor. A duplicate stand-by pump is provided and is brought into operation automatically by the action of a flow relay should the rate of flow fall below a preset value. As an additional precaution, the standby pump is driven by a 20 hp motor, fed from an independent source of direct current, thereby eliminating any risk of loss of oil to the bearings in the event of a failure of the alternating supply. A standby cooler is also installed so that servicing may be undertaken while the alternator is running. Each cooler is designed to dissipate 18,000 B.Th.U. per minute, and will reduce the oil temperature from 55/600 C to 450 C when fed with cooling water at 270 C and handling 165 gallons of oil per minute.

A3/4 - Oil cooler

Budenberg mercury-in-steel thermometers are fitted to all bearings and are connected through capillary tubing to indicating dials on the turbine gauge panel. Each thermometer has two contacts which can be adjusted independently and give an alarm if the bearing temperatures\ reaches 680 C or operate the emergency trip circuit and shut down the set if the temperature rises to 800 C.

The braking and jacking equipment was supplied by Jones Tate & Co. Ltd., Bradford. It comprises five rams, equally spaced and acting upon the brake ring which, as previously mentioned, is fabricated integrally with the lower ventilating fan on the magnet wheel. The top of each ram forms a flat plate which carries a heavy brake lining.

A3/5 - Jacking pump

Although the braking system and the jacking system are interlinked, they are operated independently of each other. For braking, oil at 285 lb per.sq. in. from the turbine governor system passes through a reducing valve where its pressure is dropped to 50 lb. Per sq. in. Between this valve and the ram cylinders is a solenoid-operated valve which opens automatically when the magnet wheel has slowed down to about half speed. Oil is then admitted to operate rams which apply the braking torque to bring the machine to rest.

By means of this jacking system the magnet wheel can be lifted when the machine is at rest to allow an unrestricted flow of oil though the thrust bearing before starting up, and it also enables essential maintenance work to be undertaken. For jacking a much higher oil pressure is required and this is obtained from a Towler Bros. Electraulic high speed multi-ram pump which delivers oil at a pressure of 1,650 lb. Per sq. in. Mechanical stops limit the upward travel of the rams and are set to ensure that each ram rises to exactly the same height. A system of electrical interlocks ensures that the machine cannot be started up unless all the rams are in their fully lowered position. Oil from the rams returns to the jacking system through a high pressure, solenoid-operated release valve.

Hand operated sustaining screws are provided for supporting the magnet wheel in the raised position. These screws are interlocked with the rams in such a manner that they cannot be operated until the magnet wheel is slightly raised so that incorrect operation is impossible. They also actuate the electrical interlocks associated with the rams.

Turbine Plant

The turbines are of the vertical Francis type and were designed by Boving & Co. Ltd, and manufactured by their sub-contractors, Peter Brotherhood Ltd., except for the runners, which were made by Markham & Co. Ltd. Each of the five machines is designed for an output of 35,000 h.p. under a net head of 950 ft., at 600 rpm. These machines are notable in that they are at present the highest head Francis turbines operating in Australia (1954), and it is believed the highest turbines of this type yet manufactured in the United Kingdom.

The spiral casings and stay rings are of cast steel, each made in four sections with heavily flanged bolted joints[138]. The horizontal to which the top and bottom covers are bolted provide additional strength and rigidity, the seal between the casing and covers being effected by rubber rings fitting into wedge-shaped grooves. Before any grouting was done under the spiral a hydraulic test was carried out to ensure that all joints were satisfactory.

The stainless steel guide vanes are cast integrally with the top and bottom spindles, and are mounted in twin journal bearings on the top and bottom covers. Each vane is individually adjustable to ensure that the clearance between the top and bottom covers is distributed satisfactorily, and adjustable eccentric pins are provided at the connection of the breaking links with the regulating ring to ensure correct closure of the guide wheel.

A special feature of the turbine design is the large roller bearing which is incorporated in the regulating ring; this reduces friction to a minimum, and eliminates sticking when the turbine has been running for long periods without changes in load. The regulating ring and guide vane levers and links are mounted outside the guide-vane pitch circle, thus allowing ample access to the inner part of the turbine, and in particular to the Huhn packing and turbine guide bearing. The top and bottom covers, manufactured from cast steel, are fitted with stainless steel rings to match those on the runner, together with a stainless steel throat ring and stainless steel clad guide vane check plates.

Particular care was taken with the runners which are of solid cast stainless steel, accurately machined, ground and finely polished to suit the water velocities incidental to the high head. Leakage losses and hydraulic thrust are minimised by the arrangement of the stainless steel sealing rings which match similar rings on the top and bottom covers. The rings are attached with stainless steel counter-sunk screws, and are thus readily renewable. In order to avoid damage to the guide vanes and runners caused by gravel or other debris from the unlined portion of the tunnel, the usual method of drying out the generators by running the machine with the guide vanes set at the “no load” position was not adopted. Instead a d.c. generator set was used to pass current through the windings.

The turbine shaft is a solid forging, the runner being attached to the lower coupling by means of clearance bolts, locating spigot and cross keys to permit easy removal and replacement. The lubricating system of the white metal lined turbine guide bearing consists of a pump, gear driven from the turbine shaft, together with a standby d.c. electric-driven pump.

Leakage between the turbine shaft and top cover is prevented by a Huhn-type packing, consisting of carbon rings held against the shaft with garter springs. The rings are of triangular section, and are arranged in pairs in such a way that the carbons are pressed against the sides of the grooves as well as

[138] Bill McEwan of CTI Consultants Pty Ltd advised that these spiral casings are unique in that they are the only Francis type turbines in the HEC that were fabricated using cast steel components rather than being fabricated from welded steel plate. Pers. Comm. 31 March 2005.

against the shaft. The latter is protected against wear by means of a renewable liner made in two halves bolted together.

Air is admitted to the runner nose via the bores of the generator and turbine shafts, and is thus discharged where it is most required to prevent rough running at low loads. To provide against leakage from the shaft bore, a non-return valve consisting of a rubber-covered copper ball, perforated mild steel housing and gunmetal seat is fitted to the lower end of the shaft.

The draft tube consists of an upper conical piece and a grouted-in lining. The conical piece or suction cone is made from mild-steel plate, and is mounted on a split cast-iron base which, in turn, is bolted to the grouted-in lining. This base is easily dismantled, after which the cone can be lowered and removed. It will be readily understood that this arrangement greatly facilitates the usually arduous and complicated job of removing the runner.

The governing system consists of the actuator and electrically driven pumping set. The steel band pendulum of the actuator is driven by a synchronous motor supplied direct from a permanent magnet generator mounted on the main alternator shaft. The actuator, which contains its own regulating valve and servomotor, controls the regulating valve of the main guide vane servomotor by means of a spring-loaded connecting rod. The end of the pilot valve spindle remote from the actuator pendulum is connected through springs to a rotating piston in a dashpot cylinder, the movement of which is controlled by the return gear from the actuator servomotor. This serves to dampen the movement of the pilot valve and compensates to prevent over correction for speed variations. The amount of damping is controlled by a small valve which is readily adjustable to suit the conditions of operation.

Since the turbines at Tungatinah may at times be required to control the system frequency of a comparatively large network, the actuators are supplied with a close regulating device. This device, which is operated by a solenoid, eliminates the actuator by damping with the result that very rapid changes in the turbine output can be obtained in the event of small variations in the system frequency.

A3/6 - Actuator

The actuators are also fitted with an electric motor-driven speed-altering device which is used for synchronising and for adjusting the load on the machine. An electric motor-controlled load limiting device is also fitted to each actuator, and is used for starting and stopping the turbine as well as for limiting the load to a pre-set value. The permanent speed variation gear provides a fixed speed droop between “no load” and full load, which is adjustable from zero to 6 per cent.

Each turbine is supplied with a pumping set to provide the governor and the inlet valve control valves with pressure oil at 285 lb. per sq. in. Each set includes horizontally mounted electrically driven screw pump (lmo type) fitted to the top of the oil tank and discharging into a pressure receiver. A non-return valve is situated between the pump and the receiver, and an unloading valve is also provided to ensure that when the pressure in the receiver is within the design range, the pump discharges back into the oil tank. When the unloading valve opens, the oil is circulated against no head, and pump power requirements and oil heating are therefore reduced to a minimum. A relief valve is provided to maintain the pressure in the receiver within a safe limit should the unloading valve become inoperative. The correct oil-to-air ratio in the receiver is maintained automatically by an oil-operated compressor with its suction pipe in the oil tank terminating at the normal oil level.

Because of the exacting pipeline conditions, a pressure regulating valve of Boving standard design is supplied with each unit to limit the pressure rise and momentary speed rise on load rejection. The valve is controlled by a pilot valve connected to the governor through a cam designed so that as soon as the governor moves in a closing direction, the pressure regulating valve opens to bypass water to an extent whereby the total flow remains virtually constant. The valve and in particular the discharge arrangements, are designed to reduce noise and vibration to a minimum.

The turbine inlet valves which were manufactured in Australia by Boving's sub-contractors, Thompson's (Castlemaine) Ltd., are of the Boving rotary type. They are drop-tight under pipeline pressure, and are designed for closing, when necessary against full unbalanced load. The cast steel rotors have a uniform cylindrical bore of 48 in., and thus offer no obstructions to the water flow between the pipeline and spiral casing inlet. The head loss is therefore no more than it would be for an equivalent straight length of pipe of the same diameter. The bodies of the valves are also of cast steel, and are manufactured in two equal flanged sections which are bolted together. Each valve is operated by means of a servomotor connected to pipeline pressure through a solenoid-operated pilot valve and operating valve – the latter being operated by pressure oil from the governor system. Each valve is also supplied with an hydraulically-operated bypass valve.

A3/7 - Main inlet valve

Cooling Water System

As it is uneconomical to draw relatively low pressure water for cooling purposes from the pipeline, three 10 in. centrifugal pumps have been provided to draw water from the tailrace and discharge into a common cooling water bus pipe. These pumps, supplied by Boving and manufactured by their sub-contractors, Thompsons (Castlemaine) Ltd., have a capacity of 8 cusecs each. They are mounted on the turbine floor (ie below minimum tail water level) and discharge through the common bus to a concrete reservoir situated on the hill behind the power station. The level in the reservoir is automatically controlled between the limits of R.L. 1189 ft. and R.L. 1192 ft. In case of emergency the pumps can discharge direct to the pressure side of the coolers, and as a further safeguard, if the level of the reservoir drops below R.L. 1187 ft., a needle valve connected to one of the penstocks automatically opens. This valve is fitted with a disperser to destroy the energy in the discharge, and is mounted on the wall of the reservoir. It closes automatically when the level reaches R.L. 1192 ft.

A3/8 - Cooling Water Pumps

End of quotation from *Water Power* of December 1954.

APPENDIX D: SUMMARY OF CHANGES 2007 - 2017

D.1 Introduction

This section summarises the changes that have taken place at the Power Station and its ancillary sites since the completion of the first conservation management plan in 2007 (see Table 6.1). The principal changes that have taken place are a result the Tungatinah Power Station Modernisation Project. The aspects of the project that had the potential to impact the heritage values of the site were considered in a series of assessments undertaken by Paul Davies (2005), Sarah Waight (2009), Andrew Dilger (2011) and Greg Jackman (2013, 2014a, 2014b and 2015) both at the commencement of the modernisation process and during it. These documents take the form of stand alone heritage impact assessments or addendums to the initial assessment:

- Waight, S. 2009 Tungatinah Power Station Modernisation Project: Heritage Impact Assessment. Unpublished report prepared for the Hydro Tasmania.
- HTC Consulting/Jackman, G. 2009 Statewide Remote Access Upgrade 2008-2009 Cultural Heritage Issues Report. Unpublished report prepared for Hydro Tasmania.
- Waight, S. and A. Dilger (a) 2011 Tungatinah Power Station Modernisation Project: Heritage Impact Assessment Addendum. Unpublished report prepared for the Hydro Tasmania.
- Waight, S. and A. Dilger (b) 2011 Tungatinah Power Station Modernisation Project: Heritage Impact Assessment Addendum. Unpublished report prepared for the Hydro Tasmania.
- Entura/Jackman, G. 2013. Statewide Fire safety Improvements 2013 HIA. Unpublished report prepared for Hydro Tasmania.
- Jackman, G. 2014a Roof Access Upgrade Tungatinah, Butlers Gorge and Lake Echo Power Stations. Unpublished report prepared for Hydro Tasmania.
- Jackman, G. 2014b Tungatinah Power Station Modernisation Project Heritage Impact Assessment Addendum No.4. Unpublished report prepared for Hydro Tasmania.
- Jackman, G. 2015 Tungatinah Power Station Modernisation Project Heritage Impact Assessment Addendum No.3. Unpublished report prepared for Hydro Tasmania.

Although some minor additional changes have also taken place, most changes that have affected the heritage values of the site have been documented in these assessments. These major changes are principally related to the replacement of turbines and exciters, refurbishment of the valve house and the construction of site offices to support this modernisation project. In addition to this, minor changes have taken place at various locations throughout the power station and some at the valve house.

The site offices are separate stand alone buildings and constructed to the east of the main bay as part of this modernisation process. These structures are not considered within this study. However, they do affect the view of the exterior of the main building of the power station and are considered for their impact on the heritage value of this aspect of the structure.

The changes that were observed during the 2017 inspection can be divided into the valve house and penstocks, cooling tank, exterior of the power station, generator floors, and east and west wings of the power station.

D.2 Valve House and Penstocks

The changes that have taken place at the valve house have been centred around the refurbishment of the valves with additional safety measures.

As recorded by Waight[139] modifications to the valve house had taken place after the 2007 conservation management plan was prepared. Modifications included the construction of a large gantry crane on

[139] Waight, S. 2009 Tungatinah Power Station Modernisation Project: Heritage Impact Assessment. Unpublished report prepared for the Hydro Tasmania.

the concrete block manifold that houses the penstocks, introduced to assist in the refurbishment of the valves but remaining in place (see Figure D.1). Small additions made to the external cladding walls of the structure. During the refurbishment of the valves new fittings had been put in place.

A set of stairs had been installed on the northwestern face of the structure and a new door opens above the earlier door. Through the new door a set of raised walkways has been added throughout the interior. A set of smoke alarms has also been installed along with new interior lights. A new electrical distribution board has been installed on the second level of the northeastern wall of the interior, and oil accumulators and controls have been replaced. In addition to this a new fibreglass plate has been installed on the floor near to the lower entrance to the building.

To the rear of the Valve House, the concrete wall of the portal had new steel stairs installed on its face. There was no visible change associated with the surge tank, including the coiled steel rope which was left in place.

The penstocks have had movement monitors fitted.

Figure D.1 View to the north showing the refurbished valve house. Note the addition of the crane behind and above the main building as well as the set of stairs and new door to the second level of the building.

D.3 Cooling Tank

More stairs and an additional platform have been added to the top of the stairs already attached to the northern face of the cooling tank.

D.4 Ruins in the Vicinity of Penstocks

No evidence remained of the old steel tent frame or partially collapsed shelter recorded in the 2007 CMP.[140] These locations were subject to careful field survey in 2017 to look for any evidence of them.

[140] See Austral Archaeology, 2007 CMP, s3.2.2, p.23

D.5 Power Station Exterior

As was noted by Jackman[141] a roof access ladder (see Figure D.2) had been installed onto the back, northwestern face, of the main bay of the building and ventilation fans (see Figure D.3) had been installed in the roof at the northwestern end of the main bay. Two large Hydro Tas signs had been installed on the external southeastern and northeastern faces of the main bay close to the roof line (see Figure D.4).

In addition to this the rails leading from the main bay had been concreted over due to occupational health and safety concerns but had been left in place. A new office building had been constructed to the northeast of the main bay of the power station. New stairs had been constructed in association with new office space in the east wing of the structure.

Figure D.2 View to the south showing the roof access ladder installed on the northwestern face of the exterior of the main bay of the power station.

[141] Jackman, G. 2014 Roof Access Upgrade Tungatinah, Butlers Gorge and Lake Echo Power Stations. Unpublished report to Hydro Tasmania.

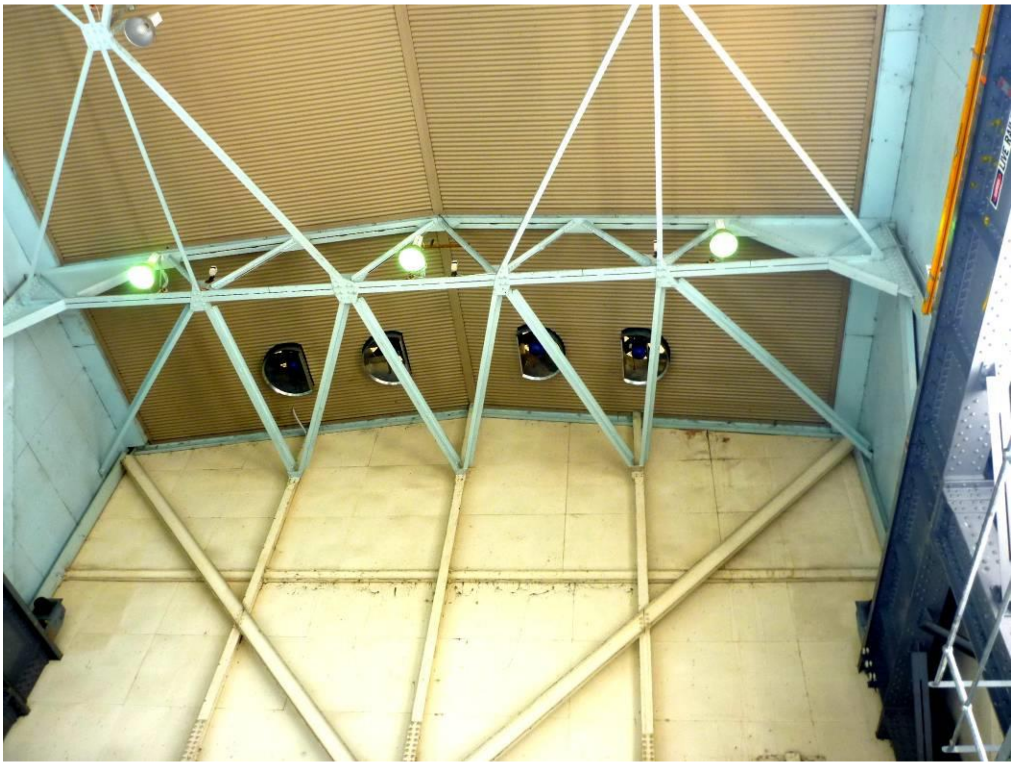


Figure D.3 View to the northeast showing the four fans installed in the roof of the main bay of the power station.

Figure D.4 View showing the northeastern face of the exterior of the main bay with the new Hydro Tasmania sign installed.

D.6 Generating Floors and Assembly Bay

The most significant changes to have taken place within the power station are those associated with the replacement and refurbishment of the turbines. Broadly the turbines TU1, TU2 and TU5 have been replaced while the associated controls of TU4 have been altered and TU3 is largely unchanged from the original assessment. Although it was initially proposed that all of the turbines be upgraded as part of the modernisation process this was not ultimately pursued and the upgrade was limited to TU1, TU2 and TU5. However, during the site inspection there appears to have been some minor changes to TU4 that were not replicated in TU3 and the extent of alteration of the internal structure could not be ascertained.

- Machine Floor 219

Changes to the access hatches appear to be present in the case of TU1, TU2, TU5, with the southern side of the access hatches having been enlarged and fibreglass panels installed (see Figure D.5 to Figure D.7). There are four new ventilator fans in the northwest portion of the roof. The ladder to the gantry crane has been replaced. The exciter covers for TU1, TU2 and TU5 have been replaced. Although the exciter cover for TU4 has not been replaced a new control panel has been installed. The only original control panel and governor actuator to remain are those associated with TU3.

Part of a single exciter cover is present on the floor along with a single exciter (see Figure D.8). All of the main inlet valve controllers have been removed from this floor.

- Alternator Floor s20

Changes to the braking hydraulics, heat exchangers and hydraulic system were present in the case of TU1, TU2, TU4 and TU5. TU3 appears little changed from the original conservation management plan. Even though TU4 is unchanged on the machine floor it appears to have undergone the same refit and refurbishment to exterior elements as the other heavily modified turbines.

- Turbine Floor S24

At the level of the turbine floor substantial change has taken place with new fibre glass floor grates (except in the case of T3), new filters and the construction partitions remaining in place. The new wire mesh and floor grates are likely to be associated with the conversion of the sump into a bund noted in the impact assessment for the modernisation project. New access platforms have been installed throughout, except in association with TU3. The access platform of TU4 has been retained but the wire mesh floor has been replaced by fibreglass.

In addition to this, new motor starter panels, new accumulators and electronic governor control panels are now present for all turbines. The spiral casing on TU3 and TU4 is intact and all others have been replaced. The servo motors for TU3 and TU4 have been retained, and all others are new. The upper cover for the guide vane and the guide links have been replaced or refurbished for TU4 even though the spiral casing appears to remain. New high pressure units were installed for Turbines 1, 2 and 5.

- Assembly Bay S8

The iron tramway rails have been covered with concrete. Some areas of the floor appear to have been repainted. During the 2017 site inspection this area was being used for storage.

- Roadside Tunnel S21

New natural earthing transfers are present. There is evidence of some grouting in the small holes cut in the walls and ceiling. The timber cable trays noted in the original 2007 conservation management plan were not in evidence during the 2017 site inspection.

- Rubber Room S23

A new free standing wooden shelf had been installed on the northwestern side of the room since the completion of the original 2007 conservation management plan.

Figure D.5 View to the west showing the exciter cover for Machine 4, in the foreground, and Machine 3 after refurbishment.

Figure D.6 View to the southwest showing the newly installed exciter for Machine 1 in the foreground and the other turbines behind

Figure D.7 View to the northeast showing the fibreglass panel installed after the widening of the access to the lower level

Figure D.8 View to the north of the exciter removed from an unspecified turbine but kept on generator floor.

4.7 Power Station West Wing

- Foyer S1

Since the foyer was recorded in 2007 an additional fire and security control panel has been installed beneath the stairs.

- Cable Room S4

The interior door to the ground floor hallway (S6) has been removed since the completion of the 2007 conservation management plan.

- Site Office S30

The window to the assembly bay has been removed since the completion of the initial conservation management plan in 2007.

- Shower Room S10

An external door has been added to the southwest of the room.

- Communications Room S11

The floor covering has been replaced or repainted at the time of the 2017 site inspection. The wall fan has been removed from this room.

4.8 Power Station East Wing

- Workshops S12

This room now contains a relocated grinder that was previously present in the grinder's room (S13). The stairway to the former gasket room (S16) is still present but is blocked off at ceiling level (see Figure D.9).

The three Macson and Dean Smith and Grace lathes were not present in the workshop at the time of the 2017 site inspection.

- Grinders Room S13

All of the grinders had been removed from this room and it was in use as a storage room at the time of the 2017 site inspection.

- Workshop Store S14

A hardboard partition wall containing a door has been constructed and bisects the room from its external wall to the interior wall.

- Gasket Room S16

This room has been changed substantially since the completion of the original conservation management plan. These changes, as proposed, have been considered in the series of Heritage Impact Assessments for the modernisation project. Now serving as an office, the earlier interior fittings, furniture and equipment have been removed (see Figure D.10). A new ceiling and new interior walls had been fitted with new lights, desks and other office furniture. The stairway to the gasket room mezzanine has been removed and the door through to the gasket storage room (S17) has been sealed. New services in this room enter through holes made in interior walls.

- Gasket Room Store S17

The gasket storage room been changed substantially since the completion of the 2007 conservation management plan. These changes, as proposed, have been considered in the series of Heritage Impact Assessments for the modernisation project. Now serving as a locker and change room, the earlier interior fittings, storage shelves and equipment have been removed (see Figure D.11). There is a new ceiling and interior walls that have been fitted with new lights, storage lockers and benches.

The stairs to the ceiling have been left in place but a suspended ceiling has been fitted at the floor level of the mezzanine. This ceiling is attached to the steel framing of the building with cables and bolts. New services in this room enter through holes made in interior walls.

- Gasket Room Hallway S18

A hardboard partition has been constructed in this hallway near to the entrance from the main bay, to create a small annex near this door. A set of external stairs, which stand free of the building itself, have been constructed on the outside of this space (see Figure D.12) and a new doorway has been cut into the exterior wall. The interior has been refitted and repainted and a new water service installed.

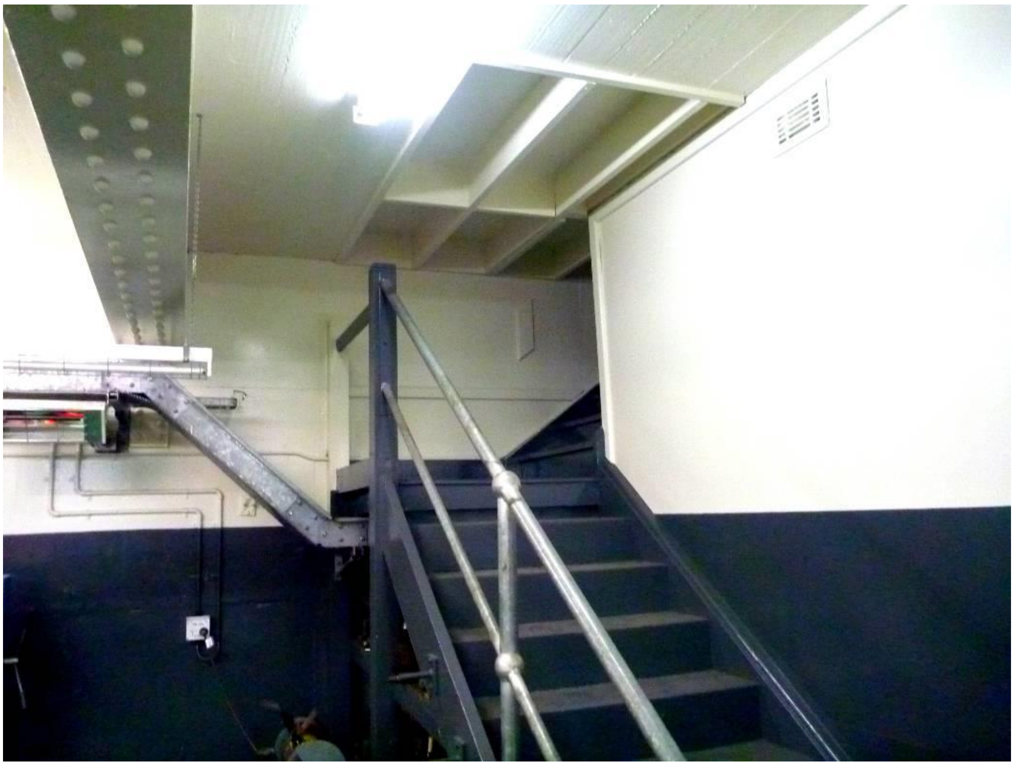


Figure D.9 View to the north showing the location of the blocked off stairway from the workshop to the former gasket room.

Figure D.10 Looking to the northeast showing the refitted gasket room, now offices. In the centre of the photograph is the location of the former door to the gasket room store.

Figure D.11 View to the south showing the interior of the gasket room store after being refitted as a locker and change room.

Figure D.12 View to the southwest showing the exterior stairs and door added to the exterior of the west wing and entering into the refurbished first floor hallway.