HLCD

City of Melbourne

Fishermans Bend In-Depth Heritage Review and Stakeholder Engagement

Summary Report

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Prepared by

Helen Lardner, Architect, Director
HLCD Pty Ltd
Total House
L8, 180 Russell St
Melbourne VIC 3122
With Dr Peter Mills Historian

Prepared for

City of Melbourne
Project Owner: Ms Tanya Wolkenberg
Project Manager: Ms Molly Wilson

Contents

1 Executive Summary

Following the completion of the *Southbank and Fishermans Bend Heritage Review* (Biosis, 2017) the City of Melbourne identified six complex industrial sites and two bridges for further study. The purpose of the project was to engage with relevant stakeholders, conduct further research as required, and undertake comprehensive site visits to determine which parts of the complex sites and bridges warranted heritage protection under the heritage overlay (HO) in the Melbourne Planning Scheme, and/or potential nomination to the Victorian Heritage Register (VHR).

The outcome, shown in the table below, was three places to be recommended for nomination to the VHR (the former Government Aircraft Factory, the former General Motors-Holden factory, and West Gate Bridge), and four places to be recommended for the HO, except for the Commonwealth Aircraft Factory, which did not meet the threshold for heritage protection. It was decided that Bolte Bridge would not be examined further at this time. During the course of the study, five additional places were identified by the City of Melbourne for assessment. Only one of these five, being the West Gate Service Centres, was recommended for inclusion in the HO.

For all complex industrial sites, the extent of the area recommended for heritage protection was reduced and defined compared to the 2017 assessment, which was undertaken from the public realm only.

Summary Table of Recommendations

Site		HLCD Recommendations		2017 Biosis Study Whole site	Reason for change in level recommended
		Level of protection	Extent of site		
1	Government Aircraft Factory (now Boeing)	HO, VHR	Part	HO	Further historical analysis. Extensive surviving fabric, greater integrity and intactness evident when 2018 site visit undertaken
2	Commonwealth Aircraft Corporation (now Boeing)	none	n/a	HO	Extensively altered, lack of integrity evident when 2018 site visit undertaken
3	Kraft Factory (now Bega)	HO	Part	HO, VHR	Further historical and comparative analysis undertaken in 2018, site visit 2020 with some altered areas evident

Site		HLCD Recommendations		2017 Biosis Study Whole site	Reason for change in level recommended
		Level of protection	Extent of site		
4	Electricity Substation	HO	Part	HO	as above
5	GMH Complex:	HO, VHR	Part	HO, VHR	as above
	- Plants no. 3 & 5, Tech Centre	HO, VHR	Included	HO, VHR	as above
	- Engine and Manufacturing Plant	none	n/a	HO	Partially demolished since the 2017 assessment
	- Head Office	HO, VHR	Included	HO, VHR	
	- Administration Building	HO, VHR	Included	HO, VHR	
	- Social Centre	HO, VHR	Included	HO, VHR	
6	Shed 21	HO	Part	HO	
7	West Gate Bridge	VHR	Bridge, Memorial Plaque, Memorial Park	VHR	
8	Bolte Bridge	Not assessed further at this point in time, due to multiple local government areas & relatively recent construction.		HO, VHR	Not applicable
9	West Gate Service Centres	HO	Whole of both sites	Identified as a place for further assessment	Not applicable

2 The Study

2.1 Introduction

The Heritage Review analysed six sites and two bridges in Fishermans Bend in order to determine their level of cultural heritage significance and recommend appropriate heritage protection mechanisms. The selected sites were identified for in-depth review following the Southbank and Fishermans Bend Heritage Review 2017. The sites are critical elements of Melbourne's industrial heritage, and part of a State-designated National Employment and Innovation Cluster. During the course of the work, City of Melbourne officers requested the assessment of five additional sites (refer to figure 1).

The team of Helen Lardner, architect and Director HLCD Pty Ltd and Dr Peter Mills, historian, brought to the study extensive experience in the assessment of complex industrial sites, and a practical approach to the revitalisation and reuse of industrial places in order to achieve better quality heritage outcomes. The consultants are particularly grateful to Tanya Wolkenberg, Molly Wilson and Helen Knight from the City of Melbourne for their dedication and assistance.

2.2 Scope

The sites selected for investigation as part of the Review are shown in figure 1:

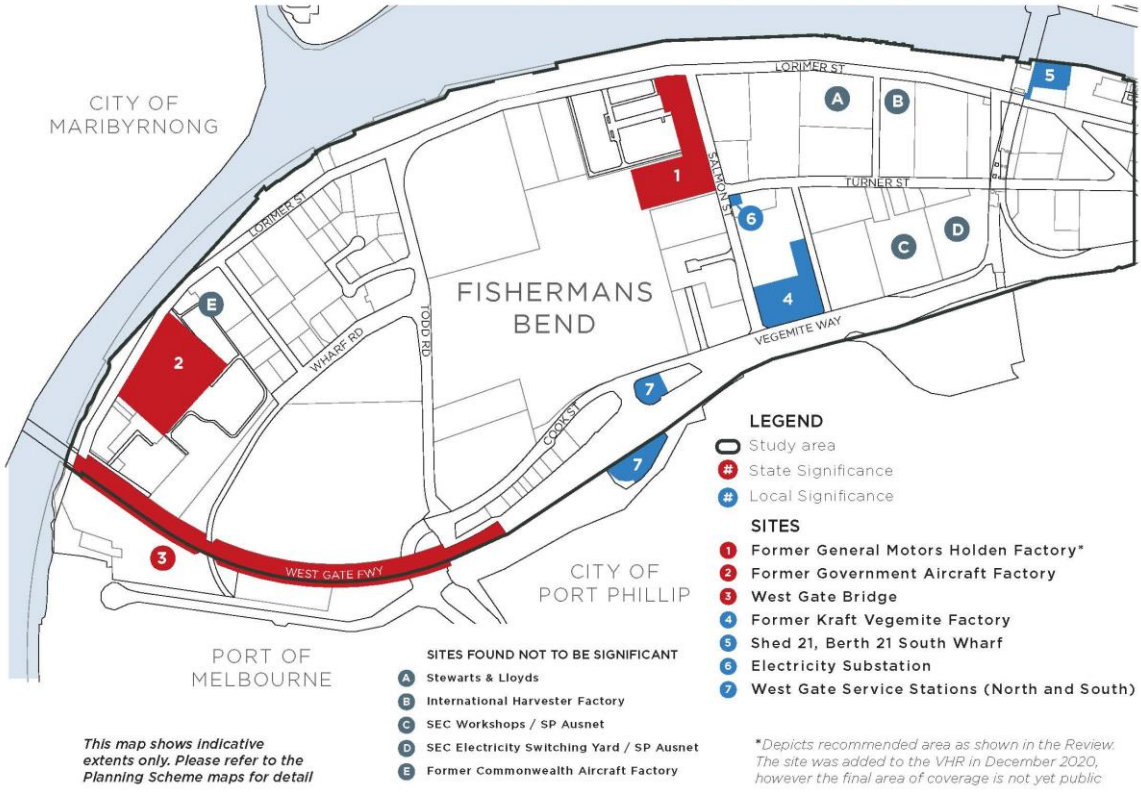


Figure 1: The locations of the sites and bridges that were assessed in Fishermans Bend. (City of Melbourne)

The scope of the project was varied from that set out in the initial brief. Due to budgetary constraints, an adaptive reuse report that formed part of the original brief was excluded prior to the consultant team commencing its work.

The Bolte Bridge was originally part of the project but was not included in the final scope due to it spanning over a number of municipalities and authorities; local heritage protection would require inclusion in the heritage overlay of a number of planning schemes. As the bridge is only 20 years old, some aspects of its significance would be difficult to assess. Given these difficulties and, because the bridge is not under threat, it was judged unlikely to be a priority at either local or state government level for heritage protection.

The scope was increased to include the additional sites listed in the table below. Of these, only the West Gate Service Centres made the threshold level for heritage protection in the planning scheme. A supplementary report entitled ‘Fishermans Bend

Further Research Places (HLCD, 2020) summarises the research into the remaining four sites, outlined in the table below:

1.	Stewarts & Lloyds	704-744 Lorimer St, Port Melbourne
2.	International Harvester Factory	748-766 Lorimer St, Port Melbourne
3.	SEC Workshops /SP AusNet	90 Turner St, Port Melbourne
4.	SEC Electricity Switching Yard /SP AusNet	108-130 Turner St, Port Melbourne
5.	West Gate Service Centres (North and South)	1 and 2 West Gate Freeway

2.3 Mechanisms Available to Protect Heritage

This project was initiated to ensure that components of Melbourne's industrial heritage were identified and protected during the transformation of Fishermans Bend. The mechanisms available for heritage protection are dependent on the level of significance of the place:

- Places that are assessed as being of State significance should be nominated for inclusion on the Victorian Heritage Register. The guiding document for assessment is the *Victorian Heritage Register Criteria and Thresholds Guidelines* available at: https://heritagecouncil.vic.gov.au/heritage-protection/criteria-and-thresholds-for-inclusion/

  Once nominated, the process of consideration of significance and potential permit exemptions is managed under the *Heritage Act 2017*; and

- Places assessed as being of Local significance should be protected in the Heritage Overlay of the Melbourne Planning Scheme. The guiding document is the VPP Practice Note *Applying the Heritage Overlay*, available at: https://www.planning.vic.gov.au/__data/assets/pdf_file/0030/96555/PPN01-Applying-the-Heritage-Overlay.pdf

  Places in the Heritage Overlay are managed under the *Planning and Environment Act 1987*.

In some cases, it may be appropriate to include an incorporated plan, which identifies works that may be exempt from the need for a planning permit with statutory protection. Council's heritage team are liaising with property owners to determine where this may be applied (2020-2021).

3 Methodology

3.1 Review of Existing Studies and Strategies

In addition to the *Southbank and Fishermans Bend Heritage Review* in 2017 by Biosis, the subsequent review had regard to the other studies and strategy documents listed in the brief, including:

- *Plan Melbourne (2017-2050)* - Outcome 4 'respect our heritage as we build for the future,' particularly the initiative 'value heritage when managing growth and change';
- The designation of Fishermans Bend as a National Economic and Innovation Cluster within *Plan Melbourne (2017-2050)*;
- The Victoria Planning Provisions (VPP) Practice Note *Applying the Heritage Overlay;*
- The *City of Melbourne Heritage Strategy* (2013), including action 2.2 to 'progressively undertake a review of heritage in high growth areas';
- *Thematic History – A History of the City of Melbourne's Urban Environment*, (Context, 2021);
- Amendment C258 - Review of Local Heritage Planning Policies in the Melbourne Planning Scheme and replacement of the A-E grading system (in progress);
- *Fishermans Bend Heritage Study* (Biosis, 2013), prepared for Places Victoria;
- *Adaptive Reuse of Industrial Heritage: Opportunities and Challenges*, (Heritage Council of Victoria, 2013);
- *Draft Fishermans Bend Strategic Framework*, which was released by the State Government in October 2017 for consultation;
- *Fishermans Bend Taskforce Social History Report and Resource Guide* (Context, 2017);
- *Australia ICOMOS Burra Charter* (2013) and its guidelines; and
- *Protecting Local Heritage Places: A national guide for Local Government and the Community* (Australian Heritage Commission, 1998).

3.2 Historical Research

The thematic history provided in the *Southbank and Fishermans Bend Heritage Review* (Biosis, 2017) was an excellent starting point for the subsequent in-depth review undertaken by HLCD. The *Thematic History – A History of the City of Melbourne's Urban Environment* (Context, 2012) presents the historical themes 'building a commercial city', which includes manufacturing and the trading port, and 'creating a functioning city' including public utilities. Unfortunately, the thematic history does not contain much information regarding manufacturing between the wars or later, or on the Fishermans Bend area specifically.

An outcome from the 2017 Biosis research was the recommendation for the whole of some sites to be given heritage protection, in some cases covering very large areas. This was partly due to sites being assessed from the public realm only without onsite assessments or inspections of interiors.

A main task of the in-depth Review was to enable a closer-grained analysis of the various parts of the large areas proposed in the initial 2017 Biosis review. This was done by establishing the provenance and use over time of various distinct elements

within the sites, and this work contributed to more detailed assessment of relative levels of significance.

The closer-grained analysis considers the levels of significance of various components within the sites, which informed the physical inspection and directing discussion with staff on site. The citations include the addition of the history of the actual building components. Sequential development plans were generated from historical records and plans, as well as aerial photos, to illustrate the surviving fabric from the most important periods of development for the sites. This was particularly useful for complex sites like General Motors Holden (GMH), Kraft and the Government Aircraft Factory. It was also beneficial for the Commonwealth Aircraft factory where it revealed that the building fragment remaining today was not of much importance compared to the extent of the site that had been demolished.

The large-scale sites have been divided into smaller, logical sections according to context and fabric in order to generate more targeted information and heritage overlay curtilages. This has also highlighted opportunities for growth where heritage is not a concern.

Historical research has served to improve the understanding of important aspects for the significance of certain sites, such as the social significance of the West Gate Bridge, and separation of the historical roles of the Commonwealth Aircraft Corporation and Government Aircraft Factory sites. Comparative historical work has assisted in establishing that Australia's iconic Vegemite was made on another site before Kraft took over the Port Melbourne site, and that the original yeast factory on this site has been demolished, therefore leading to our recommendation that the Kraft site is of local rather than state significance.

A key aspect of the latest research is the introduction of primary sources. The 2017 Biosis citations mainly referenced secondary sources, with little use of primary sources. The reliance on secondary sources can arguably lead to some distortion of facts if particularly aspects of information are omitted or interpreted in a particular way by the author. In some cases, accessing primary sources for the 2018 work was challenging due to companies focussing their archives more on the products they fabricate rather than the sites themselves. Furthermore, there was little referencing in the 2017 citations, but detail is now provided in this Review that can be readily accessed by owners, planners and other interested parties wishing to undertake more detailed research for themselves.

3.3 Site Inspections

The 2017 Biosis review was undertaken from public land, which posed difficulties in assessing large sites where some structures were located out of view from the street. An important part of this study was to undertake comprehensive site inspections

where owners permitted access. Site inspections were undertaken in 2018 for the following sites:

- Shed 21;
- GMH historical archive centre;
- GMH site (except the Headquarters and Administration Buildings that are in different ownership);
- Government Aircraft Factory (Boeing); and the
- Commonwealth Aircraft Corporation (Boeing).

The site inspections were carried out at a date and time agreed with landowners and the relevant Council officers. It was valuable for landowners and stakeholders to attend the site inspections to allow an exchange of information, including oral histories. The consultants are very grateful for the generosity of the participants.

Unfortunately, access was not provided to the Kraft site until late 2020. This site visit revealed that a substantial amount of fabric has been removed from the original dehydration facility, and other changes have been made within some sections of the plant. This site inspection led the consultant to recommend a smaller part of the site be recommended for heritage protection.

The visit to Boeing revealed that little original fabric remained at the surviving building of the Commonwealth Aircraft Corporation, and it was difficult to discern the original use of the structure. This was in contrast to some of the Government Aircraft factory buildings that were seen to have high integrity and intactness.

A site visit was not deemed necessary for the SEC Substation, as it was significant historically for its construction in 1935, which facilitated development of an industrial precinct at Fishermans Bend and for the Interwar Stripped Classical style of the building. Internal controls were not recommended for protection. The bridges are on public land but access to the higher levels is restricted to vehicular travel, and so assessment on foot, which would enable more detailed assessment, was not possible

3.4 Further Analysis

The available documentary and oral evidence relating to the sites was reviewed. Following site visits, further investigation was undertaken where required. Comparative analysis was an important aspect of the assessment of significance, allowing sites to be benchmarked against comparable places within the City of Melbourne and, in some cases, state-wide. Consideration was given to the repetitive nature of some of the industrial sites, and how much fabric should be retained to demonstrate aspects of significance.

3.5 Reporting and Deliverables

The project deliverables include this summary report and citations written to the City of Melbourne's templates. Some of the citations are comparatively long but this reflects the complexities of both the manufacturing and commercial histories, and the large-scale campus-like sites with numerous buildings and structures. Emphasis has been placed on keeping key information succinct, such as the statements of significance and recommendations. Interested readers can find much evidence to support the findings in the more expansive sections of history, descriptions and comparative analysis.

3.6 Limitations of the Study

The study was limited by not being granted access to the GMH Headquarters and Administration Buildings, however it is not considered that this detracts from the findings and recommendations that are proposed.

4 Summary Tables of Recommendations

4.1 Overall Recommendations

See the following section 4.2 for mapped extents.

Proposed Heritage Place		**2021 Recommendations**	
		Level of protection	**Extent of site**
1	Government Aircraft Factory (now Boeing)	VHR	Part
2	Commonwealth Aircraft Corporation (now Boeing)	none	n/a
3	Kraft Factory (now Bega)	HO	Part
4	SEC Substation	HO	Part
5	GMH Complex: Plants no. 3 & 5, Tech. Centre Engine & Manufacturing Plant Head Office Administration Building Social Centre	VHR VHR none VHR VHR VHR	Part Included n/a Included Included Included
6	Shed 21	HO	Part
7	West Gate Bridge	VHR	Bridge, Memorial Plaque, Memorial Park
8	West Gate Service Centres (North and South)	HO	Whole of both sites

4.2 Recommended Site Extents

SITE NAME	**Former Government Aircraft Factory (GAF), now part of Boeing, Port Melbourne**
STREET ADDRESS	226 (part) Lorimer Street, Port Melbourne.
RECOMMENDATION	Part of site is recommended for HO and to be nominated for VHR

N

Recommended extent is shown in red

SITE NAME	**Former Commonwealth Aircraft Corporation (CAC) No. 3 Aircraft Factory, now Building 43 of Boeing, Port Melbourne**
STREET ADDRESS	226 (part) Lorimer Street, Port Melbourne.
RECOMMENDATION	No heritage protection is recommended

N

Area reviewed is shown in yellow

SITE NAME	**Former Kraft Vegemite Factory**
STREET ADDRESS	1 Vegemite Way, Port Melbourne
RECOMMENDATION	Part of site is recommended for HO

Recommended extent is shown in red

SITE NAME	**Electricity Substation (operated by CitiPower Pty Ltd)**
STREET ADDRESS	224 – 236 Salmon Street, Port Melbourne
RECOMMENDATION	Part of site is recommended for HO

Recommended extent is shown in red

SITE NAME	**Former GMH Complex, Fishermans Bend**
STREET ADDRESS	241 (part), 251-259 and 261 Salmon St; part of Bayside Avenue, and part of Central Boulevard, Port Melbourne.
RECOMMENDATION	Part of site is recommended for HO and to be nominated for VHR

Recommended extent is shown in red

Note: This site was added to the VHR by the Minister for Planning in December 2020 and the final coverage is not yet public).

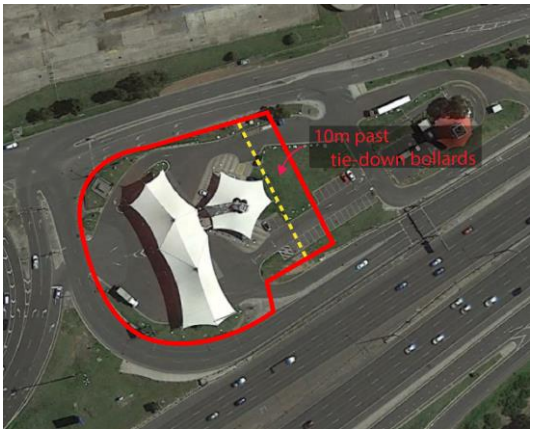
SITE NAME	**Shed 21, Berth 21 South Wharf**
STREET ADDRESS	206 Lorimer Street, Docklands
RECOMMENDATION	Part of site is recommended for HO

Recommended extent is shown in red

SITE NAME	**West Gate Bridge**
STREET ADDRESS	Port Melbourne to Spotswood, over the Yarra River
RECOMMENDATION	Recommended for nomination to VHR

The West Gate Bridge between the eastern and western abutments, the Memorial Plaque on Pier 10, and the Memorial Park form the recommended extent.

SITE NAME	**West Gate Service Stations (North and South)**
STREET ADDRESS	1 and 2 West Gate Freeway, Port Melbourne
RECOMMENDATION	Recommended for HO



West Gate North

West Gate South

5 APPENDIX: Heritage Place Citations

5.1 Government Aircraft Factory (Now Boeing) Citation

SITE NAME	Former Government Aircraft Factory (GAF), now part of Boeing, Port Melbourne
STREET ADDRESS	224-260 Lorimer Street, Port Melbourne
PROPERTY ID	110501

Figure 1: Extent of assessed site shown in yellow

Figure 2: View to Building 6 from Lorimer Street, Gate 2 (P Mills, 2/05/2018)

SURVEY DATE: 2 May 2018		SURVEY BY: Helen Lardner, HLCD with Dr Peter Mills	
HERITAGE INVENTORY	No	**HERITAGE OVERLAY**	Proposed
PROPOSED CATEGORY	Local / State significance	**PLACE TYPE**	Industrial complex
FORMER GRADE	Ungraded		
DESIGNER / ARCHITECT / ARTIST:	Commonwealth Government	**BUILDER:**	Swanson Bros Pty Ltd
DESIGN STYLE:	Interwar Period (c.1919-c.1940)	**DATES OF CREATION / MAJOR CONSTRUCTION:**	1939 and wartime expansion

THEMES

	HISTORIC THEMES	DOMINANT SUB-THEMES
	5. Building Victoria's industries and workforce	5.2 Developing a manufacturing capacity
	3. Connecting Victorians by transport and communications	3.6 Linking Victorians by air

RECOMMENDATIONS

Recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme as an individually significant place.
Recommended for nomination to the Victorian Heritage Register.
Extent of overlay: Part of the site. Refer to figure 39 in the recommendations section of the citation.

SUMMARY

The GAF at Fishermans Bend was an aircraft assembly plant, the focus of a very wide network of manufacturing plants throughout Australia. Aircraft manufacture was structured into a number of plants creating sub-assemblies, which were then sent to the two main assembly plants at Fishermans Bend and Mascot in NSW. Full aircraft were assembled at the GAF, rolled out the hangar doors and flown from the adjacent airfield.

The GAF was erected rapidly in 1939 and operated alongside the neighbouring, privately-owned, Commonwealth Aircraft Corporation (CAC) facing onto the Fishermans Bend airfield. It played an important role in Australia's increasing capabilities during WWII, expanding twice. From the wartime success with the Beaufort bomber and the Beaufighter, the GAF produced the Lincoln bomber as it transitioned to a decreased workforce following the war. Later focuses were the Canberra bomber and the Jindivik drone. However, after closure of the Fishermans Bend airfield in the late 1950s, and establishment of assembly facilities and an airfield at Avalon, GAF's important role diminished. Most of the site is now within the Boeing complex, however some buildings remain in separate ownership west of Nomad Street.

GAF Principal Periods of Development

Figure 3: Diagram showing existing buildings coloured by development period, with GAF system numbers. Buildings that have been demolished are shown dashed

1939-1941 First construction
1942-1943 First expansion
1944-1945 Second expansion
1950-1960 Post-war expansion

HISTORICAL CONTEXT

1939-41 First Construction Phase

In early 1939, a British Air Mission to Australia investigated the possibility of manufacturing a bomber aircraft. It recommended that the Commonwealth Government manufacture an operational aircraft, the Bristol Aeroplane Company's Beaufort bomber. The recommendation was accepted in March 1939. The Department of Supply and Development was set up in June 1939, and it in turn established the Aircraft Construction Branch that initiated the Beaufort programme (Mellor, pp.32 and 385-6). War was declared 1st September 1939.

The Beaufort organisation was to be responsible for all aspects of manufacture of the Beaufort Bomber, but this manufacture was distributed throughout the country under the "annex" system, with: around 600 private contractors subcontracting to provide parts; seven plants in existing railway workshops for assembly of major components; and final assembly plants at Mascot (Sydney) and Fishermans Bend (*SMH*, 30 March 1939, p.1; Mellor, pp.388-9). This distributed manufacturing system was well established in Britain and known there as "shadow industry". This would also be the pattern of manufacture of all of the complex munitions of war in Australia. To avoid complications, only a single type of aircraft would be developed by the government organisation. Any new types of aircraft required would be developed by the Commonwealth Aircraft Corporation (CAC) next door, which had the capacity for that type of work (*Sun*, 10 March 1939, p.2). From an early stage it was envisaged that engines would eventually be manufactured in Australia, with preference given to the twin row Wasp engine, a derivative of the single row Wasp engine already being built at the CAC (*Construction [Sydney]*, 3 May 1939, pp,6).

Preparation of plans and specifications for the "two main plants" was under way in early May 1939 (*Sun*, 8 May 1939, p.3). Tenders to build some portions of the aircraft assembly plant were accepted in late October 1939. Construction began in November 1939 (*SMH*, 27 October 1939, p.9; *The Argus*, 17 November 1939, p.1). The first shipments from England of tools and materials for construction of the first Beauforts arrived before the end of 1939.

Tenders were let for the construction of the "main aircraft assembly plant" in late December 1939, with completion expected in March 1940. The cost was to be £46,437, and the contractor was Swanson Bros. Pty Ltd of Little Collins Street, Melbourne. In order to accelerate production of the first Beauforts, the building contract stipulated completion in three and a half months (*Singleton Argus [NSW]*, 22 December 1939, p.7).

The Aircraft Construction Branch was replaced in March 1940 by the Aircraft Production Commission, which was to coordinate government and private aircraft factories (Mellor, pp.32 and 385-6). By May 1940, the first stage of the main assembly plant at Fishermans Bend had been completed (*The Argus*, 31 May 1940, p.3).

Initially the Bristol Aeroplane Company was to supply all engineering and tooling drawings and technical data, as well as most of the difficult-to-manufacture components. But, in July 1940, the UK Air Ministry informed the Air Production Commission that no further materials would be supplied. This embargo was relaxed three months later to allow supply of parts for the first twenty Beauforts (Mellor, p.387). In August 1940, the British advised that they could not provide Taurus engines for the Beaufort bomber (these engines were a failure in Britain). It was decided to go ahead with the manufacture of the twin-rail Wasp engines in Australia, with production to begin in the first half of 1941. This required modification of the

airframe to accommodate the new engine (Mellor, p.389; The Argus, 6 August 1940, p.5). An engine factory was established for this purpose by the CAC at Lidcombe in NSW (Mellor p.391).

A ministers' tour was held at the main assembly workshop at Fishermans Bend in January 1941, by which time the Aircraft Production Commission had been established on the site for three months, presumably in the new administration building. "Set in idyllic garden surroundings, the plant is ultra-modern. The assembly rooms are built on a vast scale commensurate with the magnitude of the commission's undertaking, and offices for the supply branch, engineering sections and administrative staffs have been designed on lines that ensure the most hygienic working conditions for the staff" (*The Argus*, 11 January 1941, p.4). An Italian cypress tree appears to have survived from that time, although most of the garden has been replanted. The first of the ten Beaufort bombers assembled at the Fishermans Bend workshops using parts from Britain was given its test flight in May 1941 (*Weekly Times*, 10 May 1941, p.3).

In June 1941 the Air Production Commission was replaced with the Department of Aircraft Production (DAP), which in turn administered four divisions: The Commonwealth Aircraft Corporation (CAC), the Beaufort Division, De Havilland Aircraft and the Maintenance Division (Mellor, p.388). The first Australian-made Beaufort had its test flight in August 1941 - within two years and three months of the decision to manufacture (Mellor, p.389).

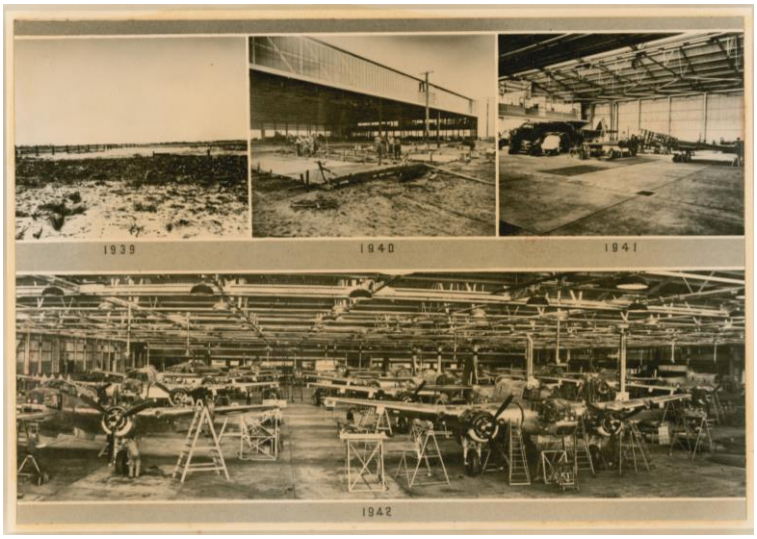


Figure 4: Sequence of photographs showing development on the site up to 1942 (Beaufort Division, c1944)

Figure 5: Excerpt of earliest available oblique aerial view from the north, showing the 'courtyard' phase of the main assembly building, April 1942. This is an enlargement of a film photograph and so is grainy. The camouflage painting of the roofs

makes the features difficult to discern, but the image is retained as an important piece of evidence (AWM, AC0145)

‘Main Assembly Plant’ (Part Building 1)

The earliest available oblique aerial photograph of the plant, dated April 1942, shows the ‘main assembly plant’, consisting of five 50ft deep bays of steel-framed sawtooth roof structures, with full-height sliding hangar doors opening towards the airfield in what is now Todd Road. To the southeast of this main section, a pair of two-bay sawtooth hangars faced each other, also with hangar doors, across a ‘courtyard’. This ‘courtyard’ arrangement helps to explain the unusual alignment of this pair within later development of the plant.

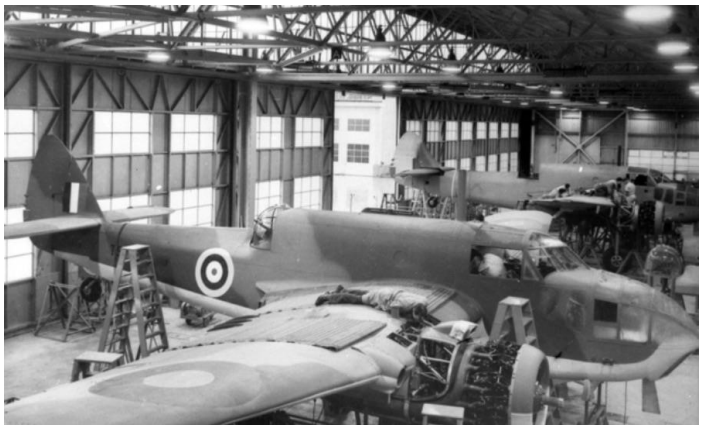


Figure 6: Inside the hangar in September 1941, which appears to show the courtyard arrangement outside (AWM, 009663)

A narrow building consisting of eight bays of steel-framed sawtooth roof structure flanked the northeast side of the main assembly area. This may have been the first engineering office (NAA, A12909 4323). Internally there were two levels, possibly with windows overlooking the interior of the main assembly building. An octagonal lookout at the southeast end is extant, as are heavy timber balustrades on the staircases.

A former external entrance opening to the road with the Administration building on the other side, is also extant on the northeast side. The Administration building, which was a long hipped-roof masonry building of two storeys on the northern corner of the site, was demolished in 2007.

Boiler House First Section (Part Building 10)

The first boiler-house (the south-western half of Building10), which is camouflage painted in a c1943 oblique aerial photograph (see below), also dates from this period.

Mid-1942 to Early 1943 - Expansion

The first proposal for manufacture of the low-altitude long-range fighter the Beaufighter, which shared 75% of its components with the Beaufort bomber, was made in 1941. The plan stalled for a while before being revived in November 1942. This assured the continuing operation of the facilities after the Beaufort bomber programme was completed, and is probably related to the next phase of building works on the site (Mellor, p.412).

By January 1943, the Fishermans Bend assembly plant had been considerably extended to keep pace with increased production of parts and equipment that were manufactured in the various annexes of the

Division. The entire organisation throughout Australia now employed around 10,000 people (*The Argus, 19* January 1943, p.5).

Figure 7: A c1943 oblique aerial with camouflage paint on the roofs of first phase of buildings and early additions up to c1942. Subsequent buildings (Building 3, part Building 4, Building 5 and Building12) show fresh white asbestos-cement roofs. The first stage of the large saw tooth hangar (part Building 4) stands in an apron of concrete indicating plans for its expansion (Beaufort Division, c1944)

Sawtooth Hangar Infill of 'Courtyard' (Part Building 1)

The first addition in this period was the infilling of the 'courtyard' space of the main assembly area with a similar sawtooth structure. This must have been quite soon after the April 1942 oblique aerial photo, as its roof was painted with camouflage colours, a practice which had stopped by early 1943.

Two-Storey Gabled Building Flanking Southwest Side of Main Assembly Plant (Building 2)

This two-storey gabled building with steel trusses, not visible in the April 1942 aerial photo, was also painted with camouflage colours, indicating it was built at the same time as the courtyard infill.

Large Hangar (Part Building 4)

This was one sixth of the eventual hangar space developed here, two out of three sawtooth bays deep and half the eventual width. The bays here were 54ft deep, compared to a 50ft bay depth on the earlier main assembly plant. The clear height from floor to truss bottom was also greater. At the back (northwest) side of this addition was a narrow two-storey red brick section with gable roof, which probably had conveniences on the ground floor and offices above.

Figure 8: Delivery of the first Beaufighter in mid-1944, showing large double-sawtooth hangar, later to be enlarged, and the infill of the early courtyard on the right (Beaufort Division, c1944)

Cafeteria (Building 3)

The exterior of this building is visible in a number of photos soon after its construction, as well as one photo of its interior in use. It consisted of five sawtooth bays supported by timber trusses and skillions on the northeast and southwest sides. External walls up to the underside of trusses were brick. The trusses are unusual and appear to have been wartime economical designs, based on simple bolted connections and hardwood timbers in small standard sizes. This design may have been used to economise on steel.

Figure 9: Aircraft in front of the cafeteria building to the right, and with the older main assembly hangar well behind to the left, late 1942 - early 1943 (Beaufort Division, c1944)

Figure 10: Interior of the cafeteria (Building 3) in use, c1944 (Beaufort Division, c1944).

Another timber-truss sawtooth building (Building 5 off the Boeing site, now 24 Network Drive), was constructed during the same period. It consisted of ten sawtooth bays with skillions on the northeast and northwest sides; only three bays and a skillion on the northeast side survive. The main and secondary trusses were all in hardwood, similar to but detailed slightly differently from the truss structure in the Cafeteria (Building 3). The northwest facade was in brick.

Conventional Timber Framed Building (Building 12)

The numbering of this building is anomalous. The building's original function is unknown. By 1979 its function is labelled as 'Publications'. While it appears to be of timber frame construction, it does not conform to the typical characteristics of the P1 style huts, thousands of which were built for the military during the war. The long strip windows, if original, may indicate use for a drawing office or perhaps as a recreation facility.

Mid-1944-45 – Further Expansion

The 500th Beaufort Bomber was delivered to the RAAF in November 1943 (*The Argus*, 1 June 1944 p.3). The first Beaufighter was handed over to the RAF by mid-1944, only 14 months after the first technical data was obtained for manufacture, and only a few months after production began (*The Argus*, 1 June 1944 p.3). Activity remained intense, with Beaufighters still being produced at a rate of 30 per month (GAF, 1979, p.2).

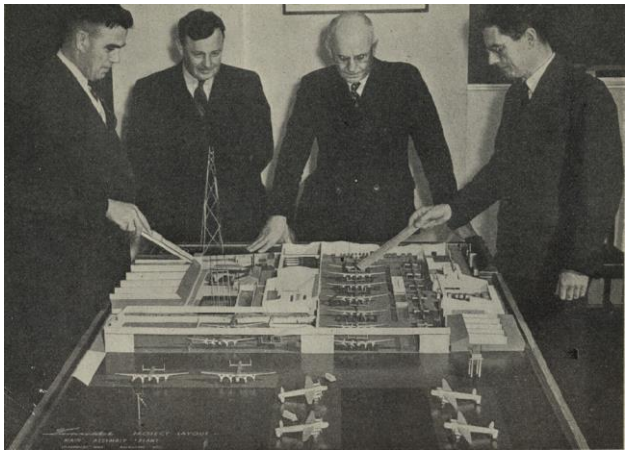


Figure 11: The Director of the Beaufort Division discusses the layout of factory extensions with his Assistant Directors and Plant Manager, 1945. The aircraft in the model are Lincoln bombers (Beaufort Division photo in Dept. of Labour and National Service, 1945, Figure.21)

In July 1945, production of the Avro Lincoln bomber, an advanced version of the Lancaster bomber, commenced. The shadow factory system developed for the Beaufort was still in use, with final assembly at Fishermans Bend (*The Argus*, 4 July 1945, p.1). The new demands of the Lincoln project are probably related to the substantial new programme of construction that started in mid-1945. In July 1945 the 1000th plane was delivered by the Beaufort division, comprising 700 Beaufort bombers and 300 Beaufighters (*The Argus*, 24 July 1945, p.11). The war ended 2nd September 1945.

Large Three-Bay Sawtooth Hangar to the Southwest (Building 7, Off Boeing Site, Now 21-51 Sardine Street)

A new three-bay sawtooth hangar on the large 54ft bay module was added at a distance to the southwest. This had a narrow masonry two-storey section on the back, similar to that on the rear of the other large hangars. This building is no longer extant.

Figure 12: Extract of 1945 oblique aerial showing the second stage of the big hangar (Building 4), joining it with the older main assembly area (parts Buildings 1 and 4) (SLSA PRG, 277/143/2)

Enlargement of Central Large Hangar and Connection to Main Assembly Hangar (Parts Buildings 1 and 4)

The central large sawtooth hangar section was enlarged with four bays to connect into the old main assembly building. It now abutted the northwest side of the timber-truss sawtooth building (cafeteria Building3). The bay connecting the new and old required cross-trusses with sloping bottom chords.

Addition of Two-Storey Brick Offices and Attached Sawtooth Building (Building 6, opposite the current entrance at Gate 2)

The office section is a two-storey building in red and cream brick with a parapeted tower on the southeast, a main long wing with a tiled hip roof, and a smaller parapeted tower element on the southwest. The original doorway is not extant. At the rear of this wing is a factory building with five bays of sawtooth roof structure and flanking skillion sections on three sides.

1945-50 Lincolns and Tudors, and the Completion of the Central Hangar

By August 1945, preparation for production of the Lincoln bomber and Tudor 60-passenger aircraft, which was based on the Lincoln, was in preparation when mass dismissals begun in the Beaufort Division. The overall workforce of the Division was reduced from 10,000 to 7,000. (*The Argus*, 24 August 1945, p.5). By November 1945, work of the annex factories throughout Australia was being contracted to the Fishermans Bend factory. In Melbourne, this included closure of the gun turret and armaments works at Fairfield, and the annex in the Newport railway works (*The Argus*, 17 November 1945, p.3).

Figure 13: This December 1945 aerial photograph shows the completion of the remaining bay of the large hangar facing the airfield at centre (part Building.4) (Historical Aerial Photography, Melbourne and Metropolitan area project December 1945, Landata)

By February 1946, production of the Lincoln bomber was being accelerated, and the Tudor aircraft was expected to be in production by the end of the year (*The Argus*, 26 February 1946, p.1). In March the test flight of the first Lincoln bomber took place in front of a crowd of 50,000 people. Twelve Tudors were to be produced for the RAAF as transport planes (*Weekly Times*, 20 March 1946, p.6). Eventually 73 Lincolns were produced and subsequently 20 were converted to a Government Aircraft Factory design for reconnaissance and submarine attack roles (GAF, 1979, p.2).

In 1947, the Department of Aircraft Production became the Aircraft Production Division within the new Department of Munitions. The Division of Aircraft Production incorporated the previous Beaufort and Maintenance divisions (*The Age*, 31 January 1947, p.3). The name of the Fishermans Bend plant transitioned to the 'Government Aircraft Factory' (GAF) at this point.

The Final Bay of the Main Hangars (Building 4)

The only substantial new building addition in this period was the final bay of the main hangar facing the airfield. This gave a continuous frontage to the airfield of around 600ft (182m), with three full-height hangar doors.

Bellman Hangars (Buildings 13, 14 and 15, Building 15 Now Incorporated Into 8-20 Network Drive)

Three Bellman hangars were relocated from elsewhere to the northwest end of the site. Surplus Bellman hangars became readily available after the end of the war. One hangar was moved from Mildura to Fishermans Bend in 1947, by the Department of Works and Housing (*The Age*, 9 July 1947, p.13).

The extant hangar (Building15) has been incorporated into a long shed at 8-20 Network Drive. Buildings 13 and 14, situated on the northwest end of the site were removed sometime between 1979 and 1986.

1950s - The Canberra Bomber and Avalon

From a wartime total of 40,000 workers in the Australian aircraft industry in 1944-45, numbers had dropped to 10,000 by 1950. The early post-war production and assembly of piston engine fighters and bombers, such as the Lincoln that had served to maintain the capabilities of the plants in peacetime, was nearly complete. Australia's entry into the Korean War in 1950 provoked some retooling to produce jet fighters and bombers (*SMH*, 23 August 1950, p.2).

In 1950 plans were made to replace the Lincoln bomber programme with production of the English Electric Company's 'Canberra' jet bomber. The bomber's Rolls Royce jet engines would be made at the Commonwealth Aircraft Corporation factory next door (*The Age*, 13 January 1950, p.3). Again, the intention was to retain sufficient capacity in Australian manufacturing to increase production substantially and rapidly in the event of conflict (*The Argus*, 11 May 1950, p.22).

Production of the Canberra involved new tooling and techniques. A special workshop was set up at the Fishermans Bend plant for production of elements such as the cockpit canopies and nose sections (*The Argus*, 11 April 1953, p.7). With the manufacture of jet aircraft, the airfield at Fishermans Bend was no longer adequate. In October 1951 plans were made for a new airfield at Lara where the Canberra bombers and other jet aircraft could be tested. The Canberra bomber was to be transferred in five parts to Avalon for final assembly (*The Argus*, 4 October 1951, 2 March 1953 p.20; p.1; 11 April 1953 p.7). As a result of this change, the GAF developed a sub-section at Avalon, with a workshop and hangar for assembly and test flight of aircraft. The airfield at Fishermans Bend closed down in the late 1950s. The first of 48 Australian built Canberras was tested at Avalon in May and June 1953 (*The Age*, 30 May 1953, p.4; 9 June 1953, p.3).

As another facet of the strategy to retain aircraft building capability in peacetime, the GAF also began to design new aircraft. The first product in this category was the Jindivik drone. From 1948 the GAF, in cooperation with the British, began the design and development of a pilotless target aircraft to be used in guided weapons trials at Woomera. A manned proof-of-concept aircraft, the Pika, flew in 1950. The first Jindivik flew in 1952, and it became the longest-lived product of the Australian aircraft industry. Over 500 Jindiviks of various versions were produced, with exports to Britain, the United States and Sweden. In 1953, the GAF turned to guided weapons and began the design and development of a heavy anti-tank weapon, the Malkara, which became the standard anti-tank weapon of the Royal Armoured Corps in Britain (http://www.austehc.unimelb.edu.au/tia/502.html#2067, accessed 6 June 2018).

By August 1956, with the GAF's Canberra bomber and CAC's Sabre jet fighter programmes tailing off, both enterprises were concerned that they would have to lay off workers (*SMH*, 9 August 1956, p.1). Before the end of the year, 400 GAF workers were made redundant (*The Age*, 27 December 1956, p.4).

One new building was constructed during this period. The three-bay sawtooth building (Building 8, off the Boeing site, now 32-38 Network Drive) was located between the two large hangars fronting the airfield, and had skillions on three sides. A narrow two-storey masonry section on the southwest side was given a tower-like architectural treatment on its northeast side.

Figure 14: Oblique aerial c1950. Note the new three-by saw tooth building and the addition of the Bellman hangars to the southw est of the site ('Primotipo' w ebsite, https://primotipo.com/tag/riverside-raceway-fishermans-bend/)

After 1960

In 1960, the French Mirage III was selected as the RAAF's new fighter. The GAF became the prime contractor, responsible for construction of the fuselage and final assembly, with the CAC manufacturing the wings and engine. The first aircraft was delivered in late 1963. After the first 30, the GAF modified subsequent Mirages to the ground attack configuration, and the last aircraft was delivered in 1968 (GAF, 1979, p.4).

In 1960, the Government Aircraft Factories began a collaboration with the Aeronautical Research Laboratories and the Weapons Research Establishment on project Ikara, a guided anti-submarine weapon. Ikara became one of the most accurate anti-submarine weapons in the world, and was used by the Royal Australian Navy ships, as well as Britain and Brazil (http://www.austehc.unimelb.edu.au/tia/503.html#2074, accessed 6 June 2018). In 1968/9, the GAF undertook modifications to the Canberra bomber to meet combat needs in Vietnam (GAF, 1979, p.4). No substantial buildings were added or removed during the 1960s.

By 1971, the GAF was completing work on the Mirage, and the CAC was about to complete the last of its Macchi jet trainers. The main hope on the horizon was the GAF's Nomad, an aircraft the GAF had developed itself. A merger of the GAF and CAC was proposed, as the CAC was better placed to market the aircraft (*The Age*, 23 December 1971 p.7). The merger did not go ahead, and by 1973 the government had guaranteed the production of 70 Nomads, with expectations of sales of 300 (*SMH*, 24 September 1973, p.16).

Figure 15: The 600ft (183m) main hangar frontage to the former airfield, GAF / Boeing Buildings1 and 4, c1978. By this stage part of the former airfield had become a carpark (NAA B6295 6473D0)

The GAF now began what it called 'offset' contracts, where it was a contractor for overseas firms to produce aircraft parts, usually where Australia was purchasing a number of the completed aircraft. In 1971, Australian airlines were purchasing 10 Boeing 727s, and Boeing offered contracts to the GAF and CAC for manufacture of parts. The GAF produced elevators and rudder panels for the 727. In a similar vein, the GAF also produced rotor blades and fuselage components for the Bell Type-206B-1 helicopter, and outboard flaps for the Fokker Type F28. These contracts enabled the GAF to keep abreast of the latest technological developments.

In 1977, the GAF was moving to sell the Nomad in North America (*The Age*, 28 April 1977, p.3). The government approved the production of another 25 Nomads, bringing the total number authorised for production to 120.

By 1979, Building 6 was a machine shop and tool room, and by 1986 the machine shop had been modernised (GAF, 1986). The sawtooth building on the CAC site immediately east of the GAF, previously the CAC's Aircraft Factory No.3, became the Sheet Metal Fabrication facility of the GAF (GAF, 1986). This is the only building from the early period of the CAC still extant.

In the period from 1971-1986, new buildings were constructed including a large store shed (Boeing Building 36) that was added in 1971-72 (NAA photo B6285 3017B). By 1986 it was described as Chemical Milling, housing a workshop designed specifically for aluminium and titanium alloys (GAF, 1979; GAF, 1986). The Engineering laboratory (Boeing Building 31) was added at the northwest end of the large hangars in two stages in 1974-75 (NNA Photo B6295 3931B).

In 1984, the Structural Bonding plant (Boeing Building 41) was constructed in front of Building 1 (Boeing Building 41) (GAF, 1986). In 1986-1987, the GAF was reorganised and corporatized, becoming Aerospace Technologies of Australia Pty Ltd (ASTA). The McDonnell Douglas F/A-18 Hornet was selected as the RAAF's new fighter in 1981, and in yet another 'offset' contract, 73 aircraft were to be assembled in Australia between 1985 and 1990, with components manufactured locally by the CAC, ASTA and 15 other companies.

ASTA was put up for sale in August 1994. Boeing purchased the site in 1997. Boeing Aerostructures Australia was established in 2000. The Fisherman Bend complex now produces the 'movable trailing edge' for the Boeing 787.

Building demolitions and additions in this period include:

- GAF Building 5 (outside the Boeing site)
  - Between 1986-2000: the demolition of seven of ten timber-truss sawtooth bays. This may have been related to the broken trusses in the building, photographed in 1976 (NNN Photo B6295 4613C).
- Part GAF Building 7 (outside the Boeing site)
  - Between 1986-2000: demolition of a narrow masonry section at the back of the large three bay hangar on the northwest part of the site.
- Old Administration block GAF Building 9
  - 2007: Demolition of the original Administration block with subsequent replacement using Boeing Building 73.
- Building 6
  - c2007 - Northwest masonry section becomes main reception area for the site. This probably occurred around the time of the demolition of the old Administration block. Alterations were made to the entrance section of this building, including the removal of the corner and alteration of four windows above into a single section of glazing.

SITE DESCRIPTION

Site Layout

Refer to the GAF complex key periods of development diagram (figure 3). The buildings were generally numbered sequentially as they were constructed. The plan below (courtesy of Boeing) shows the current layout of the Boeing complex for reference. Building 43 is part of the former Commonwealth Aircraft Corporation (CAC), and GAF has extended further west from Nomad Street.

Figure 16: Building numbers in current use by Boeing (Courtesy of Boeing)

The initial extent of the site was between Gate 1, now Canberra Street, and Gate 2, Macchi Street from Lorimer Drive. It extended through to the alignment of Jindivik Way and Malkara Lane. With the exception of the administration building, most of the original 1939 complex survives. It consists of the Main Assembly Plant (part of Building 1) and two smaller flanking buildings (also part of Building 1), which created a south east courtyard open in the direction of the airfield. In addition, part of Building 10, the first boiler house, remains from this period.

The alignment of the southeast facing sawtooth roofs reflected Lorimer Street and the Yarra River rather than the usual south facing arrangement. The airfield was southeast of the complex.

As wartime construction, there was a requirement for speed and economy. The purpose of GAF was assembly and storage, so the buildings were unadorned and of a large scale. However, masonry (face red brick) was used consistently in the complex where the human scale, rather than the aircraft scale, was dominant. This detail is seen in the various offices, the cafeteria and the amenities sections located along the rear of hangars.

The large buildings are generally steel framed, and originally had asbestos cement cladding, with hangar doors and floor-to-truss heights and widths to accommodate large aircraft. The human scale buildings, most of which are attached to the larger types, are in red brick and tile. They have domestic scale windows. Simple architectural devices such as concrete and stucco adornment of porches signify entries and vertical slit windows indicate stairwells. Some of these buildings also feature modest tower elements.

The design at GAF reflects a phase of Commonwealth vernacular design used for factories, military installations and other purposes in the late Interwar - early 1940s era, known as the Inter-War Functionalist Style.

Key aspects of the Commonwealth Government provenance of this time included a composition of horizontal emphasis juxtaposed with the vertical pavilion at one end or located centrally. Ribbon windows, cantilevered balconies or porches and metal framed windows were also features. This is in keeping with some other Art Deco buildings of the period, but the Commonwealth Architects were distinctive in their application of the Style.

The first expansion during the war, increased the Main Assembly Plant to fill in the courtyard and added Building 2, the Cafeteria (Building 3) and a large hangar, Building 4. Building 12 (renumbered), a small, conventional timber-framed structure, also dates from this time.

A second war time expansion further increased Building 1 to its current extent to Mirage Street, and added another bay to Building 4 to continue the alignment. A new two storey brick office building with an attached sawtooth section was added and became Building 6. This is the current entry and office building. In addition, Buildings 5 and 7 were added west of Nomad Street, outside of the current Boeing complex. Only three bays remain of Building 5, now 24 Network Drive. Building 7 is now part of the Bridgeside Business Park at 21-51 Sardine Street, Port Melbourne. It once fronted the airfield and was aligned with Buildings 1 and 4, prior to the airfield closure in the late 1950s.

In the 1950s, expansion was concentrated in the section between the current Nomad and Sardine Streets. This work included the relocation of three Bellman Hangers (Buildings 13,14 and 15) of which Building 13 is extant and has the current address of 3 Network Drive. Building 15 partially remains and has been incorporated in to 8-10 Network Drive, while Building 8 is now 32-38 Network Drive. Development of the site after the closure of the Fishermans Bend airfield in the late 1950s, when the new airfield and assembly facilities had opened at Avalon, is considered of lesser heritage significance.

Main Assembly Plant (Building 1) and Building 4

Some sections of the main internal spaces were inspected.

The GAF was an assembly plant - one of two in Australia during WWII. The Main Assembly Plant (Building 1) is demonstrative of this function in its large scale, clear spans and, importantly, the hangar doors which remain in situ and were the point where aircraft were completed and wheeled out the door to fly. Building 4 was also a larger hangar.

Both buildings were constructed between 1939 and 1945. The northwest two-thirds of Building 1 consists of a steel framed structure with sawtooth roofs. The main and subsidiary trusses are built up from angle sections with bolted plate connections. The sawtooth bays are 50ft (15.25m) deep and the main trusses span the full width of the building, approximately 70m. Two double-sawtooth spaces flank the main space, in similar construction, height and bay spacing. The original corrugated asbestos-cement roofing and wall cladding have been generally replaced with steel decking. The northwest bay of Building 1 is gabled. In the middle of its length to the street is a two-storey parapeted masonry element that appears to be original.

The southeast ends of Building 1 and Building 4 consist of three bays of sawtooth roofing on a 54ft spacing, with an overall length of 183m. Three hangar door openings along this wall faced the original airfield. These doors are still in place with original glazing in place on the northeast door-leaves, but with other sections with the glazing replaced or covered over. Smaller doorways have been introduced to the hangar doors.

The large cross-section columns supporting the roof structure are built up from two I-beams that were fabricated from rolled T-sections and plate riveted together, linked by a web of riveted steel angles. The sawtooth windows can be accessed from gangways with ladders on the columns.

On the northwest side of Building 4, on Jindivik Way, there is a long and narrow section of two-storey brick building. Here the original windows have generally been replaced with aluminium framed glazing. Original doorways with curved concrete porches and narrow stairwell windows above remain.

Figure 17: Building 4 column detail (P Mills, 2/5/2018)

Figure 18: Building 4 interior (P Mills, 2/5/2018)

Figure 19: Building 1 hangar doors at eastern corner (P Mills, 2/5/2018)

Figure 20: Northwest side of Building 4 on Jindivik Way (P Mills, 2/5/2018)

Part Building 1 - Narrow Sawtooth Building

The interior was partially inspected.

This section on the northwest part of Building 1 dates from the first construction phase, and appears to have housed an engineer's office on its first floor. This may account for the small-scale sawtooth lighting of the space. It once faced the original administration building across the roadway from Gate 1 (this relationship is now obscured by Building 73, after the original administration building was demolished). There are still indications of this relationship

on the northeast side, with old doorways and staircases to the first floor with heavy timber bannister detailing. The first-floor offices may have had windows overlooking the main assembly area in Building 1. An original octagonal lookout located at the southeast end is still extant.

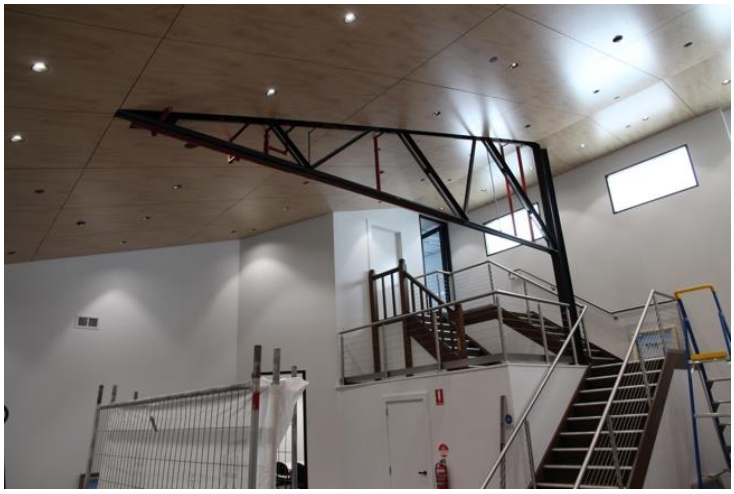


Figure 21: Narrow sawtooth part of Building 1 and stairs to lookout (P Mills, 2/5/2018)

Figure 22: Narrow sawtooth building part of Building 1, and former entry door now in Building 73 (P Mills, 2/5/2018)

Building 2

This building was not inspected internally.

Building 2 was constructed in the mid-war period of expansion on the site. It flanks the southwest side of the main assembly plant (Building1), and was probably effectively part of that space. It is a three-storey height gabled building with steel trusses. A recent two-storey narrow red brick addition now flanks the southwest side of this building.

Figure 23: Building 2 from Lorimer Street (P Mills, 2/5/2018)

Figure 24: Building 2 interior (P Mills, 2/5/2018)

Building 3 Cafeteria

The interior of the main space was inspected.

This building was constructed around the middle of the war period. It appears to have functioned from the start as a cafeteria. The roof form is comprised of four 10m deep sawtooth bays flanked on three sides by skillions. Flanking skillions are also used on other small-to-medium scale buildings around the site. External walls are of brick.

The southeast wall to the former airfield presents the full height of the sawtooth and is particularly intact with original windows and glazed door with top and side lights and curved concrete porch detailing typical to the site. Window openings have been substantially altered on the northeast side, but original side windows appear on the northwest external wall now inside Building 1. The northwest wall to the kitchen is also intact.

The roof is supported on timber posts. The timber trusses, both transverse and in the bays, are of unusual construction, without the standardised steel plate junctions and steel rod tension members of typical industrial timber trusses. They appear to be of Australian hardwood with simple black-iron bolted connections in the body of the truss and steel-plate connections at major junctions. They are typically built up variously out of doubled and single members, with steel flitch plates connecting lengths of timber in top and bottom chords, and timber blocks stiffening the paired struts and ties. A most noticeable feature is the extension of members well past their bolted connections, presumably to lessen the possibility of splitting. The steel sawtooth window frames appear to be intact, as well as the geared opening mechanisms.

Figure 25: The Cafeteria's southeast elevation (P Mills, 2/5/2018)

Figure 26: The cafeteria interior (P Mills, 2/5/2018)

Building 6

The main space under the sawtooth was inspected internally, the office wing was not.

Building 6 was constructed in the late war period. The front of the building to Lorimer Street and Gate 2 is a two-storey red brick office wing with tiled hipped roof with wide eaves. At either end there are parapeted tower elements with vertical slit windows indicating the presence of staircases. The entrance into the tower element at the north corner has been altered. The frames of the windows have been replaced with aluminium.

Behind this wing stretches a moderate-height steel-framed sawtooth building with five bays and flanking skillions on the two long sides. The side walls are brick to sill height, with steel-framed factory windows above on the southeast and southwest. The northeast facade has been heavily altered except for a pedestrian entry at the centre.

Figure 27: The building 6 frontage (P Mills, 2/5/2018)

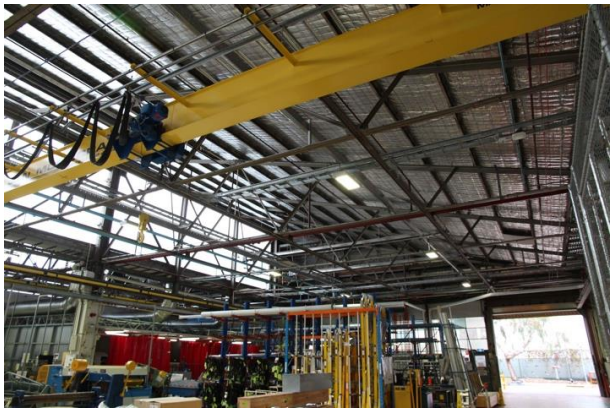


Figure 28: The saw tooth interior of Building 6 (P Mills, 2/5/2018)

Building 10 Boiler House

The boiler house was built in two stages, one in the first building programme and the other in the late war period. The gable-roofed two storey building is red brick. For both early stages, the brickwork is in an unusual pattern of two header and single stretcher, indicating solid brick construction of some thickness. There are concrete mouldings over doorways (most of which are bricked in) and around openings in the upper level. There is a more recent red-brick extension on the northwest end.

Figure 29: The Building 10 Boiler house from the north (P Mills, 2/5/2018)

Building 12

The interior was not inspected.

Building 12 is a small, conventional timber framed building that originally had a corrugated asbestos roof (now galvanised), and was part of the first expansion of the GAF in the early 1940s. Its most characteristic feature is long strip windows that have wired, obscure glazing in the bottom row, and some openable hoppers in the top. Below the timber sill are horizontal timber boards and above the windows is corrugated metal cladding. The eaves are boxed and the doors are simple and flush with the glazing above. The extent of glazing suggests it may have been a drawing office or similar, however, as the opposite side of the building opens onto a landscaped area, the building may have provided a recreational function.

Figure 30: Building 12 as viewed from Avro Lincoln Road (P Mills, 2/5/2018)

INTEGRITY

Intactness: refers to the degree to which a place retains its significant fabric. Intactness should not be confused with condition as a place may be highly intact but the fabric may be in a very fragile condition.

Integrity: refers to the degree to which the heritage values of the place are still evident and can be understood and appreciated. (*Victorian Heritage Register Criteria and Thresholds Guidelines*, p.4)

The Complex

As a wartime complex, GAF is substantially intact, although the loss of the airfield that the buildings faced is detrimental. The overall planning of the GAF site and the alignment of sawtooth roofs is still easily understood. The southwest boundary alignment with the former airfield is still expressed with the alignment of Mirage Street and Hornet Drive. Gate 1, between the former administration building (now demolished), and CAC is operable but has been overtaken by Gate 2 as the main entry adjacent to Building 6 that provides the new reception. The collection of buildings within the recommended extent retains a high degree of integrity and intactness.

Individual Buildings Recommended as Significant

- Building 1 High integrity, highly intact
- Building 2 Moderate integrity, moderately intact (interior not inspected)
- Building 3 High integrity, moderately intact
- Building 4 High integrity, highly intact
- Building 6 High integrity, moderately intact
- Building 10 High integrity, moderately intact
- Building 12 Moderate integrity, highly intact (interior not inspected)

Buildings Not Recommended (Buildings 5, 7, 8 and 15)

Parts of the wartime complex, being Building 5 and 7, are excluded from the recommended extent. Building 5 (now 24 Network Drive) retains only three of its original ten sawtooth bays. Although it has timber trusses, these are better demonstrated in Building 3. Building 7 (now 21-51 Sardine Street) had a narrow two storey masonry section, similar to the other large hangars, but it has been demolished. The characteristics of Building 7 are better demonstrated in buildings within the recommended extent. Later buildings 8 and 15 are from a less significant period and have been altered. They are excluded from the recommended extent.

COMPARATIVE ANALYSIS

The Complex

In terms of its role as an assembly plant during WWII, the only historically comparable site is Mascot in NSW. Mascot, the Sydney (Kingsford Smith) Airport is on the State Heritage Register and among the identified items are Buildings 108, 109, 110, 111, 112, 113, and 114, 128 and 143 that date from the 1930s and 1940s. Refer to
http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5063218

The GAF differed from its immediate neighbour, the Commonwealth Aircraft Corporation (CAC), in terms of role, ownership and building construction. Whereas GAF was quickly erected by the Commonwealth Government in 1939, CAC had been planned and commenced construction prior to the war when building materials were still available. CAC was a project undertaken by a group of well-established industrial firms and the more elaborate buildings represented their commitment to the new enterprise. CAC manufactured as well as assembled aircraft, while GAF was the final assembly point for aircraft. Almost all of CAC has been demolished but a substantial amount of wartime GAF remains.

Building 6 Architectural Style
The architectural treatment of the brick block of Building 6 is Interwar Functionalist.
Several architecturally comparable buildings were delivered by the Commonwealth in the same period. The Former Royal Australian Army Medical Corps Training Depot, 239 A'Beckett St Melbourne, which was designed by Commonwealth Department of Works architect George H Hallendal, and built in 1938, displays some similarities in detailing. Notably the main mass is in red brick with strip windows and cream brick pillars separating the individual sets of glazing, between emphasised expressed horizontal concrete elements of sill and lintel. It is included in the Victorian Heritage Register (H0717).

Figure 31: The Former Royal Australian Army Medical Corps Training Depot, 239 A'Beckett Street Melbourne (H0717) (Google maps, November 2017)

The GAF Administration building (now demolished) and the Defence Science and Technology Organisation (DSTO) Administration building were both designed by the Commonwealth Department of Works. They have tiled roofs, and red brick with horizontal bands of windows emphasized by cream lintels and sills. The main entry to each building was a vertical block.

Figure 32: The GAF Administration Building, which has been demolished (left) was very similar to the DSTO Administration building (right) (HLCD, 2004)

Another Commonwealth Architect designed building showing similar design influences is Building 88, Wagga Wagga RAAF Base, c1937.

Figure 33: Building 88 Hangar, Wagga Wagga RAAF Base. Built in c1937 by the Commonwealth Department of Works (HLCD, 2003)

There are a number of excellent examples of Inter-War Functionalist style buildings in Victoria protected on State and local heritage registers. Images are provided for a number of them below. Some are schools and other state institutions designed by, or under the direction of, Percy Everett, the Chief Architect of the Victorian Public Works Department, 1934-1953. They show similarities in the massing and contrasting horizontal and vertical emphasis, as well as the use of brickwork with banding, that is similar to Building 6 at the GAF.

Figure 34: The former Box Hill Girls Technical School, Whitehorse Road, Box Hill, 1936 is individually listed in the City of Whitehorse Heritage Overlay (Whitehorse Heritage Review, Building Citations, April 1999)

Figure 35: The former Essendon Technical School in Buckley Street, Essendon. Designed by Percy Everett and built in 1938, it is included in the Victorian Heritage Register, H1295 (http://www.onmydoorstep.com.au/heritage-listing/4929/former-essendon-technical-school)

The GAF Building 6, with its treatment of horizontal window panels with cream brick pillars between individual windows, in contrast to the dominant red brick of the façade, is very similar to the Brunswick Fire Station by Seabrook and Fildes, 1937 (H0916). The vertical slit stair window in the entry tower also resembles a stair window of the Brunswick building. The window treatment is also comparable to that on the MacRobertson Girls' High School in Albert Park, by Seabrook and Fildes, 1934 (H1641), except that the brick colour contrast is reversed. Both of these examples are included in the Victorian Heritage Register.

Figure 36: MacRobertson Girls' High School Albert Park by Seabrook and Fildes, 1934, is included in the Victorian Heritage Register, H1641. (http://www.bastow.vic.edu.au/blog/bastow-legacy-part-4-mess-to-mass;)

Figure 37: Brunswick Fire Station and flats, 24 Blyth St, Brunswick. Designed, by Seabrook and Fildes and constructed in 1937, the building is included in the Victorian Heritage Register H0916 (http://vhd.heritagecouncil.vic.gov.au/places/168)

Figure 38: Camberwell Court House and Police Station at 311-317 Camberwell Road, Camberwell. The Court House was, designed by Percy Everett and dates to 1938. It is included on the Victorian Heritage Register (H1194). (http://vhd.heritagecouncil.vic.gov.au/places/1681)

ASSESSMENT AGAINST CRITERIA

✓	**CRITERION A** Importance to the course or pattern of our cultural or natural history (historical significance).
✓	**CRITERION B** Possession of uncommon rare or endangered aspects of our cultural or natural history (rarity).
	CRITERION C Potential to yield information that will contribute to an understanding of our cultural or natural history (research potential).
✓	**CRITERION D** Importance in demonstrating the principal characteristics of a class of cultural or natural places or environments (representativeness).
✓	**CRITERION E** Importance of exhibiting particular aesthetic characteristics (aesthetic significance).
	CRITERION F Importance in demonstrating a high degree of creative or technical achievement at a particular period (technical significance)
	CRITERION G Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. This includes the significance of a place to Indigenous peoples as part of their continuing and developing cultural traditions (social significance).
	CRITERION H Special association with the life or works of a person, or group of persons, of importance in our history (associative significance).

STATEMENT OF SIGNIFICANCE

What Is Significant

Part of the Former Government Aircraft Factory (GAF) constructed during WWII, is significant at the State level. This includes part of the current Boeing complex, 226 Lorimer Street Port Melbourne, between Canberra Street and Nomad Street, extending to the line of the original Fishermans Bend airfield, now marked by the alignment of Mirage Way with Hornet Drive (Refer to extent plan). Buildings of significance are Building 1, 2, 3, 4, 6,10 (the eastern portion), and 12. (Refer to the current Building numbers plan).

Parts of the site planning are significant, including Gate 1 and 2, and the alignment of buildings to the open space and runways of the wartime factory.

How it is Significant

Part of the Former Government Aircraft Factory (GAF) constructed during WWII, is of local historic significance to the City of Melbourne and of State significance. It is a rare, representative example of a wartime aviation assembly plant. Building 6 has aesthetic value and Building 3 is a rare example of a timber truss building from the period.

Why it is Significant

The Commonwealth establishment of the Government Aircraft Factory (GAF) at Fishermans Bend from 1939 was a wartime action of historic significance. It reflects Australia's rapid response to rising threats, and the desire to become more self-reliant as a nation. (Criterion A)

The GAF at Fishermans Bend was one of Australia's two aircraft assembly plants during WWII. It was the focus of a very wide network of manufacturing participants throughout Australia, where a number of plants created sub-assemblies, before reaching the two final assembly plants at Fishermans Bend in Victoria and Mascot in NSW. (Criterion A)

The GAF was erected rapidly in 1939, and played an important role in Australia's increasing capabilities during WWII, expanding twice. It was particularly successful with the Beaufort bomber and the Beaufighter; both were assembled at GAF and wheeled onto the neighbouring Fishermans Bend airfield for flight. (Criterion A)

Following the war, the GAF's important role diminished. However, it remained in the aviation industry, including a substantial portion of the site that is now owned by Boeing Aerostructures Australia. The continuing link to the aviation industry is significant and contributed to Fishermans Bend becoming a manufacturing and employment hub. (Criterion A)

The collection of sawtooth roofed factories demonstrates the characteristics of a wartime air facility, particularly expressed in their simple design of wide spans, tall heights, steel-framed structure, modest external cladding and hangar doors. Building 1 is particularly important as it demonstrates the direct connection with assembly and the former airfield adjacent. (Criterion D)

Building 6 has aesthetic value as an expression of the Interwar Functionalist style applied to government buildings by the Commonwealth. (Criterion E). Building 3 is a rare example of a timber truss factory building from the period. (Criterion B)

RECOMMENDATIONS

Figure 39: The extent recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme, as an individually significant place and for nomination for inclusion in the Victorian Heritage Register

Recommendations for the Schedule to the Heritage Overlay (Clause 43.01) in the Melbourne Planning Scheme:

Melbourne Planning Scheme

EXTERNAL PAINT CONTROLS	Yes
INTERNAL ALTERATION CONTROLS (steel structure and timber trusses)	Yes
TREE CONTROLS	No
OUTBUILDINGS OR FENCES (Which are not exempt under Clause 43.01-3)	No
TO BE INCLUDED ON THE VICTORIAN HERITAGE REGISTER	Recommended
PROHIBITED USES MAY BE PERMITTED	No
NAME OF INCORPORATED PLAN UNDER CLAUSE 43.01-2	-
ABORIGINAL HERITAGE PLACE	No

REFERENCES

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The Argus (Melbourne), as cited.

The Australasian (Melbourne), as cited.

Australian War Memorial photograph collection (AWM), as cited.

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Department of Labour and National Service, 1945, '*Bulletin No.8 Industrial Welfare Division: Factory Planning Part 1: Some aspects affecting working conditions'*, Department of Labor and National Service, C. of A., Melbourne.

Government Aircraft Factories (GAF), 1979, *Government Aircraft Factories*, AGPS, Canberra.

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Mellor, D.P., 1958, *the Role of Science and Industry*, Australian War Memorial, Canberra.

Record (Emerald Hill), as cited.

Sun (Sydney), as cited

Sydney Morning Herald (SMH), as cited.

'*Technology in Australia 1788-1988*', website of the Academy of Technological Sciences and Engineering, Melbourne, as cited.

Weekly Times (Melbourne), as cited.

West Australian (Perth), as cited.

PREVIOUS STUDIES

Southbank and Fishermans Bend Heritage Review 2017	Recommended as a place of local heritage significance

5.2 Commonwealth Aircraft Factory (Now Boeing) Citation

SITE NAME	Former Commonwealth Aircraft Corporation (CAC) No 3 Aircraft Factory, now Building 43 of Boeing, Port Melbourne
STREET ADDRESS	226 (part) Lorimer Street, Port Melbourne
PROPERTY ID	110501

Figure 1: Extent of assessed site shown in yellow

Figure 2: View from Lorimer Street (P Mills, 02/05/2018)

SURVEY DATE: 2 May 2018 SURVEY BY: Helen Lardner, HLCD with Dr Peter

HERITAGE INVENTORY	No	**HERITAGE OVERLAY**	No
PROPOSED CATEGORY	Not recommended	**PLACE TYPE**	Industrial building
DESIGNER / ARCHITECT / ARTIST:		**BUILDER:**	Reinforced Concrete and Monier Pipe Construction Pty Ltd
DESIGN STYLE:	Interwar Period (c.1919-c.1940)	**DATES OF CREATION / MAJOR**	1937-c1950s

THEMES

	HISTORIC THEMES	DOMINANT SUB-THEMES
	5. Building Victoria's industries and workforce	5.2 Developing a manufacturing capacity
	3. Connecting Victorians by transport and communications	3.6 Linking Victorians by air

RECOMMENDATIONS

NOT recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme.
Extent of overlay: Not applicable

SUMMARY

The Commonwealth Aircraft Corporation (CAC), registered in 1936, was a syndicate of private companies including industry giants GMH and BHP that pursued a self-sufficient aircraft industry in Australia. The No. 1 Aircraft Factory, completed 1938, was supported by the State government who provided the adjacent landing and test ground. Before the first aircraft was finished, the factory doubled in size with the first stage of No. 2 Aircraft Factory completed in 1939. It doubled again in area between 1940 and 1941, with another major increase within two years. By late 1942 or early 1943, No. 2 Aircraft Factory was widened, and No. 3 Aircraft Factory was constructed. The building that remains on site was the No. 3 Aircraft Factory.

No. 3 Aircraft Factory was relatively austere compared to the CAC Factories constructed prior to WWII. Its relatively small interior and hangar door suggest it may have been used for development work on new aircraft types or production of sub-assemblies. After the war, CAC diversified its role. It continued to develop new aircraft, but increasingly limited its business to the manufacture of parts.

By 1981, No. 3 Aircraft Factory had become part of the Government Aircraft Factory (GAF), relabelled Building 8 and used for sheet metal work. The roof and wall cladding were probably replaced at this point. The CAC became a subsidiary of Hawker de Havilland in 1985, before it was purchased by Boeing Australia in 2000. Then most of the buildings on the site were removed, with only No. 3 Aircraft Factory and the former Executive Administration building (constructed in c1970) remaining.

Former CAC Key Periods of Development

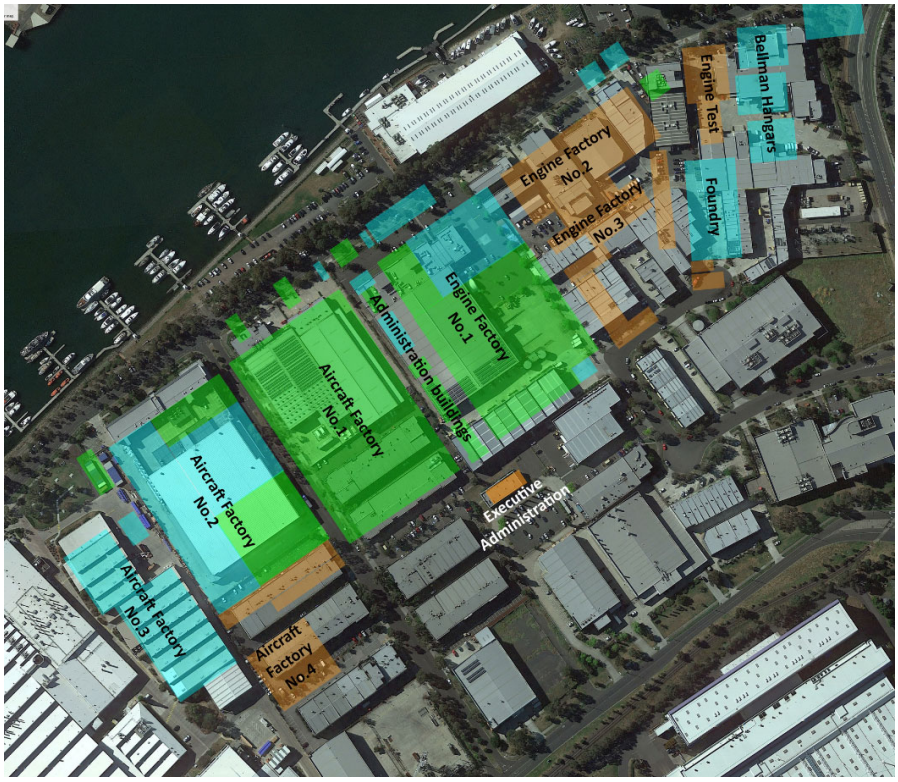

Figure 3: Diagram showing the extent of the former CAC coloured by development period. As almost all of the buildings have been demolished, they do not generally align with the existing buildings visible in the aerial photograph.

Establishment Period: 1937-39 Green

All buildings demolished.

WWII Period:1940-45 Blue

Aircraft Factory No 3 is the only remaining building.

Post war period: orange

Executive administration (c1970) is the only remaining building.

HISTORICAL CONTEXT

Pre-World War II

Contextual History

After World War I some Australian companies began constructing training aircraft fitted with imported engines, but with no civilian demand they soon went out of business. On an overseas trip in 1935, Essington Lewis, the General Manager of Broken Hill Proprietary Co. Ltd (BHP), observed the war preparations of Germany and Japan. In 1936, with government encouragement, three companies including BHP, Broken Hill Smelters Pty Ltd and General Motors-Holden (GMH) formed a syndicate to investigate the formation of a self-sufficient aircraft industry (Hill, p.381). The syndicate decided that it should first build a training aircraft. The three RAAF engineers who were sent overseas to investigate returned with the recommendation for the North American Aviation NA-33, which had been designed for simplified large-scale production. The Air Board accepted their recommendation. The original syndicate members were joined by I.C.I.A.N.Z, the Electrolytic Zinc Company of Australia Ltd, and the Orient Steam Ship Company Ltd. The Commonwealth Aircraft Corporation Pty Ltd (CAC) was registered in October 1936 (Hill, pp.382-3).

The government initially ordered 40 American NA-33 trainer aircraft (Hill, pp.382-3). The technical nucleus of the CAC was formed from the personnel of Tugan Aircraft in Sydney. The head of that firm, Wing-Commander L.J. Wackett, became the manager of CAC (CAC, 1962). A sample NA-33 was brought to Australia and production of the modified version, named the 'Wirraway', began in April 1938 (*Hill,* pp.24-25). By June 1938, the government had already ordered another 60 (*Sun [Sydney]*, 30 June 1938, p.1). Thirty were completed before the outbreak of WWII on 1st September 1939 (CAC, 1962).

Site History

Construction of the new factory was based on North American aircraft factory layouts, with supervision entrusted to Laurence Hartnett, the General Manager of General Motors-Holden (GMH) next door, where a major factory had just been built (Hill, p.16). The CAC was offered free use of 140 acres of Harbour Trust land for a landing ground that was first used in October 1937 (*Herald,* 11 December 1936, p.18; *The Age*, 22 October 1937, p.16).

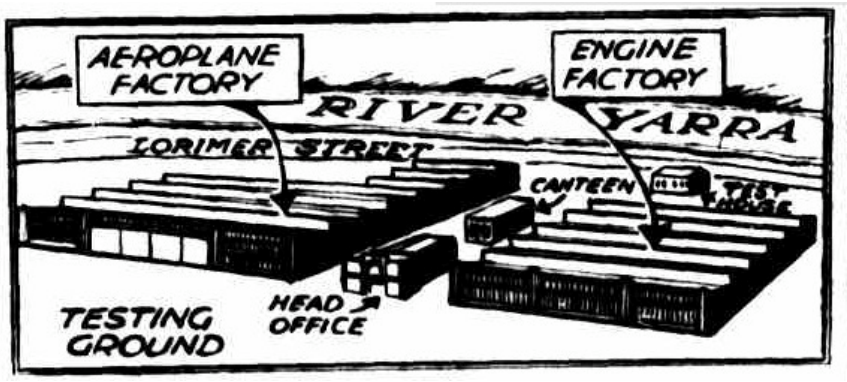

Figure 4: Sketch of the planned first stage of construction, 1937 (*The Argus,* 19 Jan 1937, p.11)

The contract was awarded in January 1937, to Reinforced Concrete and Monier Pipe Construction Pty Ltd (*The Argus*, 28 January 1937, p.13). The first stages of the No.1 Aircraft Factory, an administration block,

No.1 Engine Factory and a test house were completed in February 1938 (*The Argus*, 3 February 1938, p.10). The foundry began operation in January 1939 (Hill, 1989, p.27).

Figure 5: Early oblique aerial showing the first phase of construction (Airspy March 1938, SLV Accession No: H91.160/527)

It was not long before another major wave of building was under way. As Hill describes, “before the first aircraft was completed, the factory was doubled in size, extending toward the Yarra River (an extension allowed for in the original layout) …” (Hill, p.25). This increase included the first stage of the No.2 Aircraft Factory. It appears this phase of building was complete by May 1939 (*The Argus*, 23 May 1939 p.22).

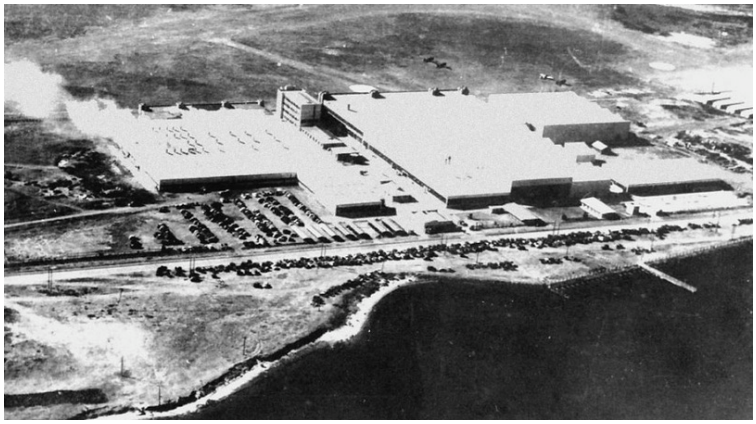

Figure 6: Oblique aerial of the CAC plant with extensions up to 1939. No.2 Aircraft Factory on the far right is approximately half built (Tony Lyons, Monash University collection, http://www.ctie.monash.edu.au/hargrave/MEGGS_CAC.html).

Wartime Contextual History

War was declared on 1 September 1939. The Wirraway became an integral part of Australia’s contribution to the Empire Air Training Scheme. Wirraways were also involve in combat in New Guinea. Wirraways were also involved in combat in New Guinea by January 1942 (Hill, p.43). The CAC had also been working on its own design for a trainer. The first of 200 of the resulting ‘Wackett’ trainers flew in February 1941, and the last was delivered in April 1942 (Hill, pp.31-33 passim). Aircraft production at the CAC peaked with these trainers in 1941 to early 1942 (Hill, p.100).

When Japan joined the war in 1942, most of the RAAF ‘s fighter aircraft were already engaged in Europe and the Middle East, and the supply of new British and American planes was limited. The government funded development of a fighter, for which the CAC already had a design under way. The ‘Boomerang’ made extensive use of the Wirraway design and parts, as well as used the Wasp engine already being produced by the CAC for the Beaufort bomber. The first fighters were quickly operational by April 1943, but the aircraft was soon replaced by the P-40 Kittyhawk and Submarine Spitfire. The CAC then started to design an entirely new fighter, the CA-15 (Hill, date, pp.64-74; CAC 1962).

In June 1940, the government approved development of a bomber and the CAC responded with the ‘Woomera’, which was first flown in September 1941. An order was placed for 105 of the aircraft, but an accident in 1943 caused delays and a new prototype was only handed to the RAAF in late 1944. By this time there were plenty of alternatives more readily available (Hill, pp.57-66, 100-101).

In 1943 Wackett was sent overseas to choose a new fighter aircraft for the RAAF. He favoured the North American Mustang. By August 1944, 350 of the aircraft had been ordered, and a total order of 600 was expected (Hill, pp.94-96). However, the retraction of orders towards the end of the war was as rapid as its build-up at the start, with the Woomera and CA15 projects cancelled in September 1944. By October activity at the CAC had been reduced by 40% (Hill, p.41). Production switched to the proven Mustang, but only 16 had been delivered by the end of the war, when the order was reduced to 250 (Hill, p.97).

Hill concludes that the CAC's magnificent facility at Fishermans Bend was, in the end, underutilized, and only used to back up the supply of imported combat aircraft to the RAAF. However, in the process of setting up production of engines and undertaking repair work for the US air force, the CAC had established capabilities and facilities that would serve it well after the war (Hill, p.99).

Site History

A series of major building programmes occurred from the start of the war up until 1943, by which time the total floor area had increased by 400%. The aircraft factories experienced the greatest increase between 1940 and 1941, with another major increase between 1942 and 1943 (Hill, p.34).

The 1940-41 phase involved the filling in of the main body of No.2 Aircraft Factory and the completion of the Lorimer Street end of the No.1 Engine Factory (Hill, p.38; AAI, Entries 63359 and 63372). The Administration building was raised from two to four storeys (*The Argus*, 24 July 1940, p.12; AAI Ref. No. 63358). The foundry was greatly expanded in 1941 (Hill, 1989, p.28). An "engine house", possibly another engine test house, was also added (AIAI 63738).

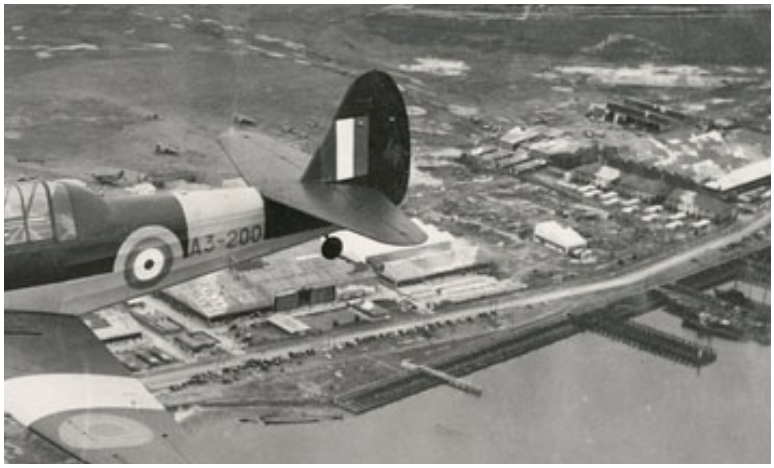

Figure 7: Extract of oblique aerial taken 22 April 1942. No.2 Aircraft Factory has been filled out but not widened, and No.3 Aircraft Factory has not yet been built (AWM Photo AC0145)

By September 1942, the new "Flight Hangar and Experimental Section" was completed. The flight hangar was probably situated at the widening of No.2 Aircraft Factory, and the Experimental Section may well have been No.3 Aircraft Factory. Hill states that "this new facility was vital, not only to relieve the enormous congestion …, but for the development work that would be required in new projects like the Woomera and the CA-15" (p.41).

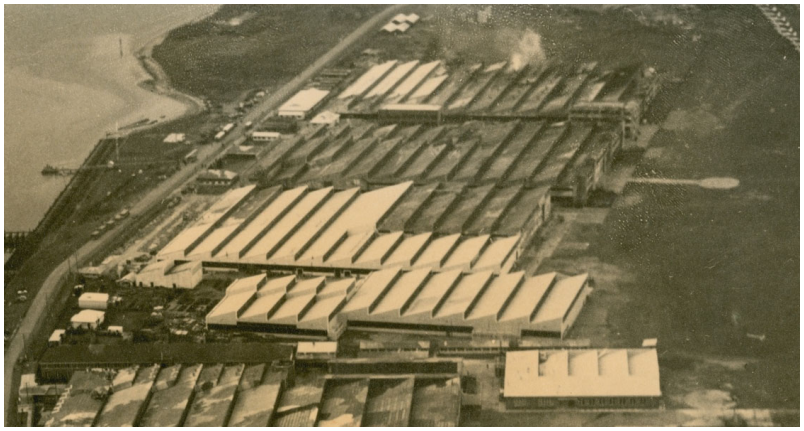

Figure 8: Extract of oblique aerial taken late 1942 or early 1943. No.2 Aircraft Factory has been widened and No.3 Aircraft Factory has been established further to the southwest (Beaufort Division, c1944)

Given the layout of No.3 Aircraft Factory, with a relatively small hangar door on the northeast and restricted clear space in the interior, it is unlikely that the building would have been used for one of the vast assembly lines of complete aircraft shown in contemporary photographs of other interiors of the plant. It is more likely that No.3 was used for developmental work on new aircraft types and/or for production of sub-assemblies.

From April 1942, the CAC also assembled, modified, maintained and repaired American aircraft. Prefabricated hangars were erected on the north-eastern corner of the site for this purpose, including three Bellman hangars and an American Butler hangar (Hill, p.86; VHR H0094, VHD). A new foundry was completed near the hangars by end of the war (Hill, p.42).

Figure 9: Extract of 1945 oblique aerial showing the new foundry under construction, and the four prefabricated hangars in the foreground. No.3 Aircraft Factory is at top (SLSA PRG 277/143/2)

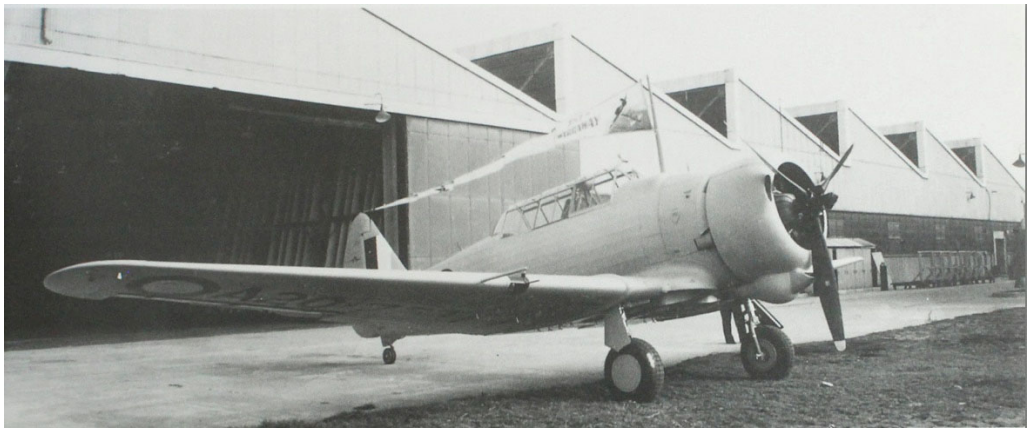

Figure 10: The last Wirraway manufactured, outside No.3 Aircraft Factory in September 1946 (Hill, Fig.16).

Post-War

Contextual History

The factory continued to produce Mustang fighters, but the order was further reduced in 1947 to a total of 200. Production was slowed to extend it to four years (Hill, p.97). From 1948-51 the CAC designed and produced the Winjeel, a standard basic flying trainer for the RAAF (CAC, 1962).

From 1948, the first jet-based project after the war was the manufacture of the Rolls Royce Nene engine to power the Australian built Vampire (CAC, 1962). This was followed by the Avon engine for the Canberra bombers being built next door at the GAF (CAC, 1962).

The CAC next redesigned the North American Aviation F-86 Sabre, a jet fighter that had seen action in Korea, to produce the Avon Sabre. The first production aircraft arrived in 1954. Early Sabres had imported Avon engines, but CAC also began to produce these (CAC, 1962).

The next aircraft to be built by the CAC, from 1965, was the Italian Macchi trainer. Production started with imported parts, but it had been expected that by the end of production in 1972, 90% of the aircraft would be manufactured in Australia (CAC 1967).

From 1964, as a subcontractor to the GAF, the CAC constructed the wings, fins, tail cones and drop tanks, and the Atar C engine for the Mirage fighter. The engine required new manufacturing techniques and a corresponding extension of the factory. By 1967, 90% of the Atar engine parts were Australian made (CAC, 1967). Production of the Bell Kiowa helicopter for the Navy began in 1971.

In 1985 the CAC became a subsidiary of Hawker de Havilland Ltd, and the name was changed to Hawker de Havilland Victoria Limited. Hawker de Havilland Victoria was purchased by Boeing Australia in 2000.

Site History

The first substantial postwar addition, the No.2 Engine Factory, was built circa mid-1950s and was used for production of the Nene and Avon jet engines (Hill, figs.53 and 68; AAI Ref. No.65323).

A number of building additions were made in the mid-1960s to keep up with advances in aircraft design and more sophisticated materials, particularly for the Mirage fighter (CAC, 1967; AAI Ref. Nos.67560, 67884, 68020 and 68021). These additions included No.3 Engine Factory and the ‘Process Building’.

Figure 11: c1967 oblique aerial showing No.3 Aircraft Factory at left. Also note No.2 and No.3 Engine Factories and the Process Building at right (CAC, 1967)

By 1975 the new No.4 Aircraft Factory, and an Executive Administration wing, had been built over the old airfield in front of the main hangars (Hill, fig.106).

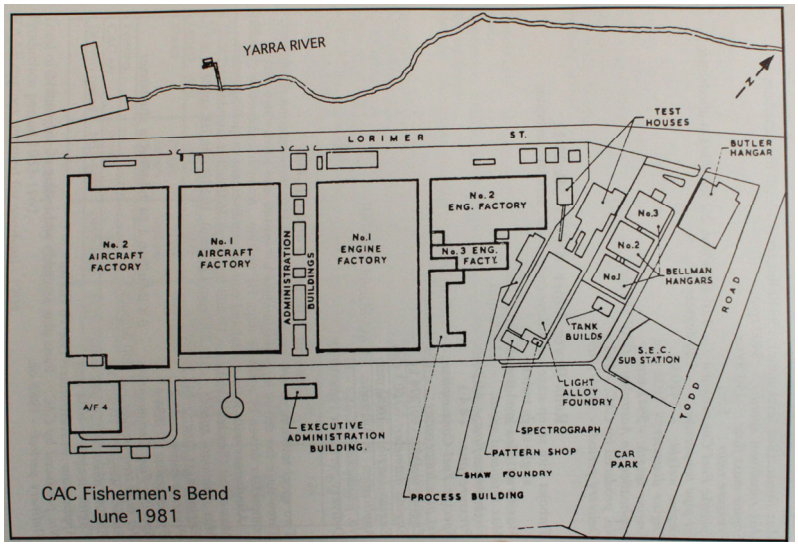

Figure 12: 1981 plan of the CAC (Hill, p.252)

By the early 1980s, No.3 Aircraft Factory had become part of the GAF (Hill, p.252; GAF 1986). After Hawker de Havilland Victoria's purchase by Boeing Australia in 2000, most of the buildings on the remainder of the old CAC site were removed. The former Executive Administration building remained for a time but later demolished (Google Earth historical imagery).

SITE DESCRIPTION

Site Layout

Refer to the CAC complex key periods of development diagram (figure 3).
The CAC site extended northeast to the current location of Todd Road where it was in close proximity to GMH, one of the companies involved in its establishment. No 3 Aircraft Factory was located at the southwest boundary, separated by what was the original entry road from Gate No. 1 of the Government Aircraft Factory (GAF). The change in the angle of sawtooth roofs distinguishes the former GAF and CAC sites.

Today the site forms part of Boeing Industries at 206 Lorimer Street, and is known as Building 43. It is bounded by Beaufort Place, Mirage Way and Canberra Street. It is set back from Lorimer Street with a landscaped forecourt. A new addition screens the building; however, the characteristic gabled form is visible down Canberra Street from Gate No 1.

Building Description

No.3 Aircraft Factory is a steel framed building with 40ft (12.2m) sawtooth bays. The floor plan is staggered at the northwest end to accommodate the angled boundary to the former GAF site. Originally clad all over with corrugated asbestos-cement, it has been comprehensively reclad with Zincalume steel, corrugated on the walls and decking on the roofs. The long side walls originally featured continuous strips of factory windows above sills, but these have been replaced with translucent corrugated Alsynite type material. The sawtooth windows have also been replaced with translucent material. Originally, the front of the building extended past the long airfield frontage of the main aircraft factories and engine factories, and the two-leaf hangar door on the southern end of the northeast wall opened onto the airfield. This door is extant but reclad.

Figure 13: Former No.3 Aircraft Factory - northeast wall (P Mills, 2/5/2018)

Internally, only the columns and trusses remain. The columns are I-beams with the flanges enlarged by riveted-on steel plates. The trusses are constructed from steel angles bolted together with plates at the junctions. The main trusses of the primary southeast section span the full width of the building, but on the northwest section there are columns at the midpoints of the trusses.

Figure 14: Former No.3 Aircraft Factory interior at the southeast end (P Mills, 2/5/2018)

INTEGRITY

Intactness: refers to the degree to which a place retains its significant fabric. Intactness should not be confused with condition as a place may be highly intact, but the fabric may be in a very fragile condition.

Integrity: refers to the degree to which the heritage values of the place are still evident and can be understood and appreciated. (*Victorian Heritage Register Criteria and Thresholds Guidelines*, p.4)

The Complex

As a complex, the CAC has very low intactness and integrity. Factory No.3 is a fragment, completed relatively late during WWII, and it does not demonstrate the scale and imposing nature of the earlier pre-war, buildings.

Individual Buildings

As an individual building, No. 3 Aircraft Factory has low to medium integrity and low intactness, although it retains its characteristic sawtooth form, steel structure and a hangar door. This demonstrates its connection to aviation; however, its original purpose is hard to discern with the loss of the CAC complex and airfield. Its smaller scale suggests that it was not involved in full aircraft assembly.

COMPARATIVE ANALYSIS

The Complex

The CAC differed from its immediate neighbour, the Government Aircraft factory (GAF), in terms of role, ownership and building construction. Whereas GAF was quickly erected by the Commonwealth government in 1939, CAC had been planned and commenced construction prior to the war when materials were still available. CAC was a project undertaken by a group of well-established industrial firms, and the more elaborate buildings represented their commitment to the new enterprise. CAC manufactured as well as assembling aircraft, while GAF was the final assembly point for aircraft. Almost all of CAC has been demolished but a substantial amount of wartime GAF remains.

No 3 Aircraft Factory

The c1942 construction date of No. 3 Aircraft Factory means that it is comparable to the buildings that formed the first expansion of GAF, such as Building 1 extension, Building 2, Building 3 and the first part of Building 4. Compared to these buildings, No. 3 Aircraft Factory retains its form and steel structure, but has lower integrity and intactness.

ASSESSMENT AGAINST CRITERIA

✓	**CRITERION A** Importance to the course or pattern of our cultural or natural history (historical significance).
	CRITERION B Possession of uncommon rare or endangered aspects of our cultural or natural history (rarity).
	CRITERION C Potential to yield information that will contribute to an understanding of our cultural or natural history (research potential).
✓	**CRITERION D** Importance in demonstrating the principal characteristics of a class of cultural or natural places or environments (representativeness).
	CRITERION E Importance of exhibiting particular aesthetic characteristics (aesthetic significance).
	CRITERION F Importance in demonstrating a high degree of creative or technical achievement at a particular period (technical significance)
	CRITERION G Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. This includes the significance of a place to Indigenous peoples as part of their continuing and developing cultural traditions (social significance).
	CRITERION H Special association with the life or works of a person, or group of persons, of importance in our history (associative significance).

STATEMENT OF SIGNIFICANCE

What is Significant

The Commonwealth Aircraft Corporation (CAC) No. 3 Aircraft Factory, now Building 43 at Boeing, 226 Lorimer Street Port Melbourne, built in c1942, has some significance.

How it is Significant

The CAC No. 3 Aircraft Factory has some historic and representative significance but because of its low integrity and intactness, it does not meet the threshold for local significance to the City of Melbourne.

Why it is Significant

No. 3 Aircraft Factory has historic significance as part of the Former CAC site. The CAC, registered in 1936, was a syndicate of private companies, including industry giants GMH and BHP, that pursued a self-sufficient aircraft industry in Australia and was supported by government. (Criterion A).

The CAC complex was commenced prior to the war when there were materials and funds available to showcase the new enterprise. No. 3 Aircraft Factory, built c1942, demonstrates the rapid growth of the company when it played an important role in Australia's increasing capabilities during WWII. (Criterion A)

The characteristic sawtooth form, steel structure and extant hangar door demonstrate some characteristics of the aviation industry at that time. (Criterion D).

RECOMMENDATIONS

NOT recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme.

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Victorian Heritage Database (VHD), as cited.

PREVIOUS STUDIES

Southbank and Fishermans Bend Heritage Review 2017	Recommended as a place of local heritage significance

5.3 Kraft (Now Bega) Citation

SITE NAME	Former Kraft Vegemite Factory, now Bega
STREET ADDRESS	1 Vegemite Way, Port Melbourne
PROPERTY ID	110590

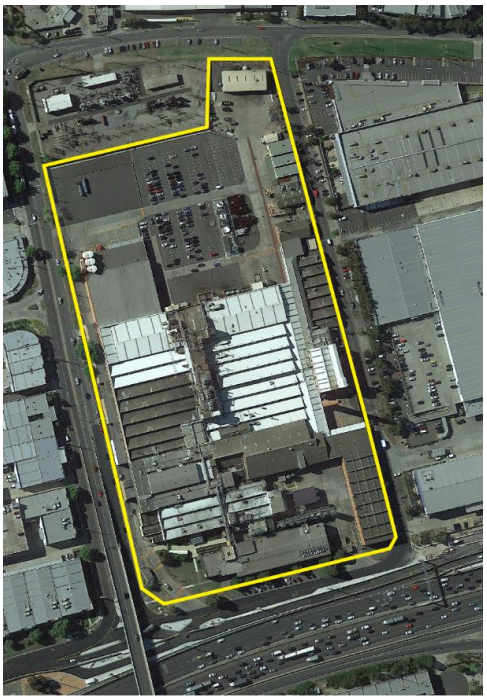

Figure 1: Extent of assessed site shown in yellow

Figure 2: View from Salmon Street (H Lardner, 10/07/2018)

SURVEY DATES: 2 May 2018 and 4 November 2020		**SURVEY BY:** Helen Lardner, HLCD with Dr Peter Mills	
HERITAGE INVENTORY	No	**HERITAGE OVERLAY**	Proposed
PROPOSED CATEGORY	Local	**PLACE TYPE**	Industrial complex
FORMER GRADE	Ungraded		
DESIGNER / ARCHITECT /	Oakley & Parkes after 1954	**BUILDER:**	Hansen & Yunken Pty Ltd
DESIGN STYLE:	Postwar Period (1945-1965) some 1943 fabric	**DATES OF CREATION / MAJOR CONSTRUCTION:**	1943 - 1967

THEMES

	HISTORIC THEMES	DOMINANT SUB-THEMES
	5. Building Victoria's industries and workforce	5.2 Developing a manufacturing capacity

RECOMMENDATIONS

Recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme as an individually significant place.

Extent of overlay: Part of the site. Refer to figure 37 in the recommendations section of the citation.

SUMMARY

Kraft had its origins in an amalgamation of the American Kraft canned cheese company and a local company, Fred Walker and Co which produced canned butter and cheese from 1908. In 1925, Walker formed the Kraft Walker Cheese Company that manufactured Kraft products in Australia. In 1928, the company consolidated several sites to South Melbourne, but it soon outgrew this facility and dispersed operations. After WWI, Bonox was introduced and, from the 1920s, Vegemite and canned meats were part of the product range.

In 1943, a government dehydration facility was built at 162 Salmon Street, Port Melbourne, and was operated by Kraft Walker. Part of the war effort, it was one of many around Australia, including a facility in Warrnambool.

Kraft Walker built new rural cheese factories and new yeast factories in NSW and Queensland, as demand for their own products increased dramatically. In 1945, a yeast 'Vegemite factory' was built at this Port Melbourne site (demolished 2006). In 1946, Kraft Walker purchased a dehydrator plant from the government and converted it to meat canning with an additional cool room. The land was on a long-term lease from the government.

The public company, Kraft Holdings, formed in 1950, becoming Kraft Foods Limited in 1952. A new Vegemite factory was built the same year. Major additions took place from 1954 to 1957, including a new administration wing (1956), processed cheese factory (1957), large cool store and north-south arterial elevated walkway. These additions, designed by architects Oakley and Parkes, were built around the existing factory which continued to operate. Subsequent additions included the 1960 cool room and loading bay, 1961 garage, 1962 northern factory extension and western covered roadway, and 1967 additions to the administration block by the same architects. Bega Cheese purchased the Vegemite and Kraft brands in 2017.

Former Kraft Factory Key Periods of Development

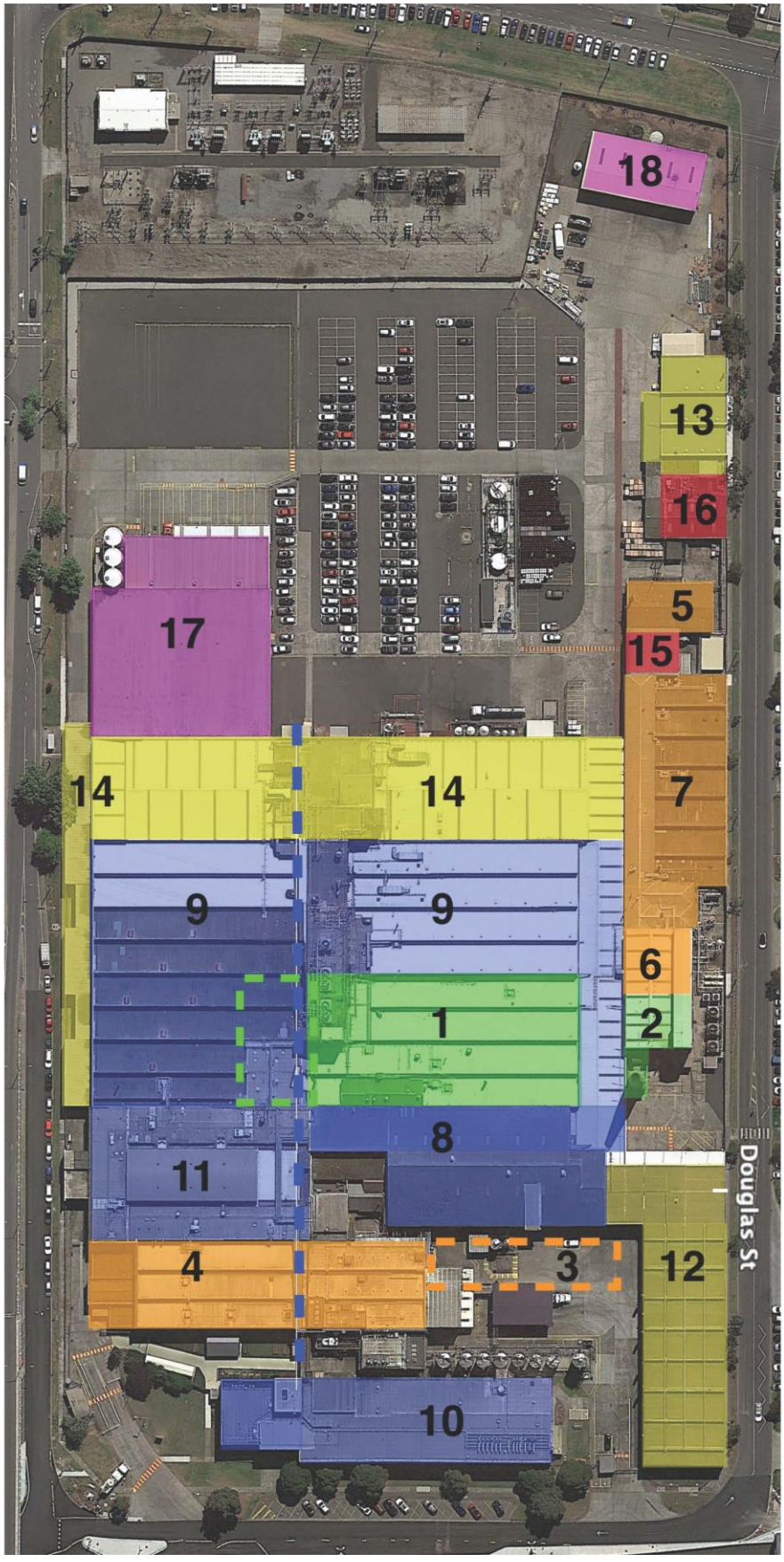

Figure 3: Diagram showing existing buildings coloured by development period and numbered with a key on next page

Establishment Periods: 1943 (Green); 1945-1952 (Orange)

1. 1943 Dehydration facility, converted to meat canning in 1946 (partial demolition is shown dashed)
2. 1943 Boiler and chimney, part of the dehydration complex (1967 chimney extended)
3. 1945-47 Yeast and yeast product factory, known as 'Vegemite B' (demolished in 2006)
4. 1952 Yeast and Vegemite factory, known as 'Vegemite A' (asbestos cement roof replaced by 2000)
5. 1951-52 Compressor building
6. 1951-54 Expansion of boiler house
7. 1951-52 Workshop building (now part of the Pilot Plant and Maintenance Building)

Major Additions after it Became Company Headquarters 1954-57 (Blue)

8. c1956 Cool store
9. 1957 Production area with three-storey concrete cheese production block
10. 1956 Administration block (1967 first floor additions)
11. 1957 Amenities including cafeteria
12. c1956 and 1962 north-south Arterial elevated walkway (alignment is shown dashed)

Early 1960s Expansion Yellow

12. 1959-60 New cool room and loading bay
13. 1961 New garage
14. 1962 Northern factory extension and western covered roadway

Late 1960s Red

15. Pre-1969 Infill between workshops and compressor building
16. Pre-1969 Garage extension to the south

1970s And Later Pink

17. Pre-1979 Despatch building
18. Post-1979 Shed.

HISTORICAL CONTEXT

Early History of the Kraft Company In Australia

Kraft was established in the USA in 1903, with the first batch of Kraft canned cheese shipped in 1916. Fred Walker and Co. was established in Australia in 1908, and shipped canned butter to Asia. The company also began producing 'Red Feather' canned cheese, with Bonox introduced to the product line after World War 1, and Vegemite and canned meats following in the 1920s.

In 1925, Walker travelled to the US to investigate the successful Kraft processed cheese product. He obtained licensing rights to manufacture it in Australia, forming the Kraft Walker Cheese Company. Production started at Maffra Street, South Melbourne in 1926, with Vegemite and Bonox produced at Albert Park, and canned meats in Dandenong. In 1928, they were consolidated at Riverside Avenue, South Melbourne. However, with increasing demand for products, the new factory was soon outgrown, and production was expanded to five other metropolitan sites. After World War II, the company planned to consolidate all of its activities on a new, larger site (Kraft Food Ltd, 1957, p.7; Kraft, 1976).

Wartime Production on Port Melbourne Site

During WWII, dehydration of food for allied fighting forces in the Southwest Pacific was one of the biggest projects carried out by the Commonwealth Department of Commerce and by Commonwealth Food Control. Dehydrated vegetables retained much of their vitamin content and gave great savings in weight and space required for shipping. The dried vegetables were packed in cans for shipment (Mellor, 1958, p.599). By 1943, the Allied Works Council had been given the responsibility for building the factories required for this new industry. The Fishermans Bend factory was one of initial thirteen dehydration plants planned around Australia in 1943 (Allied Works Council,1943, pp. 71 and 73).

The Fishermans Bend plant was the biggest in Victoria. Another large plant was planned at Dandenong. The remaining plants were to be located close to various vegetable growing areas. In 1943, an existing factory in Fitzroy was drying carrots; potatoes were dehydrated at the new factory in Maffra Street. New factories were planned at Colac, Ballarat, Bairnsdale and Warrnambool, and an existing fruit drying factory was to be used at Irymple. There were five plants operating in NSW, with two more nearly ready. Tasmania had three plants operating and two new plants about to commence operation (*The Age*, 9 September 1943:2; *Canberra Times*, 9 September 1943:3; *Herald*, 30 October 1943:7). Eventually, thirty-two wartime dehydration plants were established Australia-wide, twenty-four of which were new factories and the remainder converted fruit drying plants (Mellor, 1958, p.599).

In April 1943, builders Hansen & Yunken were constructing a dehydration facility at Port Melbourne/Fishermans Bend for the Allied Works Council (*The Age*, 20 April 1943:3).

The four buildings at Fishermens Bend were located on a 16,666 sq. yard site. Future expansion was anticipated from the start with appropriately aligned temporary walls. As the Works Council stated, "provision for expansion has been made … because this new industry is expected to play a part in the Commonwealth's post-war economy" (Allied Works Council, 1943, pp. 71 and 73).

Figure 4: The Fishermans Bend dehydration factory interior under construction in 1943 (Allied Works Council, 1943, p.74).

The Fishermans Bend factory building comprised a four-bay sawtooth-roofed structure with Oregon primary and secondary trusses, asbestos-cement roof and steel-framed glazed lights. The east and south walls were in permanent brick construction, and the north and west walls were of temporary timber frames clad with asbestos-cement to allow for future expansion. The asbestos-cement clad east facade had some elaboration at least by the mid-1950s with the Kraft Foods name and white-painted trim (facade no longer extant). The floor was a concrete slab raised above ground level on brick piers to allow vehicle access. Office and staff rooms were created with timber framed walls, while toilets and the vegetable store were walled with rendered brick and terracotta lumber.

The boiler house was of reinforced-concrete frame construction with brick panel walls on the south, east and west. There were timber frames clad with asbestos-cement on the north, to allow for additional boilers in the future. The large dining hall with servery contained a first aid room and change rooms (Allied Works Council, 1943, pp.71 and 73).

Figure 5: Captioned 'a Victorian dehydration factory' this is the Fishermans Bend boiler house under construction in 1943, with the sawtooth roof of the dehydration factory building behind (Allied Works Council, 1943, p.73)

The Fishermans Bend plant was owned by the government but operated by Kraft Walker, who first advertised in October 1943 for women workers for the new "Vegetable Dehydration Factory" (Kraft Foods Ltd, 1957, p.5; *The Age*, 16 October 1943:3). By late September 1943, the plant was drying cabbages and carrots. Amenities for workers were considered "exceptionally good".

They included change rooms with cloaking attendants, hot and cold showers and foot baths, a canteen providing three course meals, and first aid and welfare rooms (*The Age*, 9 September 1943:2; *Canberra Times*, 9 September 1943:3; *Herald*, 30 October 1943:7).

By January 1944, there were 100 employees at the Fishermans Bend factory, with expectations that another 350 would soon be added. The 15 tons of cabbage processed per day was expected to soon increase to 50 (*Weekly Times*, 19 January 1944:6). In June 1944, however, there was a shortage of labour at the dehydrating plant at Fishermans Bend, exacerbated by an oversupply of vegetables. Only one of the two production lines at the new plant was working (*Herald*, 13 June 1944:3; 15 June 1944, p.7). In August 1944, Kraft Walker advertised for 150 more women to work in the "largest dehydration plant in Victoria", to handle an extra 600 tons of potatoes per month (*Army News* (Darwin), 2 August 1944:2). By August 1944, Kraft Walker was also operating the new dehydration factory at Warrnambool for the Commonwealth Government (*Herald*, 12 August 1944:6).

Figure 6: Women removing blemishes from peeled potatoes at the Kraft Walker-operated dehydration plant at Salmon Street, July 1945 (AWM photograph, Acc. No. 111137)

Late-War and Immediate Post-War

The overall output of the Kraft Walker company had increased appreciably because of the war. In November 1945, 67% of its output still went to the services, and the remainder to civilian consumption (*Herald*, 9 November 1945:2).

In November 1945, the company announced a £400,000 expansion programme to cope with the increased demand for its products, and the introduction of new lines. Kraft Walker built new country cheese factories and set up yeast factories in NSW and Queensland. construction of a new factory at Fishermans Bend in brick and asbestos-cement, for the manufacture of yeast and yeast products, was also under way in November 1945. The works cost £15,000, and were undertaken by Hansen and Yunken Pty Ltd. This new factory was expected to put 200 more workers on the payroll in the new year (Kraft Foods Ltd, 1957:5; *The Argus*, 30 October 1945:18; 1 November 1945:18; Sun, 9 November 1945:9; *Weekly Times*, 14 November 1945:31; *Herald*, 9 November 1945:2; AAI, Rec. No.63980). These buildings appear to have been the linear arrangement visible in the December 1945 aerial photograph, at a distance to the south of the dehydration factory (not extant) (figure 7).

Figure 7: Extract of December 1945 aerial show ing, in addition to the main factory and boiler house, tw o new building groups to the south, for yeast and yeast product manufacture (Melbourne and Metropolitan Area Project, Run 22 Frame 58654, December 1945, Landata Aerial Photography)

In 1946 after the end of WWII, the Government's wartime dehydrators around Australia were sold off. Kraft Walker purchased the dehydration factory buildings at Fishermans Bend from the government (*The Age*, 14 October 1946:1; *Weekly Times*, 15 January 1947:13). The factory was converted to meat canning (Kraft Foods Ltd, 1957, p.5). Port Melbourne Council issued a permit to build a concrete meat cool room, to cost of £5000, in November 1946 (AAI, Rec. No.64126). This may be the gable roof visible above the centre of the southern sawtooth bay, in the 1954 and subsequent aerial photographs (figure 8). Permits were issued by council for alterations to the yeast factory (later Vegemite 'B') in 1949 and 1950 (AAI, Rec. Nos.36632, 64437, 68515).

The public company Kraft Holdings Limited, was formed in 1950. It acquired operating ownership of subsidiary Kraft Walker Cheese Company Pty Ltd (Kraft Foods Ltd, 1957, p.5). In January 1952 Kraft Walker Cheese Co Pty Ltd changed its name to Kraft Foods Ltd (*The Age*, 4 January 1952:7).

Figure 8: Extract of a 1954 aerial showing the wartime dehydration factory, the 1945 yeast factory to the south east (Vegemite 'B'), and the three saw tooth bays of the new Vegemite factory. On the northeast the boiler house has been extended and the new workshop building (now part of Pilot Plant and Maintenance building) has been built further to the north (1954 aerial, Landata).

The three-bay sawtooth-roofed Vegemite building (later Vegemite 'A'), complete with loading dock and offices, and was built in 1952 at a cost of £40,000. Walls were in brick and the builder was Hansen & Yunken Pty Ltd (*The Age*, 21 October 1952:4; AAI, Rec. No.64679). This three-bay sawtooth building, to the south of the original wartime sawtooth factory, is visible in a 1954 aerial photograph (figure 8). The detailing of the parapeted west wall of this section, and the ancillary buildings in front are distinct from any other parts of the complex.

In c1951-52, the workshop building (now part of Pilot Plant and Maintenance building) was constructed at a cost of £38,000, and extended at a cost of £20,000 (AAI, Rec. No.64531 and 64530; 1951 and 1954 aerials, Landata). This combined six narrow bays of sawtooth on the east boundary, with a narrow two-storey gabled brick building on the west. The brick building was rendered and detailed with concrete awnings and relief mouldings. The boiler house was extended to the north in the same period (AAI Rec. No.64570 and No.64568; 1951 and 1954 aerials, Landata).

Major Additions 1954-7

In 1953, Kraft Holdings issued debentures to provide funding for the "erection of new premises and installation of additional modern plant", which would permit expansion into new food products. The 16 acres of land on Salmon Street was still at this point held on a long-term lease from the State government (*The Argus*, 24 October 1953:42). Planning for a new factory on this site was completed and construction started by 1954 (Kraft Foods Ltd, 1957, pp.7-8).

The architects for the additions were Oakley, Parkes & Partners, and the builders J.R. and E. Seccull Ltd. The project was undertaken in a series of stages under four main contracts over the three years from 1954. Altogether the cost approached £3m (*Cross-Section*, 1 August 1957, p.1). The new administration wing was occupied by August 1956, while the processed cheese factory was still under construction (*The Argus*, 23 August 1956:19). The official opening was on 19 March 1957.

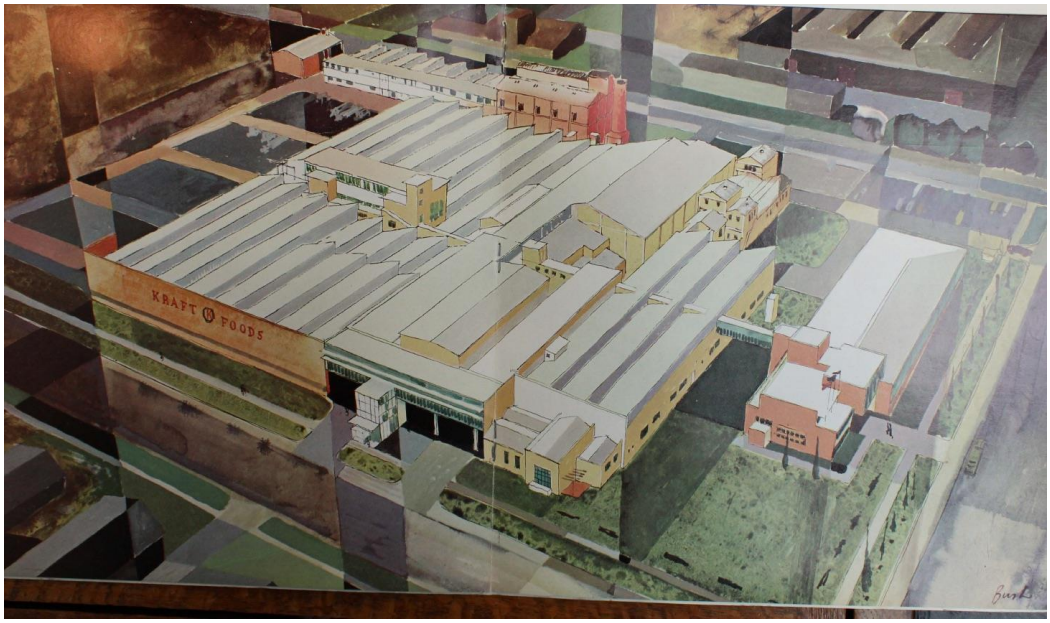

Figure 9: Schematic drawing prepared to show the 1954-57 factory expansion (Kraft 1957)

The schematic illustration of the site for Kraft Walker's 1957 publication (figure 9) shows that all of the buildings up to 1952 were retained bar the western quarter of the 1943 sawtooth factory area, and some ancillary buildings on the footprint of the amenities building. Indeed, the additions were carefully planned to integrate the existing buildings, with very little alteration inside them, so that production could continue unabated (A&A, p.29).

The main planning strategy for circulation of staff in the completed factory was the 500ft "arterial" north-south walkway at first floor and roof truss level. The office block was designed so that a future first floor could be built over the office section to the east of the entrance. Executive offices and meeting rooms were panelled in maple, and a demonstration kitchen was incorporated. The building was of reinforced concrete frame with brick panel walls to sill height. The curtain walling was constructed with steel glazing bars, stainless steel external trim and opaque glass spandrels (A&A, p.29) (figure 10).

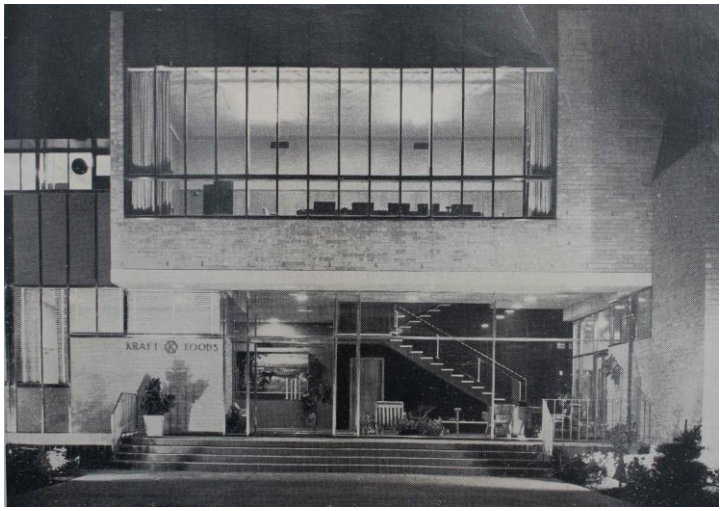

Figure 10: The Administration building entrance in 1957 (Kraft, 1957)

The amenities building (figure 11), and the large gabled cool store to its east, were located between the 1952 Vegemite factory and the 1943 sawtooth factory. The amenities section on the first floor connected to the arterial

walkway, with a cafeteria designed to seat 500, and clerestory lighting on three sides. The building also included a first aid centre, social welfare centre, games room, lounge and library, and an outdoor deck (A&A, p.29).

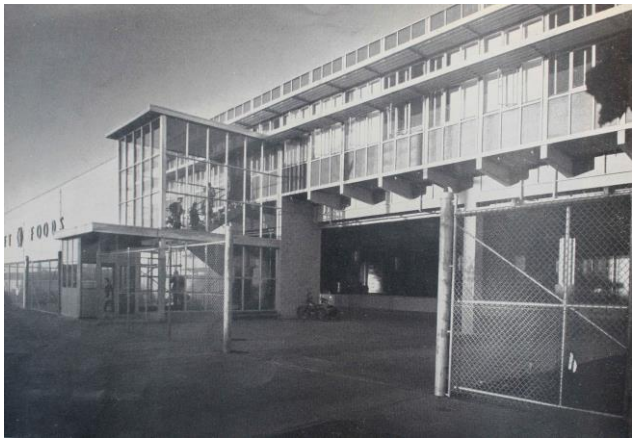

Figure 11: The western front of the amenities building and glazed staircase entrance, 1957 (A&A, March 1957, pp.28-29)

The main production building included the 1943 sawtooth building, combined with extensions to the west and north on the same sawtooth bay pattern. There was a 20ft clear space to the underside of the new steel trusses. One of the older buildings, presumably the 1943 factory building, had its trusses raised from 16ft to the new 20ft standard. The three-storey cheese production block, which was aligned north-south in the centre of the new saw factory building, was constructed in reinforced concrete, with allowance for extension to the north (A&A, p.37). One separate new building in this phase of works was the compressor house, standing to the north of the workshops building (AAI Rec. No.65344).

Figure 12: The west side of the production building with a large expanse of brickwork broken by a continuous strip window, c1957. This was soon to be obscured by the 1961-62 addition of a covered loading area (SLV, Acc. No. a42751)

Later Developments

In September 1959, work began on a new coolroom on the southeast corner of the site (figure 13). Designed by Kraft engineers and Oakley & Parkes architects, the building consisted of four rooms, each with a ceiling height of 23 feet, and a cheese capacity of 800 tons. The stores provided for fork-lift

operations and large-drum storage. A large loading bay at the north end connected the coolroom to the existing building. The structure was a steel frame and the external infill was in brick. The stores were in operation by March 1960 (Kraftsman, June-July 1960). A new "No.2" boiler was installed in the same year (Kraftsman, October-November 1960).

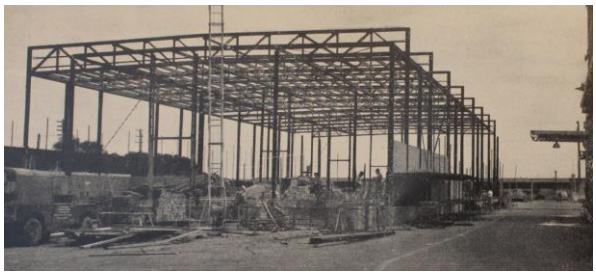

Figure 13: Cool room under construction in 1959-60, view from the north (Kraftsman, June-July 1960)

During the war years, the company had only a few sales vans, relying on contractors for cartage. After the war, the company decided it would be less vulnerable with its own fleet. The first garage to service the fleet was established at the South Melbourne factory, and an initial garage (not extant) constructed for the move to Fishermans Bend. The latter was soon inadequate, and the resulting new garage (now Storage) (figure 14) built in 1960-61, was fully equipped with the latest technologies, designed to handle the 80 vehicles of many types operated by Kraft Port Melbourne. The article on the new garage in the Kraftsman stated, "the company could safely claim that [it] is the finest in Australia" (Kraftsman, October-November 1960; December-January 1960-61).

Figure 14: The newly completed garage at the northeast corner of the site, 1961 (Kraftsman, December-January 1960-61)

In mid-1962, an L-shape extension was added to the west and north walls of the factory. On the north the brick, steel, reinforced concrete and asbestos-cement addition housed additional space for the "raw materials store, production area and finished goods" (figure 15). The two-storied central section also added 90ft. to the central walkway. The west side extension was a covered roadway which protected finished goods from the weather during loading (figure 16). The long and tall stretch of cream brick wall was separated horizontally by a continuous strip of window, visible in the c1957 photo (figure 12), was altered and obscured by this covered roadway addition (Kraftsman, June-July 1961; June-July 1962).

Figure 15: The 1962 northern extension (Kraftsman, June-July 1962)

Figure 16: The new covered way on the west side, 1962 (Kraftsman, June-July 1962)

By April 1967, work had commenced on additions to the administration block, consisting of a second storey over the east wing. The architects were, once again, Oakley and Parkes and Partners (Kraftsman, April-May 1967) (figure 17). In 1973, the General Office and Export staff moved to new accommodation in Melbourne's CBD (Kraftsman, August September 1973). Three other additions in the late 1960s were the increasing of the height of the boiler house chimney, the extension of the garage to the south, and infill of the space between the workshops and the compressor building (now all part of the Pilot Plant and Maintenance) (1966 and 1969 aerials, Landata).

Figure 17: The administration block in 1976, with first storey additions complete (Kraft, 1976)

In the 1970s, a large square dispatch building with steel deck roof was constructed on the northwest corner of the main production building. A 1979 aerial indicates that this was also extended with a skillion to the north (1979 aerial, Landata). The asbestos-cement roofing of the 1943 and 1952 factories and Vegemite 'A' building, was replaced in stages up to the present. An open sided shed was added at the northeast corner of the site by the same date (Google Earth historical imagery). The 1945 yeast factory (Vegemite 'B') building was removed in 2006 (Google Earth historical imagery).

Kraft foods split into the Kraft Foods Company and Mondelez in 2012. Bega Cheese purchased the Vegemite and Kraft brands from Mondelez in 2017.

SITE DESCRIPTION

Site Layout

The significant development of the Kraft factory occurred continuously over a period of 24 years; from the dehydration plant and boiler built in 1943, to the addition of a second storey to the administration building in 1967. In the initial phase of building to 1952, buildings including the former dehydration plant (later meat cannery), the boiler house and chimney, the yeast factory (Vegemite 'B') and the Vegemite factory (Vegemite 'A'), which were spread around the southern/central part of the site. In the building phase from 1954 to 1957, when the company made the site their headquarters, these structures were absorbed into a much larger building mass, with the administration wing standing separately at the main address to the south.

From 1957 onwards, additions either increased the main factory building mass, or were placed independently on the site. Those additions increasing the main building mass were the 1962 covered way on the west side, and the 1962 northern extensions. Standing relatively independently were the 1959 new cool store and the 1961 garage.

Facing Vegemite Way, the administration block is reinforced concrete framed construction with cream brick infill, now painted grey on the more prominent facades (figures 18 and 19). The laboratories are located at the east end of the administration block. The various front facades are curtain walls with sections of brickwork in the massing around the entrance. The curtain walls have steel frames with opaque glass spandrels and stainless-steel trim on the exterior of the framing. Windows on the west wall have been altered.

Figures 18 and 19: The entry and part of the two-storey Administration building as seen from Vegemite Way. (H Lardner, 10/07/2018).

To the east of the administration building is the 1959-1960 cool store with steel portal frame and unpainted brick infill to external walls (figures 20 and 21). Decorative protruding bricks mark the southern frontage and the alternate bay dividers project above the roof line.

Figures 20 and 21: The 1959-1960 cool store as seen from the Douglas Street boundary and from the northwest. (H Lardner, 10/07/2018; P Mills, 4/11/20)

Heading north from the administration wing is a pedestrian walkway spine at first floor and roof level, which extends to the northern end of the main factory mass. The first building encountered is the 1952 yeast factory (Vegemite 'A'), which has three sawtooth bays with a steel structure and parapeted brick external walls. An arrangement of smaller single storey volumes, originally offices, flank the west wall of this building (figure 22).

Figures 22: The 1952 yeast/Vegemite factory, including a single storey section as seen from Salmon Street, which is now used for archive storage. The elevated walkway is on the right (H Lardner, 10/07/2018)

Figures 23: The south and east elevations of the coolroom (P Mills, 4/11/2020)

Next along the walkway are the amenities block on the west, and the large gabled coolroom on the east. The coolroom is concrete framed with brick infill, and has corrugated roof cladding (figure 23). The amenities block is constructed with reinforced concrete to first floor and steel frame above. The west wall of the amenities building originally matched the curtain walls of the administration block, with two layers of horizontal aluminium-slat sun-screening (figure 11). The spandrel glass at top and bottom has been covered with painted ribbed steel. The original fully glazed staircase giving access to Salmon Street (figure 24), was partially obscured by the later addition of a segment of brick wall as part of the 1962 covered way works.

Figures 24 and 25: Original fabric is evident in the amenities block, despite 1960s alterations. External view from the north and interior from the east (H Lardner, 10/07/2018; P Mills, 4/11/2020)

Further north along the walkway spine is the main production area under a series of eight sawtooth bays. The sawtooth structure here is primarily steel, but the southeast quarter retains timber primary and secondary trusses from the original 1943 factory building. It appears that this section of timber roof structure was lifted to match the height of the new sawtooth structure in c1956. Standing up out of the north-centre of this sawtooth expanse is a three-storey structure in reinforced concrete, originally a cheese plant.

The west wall of the sawtooth factory area was originally a vast expanse of brickwork covering up the sawtooth ends, with a continuous strip window at ground floor sill level, and a large logo on the wall above. This was covered up by the 1962 covered-way addition, which presents a series of segments of cream brick wall right on the boundary to Salmon Street (figures 26 and 27). The north wall similarly was a large expanse of cream brick that was concealed by the 1962 additions.


Figures 26 and 27: The west wall to Salmon Street, and looking north through the covered way (H Lardner, 10/07/2018; P Mills, 4/11/2020)

Further to the north again is the 1962 extension that expanded the main production area floor, with east-west gable roofs, steel structure and with a cream brick wall to the north. The central section was in reinforced concrete, creating a widened extension of the 1950s three-storey cheese plant. The north-south elevated walkway was continued through these extensions. The pre-1979 despatch building addition to the north on the west side, has added a cream brick wall to the west, to match the 1956 alignment.

To the east of the main factory sawtooth expanse is the boiler house in reinforced concrete frame with brick infill, expanded since its origins during the war, as well as the original brick chimney that was extended in height in 1967, with the new work visible in a 1969 aerial photograph (figures 28 and 29) (1969 aerial, Landata).


Figures 28 and 29: The chimney and boiler house as seen from Douglas Street, and the curved flue between boilers and chimney (P Mills, 4/11/2020)

North of the boiler house is the workshop building (now part of the Pilot Plant and Maintenance building). This building has two parts: a narrow two-storey brick section on the west with rendered facade and hipped asbestos-cement roof (figures 30 and 33), which connects to a series of narrow and low sawtooth bays with steel trusses and asbestos-cement roofing and a brick wall on the east to Douglas Street (figure 31). The west facade feature concrete awnings over the entrances and windows and some relief work in the render.

Figures 30 and 31: The west facade of the workshop building from under the covered way, and the sawtooth roof profile of the east facade of the workshop building, as seen from Douglas Street (P Mills, 4/11/2020; H Lardner, 10/07/2018)

Next to the north is an infill between the workshops, and then the compressor building with red brick facade and vertical sheet-metal sun-shading. The next structure, part brick and part asbestos-cement cladding, was originally the compressor building (figure 32). Further north along the east boundary is the 1961 garage, which is steel framed and features a sawtooth roof structure and brick walls. An extension to the south of the garage has a steel portal frame.

Figures 32 and 33: The brick front compressor building at centre with late 1960s infill at right, and the west side of the workshop building (P Mills, 4/11/2020)

INTEGRITY

Intactness: refers to the degree to which a place retains its significant fabric. Intactness should not be confused with condition as a place may be highly intact, but the fabric may be in a very fragile condition.

Integrity: refers to the degree to which the heritage values of the place are still evident and can be understood and appreciated. (*Victorian Heritage Register Criteria and Thresholds Guidelines*, p.4)

The Former Kraft Factory has developed and evolved on this site while continuing as a working factory. This means that the earlier phases have been retained with the exception of the 1945 yeast 'Vegemite factory' that was completely demolished in 2006.

From what is visible from the public realm and in aerial photographs, the site retains evidence of its important stages of development; being the establishment period of 1943 and 1945-1952, and the major

additions after it became the company headquarters in 1954-57. The 1959-1960 coolroom and loading bay is also substantially intact. Fabric associated with the later 1960s onwards is of less significance. Refer to figure 3 that identifies the built fabric from these periods.

Although there have been more recent modifications across the site, the Former Kraft Factory has high integrity. The heritage values can be appreciated and understood particularly in the distinct built forms and characteristic materials of individual buildings. The administration and amenities buildings, with their feature glazing and moderne materials are very different from the utilitarian coolrooms, production buildings, boiler and chimney. The site can be seen from a number of surrounding streets with distinct forms like the boiler and the chimney evident.

Many of the alterations to buildings that are evident from public views are minor, such as the bricking in of window openings, replacement of corrugated asbestos roofs, and the addition of new equipment. However, the 1962 northern factory extension and western covered roadway, have obscured some views to earlier fabric.

An interior inspection showed that the original 1943 dehydration plant was partially demolished (shown dotted in green on figure 3), and the north wall of the plant had also been compromised. The boiler and chimney remain from the 1943 complex with later additions. The integrity of the 1943 dehydration facility is low and comparative analysis (refer to the next section) has demonstrated that more intact examples of wartime dehydration factories remain. A site inspection also revealed that the 1957 production area had undergone modernisation and alteration, and these areas are now obscured by later additions. These buildings are not included in the recommended extent except as a buffer zone to the c1956 coolstore and the 1957 amenities building and cafeteria.

The Administration Block, designed by architects Oakley and Parkes, has a high degree of integrity in terms of its aesthetic values as seen from Vegemite Way, despite the brick infill being painted grey and the 1967 first floor additions. The west wall has diminished aesthetic value because of alterations to the windows.

COMPARATIVE ANALYSIS

The 1950s saw a manufacturing boom in Victoria, with expanding road and rail networks facilitating the decentralisation of industry. The result was many new industries on greenfield sites. Often they were located on arterial roads, such as the development at Dandenong South with International Harvester (1951), H J Heinz (1954) and GMH (1956) along the Princes Highway. Major provincial centres, and land on the urban fringes at places like Thomastown, Braybrook, Bayswater, Cheltenham and Clayton, all experienced significant industrial growth.

In the 1950s, these highly visible sites offered companies the chance to publicly project their modernity through architect-designed, International Style buildings. Architecturally-conceived factory complexes from the United States and Europe were influential. Of the 16 factories identified in the 'Survey of Post-War Built Heritage in Victoria for Heritage Victoria' (Heritage Alliance, 2008), 14 were from the 1950s and 1960s. Only one of these is on the Victorian Heritage Register: the ETA Factory at Braybrook (VHR H1916). This factory was by architectural partnership Grounds, Romberg and Boyd, and attributed to Frederick Romberg. Designed c1957 and opened in 1962, the complex was particularly significant for the two-storey aluminium curtain wall to the Ballarat Road frontage, which is now partially demolished.

Figure 34: ETA Factory, 254 Ballarat Road, Braybrook (http://vhd.heritagecouncil.vic.gov.au/places/5623)

The three examples in Dandenong South mentioned above, are all individual heritage places in the Heritage Schedule of the Greater Dandenong Planning Scheme, and have Incorporated Plans under Clause 43.01-2. International Harvester (HO56, 1951-2) and Heinz Factory (HO57, 1953-55) are early examples of post-war factory complexes by architects, Hassell & McConnell. GMH Dandenong (HO58, 1956 onwards) is one of the largest 1950s factories, along with the British Nylon Spinners Factory at Bayswater North (1955-1958), both by architects Stephenson & Turner.

The Former Kraft Factory differs from these green fields examples because it is a World War Two factory in the inner suburbs, which underwent extensive expansion in 1954-1957, and then again in the 1960s. The buildings from the 1954-1957 period, when Kraft established their headquarters at the site, were designed by Oakley & Parkes & Partners. Oakley & Parkes had a very successful Australian practice with a diverse range of notable buildings, including Moderne designs for Yule House, Melbourne (1932 with Rae Featherstone) and Kodak House Melbourne (1934-1935).

The most comparable example by Oakley & Parkes is the Spicers & Detmold Factory, Coburg (1940 in collaboration with architects Carleton & Carleton). This individually significant place in the Heritage Overlay of the Moreland Planning Scheme (HO117) is described as 'an interesting example of the Dutch Modernist style as applied to a large industrial complex' (http://vhd.heritagecouncil.vic.gov.au/places/56684) Like Kraft, the architect designed element provides the street frontage but the remainder of the site is composed of other factory buildings. Part of the original facade is obscured by later additions.

Figure 35: Spicers & Detmold Factory, Coburg (Google images, May 2017)

An earlier factory by Oakey & Parkes is the Southern Can Company, 240 Geelong Road Footscray (1937), which also shows the influence of Dutch Modernism. It is an individually significant place in the Maribyrnong Planning Scheme (HO127) (http://vhd.heritagecouncil.vic.gov.au/places/28368)

Figure 36: Southern Can Company, 240 Geelong Road Footscray (Google images, December 2017)

In terms of the architectural significance of the Oakey & Parkes work, the 1954-1957 Kraft buildings are comparable. However, the Former Kraft Factory is also distinguished from the other examples by the legibility of its evolution from 1943 onwards. The Kraft complex demonstrates its historical growth that is linked to the importance of the Kraft brand, including the Australian icon, Vegemite.

Wartime Dehydration Factories

Although the dehydration factory at the Kraft site has low integrity, dehydration factories are important from a historical perspective as a wartime action that also benefitted industry after the war. Dr Peter Mills undertook a comparative analysis to determine whether other wartime dehydration factories survive in Victoria. Six factories were identified and are briefly described below with only the Colac example currently included in the heritage overlay. Although further study and greater heritage protection is required for the other examples, in this context, the remnants of the dehydration factory at Fishermans Bend do not meet the threshold for local significance.

Former Dandenong Dehydration Factory, 29-39 Attenborough Street, South Dandenong, now Tuffmaster carpet factory, was constructed in 1941-1942 (*The Argus*, 13 January 1943:8). The factory was initially operated by Swallows and Ariel Ltd (*Weekly Times*, 26 August 1942:9). It was sold in 1947 to Yarra Falls Ltd. (*The Argus*, 7 May 1947:6). The 10-bay sawtooth main roof (2330sqm) appears to be substantially intact externally along with a broad gabled shed to the west. There is a separate boiler house with pyramidal roof and no chimneys, as well as a small two-storey gabled building that is possibly former offices. Not heritage listed but separate later factory front in heritage study (City of Greater Dandenong, 2003, pp.7-10).

Former Maffra Sugar Factory Dehydration Plant at 1A Sale Road Maffra, now Gippsland Vehicle Collection Motor Museum, was constructed in 1942-1943 (*The Argus*, 19 March 1943:10) and disposed of by the Commonwealth in 1947 (*Weekly Times*, 15 January 1947:13). Used for light industry subsequently (*Herald*, 7 June 1947:9), this example is a long, gabled red-brick building with asbestos-cement roofing and timber trusses internally. It covers approximately 2184sqm with no apparent boiler house or chimney. It is not heritage listed.

The former Ballarat Potato Dehydrating Factory situated at Dodds Lane, Eureka (Ballarat), is now derelict after fire damage in 2015. Built for dehydration of potatoes in 1943 (*The Age*, 20 January 1943:5; *The Argus*, 24 June 1944:5), and operated by the Sunshine Biscuit Co. Pty Ltd (*The Age*, 24 June 1944:2), it was closed in 1946 (*The Argus*, 13 August 1946:20).From 1947 it was used by the Ford Company to manufacture of car parts (*Weekly Times*, 15 January 1947:13; *The Argus*, 4 January 1947:8). It has four sawtooth bays and two large gables with ridge vents, asbestos-cement roof and wall cladding, and a total area of 2000sqm. A separate gable building may have been the boiler house, with the chimney removed. This site is not heritage listed.

Former Warrnambool Dehydration Factory on Pertobe Road, South Warrnambool, is now Tel el Eisa Army Barracks. Construction commenced in 1943 (*Camperdown Chronicle*, 21 September 1943:4). It was opened in August 1944 and operated by Kraft Walker Cheese Company (*The Age*, 9 August 1944:3). Extent similar to the current fabric is clear from a 1948 aerial photograph (1948 aerial, Landata). It was sold in 1947 to Briar Manufactures Ltd (*The Age*, 17 January 1951:6). By 1962 it was used as an Army Training Depot (CAG, 6 September 1962, Issue No.75 p.3178). The factory is four bays of sawtooth roof and a long gable roofed section with all cladding replaced (area 1900sqm). The boiler house and steel chimney are not extant. The c1910s drill hall was relocated to the site, and is listed on the Victorian War Heritage Inventory (Place ID 126138), but the dehydration factory is not mentioned.

Former Colac Onion Dehydration Factory at Rossmoyne Road in Colac West, now operates as a sawmill. Constructed in 1942, it was located in a large onion growing area (Mary Sheehan & Assoc., 2003, Ref. No.163). The factory was sold to the Colac Dairying Co Ltd in 1947 (*Weekly Times* [Melbourne], 15 January 1947:13). Casein production continued until 1975 (Mary Sheehan & Assoc., 2003, Ref. No.163). This factory has five narrow sawtooth bays and five wider sawtooth bays with a wide gable-roofed section (1650 sqm), with walls and roof asbestos-cement cladding. A separate gabled boiler house has a brick chimney. It is included in Heritage Overlay HO163, Colac Otway Shire.

Former Bairnsdale Dehydration Factory on McLeod St in Bairnsdale, is a renovated and possibly used for light industry. It was constructed for an initiative of local growers who formed Bairnsdale Food Products Ltd. to supply wartime government contracts. It opened in June 1944 and was closed by July 1946 (*Gippsland Times*, 17 February 1944:6; *The Age*, 15 June 1944:4; 18 July 1946:8). It was later acquired by Dunlop Rubber Australia Ltd. in 1948 (*The Age*, 27 February 1948:4; *Gippsland Times*, 31 May 1948:4). This factory is aligned with the former railway line. The main building is timber framed and trussed with a gable roof and ridge lantern, 1450sqm in area. It was reclad in 2010. The separate boiler house with pyramidal roof and original cladding survives, but the original chimney was removed. The factory is not heritage listed.

ASSESSMENT AGAINST CRITERIA

✓	CRITERION A Importance to the course or pattern of our cultural or natural history (historical significance).
	CRITERION B Possession of uncommon, rare or endangered aspects of our cultural or natural history (rarity).
	CRITERION C Potential to yield information that will contribute to an understanding of our cultural or natural history (research potential).
✓	CRITERION D Importance in demonstrating the principal characteristics of a class of cultural or natural places or environments (representativeness).
✓	CRITERION E Importance of exhibiting particular aesthetic characteristics (aesthetic significance).
	CRITERION F Importance in demonstrating a high degree of creative or technical achievement at a particular period (technical significance)
	CRITERION G Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. This includes the significance of a place to Indigenous peoples as part of their continuing and developing cultural traditions (social significance).
	CRITERION H Special association with the life or works of a person, or group of persons, of importance in our history (associative significance).

STATEMENT OF SIGNIFICANCE

What is Significant

Part of the Former Kraft Factory (now Bega), 1 Vegemite Way, Port Melbourne, constructed between 1943 and 1967, is significant at the local level. Refer to figure 37 that shows the recommended extent. Buildings numbers provided on figure 3 are included in brackets.

Buildings of Significance Are:

- 1943 Boiler with the 1951-1954 expansion (Numbers 2 and 6 on figure 3)
- 1943 Chimney with the 1967 extension (Number 2 on figure 3)
- 1952 Yeast and Vegemite factory, known as 'Vegemite A' (Number 4 on figure 3)
- 1951-1952 Workshop building (Number 7 on figure 3)
- c1956 Cool store (Number 8 on figure 3)
- 1956 Administration wing with 1967 first floor additions (Number 10 on figure 3)
- c1956 North-south arterial elevated walkway (partly included and shown dashed on figure 3)
- 1957 Amenities including cafeteria (Number 11 on figure 3)

- 1959 New cool room and loading bay (Number 12 on figure 3)

How it is Significant

Part of the Former Kraft Factory, constructed between 1943 and 1967, is of local historic significance to the City of Melbourne. It is a representative example of a post-war food manufacturing plant. Additions after 1954 designed by architects Oakley and Parkes, have aesthetic value.

Why it is Significant

The evolution and consolidation of the Former Kraft Factory between 1943 and 1967, is legible on the site with the exception of the 1945-1947 yeast and yeast product factory, known as 'Vegemite B' (demolished 2006). The company built on its wartime contribution and the earlier successful importation of American products. It continued to function in its existing buildings while expanding, and planned for further growth. This confidence in its future was borne out by Kraft becoming a household name and its food products continuing today. (Criterion A)

The Former Kraft Factory continues to produce the iconic Australian brand Vegemite from this site, including in the 1952 yeast and Vegemite factory known as 'Vegemite A'. The street to its south is 'Vegemite Way', and company signage proudly proclaims it is 'the home of Vegemite'. (Criterion A)

The 1943 vegetable dehydration factory, operated by Kraft Walker, was established as a government wartime action and is of historic significance. It was converted to a meat canning plant in 1946, and subsequent development has left few legible remains apart from the original portions of the boiler and chimney. (Criterion A)

The Former Kraft Factory is representative of a successful post war food manufacturing plant. It retains processing plants, cool rooms, boiler and chimney, administration facilities, staff amenities and other important infrastructure that is distinctive in form and can be appreciated from the public realm. The site's organic growth over time means that these components can be best understood in the southern and western portions of the site, where they are expressed in the extant fabric. (Criterion D)

The factory additions, designed by architects Oakley and Parkes from 1954 -57, strongly show the influence of the International Modern movement favoured by large corporations and multinationals. The use of reinforced concrete frames and curtain wall construction, and cuboid forms with large glazed areas, has aesthetic value. (Criterion E).

RECOMMENDATIONS

Figure 37: The extent recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme as an individually significant place. Note that a buffer of 10m or 5m is recommended from significant buildings shown dotted in yellow, and elsewhere the site boundary forms the extent.

Recommendations for the Schedule to the Heritage Overlay (Clause 43.01) in the Melbourne Planning Scheme:

Melbourne Planning Scheme

EXTERNAL PAINT CONTROLS apply to 1943 Boiler and Chimney, 1956 Administration Block and 1959 Cool Store	Yes
INTERNAL ALTERATION CONTROLS	No
TREE CONTROLS	No
OUTBUILDINGS OR FENCES (Which are not exempt under Clause 43.01-3)	No
TO BE INCLUDED ON THE VICTORIAN HERITAGE REGISTER	No
PROHIBITED USES MAY BE PERMITTED	No
NAME OF INCORPORATED PLAN UNDER CLAUSE 43.01-2	Recommended to be undertaken
ABORIGINAL HERITAGE PLACE	No

REFERENCES

The Age (Melbourne), as cited.

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Allied Works Council, 1945, *Report on the activities of the Allied Works Council for the period July 1, 1943 to February 5, 1945*, Allied Works Council, Melbourne.

Architecture and Arts (*A&A*), March 1957, 'Factory at Port Melbourne'.

The Argus (Melbourne), as cited.

Australian Architectural Index (*AAI*), Miles Lewis, University of Melbourne, as cited.

Border Watch (Mount Gambier S.A.), as cited.

Canberra Times, as cited.

City of Greater Dandenong, 2003, '*City of Greater Dandenong Heritage Study and Heritage Places Vol.2*', City of Greater Dandenong.

Commonwealth of Australia Gazette (CAG), as cited.

Courier (Ballarat), as cited.

Cross Section, as cited.

Dandenong Journal, as cited.

Camperdown Chronicle, as cited.

Gippsland Times (Sale Vic.), as cited.

Herald (Melbourne), as cited.

Kraft, 1957, '*The Kraft Story'*, Kraft Walker Cheese Co., Melbourne.

Kraft, 1976, '*Kraft golden anniversary, 1926-1976: 50 years of fine foods'*, Kraft, Melbourne.

Mary Sheehan & Assoc., 2003, '*Colac Otway Heritage Study Vol.2 Part 1'*, Shire of Colac Otway.

Morning Bulletin (Rockhampton Qld.), as cited.

Victorian Heritage Database (VHD), as cited.

The Kraftsman, Kraft Foods Limited Australia, as cited.

The Sun (Sydney), as cited.

Weekly Times (Melbourne), as cited.

PREVIOUS STUDIES

Southbank and Fishermans Bend Heritage Review 2017	Recommended as a place of local heritage significance

5.4 SEC Substation Citation

SITE NAME	Electricity Substation
STREET ADDRESS	224-236 Salmon Street, Port Melbourne
PROPERTY ID	110592

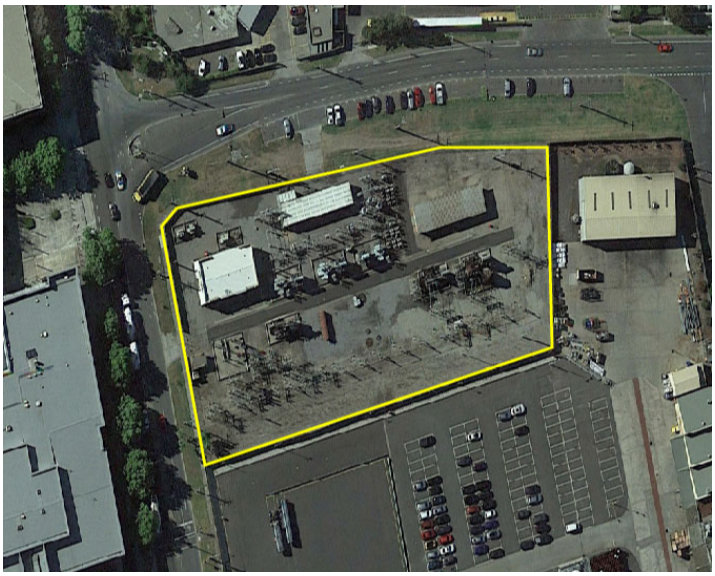


Figure 1: Extent of assessed site shown in yellow

Figure 2: View of the substation from the southwest (H Lardner, 09/07/2018)

Figure 3: View of the substation from the corner of Salmon and Turner Streets (H Lardner, 09/07/2018)

SURVEY DATE: 9 July 2018 SURVEY BY: Helen Lardner with Dr Peter Mills

HERITAGE INVENTORY	No	**HERITAGE OVERLAY**	Proposed
PROPOSED CATEGORY	Local	**PLACE TYPE**	Building
FORMER GRADE	Ungraded		
DESIGNER / ARCHITECT / ARTIST:	The State Electricity Commission of Victoria	**BUILDER:**	The State Electricity Commission of Victoria
DESIGN STYLE:	Interwar Period (c.1919-c.1940)	**DATE OF CREATION / MAJOR CONSTRUCTION:**	c1935, yard increased in 1950s and 1960s

THEMES

HISTORIC THEMES	DOMINANT SUB-THEMES
5. Building Victoria's industries and workforce	5.2 Developing a manufacturing capacity

RECOMMENDATIONS

Recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme as an individually significant place.

Extent of overlay: Part of the site. Refer to figure 13 in the recommendations section of the citation.

SUMMARY

From 1926, power had been supplied to South Melbourne from the Yarraville Terminal Station by overhead cables on high towers. After General Motors Holden (GMH) purchased land for a factory in Fishermans Bend in 1935, government authorities installed services to support the development of an industrial precinct. The State Electricity Commission of Victoria (SEC) supplied power to Fishermans Bend by July 1935, as part of electricity purchased in bulk by the Port Melbourne municipality. The substation was constructed at this time on the route of the overhead cables.

After construction of the Commonwealth Aircraft Factory in 1937, cables were undergrounded because of the new airfield. As the industrial precinct expanded, the yard area of the SEC substation was expanded in the 1950s and then reached the current extent by 1969. The provision of electricity was critical to the development of manufacturing in Fishermans Bend and demonstrates the government commitment to establishing the industrial precinct.

SITE HISTORY

In 1926, the State Electricity Commission of Victoria (SEC) established 22,000-volt cables from the Yarraville Terminal Station to South Melbourne. To cross the Yarra River, cables were stretched between 247ft high steel towers on either side. The cables then travelled above ground past the site of the future SEC substation on Salmon Street, and on to Substation G in South Melbourne (SEC, 1925-26, pp.31-32).

The purchase of land for a factory by General Motors-Holden (GMH) in June 1935, set off moves by various authorities to install services in anticipation of expanding industrial activity. Before GMH's arrival, the Harbour Trust had already constructed new concrete wharfs along the Yarra River (*The Argus*, 6 November 1936, p.1). The Metropolitan Board of Works installed a new main sewer along Salmon Street (*Building*, p.73). Salmon Street itself was constructed as a concrete road jointly by the Victorian Government and the Port Melbourne Council (*Record*, 4 July 1936, p.8). The anticipation was that with the impetus offered by the GMH factory, and provision of infrastructure and services, Fishermans Bend would become the "Birmingham of Australia" (*Record*, 14 November

1936, p.4; 5 December 1936, p.7). At the opening of the GMH factory its Managing Director L.J. Hartnett, thanked "the many public authorities who had helped to move away difficulties" (*Record*, 4 November 1936, p.4).

Figure 4: Oblique aerial from northwest with substation at top left and the GMH factory in forefront, c1936 (Airspy photo, SLV Accession no- H91.160/259)

A July 1935 newspaper article indicates that all electrical facilities had been provided at Fishermans Bend by the State Electricity Commission of Victoria by July 1935 (*Herald*, 30 July 1935, p.4). At this time the electricity for the Port Melbourne municipality was still purchased in bulk from the SEC (SEC, 1936-37, p.9). It appears that the power to GMH was part of this arrangement, as in July 1935 the Metropolitan Electricity Supply department of the Port Melbourne Council advised GMH of the terms under which electricity would be supplied. There was a promise of considerable revenue for the Council from this service (*Record*, 22 June 1935, p.1; 6 July 1935, p.1).

The SEC's 1936-37 Annual Report reveals that five new metropolitan substations were built that year, including one in North Fitzroy which "as usual is designed to fit in with the architectural features of the neighbourhood". The North Fitzroy example had a suburban scale and detailing. It is reasonable to assume that this design strategy had also applied to the Fishermans Bend substation, and that the touch of Moderne design used was adopted in the light of the emerging Moderne headquarters for GMH in Salmon Street (SEC, 1936-37, p.34).

One of the acclaimed aspects of the modernity of the new GMH plant was its use of electricity for illumination of the assembly line for night workers. GMH proudly declared that the electricity required just for this lighting was enough to supply a town of 12,000 people (*The Argus*, 6 November 1936, p.1). The SEC supply at 6,600 volts from the substation went to GMH's own substation on the north side of their site, and then transformers at each major building in the factory complex, reducing the supply to 415 volts (*The Argus*, 6 November 1936, pp.28 and 33; AAI, Rec. No. 63591).

In 1937, with construction of the Commonwealth Aircraft Factory (CAC) to the west of GMH, there was criticism of the overhead powerlines stretching across the middle of the new airfield to the tower for the river crossing (*The Age*, 12 June 1937, p.22). When the first stage of the CAC factory was completed, use of the airfield was still

blocked (*The Argus*, 3 February 1938, p.10; *Age*, 18 June 1938, p.18). The work was done by late 1938, with special underground cable imported from England. The straining tower supporting the wires crossing the Yarra River was moved from the centre of the CAC's property, closer to the river's edge (Herald, 6 October 1938, p.3; Age, 2 November 1938, p.18).

The CAC was followed in 1939 by another factory next door for the Beaufort Division of the Department of Aircraft Production (later Government Aircraft Factory). In an article in *The Age* on the State's electricity resources, the electrification of the aircraft factories at Fishermans Bend was cited as an example of the increasing "penetration of industry by electricity as a motive power" (*The Age*, 15 June 1939, p.12).

By the 1950s, the yard area of the SEC substation had been increased in size (Pratt Airspy, 1956). By the late 1960s, the yard had expanded to the full extent of the property (figure 6: 1969 aerial photograph). The substation is still operational.

Figure 5: 1956 oblique aerial from southeast (Pratt Airspy photo, 1956, SLV Acc. No. H2008.32/7)

Figure 6: 1969 Aerial (State Aerial Survey Melbourne-Camberwell Project Run 1, 17 December 1969, Central Plan Office Victoria)

SITE DESCRIPTION

The substation is located on the south east corner of Salmon and Turner Streets in Port Melbourne. The 1935 building faces Salmon Street and is situated behind a tall paling fence. The switch yard appears to be a more recent installation. There is a c1960s cream brick building along Turner Street.

The 1935 rectangular building is articulated with corner pillars with recessed bays between them. The bays have steel-framed, strip highlight windows. Decoration of the rendered building is in low-relief, including dentils to the corner pillar parapets, and pilasters in the recessed bays on the long sides and a low plinth. There is a roller door facing Salmon Street and a timber door on the south elevation.

The symmetry, division into vertical bays, large plain surfaces and stripped back use of classical elements, such as pilasters, plinth and dentils, are indicators of the Interwar Stripped Classical style.

Figure 7: View from southeast on Salmon Street (H Lardner, 09/07/2018)

INTEGRITY

Intactness: refers to the degree to which a place retains its significant fabric. Intactness should not be confused with condition as a place may be highly intact, but the fabric may be in a very fragile condition.

Integrity: refers to the degree to which the heritage values of the place are still evident and can be understood and appreciated. (*Victorian Heritage Register Criteria and Thresholds Guidelines*, p.4)

The 1935 building appears substantially intact from the exterior and retains a high degree of integrity. The render has been painted and appeared darker in the c1936 aerial (figure 4). It is likely that the substation was originally face brickwork, but closer inspection would be required to confirm this. This aerial at figure 5 also shows that the building originally had a small yard around it with a water tower on the southern side. The water tower has been

removed. The switch yard has been extended to both the south and the east and appears to be a more recent installation.

COMPARATIVE ANALYSIS

The State Electricity Commission (SEC) of Victoria was established in 1921, and was responsible for the generation, transmission and distribution of electricity in Victoria. The Commission ceased operations in the early 1990s. Prior to the SEC, private companies had begun supplying electric light and power. The *1896 Electric Power and Light Act* allowed local councils to act as Municipal Electricity Undertakings (MEUs), managing electricity distribution and retailing to their ratepayers. The City of Melbourne was the first MEU in 1897.

A thematic group of five electricity substations in Southbank, originally operated by the Melbourne Electric Supply Company Ltd, is proposed for inclusion in the Heritage Overlay of the Melbourne Planning Scheme in the *Southbank and Fishermans Bend Heritage Review 2017* (Biosis, 2017). Of these, the substation at 79 Fawkner Street (c1900) is a simple form that has now been modified. The substation at 99A Sturt Street (c1920s) is a small rendered brick pavilion structure with a gambrel roof and louvred lantern. Also from the mid-1920s, substations at 33 Hancock Street and 181 Sturt Street are small, red brick with gabled ends and some decorative brick detailing. The substation at 7 Moray Street is a moderne-style rectangular red brick building with a rendered upper band and brick parapet detailing. The pitched roof is evident behind the parapet.

Figure 8: City of Melbourne's 1925 Substation at 7 Moray Street, Southbank (Google imagery, October 18, 2016)

There is a number of c1940 pavilion-style substations designed for parkland locations by the Melbourne City Council Architects Branch, which are included in the Heritage Overlay. These include 4 Lansdowne Street in East Melbourne (illustrated below) and others in Powlett Reserve, Royal Park, Yarra Park and the Domain. Although these examples are quite different in appearance, they demonstrate that an architectural aesthetic was being applied to substations at this time in Melbourne.

Figure 9: City of Melbourne's c1940 pavilion-style Substation 5 at 2-4 Lansdowne Street, East Melbourne (City of Melbourne i-Heritage database)

The SEC's 1936-37 Annual Report states that a new substation in North Fitzroy "as usual is designed to fit in with the architectural features of the neighbourhood". The substation at 193 McKean Street in North Fitzroy is an Interwar Stripped Classical design. It appears similar to the Salmon Street, Port Melbourne example with corner pillars and the same parapet detailing, however, this building has face brickwork with decorative banding and a central window facing the street. It has been doubled in size but is part of the North Fitzroy Precinct (HO327) in the Yarra Planning Scheme.

Figure 10: The SEC substation at 193 McKean Street, Fitzroy North (Google image, August 2017)

Another SEC substation from a similar period is 64 Brunswick Road, Brunswick in City of Moreland (HO276). While this substation has a steep pitched central gable roof and stucco finish, its corner articulation and proportions are similar. There is a comparable plinth and roller door facing the street. The decorations around the door are in low relief but there is a heavy cornice element wrapping around the sides of the building to the corner pillars.

Figure 11: The SEC substation at 64 Brunswick Road, Brunswick (Google image, October 2017)

In the 1936-37 SEC Annual Report, comments were made about fitting in with the architectural features of the neighbourhood. The substation at 224 Salmon Street, Port Melbourne can be seen in the context of the early development of Fishermans Bend, including the GMH site opposite. The corner pillars reflect the treatment of buildings on the GMH site, including the very decorative Australian Headquarters and Victorian Administration buildings, and also seen on Plant 1 behind them (refer to image below).

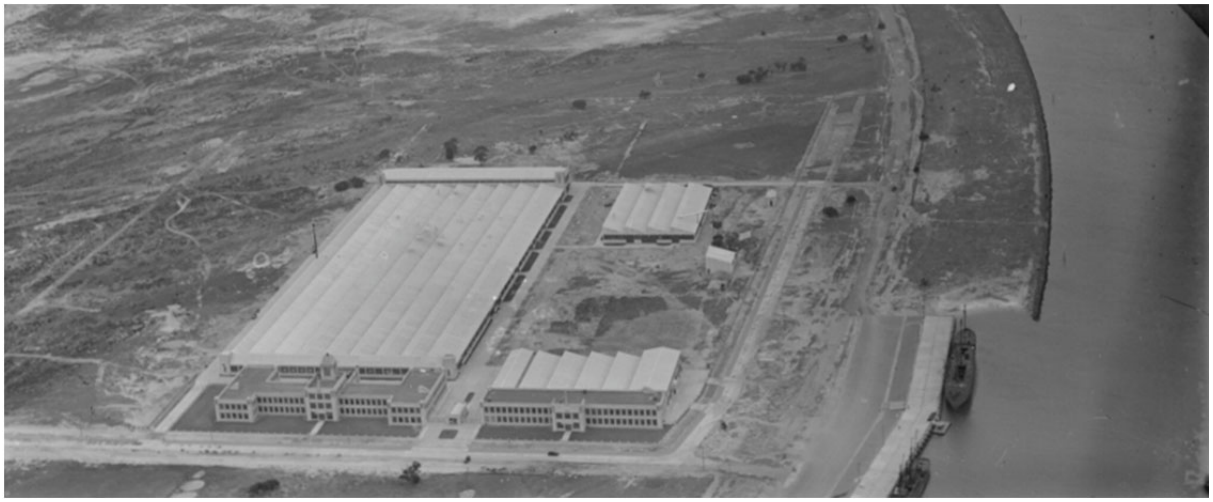


Figure 12: The GMH buildings facing Salmon Street near the substation in c1936 (Oblique aerial Pratt SLV Accession no. H91.160:258)

ASSESSMENT AGAINST CRITERIA

✓	**CRITERION A** Importance to the course or pattern of our cultural or natural history (historical significance).
	CRITERION B Possession of uncommon rare or endangered aspects of our cultural or natural history (rarity).

	CRITERION C Potential to yield information that will contribute to an understanding of our cultural or natural history (research potential).
	CRITERION D Importance in demonstrating the principal characteristics of a class of cultural or natural places or environments (representativeness).
✓	**CRITERION E** Importance of exhibiting particular aesthetic characteristics (aesthetic significance).
	CRITERION F Importance in demonstrating a high degree of creative or technical achievement at a particular period (technical significance)
	CRITERION G Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. This includes the significance of a place to Indigenous peoples as part of their continuing and developing cultural traditions (social significance).
	CRITERION H Special association with the life or works of a person, or group of persons, of importance in our history (associative significance).

STATEMENT OF SIGNIFICANCE

WHAT IS SIGNIFICANT

The 1935 substation building at 224 Salmon Street, Port Melbourne is significant at a local level.

HOW IT IS SIGNIFICANT

The 1935 substation building is of historic and aesthetic significance to the City of Melbourne.

WHY IT IS SIGNIFICANT

Construction of the 1935 SEC substation was a government initiative to facilitate development of an industrial precinct at Fishermans Bend. Along with the establishment of the GMH site on Salmon Street, it was an early building and provided electricity for major manufacturers, like GMH, the Commonwealth Aircraft Corporation, the Government Aircraft Factory and others that quickly followed. These industries made an important contribution during World War II, and contributed to Victoria becoming Australia's primary manufacturing state. The substation's location, form and scale demonstrate its central role in distributing power to the Fishermans Bend industrial precinct. (Criterion A)

The Interwar Stripped Classical style of the 1935 SEC substation is evident in features such as its symmetry, division into vertical bays, large plain surfaces and stripped back use of classical elements such as pilasters, plinth and dentils. The substation is of aesthetic significance, reflecting the prevailing application of architectural styles to functional buildings generally and the aesthetic of the newly established GMH complex in particular. (Criterion E)

RECOMMENDATIONS

The extent shown in red (figure 13) is recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme, as an individually significant place. It incorporates the property boundaries to the north and west of the building, the edge of the roadway to the south and an eastern extent that is 5 metres beyond the main wall of the building.

Figure 13: The recommended extent for inclusion in the Heritage Overlay in the Melbourne Planning Scheme.

MELBOURNE PLANNING SCHEME

EXTERNAL PAINT CONTROLS	No
INTERNAL ALTERATION CONTROLS	No
TREE CONTROLS	No
OUTBUILDINGS OR FENCES (Which are not exempt under Clause 43.01-3)	No
TO BE INCLUDED ON THE VICTORIAN HERITAGE REGISTER	No
PROHIBITED USES MAY BE PERMITTED	No
NAME OF INCORPORATED PLAN UNDER CLAUSE 43.01-2	-
ABORIGINAL HERITAGE PLACE	No

REFERENCES

The Age (Melbourne), as cited.

The Argus (Melbourne), as cited.

Building: the magazine for the architect, builder, property owner and merchant (Building), 12 October 1936, 'The Melbourne Plant for General Motors Holden's Ltd.'

Herald (Melbourne), as cited.

Record (Emerald Hill), as cited.

State Electricity Commission of Victoria (SEC) Annual Reports, as cited.

PREVIOUS STUDIES

Southbank and Fishermans Bend Heritage Review 2017	Recommended as a place of local heritage significance

5.5 GMH Complex Citation

SITE NAME	Former GMH Complex, Fishermans Bend
STREET ADDRESS	241 (part), 251-259 and 261 Salmon Streets; part of Bayside Avenue and part of Central Boulevard, Port Melbourne
PROPERTY ID	110509, 110593, 110594

Figure 1: Extent of assessed site shown in yellow

Figures 2 and 3: The Social Centre and Plant 3 (H Lardner, 20/04/2018)

SURVEY DATE: 18 April 2018		SURVEY BY: Helen Lardner, HLCD with Dr Peter Mills	
HERITAGE INVENTORY	No	**HERITAGE OVERLAY**	Proposed
PROPOSED CATEGORY	State	**PLACE TYPE**	Industrial complex
FORMER GRADE	Ungraded		
DESIGNER / ARCHITECT / ARTIST:	Local GMH staff Stephenson & Turner for 1964 Technical Centre	**BUILDER:**	Various
DESIGN STYLE:	Interwar Period (c1919-c1940), Post-war Period (c1945-1965)	**DATES OF CREATION / MAJOR CONSTRUCTION:**	1936-1969

THEMES

	HISTORIC THEMES	DOMINANT SUB-THEMES
	5. Building Victoria's industries and workforce	5.2 Developing a manufacturing capacity
	3. Connecting Victorians by transport and communications	3.4 Linking Victorians by road in the 20th century

RECOMMENDATIONS

Recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme as an individually significant place.
Recommended for nomination to the Victorian Heritage Register.
Extent of overlay: Part of the site. Refer to figure 38 in the recommendations section of the citation.

SUMMARY

The Australian government encouraged car manufacturing following WW1. From 1925, Fishermans Bend had been identified for future industrial development. General Motors Holden (also known a General Motors Holden's; GMH) took up the first 50 acre site in 1935, pioneering growth in the area.

GMH was established in 1931 after the American General Motors Corporation took over the South Australian firm, Holden's Motor Body Builders. The manager of Vauxhall in England, Laurence Hartnett, came to run the company. Opened by the Prime Minister on 5 November 1936, the 1936-1938 establishment of GMH was on a 12 acre site fronting Salmon Street, divided into three equal plots by two internal roadways (now Bayside Avenue and Central Boulevard), and a central north-south roadway. Local GMH staff designed the complex, which was laid out with a structural grid to accommodate future factories. Constructed were the stream lined moderne Australian Headquarters and Victorian Administration Building, with NASCO spare parts warehouse to the rear (warehouse demolished), Plant 1 (demolished) and Plant 2 (demolished). Industrial buildings featured carefully designed bolted steel trusses and vertical steel sliding doors.

During WWII, the GMH site made an important contribution to Australia's self-sufficiency through the manufacturing of engines. Plant 3 (1943) was constructed to provide additional toolroom and machine shop capacity, and was regarded as exemplars. Fishermans Bend became a hub for industry, employment and the war effort. The company nurtured in-house skills, and constructed a full-scale foundry with the engineering development and experimental capacity that enabled production of an all-Australian car. The expansion continued the design vision of GMH local staff, including the rational grid and the optimal structural steel system into Plant 3 (the Engine Plant) and Plant 4 (the first section of the Old Foundry – now demolished). The 1945 Social Centre was built in a streamlined moderne style. Following the War, Plant 5 was built (1948 section), mirroring Plant 3 around the Social Centre. Plant 3 became the 'Experimental Engineering Department', machine shop production in Plant 5 and Plant 4 were extended (now demolished). The Prime Minister unveiled the first Holden car in November 1948 in a ceremony outside the Social Centre, which was a focus for many company events throughout its history. GMH and the Holden car became iconic in Australia.

In late 1956, in response to Australia's rapid growth in car ownership in the 1950s, a new GMH plant was established at Dandenong. The Fishermans Bend complex focused on the development and output of engines and mechanical parts. Plant 5 was extended to the west, and the medical centre in the northwest corner of Plant 3 was extended and altered. Buildings from this period that have been demolished include Plant 6 and the new power house.

In the mid-1960s, Holden retained its leadership in the car market with one in every three cars on the road, but the Holden engine was no longer innovative. Design and styling of cars was also gaining importance. By 1964, design and development was under way for the Australian V8 engine to be manufactured at Fishermans Bend. The Technical Centre, designed by the leading architectural firm of Stephenson and Turner in the Late Twentieth Century International style, was opened by the Prime Minister in 1964. The adjoining Plant 3, which had been the first manifestation of a Technical Centre post-war, was then considered part of the Technical Centre and was extended to the south with a corridor and new masonry test cells for engine performance. The all-Australian built engine was designed in the Fishermans Bend Technical Centre. Plant 10 (1963 - the 6 cylinder 'Red Engine' plant), and Plant 16 (1969 -the V8 Engine plant) were constructed on a slightly larger grid. Both buildings currently have demolition permits. From the 1970s, globalisation and the rise of fuel efficient small cars, impacted on GMH's dominance in the market. The site continued operation for a period of 80 years as the Australian headquarters of GMH, until progressive decommissioning in the last decade.

GMH Complex Key Periods of Development

Figure 4: Diagram showing existing buildings coloured by development period with GMH system numbers. Buildings that have been removed are shown dashed

1936-38 First factory

1939-45 Wartime additions

1946-48 Early post-war and the Holden

1950s Expansion

1960s Expansion

1970s – 2018

HISTORICAL CONTEXT

1936-38 - Fishermans Bend Complex Established

Contextual History

At the outset of the twentieth century, motor vehicles were either imported into Australia complete, or chassis were imported and fitted with Australian-made bodies. Holden and Frost's saddlery in Adelaide started a motor vehicle trimming department in 1910. H.J. Holden of Holden and Frost started building bodies in 1914 (Darwin, p.3). Meanwhile in the USA, 1908, General Motors Corporation (GM) was formed by the amalgamation of the Buick Motor Corporation and the Olds Motor Works. The GM Export Company then established a branch in Sydney in 1912 (GMH, 2008, p.12).Ford opened its first Australian branch in 1909, importing fully assembled cars (Wilkins & Hill).

The Australian government's banning of importation of car bodies in 1916, in order to preserve foreign exchange, and because there was a severe shortage of shipping, provided the first impetus towards complete car manufacture in Australia (GMH, 1946, p.8; *GMH People*, December 1963, p.14). Among the first firms who took up this opportunity was Holden and Frost. In 1917, they built 99 car bodies for Dodge and Buick chassis (GMH, 2008, p.12; Darwin, p.3).

The ban on foreign car bodies was lifted in 1918, but pre-war tariffs on bodies and panels were doubled as an incentive for local assembly of cars and production of bodies. In the early 1920s, protection was extended to chassis and other parts to encourage companies to establish manufacturing operations in Australia (GMH, 1946, p.7). In 1919, H.J. Holden formed the new company Holden's Motor Body Builders. In 1920, it became Holden's Motor Body Builders Ltd (Darwin, p.3).

In 1923, General Motors decided that they wished to use Holden's as their sole body supplier in Australia. On the basis of this potential, Holden's built an advanced new body-manufacturing plant at Woodville in South Australia, which opened in 1924. This plant was soon producing 17,000 bodies a year for GM and Dodge, undercutting the prices of Ford. GM in turn began to use Holden's as its sole body supplier in Australia (GMH, 2008, p.12; Darwin, p.3). General Motors (Australia) Pty Ltd was incorporated in 1926, and assembly plants using Australian made bodies and imported chassis, were established in each of the five mainland Australian states in the 1920s (GMH, 1946, p.7).

Automotive tariff rates were increased again in 1926 and 1929. By 1930, Chrysler, Ford and International Harvester had established assembly plants to build vehicles on imported chassis with local bodies and other parts (*GMH People*, December 1963, p.14). Ford was the first international company to establish a headquarters and centralized body-manufacturing plant with an accompanying assembly plant, with construction starting in 1925. The first Model A rolled out of this plant at Norlane, Geelong, in 1928 (Easdown, p.36).

General Motors made its counter-move in 1931, when it took over Holden's Motor Body Builders Limited, which was struggling under Depression conditions, to form General Motors - Holden's (GMH). The manager of Vauxhall in England, Laurence Hartnett, was sent out to turn the company around. The GMH office and assembly line were located in City Road, South Melbourne.

Site History and Extant Buildings

Planning for an industrial area at Fishermans Bend

The large area of vacant Crown land at Fishermans Bend was singled out in the Melbourne Metropolitan Town Planning Commission's (MTPC's) first report in 1925 as "having a very important bearing on the future development of the Metropolis". The Commission drew up plans for industrial, harbour and residential development of the 900 acres available, with 420 acres to be devoted to industrial uses (MTPC, 1925, p.46).

The first candidate for establishing new industry at Fishermans Bend was the Vacuum Oil Company in 1931, but the company withdrew (*The Age*, 26 June 1935, p.9). GMH stepped into the breech. Their 50-acre site was approved by Cabinet in June 1935. It was hoped that with the lead of GMH, Melbourne, and the Fishermans Bend industrial area would soon become the "Coventry or Detroit of Australia" (*The Age*, 26 June 1935, p.9).

By the mid-1930s, an increasing proportion of vehicle parts were being produced in Australia, but attempts to produce full cars had only been undertaken by individuals or under-capitalized companies, and had failed (*The Argus*, 17 January 1936, p.15). Mr Hartnett made it clear that GMH's plans for the Fishermans Bend site took into consideration the eventual manufacture of an all-Australian motor car (*The Age*, 26 June 1935, p.9; *Dandenong Journal*, 18 July 1935, p.14).

Development of the GMH Site

Within GMH a "Construction Department and a New Equipment Section" was formed and, with a few exceptions, the local staff of GMH produced the whole of the plans and specifications for the buildings, equipment and services (*Building*, 12 October 1936, p.54). A 1973 oral history account indicates that the architect was Eric Gibson, "a GMH employee working … in the Mechanical Manufacturing Section of the Manufacturing Department", and that Gibson designed the Pagewood plant that opened in 1940 (SLSA, BRG 213/73/4/Vol5/1).

Site work began in early 1936 (*The Age*, 21 January 1936, p.5). The builders were The Reinforced Concrete and Monier Pipe Construction Co. Pty Ltd. The Premier, Mr Dunstan, poured the first concrete in March 1936 (*Table Talk*, 12 March 1936, p.43). By 4 September 1936, the assembly chain at the old headquarters in South Melbourne stopped and was to start up at Fishermans Bend within ten days. The spare parts department had already been transferred, and the office was soon to follow (*The Age*, 21 January 1936, p.5).

The complex was officially opened on 5 November 1936, by the Prime Minister Mr Lyons (*The Argus*, 5 November 1936, p.10). Mr Hartnett described the factory at the opening as "a contribution to the advancement of factory building technique in Australia which might help others to emulate or build upon" (*The Argus*, 6 November 1936, p.1).

Site Planning

The new works included an assembly plant (Plant No.1), spare parts warehouse, commercial motor-body (truck body) building plant (Plant No.2) and two Administration Buildings, one housing the general headquarters of the company in Australia and the other, which backed onto the spare parts warehouse, accommodated the Victorian sales-service department.

The two office buildings were situated to face Salmon Street, and the whole site was divided into three equal sections on a long axis by two internal roadways "as the main arteries for communication for traffic and services to the three building plots". A further central northsouth roadway gave access to Lorimer Street and the wharves (*Building*, 12 October 1936, p.56).

Over 80 different designs were considered for the factory structure, before the choice was made for a sawtooth roof with lattice girder spans of 50 feet carrying roof trusses 40 feet in span. Much of the remaining site was subdivided into blocks that measured 50 feet east to west, by 40 feet north to south, establishing a standard column spacing for future buildings (*Building*, 12 October 1936, p.56).

The factory building in which the cars were assembled, Plant No.1, covered 7½ acres. The company claimed it was the largest single storey building in Australia (*The Argus*, 6 November 1936, pp.20-21). All of the steel structure was bolted together, a detail that the company claimed was superior to and cheaper than the riveted connections in earlier factories, such as at Ford in Geelong. The roof trusses were designed to carry an equipment loading of 6 tons, with a clear height from the floor of 18 ft. The bottom chords were doubled angles slightly set apart, to facilitate attachment of services and equipment. 'Fibrolite' corrugated asbestos-cement was used for roof and wall cladding, due to rapid deterioration of galvanised iron in this coastal locality. External treatment of the factory followed the "general architectural lines" of the office buildings, with the horizontality of the walls broken by masonry pylons at the corners. Numerous vertical sliding steel doors gave unimpeded access from the streets to the interior (*Building*, 12 October 1936, pp.77-83). All of these features were to be adopted in the design of Plants No.3 and No.5.

1936 Headquarters Building and NASCO Administration Building

The architectural arrangement of the Salmon Street frontage was described in *Building* magazine as "a building façade over 640ft in length, broken only by the gateways separating the Gatehouse from the two larger buildings. … The horizontality of the long frontage has been restrained from undue emphasis by the pylon treatment at each salient corner of the buildings and by the vertical lines of the intervening fluted piers running from the ground line to the cornice under the parapets. This effect is further accentuated by the additional storey height of the central front wing of the Administration Building, surmounted by a handsome tower rising to a height of 88 feet above the pavement" (*Building*, 12 October 1936, pp.73-5).

The Headquarters was a back-to-back ''E'' shape in plan, and was constructed in beam and slab reinforced concrete, with a trafficable flat concrete roof. The final stepped section of the tower featured neon lighting in a Moderne pattern (*Building*, 12 October 1936, pp.73-5). The NASCO Administration Building on the other side of the gatehouse was similar in external treatment, but was a simple rectangle in plan, two storeys only, and at the back butted straight into the more utilitarian NASCO warehouse building behind.

Figure 5: The tower of the Headquarters Building, featuring neon tubing, 1936 (*Building*, 12 October 1936, p.54)

1939-45 - Wartime Expansion and Production

Contextual History

In the inter-war years, Australia's plan for arming the military forces relied on maintaining a nucleus of government factories versed in the techniques of making armaments, and secondly, in having the capacity to instruct commercial industry in those techniques so that they could step into production quickly in response to an emergency. During the inter-war years however, commercial industry was "too immature" for the second part of the plan to be developed (Mellor, pp.27-29). Australia's production was predominately primary industry, and many types of manufacture had never been attempted.

As war loomed in the late 1930s, the managing director of GMH, L.J Hartnett, offered portions of the company's plant to the government for armaments manufacture. During a visit by the Prime Minister to GMH's Woodville South Australian plant in December 1938, Hartnett pointed out the toolroom as "the centre where the highest skill and mechanical brains were applied" (*The Argus*, 16 December 1938, p.2). As Woodville was a manufacturing plant producing pressed metal components for car bodies, it already had a well-developed toolroom, unlike the Fishermans Bend plant, which was largely an assembly plant at this stage. In the early war years, manufacturers were recognising the importance of well-developed toolrooms for the war effort. Die Casters Ltd, who supplied parts to the automotive body-building industry, had been planning for the eventuality of war since the mid-1930s, and entered the war with "an excellently equipped toolroom, manned by a highly experienced technical staff and tool-making engineers", ready to "swing behind the war effort" (*The Age*, 13 November 1940:7). In 1941, the Chairman of BHP announced the building of a new toolroom at the Newcastle steelworks "to look after the ever-increasing quantity of precision work for defence needs" (*The Argus*, 30 August 1941, p.2).

As war developed, the more difficult production tasks, especially those where Australia had no previous manufacturing experience, were undertaken by the larger and more capable manufacturers, including the automotive industry, as coordinating contractors. Historian of wartime industry, D.P. Mellor, commented that "without its automotive industry Australia would not have been able to build aircraft on the scale attained at the height of the war." He singled out the contribution of GMH. "Early in the development of the war it was found that [their] spacious, well-equipped factories and organising and engineering experience could be used for the production of important aircraft components" (Mellor, p.394).

GMH undertook a wide variety of munitions manufacture at its various plants throughout Australia, including engines, guns, major airframe assemblies, small marine vessels, shell and bomb cases, and motor vehicle

bodies of many types. New buildings for these purposes, to a total of 335,000 sq. ft., were added to GMH plants, mainly at Fishermans Bend and Woodford, South Australia (GMH, 1946, pp.3 and 11).

Production of the three engines manufactured during the war by GMH, the Gypsy Major Aero engine, the Gray Marine Diesel and the naval torpedo engine, was based at the Fishermans Bend plant, with the company also managing a vast array of subcontractors around the country. Engines were particularly challenging because neither government munitions factories nor commercial industry in Australia had any experience. In several cases GMH had to start from little more than sets of drawings from overseas. There were short times between orders and production, and often short production runs. Specialised tools and machinery were often unavailable, and it was necessary to manufacture new production machinery, or adapt existing machinery and tools (GMH, 1946, pp.3 and 11).

Much of the area surrounding the GMH plant at Fishermans Bend became part of a large precinct of wartime manufacture, including the new plants for the Beaufort Division of the Department of Aircraft Production, the Commonwealth Aircraft Corporation, and the government dehydration plant on the later site of the Kraft factory.

Site History and Extant Buildings

The first engine to be built at the GMH factory at Fishermans Bend during the war, was the Gypsy Major aero engine (GMH, 1946, p.12). De Havilland Moth aircraft were used for training Australian aircrew but engines had become unavailable from overseas. In October 1939, the Commonwealth Government ordered 500 Gypsy Major aero engines from GMH (GMH, 1946, p.129). Almost the entire engine was manufactured in Australia, using 85 subcontractors in three states. This called for high precision tooling, elaborate metrology and metallurgical testing (*The Age*, 22 October 1940, p.6; GMH, 1946, p.11). GMH delivered the 1000th Gypsy Major engine in 1943 (GMH, 1946 p.139). The manufacture of parts and assembly of the engine was located in Plant No.1, as was the new Metrology section (*GMH People*, February 1956, p.10).

Two buildings were constructed for the two subsequent engine projects allocated to GMH, of which one is extant, Plant No.3 (see below). The other was the 1943 Foundry (first stage of Plant No.4, demolished), which was set apart in the southwest corner of the site, and produced castings for the Gray Marine Diesel (GMH, 1946, p.11). The Social Centre/cafeteria was built in 1945 (see below).

1943 Plant No.3

The second engine to be produced by GMH at Fishermans Bend was the naval torpedo engine, again a first for Australia. Mellor wrote that "General Motors-Holdens Ltd, with their experience in the manufacture of aeroplane engines, were sufficiently confident of their engineering techniques to undertake the manufacture of torpedo engines" (Mellor, p.289).

The first step in production of the torpedo engine was the construction of a new building at Fishermans Bend, Plant No.3. This building was designed to provide tooling and machine shop capacity for the fabrication, assembly and testing of those torpedo engine components unobtainable from GMH's subcontractors. It also provided an area for engineering development and experimental work (GMH, 1946, pp.11 and 158-63).

Preparation for manufacturing this engine may have started in late 1942, indicated by advertising for a machine shop superintendent to develop and supervise a new toolroom at the Melbourne factory (*The Age*, 5 October 1942:6).

A 1973 oral history account indicates that a GMH employee designed Plant No.3 and later Plant No.5 (SLSA, BRG213/73/4/Vol5/1). Plant No.3 was completed within six months and considered by the company to be "one of the most modern in Australia" (GMH ,1946, pp.11 and 158-63). As soon as it was completed, the Toolroom was moved there from Plant No.1 (*GMH People*, December, 1956 p.10).

Plant No.3, and its machine room, was used as an exemplar in a 1945 Department of Labour and National Service Industrial Welfare Division bulletin on factory planning. The salient features were "wide clear passageways, well defined by painted lines, warm wooden floors, light painted machinery, good natural and artificial light, and unit heaters …" (Deptartment of Labour & Nat. Service, figures 1, 7 and 23).

The same structural grid that had been established for the 1936 plant buildings was followed in the new Plant No.3, and the steel structure, shown in January 1943 drawings by steel fabricators Johns & Waygood Ltd., appears to have followed the 1936 design (S&T, date, H2018.14.119). The facade treatment of Plant No.3 to Salmon Road was also very similar to that of Plant No.1, including masonry pylon elements on the corners. There was a formal pedestrian entrance to Plant No.3 at the centre of the main east front (*Pointers*, December 1946, photograph p.335). As on Plant No.1, there was a separate roof over the east facade between the corner pylons, sloping down to the east and hiding the sawtooth roofs behind. This roof appears to be intact.

Figure 6: c1944 oblique aerial photo showing Plant No.3 on the left and the wartime foundry at a distance behind (GMH, 1946, p.15).

The third wartime engine project to be allocated to GMH was the Gray Marine Diesel, in July 1943. This American-designed engine was in demand for small craft for island warfare in the South West Pacific, but sufficient engines could not be obtained overseas because of high demand by the Allied Forces. The machine shop in Plant No.3 produced the major engine components including cylinder heads, cylinder blocks, crankshafts and camshafts, and assembled the engines onsite (GMH, 1946, pp.147-48).

Plans of the arrangement of the machine room and tool room in Plant No.3, during the war, have not been found. The offices were ranged a bit less than a bay deep on either side of the main entrance on the east, and were accessed by a centrally loaded north-south corridor. This arrangement could still be seen on c1953 plans of Plant No.3 (S&T, H2018.14.119). The location of the engineering drawing room in Plant No.3 during the war is unknown, but it is likely that it was in the southeast corner of the building, where it was

located after the war and into the 1950s. This location had abundant light from the south wall and the sawtooth above. A 1944 photograph also indicates that this was a likely location (see below).

Figure 7: Engineering Department drawing area, c1944 (PR Division GMH, 1944, Vol.4, p.33 overleaf)

1945 photos of the machine room indicated a large open production area. Wooden floors over concrete extended throughout the plant, not just within the toolroom (Department. of Labour & Nat. Service, figures 1, 7 and 23). The machine shop was equipped with its own metrology and gauge rooms. A torpedo engine-testing tank, originally destined for Singapore, was also installed in the plant (Mellor, p.289).

Figure 8: The machine room in plant No.3 in 1945, looking west (Deptartment of Labour & Nat. Service, figure 23)

Plant No.3 included the first stage of the "GMH Hospital" at the northwest corner, with a First Aid room under the supervision of a District Superintendent of the St John's Ambulance Brigade (*Pointers*, November 1944, p.327; February 1945, cover). This facility was entered from a porch on the northern wall of Plant No.3. The existence of separate and equal male and female waiting and rest rooms and toilets in a c1943 plan is indicative of the many women workers in the plant during the war. This original part of the Hospital (it was extended outside the main boundary of Plant No.3 in 1953) retains many intact internal elements, including the curved walls of the first-stage entry, ceilings and cornices, terrazzo skirtings and a foot-bath (SLSA, BRG 213/73/11/28)

Plant No.3 and the new foundry (part of Plant No.4) were later judged by GMH to be "crucial to the war effort". In addition, the skills gained set the scene for the production of the all-Australian car (GMH, 2008, p.15).

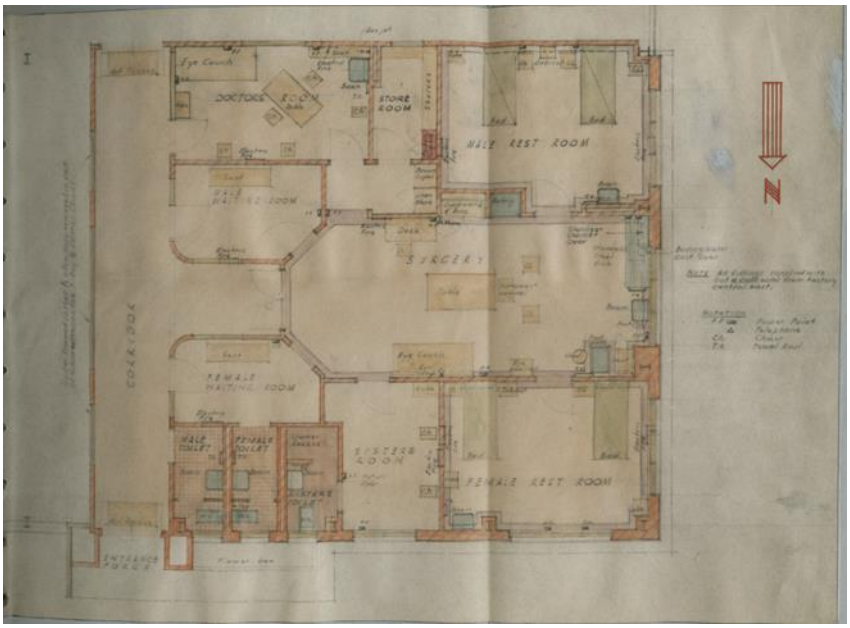


Figure 9: Hospital facilities, northwest corner of Plant No.3, c1943 (SLSA, BRG 213/73/11/28)

1945 Social Centre/Cafeteria

A social centre for Fishermans Bend had been planned for when the land was first taken up in 1935, but the war had delayed it (*Pointers*, January 1946, p.9). Up to 1945, a section of one of the plants, probably Plant No.1, was partitioned off to create a cafeteria (*Pointers*, November 1945, p.293). Similarly, various events such as Christmas parties, concerts and boxing matches were held inside Plant No.1 (*Pointers*, February 1945, p.30; March 1945, p.52; May 1945, p.111).

There was a precedent for the Fishermans Bend Social centre at the company's new plant built at Pagewood (Sydney) in 1940. This was a building of similar scale and materials to that later designed for Fishermans Bend. It had a similar Moderne tower element, but this was located part way along the length of the hall (*Pointers*, February 1940, p.138).

The Social Centre at Fishermans Bend was under construction before the end of the war, in May 1945 (*Pointers*, May 1945). The builders were Messrs. Doig, Reid and Bryan, and it appears that the architects were again in-house (*Pointers,* January 1946, p.12). The murals on either side of the canteen servery and stage above were designed and executed by Miss Robertson of the company's own Public Relations Department (*Pointers,* November 1945, p.293). Eileen Robertson studied at the Firbank Church of England Girls Grammar School in Brighton (*The Age*, 28 August 1934, p.4). She won the Melbourne National Gallery travelling scholarship in 1933, and went to England and the continent, studying at the Royal Academy Art School. She was appointed to GMH's Public Relations Division in early 1944 (*Pointers*, March 1944, p.248; *The Age*, 24 May 1933, p.9; *Table Talk*, 11 May 1933, p.5).

The National Trust suggests that the futurist panel was carried out in the style of American industrial designer Norman Bel Geddes (National Trust Australia Victoria, 2007, GMH Administration Buildings and Social Centre, VHD). Geddes had been commissioned by General Motors to produce an exhibit at the 1939 World's Fair in New York. Labelled 'Futurama', it featured a futuristic city linked by automated freeways

weaving between layered and curvaceous skyscrapers. An image of the Social Centre mural was used on the cover of the September 1951 issue of the company magazine *Pointers*, in which the 25th anniversary of the founding of General Motors (Australia) was commemorated (*Pointers*, November 1951, front cover).

The Social Centre was opened on 30 November 1945, by Mr Hartnett, who stated that visits to overseas plants had influenced the inclusion of the "best and latest" in the cafeteria. He described the servery in assembly line terms. "Each 'race' at the servery would take 10-12 persons per minute. With four races working that meant the café could serve 48 persons per minute" (*Pointers*, January 1946, p.9).

The centre quickly became the locus of a number of activities in addition to its role of feeding the workers. Father Christmas visited children of workers at the new canteen in December 1945, and similar Christmas parties would be held here for decades (*The Age*, 17 December 1945, p.4; *Pointers*, January 1947, p.398). A "Plant Social Club" had operated since the establishment of the factory in 1936, but in September 1946, this was expanded to include the NASCO staff and renamed the GMH Sports and Social Club. The new centre was expected to contribute to the success of the expanded club (*Pointers*, October 1946, p.288). The opening also coincided with the establishment of the Geno Foremen's Club, which was given its own room upstairs (*Pointers*, October 1946, p.302; November 1946, p.337).

Job advertisements in the newspapers presented the centre as an incentive for prospective employees, alongside the tennis courts and putting green (*The Argus*, 13 September 1947, p.6). References to 'social centres' for factories begin to appear in newspapers in the 1940s, a movement that may have been accelerated by the prevalence of women in factories during the war. A 1945 article on improving conditions in the industrial work force in Victoria, especially for women, used as an example of a rope factory where amenities for workers were centralised in a 'social welfare centre'. With similar facilities and uses to the GMH building, for several years it was used as an exemplar (*The Australasian*, 18 August 1945, pp.7-8).

The centre was open to all GMH employees, who could hire it in the evenings (*The Age*, 17 December 1945, p.4). An early take-up of this offer was by the GMH sub-branch of the Returned Sailors' Soldiers' Airmen's Imperial League of Australia (RSSAILA), the precursor to the RSL, which started holding annual dances in the centre from 1946 (*Pointers*, May 1946, p.112; October 1946, pp.301 and 289). They held their sixteenth annual ball there in 1962 (*GMH People*, September 1962, p.19).

The centre had an important official function as a locus for VIP visits and ceremonies for launches and openings. When the Duke and Duchess of Gloucester visited in 1946, they were "particularly interested in the Social Centre … where they met long-service members of the staff representing the various departments" (*Pointers*, December 1946, p.350). When the Holden car was unveiled to 1000 guests in November 1948, it was mounted on a revolving stage in the hall. "The heroine of the afternoon, the sleek, shining Holden, made her debut to strains of soft piano music from behind dramatically opened curtains" (*The Argus*, 30 November 1948, pp.3 and 9). The social centre was used as part of inspections of the factory by Victorian Holden dealers and featured in public tours of the site (*Pointers,* November/December 1953, p.6; *GMH People,* July 1954).

From the 1960s, it became known as the 'staff cafeteria'. The scale of the factory had increased greatly by this time, and new canteens/cafeterias had been built for the factory workers, first in Plant No.6 and later on the far side of Plant No.10. 'Staff' here referred to the upper echelons of workers, such as in the Technical Centre. The stratification of blue- and white-collar workers was a well-understood feature of the organisation of the site (*GMH People*, June 1965, p.3).

The Social Centre underwent a refurbishment in 1996. In 1998, a time capsule was placed under a plaque in front of the Social Centre by Prime Minister John Howard, on the occasion of the fiftieth anniversary of the FJ Holden. In 2009 it was renamed 'JC's Café', in recognition of long-standing employee John Connell.

1946-1948 - The First Holden Car

Contextual History

Government encouragement for an all-Australian car had started before World War II, culminating in the 1939 Bounty Bill, which gave incentives for Australian manufacture of engines and chassis, and the Motor Vehicle Agreement Act of 1940. When war intervened, automotive plants became part of Australia's munitions production (Darwin p.135; *GMH People*, December 1963, p.14).

In 1943 and 1944, GMH management undertook studies of the various aspects of the production of an all-Australian car. At the same time, Hartnett began discussions with the Secondary Industries Commission and government heads on how to translate the capacity gained during the war into production of an all-Australian car (Darwin, p.137). While this project was going on, by May 1946, the Fishermans Bend plant had returned to the assembly of passenger cars and commercial vehicles as had been occurring before the war (*Pointers*, May 1946, p.102).

Toward the end of 1944, the Commonwealth Government invited companies to submit proposals for local production of a complete car. GMH was the first to respond, submitting their plan to the Secondary Industries Commission in January 1945. A GMH team commenced work with GM in Detroit, with plans to come to Australia in October 1946. Manufacture was to be concentrated at Fishermans Bend, with a new manufacturing plant and mechanised foundry for grey-iron castings. The new facilities in Plant No. 3 for the Engineering and Production Engineering Department would include Toolroom, General Experimental area and Laboratory facilities. This entailed rehabilitation of the plant from Defence production. An enlarged workforce was engaged and trained on the new machines and in new techniques. Sheet metal pressings of bodies and chassis were to be done in an extended and modernised plant at Woodville, South Australia. £750,000 was to be spent at Woodville and £1,157,000 at Fishermans Bend (*Pointers*, May 1946, p.110; *Labor Call*, 25 June 1948, p.4; *GMH People*, February 1956, p.2). Cars were to be assembled in all the state capitals.

Site History and Extant Buildings

Despite austerity restrictions associated with WWII, by May 1946, approval had already been given for £150,000 of urgent building extensions at Fishermans Bend (*Pointers*, May 1946, pp. 99 and 110). Two new building additions were planned. In July 1946, General Manager Mr Hartnett poured the first concrete in the piers for the new Plant No.5, where the Australian engine would be built. "[The employees] were seized with the importance of the occasion which marked a milestone in the progress of the motor industry in Australia" (*Pointers*, August 1946, p.196).

First production was scheduled for April 1948 (Wright, p.48). At the official opening in November 1948, the Prime Minister Mr Chifley unveiled the first Holden in front of over 1000 guests (*Gippsland Times*, 16 Sept 1948, p.5). The manufacture of the six-cylinder engine, later colloquially known as the 'Grey Engine', commenced at this point (GMH, 2008, p.176). Plant No.5 would later come to be known as the 'Grey Engine Plant'. By January 1949, Holdens were being produced at the rate of 10 per day (*GMH People*, December 1967, p.4).

The main extant new building from this phase was the first stage of Plant No.5 (see below). Plant No.3 became the 'Experimental Engineering Department' (see below). The demolished buildings from this phase include the 1948 extensions to Plant No.4, and the (Old) Grey Iron Foundry (GMH, 1948, p.4).

1948 Plant No.5 first stage

Plant No.5 was a new sawtooth-roofed plant with the same structure and grid as Plant No.3, and an area of 126,000 sq. ft. Its machine shop produced finished engine components, which were then assembled in its engine assembly area (GMH,1948, pp.6). Plant No. 5 also included a Heat Treatment Section (*GM World*, December 1948, p.10). The plant cost £1,200,000 to build and equip, and was considered "to be as modern as any automotive plant in the world" (*GM World*, July 1948, p.8). At this stage Plant No.5 extended to the west the same distance as Plant Nov.

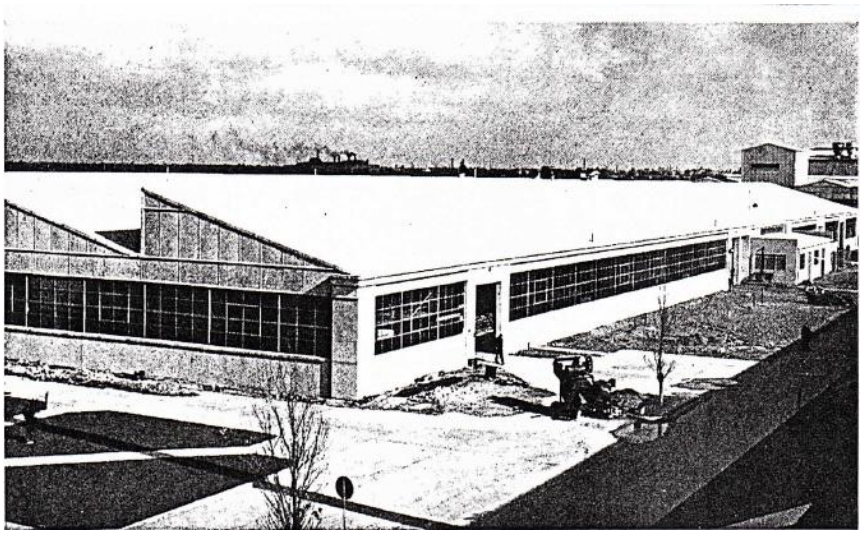


Figure 10: Plant No.5 from the northeast, 1948, with foundry behind (*GM World*, July 1948, p.2)

1945-52 Plant No.3

Soon after the war, Plant No.3 was converted to housing the Engineering and Inspection Departments and Laboratory (GMH, 1948, p.10). The toolroom that had served production of the torpedo engine and Gray Marine diesel during the war, now engaged in setting up machine shop production in Plant No.5. As evidence of the toolroom's involvement in the production engineering of the new car, in late 1946 a jig borer machine arrived at Fishermans Bend and was located in Plant No.3 where it would "enable [the toolroom] to produce tooling of an accuracy which will permit the manufacturing division to economically produce components for the engine" (*Pointers*, January 1947, p.387; June 1947, p.142). There was also a "Central Laboratory" already established in Plant No.1, a separate entity that appears to have been related to testing regimes for the Manufacturing Department (*GMH People*, January 1949; GMH, 1960, p.9).

By 1949, the new car was in production. The typical role of the toolroom from this time is described in a 1956 GMH publication:

> *Toolroom's function is to make and maintain the jigs and fixtures, tools and gauges used in the manufacture of Holden components and, in conjunction with the pattern shop, to produce and maintain Foundry patterns, core boxes and drier plates, also to try all this tooling before it is released to production (GMH People*, December 1956, p.11).

Alongside the toolroom, Plant No. 3 housed the Engineering Department, which developed new products. GMH saw this department in Plant No.3 as the first manifestation of a 'Technical Centre'. 'Technical Centres' became a feature of the American automotive industry organization early in the post-war period. An article in a 1945 issue of GMH's magazine *Pointers* featured planning for a General Motors "Technical Centre" just outside Detroit. The Modernist design included separate buildings for the "Styling Section", "Advanced Engineering", "Research Laboratories" and "Process Development" (*Pointers*, December 1945, p.336). Before the war, these departments had been spread throughout the American organisation, with various divisions having their own product research and engineering departments, and a central research laboratory (*Pointers*, January 1946, p.2).

The General Motors Vice-President described the new centralised approach, "the Technical Centre – a place where research, styling, advanced product study and process development can be brought together in one location, a place where each period of a long-time development can be considered separately" (*Pointers*, December 1945, p.336).

In 1945, GMH was already gathering staff for its own Technical Centre at its headquarters in Fishermans Bend, with a similar array of departments (*Pointers*, December 1945, p.336). The Engineering Department in Plant No.3 made an important contribution to the production of the first all-Australian car and was well established in Plant No.3 by 1951. "Established to make possible Holden production in Australia, the most fully equipped and staffed Engineering Department in the Australian automotive industry occupies the 100,968 sq. ft. Plant 3 at Fishermans Bend" (*Pointers*, November 1951, p.12; GMH, 1960, p.10).

Figure 11: Oblique aerial photograph, early 1948 (*Pointers*, March 1948, p.16-17)

The 1950s - GMH Expansion, the New Plant at Dandenong, and Fishermans Bend Changes its Role

Contextual History

In 1950, the majority of cars sold in Australia were still imported from Britain (Davison, p.16). But from this point, the Australian industry enjoyed a high rate of expansion. Demand for Holdens exceeded supply – with waiting lists of 3 years (Davison, p.36). Sales in 1948 were 112, in 1949 7,725, in 1950 21,113, and in 1951 25,177. By 1955, sales were 63,800 (*GMH People*, December 1967, p.4).

By the mid-1950s, Melbourne had a population of 1.4 million. It was the most industrialised city in Australia with half of the workforce employed in manufacturing. From the early twentieth century Melbourne already had an established pattern of suburban development, but in the post-war period it sprawled unrestrained into low-density dormitory suburbs far from the city centre and beyond the existing railway lines. As Buxton et al describe, "planning for an extended road system, coupled with new outer suburbs of detached houses served by car dependent shopping malls, and the relocation of industry from the central city and inner suburbs, would come to define Melbourne. This quickly changed the expanding city into one of the world's most car-based places." (Buxton et al, pp.18-21).

Within this context, the large car manufacturers thrived, and cars rapidly became more affordable. In 1953, one in five Australians owned a car, but by 1962, it was one in three. "Throughout this period Australians remained, next to Americans and Canadians, the most automobilised people on earth. The one car family and the family car were becoming the norm". As demand was satisfied, the manufacturers were forced to compete for the consumers' attention. With American-based models rather than British now taking the majority of sales, the stage was set for the enduring Holden-Ford rivalry (Davison, pp.15-16).

By 1951, GMH's manufacturing operations at Fishermans Bend included all grey iron casting, machining, and production and assembly of Holden engines and mechanical components (*GMH People*, October 1951). In November 1952, an £11 million Australia-wide expansion programme was announced, with enlargement of the Melbourne, Sydney and Adelaide plants (Wright, 1998, p.78). A 1953 article on the rise of the Australian car industry described the GMH's achievement at Fishermans Bend. "…the GMH works at Fishermens Bend are now in their fashion probably the most striking example of manufacturing technology in Australia. The ranks of machine tools … are unsurpassed by anything of their kind in the world. This 'new Australia' with its tremendous accretion of modern precision equipment, with its notices in three languages to its cosmopolitan labour force, is indeed an industrial nation which could not have been envisaged a generation ago" *(Mail* [Adelaide[, 9 May 1953, p.15).

In mid-1954, GMH announced planning for a new assembly plant and expanded spare parts section at a 153-acre greenfield site at Dandenong, along with new buildings at Fishermans Bend, Woodville in South Australia and Pagewood, NSW (*GMH People*, August 1954, pp.6-7). Architects Stephenson and Turner became the house architects for GMH from c1947 on (SLSA, BRG213/73/4/Vol5/1). Like the Fishermans Bend industrial area before it, GMH's lead provided the impetus for other large manufacturers to make the move to outer metropolitan industrial areas (Davison, pp.82-3). The Dandenong assembly line started up in late 1956. Fishermans Bend now had extra space to devote to an increase in the output of engines and mechanical parts. By 1958, GMH's capacity had been raised from 72,000 to 100,000 Holdens a year (*GMH People*, May 1958, p.1).

Site History and Extant Buildings

The 1951 expansion plan allowed for an increase in the floor area of buildings at Fishermans Bend from 833,322 sq. ft. to 1,118,672 sq. ft. The mechanised foundry (Plant No.4, now demolished) was doubled in capacity to 150 tons of iron poured per day (*GMH People*, December 1952; August 1953, p.5). By July 1954, this expansion programme was close to completion (*GMH People,* August 1954, p.1).

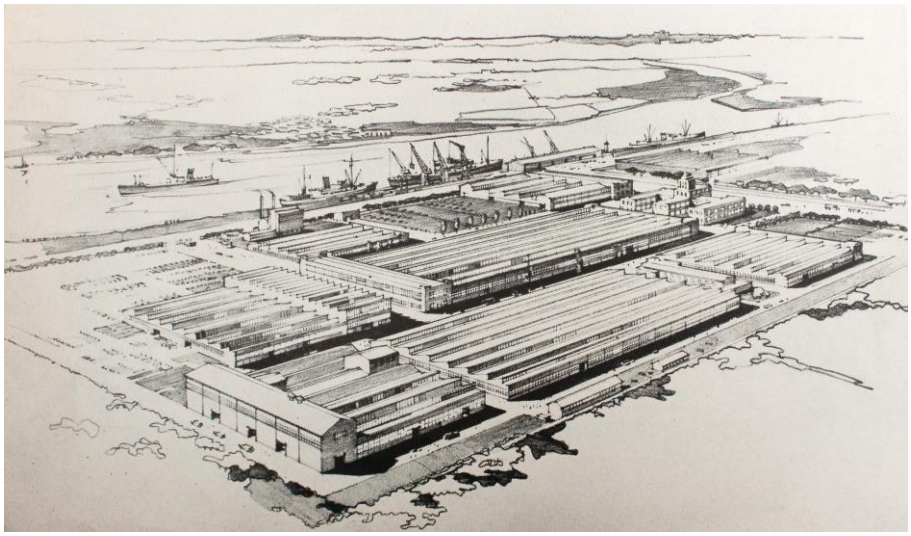


Figure 12: Schematic from the southwest illustrating changes planned in the 1952 expansion programme, including Plant No.6 first stage, Plant No. 5 extended up to the foundry, and enlargement of the foundry Plant No.4 (*GMH People*, December 1952, p.2)

Extant buildings from this early 1950s expansion include an extension to Plant No.5, two small buildings to the west of Plant No.5, and additions to the Medical Centre in Plant No.3 (see below). Additions that have now been demolished included the new manufacturing building, Plant No.6 that provided for expanded manufacturing of steering, front axle and rear axle assemblies, as well as housed a training centre, plant services and a modern canteen (*GMH People*, December 1952; August 1953, p.5). Other demolished buildings from this phase were a new power house (*GMH People*, December 1952; August 1953, p.5).

In the second half of the 1950s, After the assembly plant and NASCO moved to Dandenong, use of the Fishermans Bend plants was reorganized. The former assembly plant, Plant No.1, became the Gear and Axle Plant; Plant No.2 became a machine shop (GMH, 1960, p.9). The Grey Iron Foundry (Plant No.4, now demolished) was re-equipped to accommodate expanded engine production (*GMH People*, September 1956, p.1; May 1957, p.2). In c1959 Plant No.6 was extended up to the western boundary. The former NASCO warehouse building was doubled in size. This later became Plant No.8 Supply Department (demolished) (GMH, 1960, p.9).

1953 Extensions to Plant No.5

The main machine shop in Plant No.5 was increased in area from 126,000 to 197,000 sq. ft to house the expanded engine, transmission and gear manufacturing departments (*GMH People*, December 1952; August 1953, p.5). This carried Plant No.5 back to the roadway to the east of the foundry.

1953-4 Reorganisation of Plant No.3

With the expansions of the company in Melbourne in the early 1950s, including the construction of Plant No.6 and the shifting of vehicle assembly to Dandenong, Plant No.3 was now dedicated more fully to development of the nascent technical centre. Production oriented functions including the Toolroom and the Metrology Section were now relocated to Plant No.6 (*GMH People*, February 1956, p.9; December 1956, p.11).

Some aspects of the reorganisation of Plant No.3 in the early 1950s can be garnered from drawings. Development of new models still required a machine shop to produce one-off parts for prototypes. The machine shop and modelling areas appear to have been located in the northern half of the building. The testing laboratory was concentrated in the southern half. By 1960, facilities included five engine dynamometers cells, a chassis dynamometer, mechanical and structural rig testing, a carburetor flow room, electrical testing area, low temperature room, and water and dust test booth (S&T, H2018.14/115; H2018.14/122; *GMH People*, November 1960, p.2).

The engineering offices remained in their original position along the eastern side of the building, flanking the central entrance. The engineering drawing office was located in the position of the later panel shop, in the southeastern corner of the building behind the offices. A test area in the southwest corner included dynamometer cells.

Some of these arrangements may still be evident on the north side by some machines and tables in near-original positions. Several machines in an extant timber tools section may be original and in their original positions, according to the layout of a Wood Mill shown in a c1953 plan. They may also date from the wartime period. There are also several extant table-sized cast-iron surface plates, which probably also date from the 1950s or perhaps from the wartime and early post-war toolroom. Only a fleeting view of this area has been obtained for this assessment and photography was not permitted, but it is clear that a detailed examination would reveal more information.

During the 1950s, the central east-west corridor only extended half-way across the building, with the external entrance on the west wall (S&T, H2018.14/119). In c1953 a theatrette (no longer extant) was built within the northeast corner of Plant No.3. It was entered through a door in the north side of the northeast masonry pylon (S&T, H2018.14/122; H2018.14/116). In the same year the first aid/medical centre at the northwest corner of Plant No.3 was extended and altered (*GMH People*, December 53, p.8). Comparison of the current layout with the 1943 plan (see above) indicates that this took the form of a single-storey brick extension with parapet and flat roof extended out to the north, as well as some expansion to the east within Plant No.3.

Figure 13: Newly enlarged medical centre on the northwest corner of Plant No.3, 1953 (*GMH People*, December 1953, p.8)

The 1960s - The New 6-Cylinder Engine, The Technical Centre, The Nodular Iron Foundry and The V8 Engine

Contextual History

As early as 1958, plans had been made for a £9m expansion in 1961-1962 (*GMH People*, December 1958). By 1961, the projected expenditure on expansion had increased to a total of £15m, out of which £3,750,000 was for expansion of manufacturing at Fishermans Bend (*GMH People*, January-February 1961, p.2). By 1963, GMH planned to expand production to 175,000 vehicles per year, with investment of up to £33.5m (*SMH*, 9 March 1963, p.6).

In 1965, Holden retained its leadership in the car market with one in every three cars on the road was a Holden (Wright, 122). But the Holden engine, despite modifications, was showing its age. Ford had been much slower off the mark than Holden to build an Australian engine. A Ford V8 engine assembly line had opened at Geelong in 1953, but the parts for this engine were still largely imported (Tuckey, p.88; *The Age*, 17 March 1953, p.12). Ford announced a plan for its own all-Australian car, based on the Zephyr, in 1958. An important part of this was the full manufacture of the six-cylinder engine in Australia (*SMH*, 6 July 1958, p.5). The foundry and machining were expanded at Geelong by c1960 to allow manufacture of this new 6-cylinder engine (Tuckey, p.93).

By 1964, design and development were under way for the Australian V8 engine to be manufactured at Fishermans Bend (GMH, 2008, p.178). Ford was also building a new V8 engine plant. By 1969, Ford and Chrysler had both brought new models with V8 engines onto the market (*The Age*, 17 June 1969, p.13; 8 July 1969 p.6; 9 July 1969, p.14).

Site History and Extant Buildings

The original 50 acres at Fishermans Bend were no longer sufficient. By 1961, GMH had acquired an additional 36 acres of leasehold Crown land to the south, bringing the total area to 86 acres (*GMH People*, January-February 1961, p.2). Much of this area would soon be covered by a suite of new engine manufacturing plants and foundries.

The extant buildings from this period are the 1963 Plant No.10 for the new 6-cylinder engine, the 1964 new Technical Centre, and the 1969 Plant No.16 for the V8 Engine (See below). Now demolished buildings from this period include the 1965 New Grey Iron Foundry Plant (Plant No.11), which could pour 240 tons iron each day (*GMH People*, April 1965, p.1). The new Fettling Shop (Plant No.12, now demolished) just to the north of the new Grey Iron Foundry, was also in operation by 1965 (*GMH People*, June 1965, p.3). The new cafeteria, No.2 Cafeteria (demolished) was built in c1965 (*Pointers,* January-March 1967, back cover). Finally, the Nodular Iron Foundry Plant 14 (demolished) to the west of the new Grey Iron Foundry, was opened in 1967 and produced crankshafts and wheel hubs for Australian use and export to the UK arm of GM (*Pointers,* January-March 1967, p.3; *GMH People*, May 1967, p.17).

1963 Plant No.10

Construction of Plant No.10, where manufacture of the new 6-cylinder engine (known as the Red Engine) would take place, was completed by December 1961 (*GMH People*, August 1961, p.3; December 1961 p.7). In June 1963, the plant commenced operation, with a capacity of 700 engines per day (*GMH People*, June 1954, p.11). Plant No.10 accommodated the entire engine assembly, testing and processing of engine components for the Red Engine under one roof. It was considered to be “a giant showpiece of the

automotive industry", with "manufacturing techniques and equipment never before seen in Australia". The floor area was 292,000 sq. ft and the final cost was £11m (*GMH People*, September 1963, p.10).

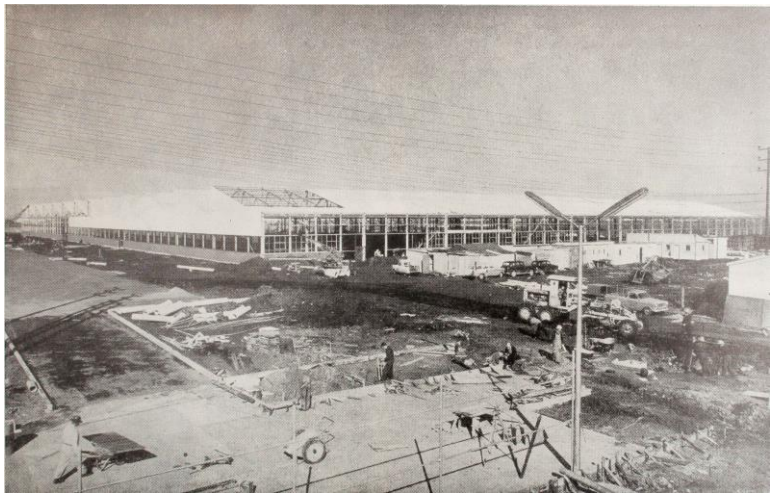


Figure 14: Plant No.10 under construction on reclaimed land, 1961 (*GMH People*, August 1961, p.3)

The new plant was built on a slightly larger grid that the earlier plants, with square rather than rectangular units. The height to the bottom chords of the trusses was also greater. The long L-shaped assembly line was considered the most mechanised in Australia, with four interconnected conveyors moving engines on 400 J-hooks slung from electronically controlled overhead conveyor tracks (*GMH People*, September 1963, p.19).

1964 Technical Centre and The "Reconstruction" of Plant No.3

In the USA, the Eero Saarinen-designed General Motors Technical Centre was built on a 330-acre landscaped site in Michigan, c1956 (*GMH People*, October 1981, p.6). The new Engineering and Styling centre for General Motors British brands Vauxhall and Bedford, was built in Luton in 1963 (*Pointers*, September 1964, p.18). The rationale for a new enlarged Technical Centre at Fishermans Bend was that GMH was the only automotive company that designed and engineered complete vehicles in Australia, and this would be the only facility in Australia where a car could be completely designed and engineered. By March 1963, the new building was under construction (*GMH People*, March 1963, p.15).

On 10 June 1964, the Prime Minister opened the new centre at Fishermans Bend, costing over £3,000,000 and with 270,000 sq. ft. of floor space. The new building doubled the Department's facilities, housing over 670 engineers, stylists, designers, draftsmen and skilled tradesmen. The building also housed the Public Relations Theatrette, where films covering the company's activities were shown to plant tour visitors, and the Photo Section (*Pointers*, May 1964, p.3; *GMH People*, June 1964, p.26). With the market becoming increasingly saturated, model differentiation, and hence styling, was becoming increasingly important (Davison, p.16). This may have provided some of the motive for the establishment of the expansive new Technical Centre.

The three-storey building was designed by architects Stephenson & Turner, who had been engaged for Plant No.6 in the early 1950s, and who had designed GMH's new factory at Dandenong in the mid-1950s. The builders were Lewis Constructions. The ground floor housed the "Rig Test Laboratory" with test facilities designed by GMH's engineer, Frank Pound. It was equipped with a high ceiling and special services, fixtures and fittings and test cells (*GMH People*, June 1964, p.26). The drawing office, where body and mechanical drawings were prepared under "brilliant daylight type lighting", occupied most of a floor (*GMH People*, June 1964, p.26).

Figure 15: Northeast corner of the new Technical centre at night, 1964 (*GMH People*, June 1964, p.26)

Plant No.3 Post-1964

Plant No. 3, which had housed the Experimental Engineering Department for GMH since the war, was now "reconstructed" as part of the new Technical Centre (*GMH People*, August 1964). With the up-to-date new facilities for functions such as drawing and test-rigs located in the extension, areas in Plant No.3 were freed up and the layout underwent considerable change. The large drawing office area that had been in the northeast of Plant No.3 since at least the early 1950s, was relocated to the upper floor of the new building. This was probably the point at which the four extant presses were introduced into the former drawing area in Plant No.3. These may have come from elsewhere, or may have been relocated from another part of the Plant No.3. The central east-west corridor in Plant No.3 was now extended to the full east-west length of the building (S&T, H2018.14/113).

The northern half of the Plant No.3 accommodated a machine shop and model shop. There are still extant features within this area that date from the 1950s, and perhaps earlier, such as the Wood Mill. The 1953 theatrette was removed from the northeast corner, replaced with an improved version in the new building (S&T, H2018.14/113). In c1969, a mezzanine was built over approximately 6 bays in the southwestern part of Plant No.3. This can be seen externally in the interruption to the sawtooth profile of the western elevation (S&T, H2018.14/116).

The dynamometers/test cells that had been located on the eastern end of the southern side of Plant No.3 in the 1950s, were removed. The new Technical Centre featured a narrow wing extended in a single-bay depth along the south side of Plant No.3, containing up-to-date test cells for engine performance. A new corridor ran the length of this addition between the cells, and the original southern wall of Plant No.3. The new technical centre contained an extensive test area over the southern half of its ground floor, removing any need for test equipment on the floor of Plant No.3 (S&T, H2018.14/115).

1969 V8 Engine plant, Plant No.16 (now largely demolished)

The new 180,000 sq. ft., $22 million V8 engine plant was officially opened by the Federal Treasurer in July 1969. The building continued the structure and the grid of Plant No.10. The all-Australian-built engine was designed in the Fishermans Bend Technical Centre.

1970s-2018 - Globalisation

Contextual History

The price of fuel rose rapidly world-wide in the late-1970s. Japanese manufacturers were producing small, fuel-efficient four-cylinder cars.

In 1976, GMH earmarked $17m to build four-cylinder engines at its Fishermans Bend plant (*SMH*, 5 March 1976, p.3). Toyota agreed to buy 4-cylinder engine blocks from GMH's expanded foundry at Fishermans Bend (*The Age*, 12 June 1976, p.23). In 1978, GMH announced a 'world car' and a 'world-wide engine'. Parts for the world-car would be sourced world-wide, and with the scale of a world market, producers would be able to afford the latest technologies. GMH predicated going ahead with the 4-cylinder engine plant, now to cost $210m, if the Federal Government changed its rules on the local content of cars. The plant would produce 300,000 engines per year, two-thirds of which would be shipped overseas. (*SMH*, 7 February 1979, p.1). The government started an exports credit programme in 1979. Engines were shipped to Germany and the UK (GMH, 2008, p.167).

In the 1983 restructuring of the company, manufacturing capacity was found to be greatly above requirement. Manufacture at Fishermans Bend of manual transmissions, suspension components and differential and axle assemblies discontinued, and transmission gears, cold formed products and electrical components were to be phased out (*SMH*, 21 May 1983, p.1).

The 6- and 8-cylinder 'Blue' engines were released in 1980. Production of the 4.2 litre V8 engine ceased in 1984. In 1986, GMH was reorganised into two subsidiaries, Holden's Motor Company (HMC) and Holden's Engine Components Company (HEC). Assembly of the V6 engine began in 1988 (GMH 2008, p.180). In 1995, $200m was invested for introduction of DOHC (double or dual overhead camshaft) technology, foundry modernisation and capacity expansion. HEC became Holden Engine Operations (GMH, 2008, p.179).

Development of the new 'Global V6 ' engine, a collaboration between GMH engineering and a multi-national GM team, started in 1999. Production began at the new plant (Plant No.18) in 2004. (GMH, 2008, pp.180-81). In 2009, production of the Family II engine ceased (GMH, 2008, p.179).

Site History and Extant Buildings

Work on the 4-cylinder 'Family II' engine plant started in 1979 (see below). At the same time the old Grey Iron Foundry (Plant No.4, demolished) was refurbished for manufacture of components for the 4-cylinder engine (*The Age*, 31 January 1979, p.24; *GMH People*, July 1981, p.8; December 1981, p.4). The newer foundries (Plants Nos. 11, 12 and 14, now demolished) were also refurbished for the project (*SMH*, 7 February 1979, p.1).

By the late 1980s, the factory buildings to the west of the old headquarters (Plants No.1, No.2, No.8, not including Plant No.6), were demolished and the land, together with the old NASCO Administration Building, was sold. It became redeveloped as an industrial park (*Around the Bend*, Autumn 1989, p.4).

Because of excess capacity, no new major building activity took place until 2003. In 2004, the $400m V6 engine plant at Fishermans Bend, Plant No.18, started production. In 2005, the new Headquarters Building opened to the south of the Technical Centre (*GMH People*, March 2003, p.3). Subsequently the old Headquarters Building was sold.

In 2005/2006, Plant No.6 was removed. The Power House followed in 2011, with Plant No.4 (old Grey Iron Foundry) going in 2014. Demolitions of Plant No.11 (Grey Iron Foundry), Plant No.12 (Fettling Works), Plant No.14 (Nodular Iron Foundry) and Cafeteria No.2 occurred in 2016.

1979 Four-Cylinder Engine Plant

In February 1979, work began on the $130m four-cylinder engine plant, which involved an extension to the southern end of Plant No.16 (*SMH*, 7 February 1979, p.1; *Around the Bend*, Spring 1984, p.4). It was opened by the Prime Minister, Mr Fraser, in November 1981 (*The Age*, 27 August 1981, p.8; 10 November 1981 p.5). The plant and machinery were identical to plants in West Germany and Brazil, and cost $255 million (*GMH People*, December 198,1 p.4).

SITE DESCRIPTION

Site Layout

Refer to the GMH complex key periods of development diagram (figure 4).
Of the original 12 acre site established in 1936, the frontage to Salmon Street divided into three equal plots by two internal roadways, remains legible. These roads are now called Central Boulevard and Bayside Avenue. The two blocks closest to Lorimer Street have been reduced in their westward extent. The 1936 Victorian Administration Building, without the attached NASCO spare parts warehouse to the rear (demolished in the 1980s), is at 261 Salmon Street. In the central block, the 1936 Australian Headquarters Building, 251-259 Salmon Street, retains its full extent. However, the land behind, where Plant 1 was located prior to demolition in 1980s, has now been alienated.

The third block at 241 Salmon Street, between Bayside Avenue and Caprice Avenue, retains its full extent west to the Defence Department Aeronautical and Maritime Research Laboratory (AMRL). It was developed in 1943 with the construction of Plant 3, which is extant. In 1964, Plant 3 was extended towards Salmon

Street with the Technical Centre addition and by one bay towards Caprice Avenue. Plant 5 is in alignment behind Plant 3, separated by the standalone 1945 Social Centre. The original 1948 section of Plant 5 remains. It was extended westward in 1953, and part of the 1953 section remains separated from the original with a new eastern wall and linked only by elevated pipework. The Old Grey Iron Foundry (Plant 4) was demolished in 2014, and there is now a carpark west of Plant 5. The area west of the 1948 section of Plant 5 is outside of the recommended extent.

By 1961, the GMH complex had expanded south of Caprice Avenue. Number 61 Cook Street is an L-shaped block containing parts of Plant 10 (built 1963) and Plant 16 (built 1969). To the north, it abuts the third block described above, but only extends eastward to approximately align with Plant 5. The rest of these two plants is on a rectangular block at 85 Cook Street. The balance of the site, west of 61 Cook Street, was developed after the 1970s. The land south of 241 Salmon Street is excluded from the proposed extent.

The land fronting Salmon Street provides a landscaped setting for the Australian Headquarters and Victorian Administration Building. The palm trees within the setback to Salmon Street and the central median strip of Central Boulevard are not original. Historic aerial photographs show mainly low perimeter planting to the buildings and the fence, with some conical tree plantings down the median strip. Most of the remainder of the site is predominately buildings, hardstand and carparking. Trees near the Social Centre appear more recent. A vegetation survey has not been undertaken to determine whether there are any significant plantings.

Figure 16: The symmetry of the Australian Headquarters (left), and the Victorian Administration Building about Central Boulevard as seen from Salmon Street. The low fence is original but the curved sections and taller pillars, along with the palm trees, are not. The built structure in the centre of the roadway has been substantially changed. (Google imagery December 2017)

Australian Headquarters Building (1936)

The Australian Headquarters Building was the centre piece of the three original blocks to Salmon Street. With its streamlined moderne style, it tapped into the feeling of progress and faith in modern technology found in internationally important examples, such as the Rockefeller Centre, New York (1931-39). It was a strong public statement for the newly established, Australian operations of GMH.

Characteristics of the style exhibited in the Headquarters include symmetry, strong three-dimensional forms, and the stepped geometric tower and stylised decoration on corners. The double-storey, fluted pilasters support an oversized entablature, and extensive glazing. The windows are tripartite and the glazing bars may be original.

The building retains its original form, distinctive back-to-back E shape plan, reinforced concrete construction and trafficable flat concrete roof. The decorative form and detailing continues on all sides of the building. The original integrated lighting design may not survive.

The garden setting has its original front fence, now modified with curved corners and larger pillars. There was a guard house between the buildings, and it is unclear if any parts were incorporated in the current structure.

The interior was not inspected but has the potential for important areas to remain, including General Manager Hartnett's corner office (seen in *The Argus*, 6 November 1936, p21) and decorative company spaces, such as a former board room, library and showroom.

Figures 17 and 18: The Australian Headquarters in its garden setting, viewed from the southwest and in *GMH People* December 1953, V.7 No.3 back cover

Victorian Administration Building (1936)

The Victorian Administration Building is also streamlined moderne in style, and similar in external treatment to the Headquarters, so it strengthened the public presence of the company on Salmon Street. However, as fitting its lesser status, the Administration Building was a more austere design. It has a wide frontage to Salmon Street with a central, projecting entry bay. Like the Headquarters Building, the central and end bays have art deco vertical mouldings, but there is no tower.

The symmetry, strong three-dimensional forms, and stylised decoration are characteristics of the style. The double-storey fluted pilasters support an oversized entablature, and extensive glazing. The windows are tripartite and the glazing bars may be original. These details match the Headquarters Building.

The Administration Building was directly attached to a warehouse behind that had its own entry facing Lorimer Street. The original warehouse section has been demolished and another building constructed in its place. This addition is not of heritage significance.

The Administration Building retains its original form and extent, corner siting, external details and garden setting, with some modifications to the original front fence. The interior was not inspected.

Figure 19: The Victorian Administration Building viewed from the northeast (Google Imagery October 2017)

Social Centre (1945)

The GMH Social Centre is on Bayside Avenue, flanked by Plants 3 and 5 to form a symmetrical composition. This symmetry is further emphasised by the placement of the Social Centre on an island site with internal roads of similar width to each side, and by its streamlined moderne design. The radial paths from the Social Centre remain. The forecourt of the Social Centre was the setting for many GMH ceremonies and promotions. It has a '50 Golden Years' time capsule, placed by The Hon John Howard, Prime Minister on 29 November 1998, which is to be opened on the centenary.

Figure 20: Aerial view by Charles Daniel Platt in c1850-60, after Plant 5 has been extended to the west, and prior to demolition of Plant 1 (SLV H2008.41/72, http://handle.slv.vic.gov.au/10381/97887)

Figure 21: The relationship between Plant 3, the Social Centre and Plant 5. (Google Street view 2014)

The Social Centre's stepped silhouette of face brickwork bays in a ziggurat formation has a central rendered entry crowned with a flagpole. This facade features glass bricks and the entry has been changed with a new glass and steel canopy addition, which is not of heritage significance.

The double storey parapet bays extend to the sides of the building for a short way before the pitched, corrugated cement sheet roof is visible. The mass of the building is set in at the upper level with a small terrace and cross patterned, metal balustrade. Windows on the sides are multi-paned and steel-framed with some bays extending downwards to include steel-framed doors. External louvres remain on the upper windows.

Figures 22 and 23: The Social Centre seen from the northeast and the western elevation (H Lardner, 20/04/2018)

The Interior of the Social Centre features a large, central space with double height coved ceiling and clerestorey windows. To either side, the external bays are expressed in the structure of the lower wings. Entry is from the north and illuminated by the glass brick panels, however the focus is on the southern end that has a stage and a proscenium arch. Behind this, at the lower level, was a commercial kitchen (now removed), and at the upper level was the executive dining area. This area is in poor condition but features some decorative timberwork in cabinetry and stair rail. There are a number of other art deco features, such as the strip lighting to the coved ceiling, parquetry floor and metal railing to the stage.

Flanking either side of the stage are the 'History of Transport' murals by GMH employee Eileen Robertson. To the east, the mural depicts the early days with a sailing ship, steam train, horse and buggy, bullocks and a very early car. It is a painting in a landscape naturalistic style. In contrast, the other mural is futuristic and moderne with stream-lined vehicles of the future, buildings, bridges and aircraft. The National Trust Register points out that this mural is in the manner of American industrial designer, Norman Bel Geddes (B5230).

Figures 24 and 25: The interior looking south with the murals, and north in the Social Centre (P Mills, 18/04/2018)

Plant 3 (1943)

The local GMH staff created a standardised design for the initial factory buildings (Plant 1 and 2, both now demolished) and for future expansion. This design, including the structural system, grid and some vertical steel sliding doors, is still demonstrated by Plant 3 and Plant 5.

The factory blocks were 50 feet east to west and 40 feet north to south, creating a rational grid with standard column spacing. The design of the optimal structural steel unit was a sawtooth roof with lattice girder spans of 50 feet to carry roof trusses 40 feet in span, spaced at 12ft 6inch centres. The structure was bolted not riveted, and enabled tall, clear interior spaces. Paired bottom chords of trusses facilitated the incorporation of equipment and services. This design is extant in Plant 3.

Plant 3 is east of the Social Centre on Bayside Avenue. It consists of sawtooth bays with south-facing lights and has a number of services and auxiliary structures attached to it. In the 1960s expansion, a masonry bay was added to the south of the building to house engine testing cells, and the Technical Centre was constructed to the East.

The scale, form and location of Plant 3 are significant, along with its structural grid and purpose designed testing rooms. The banks of multi-paned, steel framed windows, including openable hoppers, and corrugated cladding (now steel) are important features. Some facades have been modified and the original corner masonry piers facing Salmon Street (figure 20) have been cut to below the roof line. The Bayside Avenue frontage had a number of changes associated with the auxiliary structures, and has retained original doorways, some now including roller shutters. The masonry Medical Centre on the northwest corner of Plant 3 was an original feature extended with the 1953 addition on the north side (figure 13).

As well as the structural system, the interior of Plant 3 has many features that demonstrate aspects of its construction as the exemplar toolroom during the war and use as the 'Experimental Engineering Department', later part of the Technical Centre. The machine shop and modelling areas appear to have been located in the northern half of the building, and the testing laboratory was concentrated in the southern half. On the north side, some machines and tables may be original and in their original positions from the post war or wartime period. Further detailed examination is required as access was restricted while it was in use. Engineering offices were originally located along the eastern side of the building with the engineering drawing office in the south-eastern corner. These were relocated to the 1964 Technical Centre, and now four presses occupy the former drawing area. The 1950s dynamometers/test cells were removed and replaced with the 1960s southern bay of test cells that remain. Some original internal features of the Medical Centre remain. As well as the internal layout and some equipment, functions are also evident in lighting, door types and flooring. Ceramic floor tiles are used in corridors and structural areas. There are areas of parquetry and timber floor boards that provide a softer floor in areas where sensitive equipment could be dropped (to minimise damage and breakage), and in the former engineering office and drawing room.


Figures 26 and 27: Plant 3 western side looking towards Bayside Avenue with the medical centre at the far corner. and the interior of Plant 3 illustrating the innovative structural system (H Lardner, 18/04/2018)

Technical Centre (1964)

The three storey Technical Centre was added to the Salmon Street frontage of Plant 3 in 1964. It was purpose-built by Stephenson and Turner architects, who had designed the Dandenong Complex for General Motors in 1954.

The Technical Centre is a large rectangular building with cooling towers set back from the street frontage. The steel-framed building has a strong horizontality with continuous banks of metal windows wrapping around the facades. Originally, these had sun shading provided by slatted screens that have been removed. The facade has a new external finish over the masonry and an unsympathetic colour scheme, diminishing the impact of the contrasting elements. The entry remains on the northern side; however, a new canopy has been added to it. On the southeast corner, a large reflective panel with signage covers the building over three level, but sits in front of the original structure.

The building exhibits aspects of the Late Twentieth-Century International Style that was popular from the 1960s onwards, including cubiform overall shape, expression of the structural frame in the facades, curtain wall construction, horizontal bands of windows, plain smooth wall surfaces broken into rectangular shapes, and external sun shades (now removed). The contrast between these features and the plain walled cooling tower block was also reflective of the style. (Apperley, Irving and Reynolds, *A Pictorial Guide to Identifying Australian Architecture*, p235). There are better examples in Victoria of the style and the work of Stephenson and Turner.

Figures 28 and 29: The 1964 Technical Centre added to Plant 3 (H Lardner, 18/4/2018) compared to a 1964 photograph that shows the visual impact of the current total beige paint colour and removal of the sunshades.

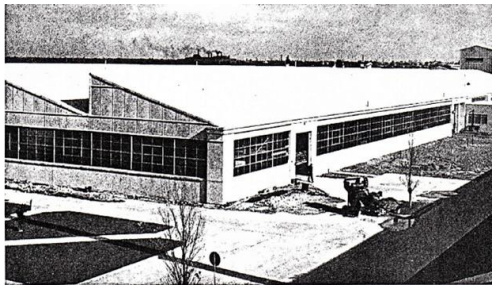
The Technical Centre includes offices, drawing offices and showrooms, as well as laboratories and testing facilities. Much of the interior has been extensively remodelled and is not of heritage significance. However the original entry foyer and theatrette are substantially intact and retain many original features, such as travertine-lined walls, marble floor, clock and staircase in the entry foyer; and timber lined walls and a projector room in the theatrette.

Plant 5 (1948, 1950s)

Plant 5 was constructed after WWII and expanded to the west in the 1950s (figure 20). It is a south-facing, sawtooth roofed building. The western end of the 1948 section has been demolished with a roadway now inserted between it and the 1950s section.

Although Plant 5 was constructed later than Plant 3, it was part of the original design and completes the symmetry around the Social Centre when viewed from Bayside Avenue (figure 21). It also continues the original grid and structural steel system of the original factory blocks. The strips of steel-framed windows, including central hoppers, and the framed doorways match Plant 3. Asbestos cement cladding has been replaced with corrugated metal cladding, and alterations have been made to some doorways.

The interior of Plant 5 had a workshop; equipment such as cranes, hoists and extraction units have been removed. It is now largely open with a concrete floor and no longer demonstrates much about its former use. The 1950s section that is now detached and has been altered is of low significance.



Figures 30 and 31: The northeast corner of Plant 5 showing the original form, including windows that are now painted. (P Mills, 23/05/2019 and extract from figure 10)

Figure 32: Interior of Plant 5 (H Lardner, 20/04/2018)

INTEGRITY

Intactness: refers to the degree to which a place retains its significant fabric. Intactness should not be confused with condition as a place may be highly intact but the fabric may be in a very fragile condition.

Integrity: refers to the degree to which the heritage values of the place are still evident and can be understood and appreciated. (*Victorian Heritage Register Criteria and Thresholds Guidelines*, p.4)

The Complex

As a complex, GMH Fishermans Bend is considered to have high integrity and to be moderately intact for the most significant period from 1936 to the mid-1960s. It retains evidence of the historically important phases, including the first factory (Australian Headquarters Building, Victorian Administration Building and evidence of the original factory layout in streets and grid), wartime additions (Plant 3 and the Social Centre), the early post-war Holden period (Plant 5 1948 section), 1950s expansion (Plant 5 addition) and the 1960s expansion (Technical Centre and southern bay addition to Plant 3).

In terms of intactness, the loss of Plant 1 was detrimental. However, many aspects of the design of Plant 1, including the innovative structural system, grid and vertical sliding steel doors, were carried into Plant 3 and 5 so may still be understood. The loss of the foundry was also detrimental. Overall, the heritage values of the GMH complex are still evident and can be appreciated.

For working industrial sites where manufacturing continues over a lengthy period, it is usual for the physical fabric to include changes that reflect technological and process development. At the GMH complex, this is evident however the sequential development of the site can still be clearly appreciated. In part this is due to the original design that anticipated future buildings and expansion. It is also because some continuing functions were addressed in new ways by expanding facilities. The engineering and design sections, which began in Plant 3, were expanded in the 1964 Technical Centre.

Factory buildings, like Plants 3 and 5, are commonly constructed from utilitarian fabric with ancillary services and structures. The replacement of asbestos cement cladding and changes to ancillary structures and services are common with this type of building. As long as the heritage values remain evident, these changes do not detract from their significance.

Individual buildings

BUILDING	EXTERIOR	INTERIOR
Australian Headquarters Building	Exterior high integrity, highly intact	Interior not inspected but considered likely that important interior fabric remains
Victorian Administration Building	Exterior high integrity, highly intact	Interior not inspected
Plant 3	Exterior high integrity, highly intact	Interior high integrity, highly intact
Technical Centre	Exterior moderate integrity, moderately intact	Interior – Entry foyer and theatrette high integrity, highly intact – Other spaces seemed to have low integrity and low intactness but were not fully inspected
Social Centre	Exterior high integrity, highly intact	Interior high integrity, highly intact
Plant 5	Exterior high integrity, moderately intact (loss of western end of 1948 section). 1950s section moderate integrity (now detached), low intactness	1948 interior moderate integrity (retains structural grid and system), intactness low because interior stripped 1950s section interior not inspected
Plant 10 (outside of recommended extent)	Exterior moderate integrity, but works underway to remove asbestos cladding from roof and some walls, current demolition permit	Interior not inspected
Plant 16 (outside of recommended extent)	Exterior moderate integrity, but works underway to remove asbestos cladding from roof and some walls, current demolition permit	Interior not inspected

COMPARATIVE ANALYSIS

The Complex

The Former GMH Complex is comparable to the Ford Motor Company Complex at 365-455 Melbourne Road in Norlane, which is on the Victorian Heritage Register (VHR H2305). The Ford Factory was constructed between 1925-1942 so it is an earlier example. Ford has a Federation Free Classical street presentation rather than the Moderne design GMH presents to Salmon Street. Ford was built by the American Company to be an exact model of American Ford factories, whereas GMH was an Australian company with a local solution to their factory layout and structure. Both became iconic car manufacturers in Australia with loyal followings.

The GMH Fishermans Bend complex provides better evidence of car manufacturing in Victoria than Rootes/Chrysler or AMI/Toyota who operated smaller, more fragmented sites over shorter periods. Its importance from 1936 to the 1960s demonstrates a greater historical period than just the outer suburban

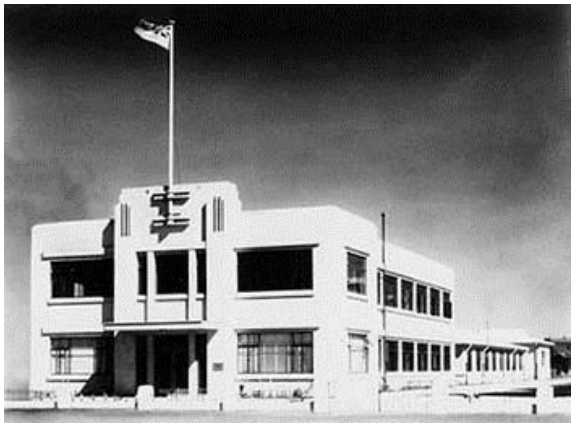
industrial sites, like Dandenong and Altona, established at the height of rapid growth of car ownership in Australia in the 1950s.

The Australian Headquarters and Victorian Administration Buildings, 1936

Architecturally, the Australian Headquarters and Administration Buildings are good examples of their style, retaining many original features. They belong to a group of Inter-War Art Deco styles c1915 – c1940, often used for commercial buildings.

There are important international design exemplars from the period which are factories, including the Hoover Factory London, 1932-5, and the Firestone Tyre Factory (1928, demolished 1980), both designed by Wallis Gilbert and Partners. Aspects of the design reflect the 1928 GM Assembly Plant in Regina Canada, which was partly damaged by fire in 2017 (https://www.620ckrm.com/2017/05/03/114525/).

An outstanding Victorian example is the 1939 Century Building, 125-133 Swanston Street Melbourne, by Marcus Barlow (VHR, H2250) which is grander in scale and has more emphasis on verticality. In Fishermans Bend, the Commonwealth Aircraft Corporation (CAC), a private company in which GMH was a major shareholder, had a Main Office Building, 1939, which was more similar to the GMH examples. It was constructed in 1939, had two additional storeys added, but has now been demolished. The 1934 Offices and 1939 Administration Building of the Former Olympic Tyre and Rubber Factory, 56 – 84 Cross Street, Footscray is a less sophisticated example with some comparable design features.



Figures 33 and 34: CAC Main Office Building in 1939 and 1997, now demolished (Tony Lyons, http://www.ctie.monash.edu.au/hargrave/MEGGS_CAC.html)

Figures 35 and 36: The 1934 Offices and 1939 Administration Building, Former Olympic Tyre and Rubber Factory, 56 – 84 Cross Street, Footscray (CMP, HLCD, January 2005)

The Social Centre

In Australia, during the Interwar period, the Commonwealth developed a vernacular Stripped Classical Style under the leadership of Chief Architect, J S Murdoch. The Defence Science and Technology Organisation (DSTO), at 502-552 Lorimer Street Port Melbourne, has an Administration Building with a feature block entry with a flagpole, vertical fluting and bands of windows. Its face masonry, hipped terracotta tiled roof and paired back ornament is comparable to the Social Centre, but more restrained. The Social Centre shows a striking use of the streamlined moderne style to create a much bolder composition.

Figure 37: DSTO Administration Building (HLCD, 2004)

The Former Government Aircraft Factory Administration Building, which faced an internal roadway, now Canberra Street off Lorimer Street in Port Melbourne (constructed 1939), was similar in appearance to the DSTO Building, but was demolished after 2004.

Within the Social Centre, the earlier of the two 'History of Transport' Murals, is comparable in subject matter to the 'History of Transport Mural' at Spencer Street Station, now Southern Cross (VHR H936). The Station example was a state-commissioned public work, completed more than 30 years later in 1978 and is much larger. It has many more vehicles depicted.

The National Trust of Australia (Victoria) suggests that the futurist mural was carried out in the style of American industrial designer Norman Bel Geddes (National Trust Register B5230). Geddes had been commissioned by General Motors to produce an exhibit at the 1939 World's Fair in New York. Labelled 'Futurama', it featured a futuristic city linked by automated freeways weaving between layered and curvaceous skyscrapers. It seems likely that this was a strong influence on the Fishermans Bend work by …….

Technical Centre

The architects for the 1964 GMH Technical Centre were Stephenson and Turner, a company highly regarded for their innovative design and industrial projects in Victoria. The former Standard Vacuum Refinery Co. Complex in Altona has a c1955 office building by the same architects, which is comparable but now altered. Other notable examples are the British Nylon Spinners factory, Bayswater and their work at five sites in Australia and New Zealand for GMH, including Dandenong, which had extensive glass curtain walls. Stephenson and Turner, a large Australian practice, were also noted for their hospital design, commercial offices and banks.

LEVELS OF SIGNIFICANCE WITHIN THE SITE

The levels of cultural heritage significance within the site are summarised below.

Primary Significance

Elements of primary significance are substantially intact and demonstrate key aspects of the site from 1936 - 1948, including establishment of GMH at Fishermans Bend, World War II use and development of the All - Australian car.

Of primary significance:

- The original complex layout demonstrated by the frontage to Salmon Street, division into three equal plots by two internal roadways (now Central Boulevard and Bayside Avenue).
- The symmetrical arrangement of Plant 3, the Social Centre and Plant 5 as viewed from the northern (Bayside Avenue) side.
- The symmetrical relationship of the Australian Headquarters and Victorian Administration building about Central Boulevard, as viewed from Salmon Street.
- Views along Salmon Street to the Australian Headquarters and Victorian Administration building.
- The landscaped setback to Salmon Street for numbers 241 (part), 251-259 and 261 Salmon Street, including original low front fence (excluding the individual plantings).
- The Australian Headquarters building - exterior and interior (interior subject to investigation).
- The Victorian Administration building - exterior (not the recent Western addition) and interior (interior subject to investigation).
- Plant 3 - exterior and interior (not the southern wing with the 1960s purpose-designed testing rooms, and excluding parts of the interior that have been substantially altered).
- The Social Centre - exterior and interior including the 'History of Transport' murals by Eileen Robertson, forecourt with radial paths and time capsule (excluding individual plantings and recent entry canopy).
- Plant 5 north and east facades, the sawtooth roof form, the first two bays facing Bayside Avenue and a representative section of the steel structural grid in the 1948 section, including trusses and columns.

Secondary Significance

Elements of secondary significance are of two types:

1. Fabric from the 1936-1948 period, which has been substantially altered or which no longer demonstrates important aspects of the occupation of the site.
2. Fabric that relates to the technical innovations of the 1960s period.

Of secondary significance:

- Plant 5 interior (except elements identified under primary significance).
- 1964 Technical Centre – exterior and interior to the extent of the foyer and theatrette only.
- Plant 3 substantially altered sections of the interior.
- The southern wing of Plant 3 (1960s purpose-designed testing rooms).

Low Significance

Elements of low significance are of two types:

1. Fabric that relates to the technical innovations of the 1960s period, which has been substantially altered or that no longer demonstrates important aspects of the occupation of the site.

2. Fabric that relates to expansion or additions during the 1950s and after 1970, and conveys little further information about the use of the site apart from its continuity of use.

Of low significance:

- Plant 5 1950s extension.
- Small buildings to the south of Plant 5 and the Social Centre.
- Accretions to buildings of primary or secondary significance from the 1950s and after 1970, including air conditioning, services, and ancillary structures.
- Interior of the 1964 Technical Centre (except the foyer and theatrette).

ASSESSMENT AGAINST CRITERIA

✓	**CRITERION A** Importance to the course or pattern of our cultural or natural history (historical significance).
	CRITERION B Possession of uncommon rare or endangered aspects of our cultural or natural history (rarity).
	CRITERION C Potential to yield information that will contribute to an understanding of our cultural or natural history (research potential).
✓	**CRITERION D** Importance in demonstrating the principal characteristics of a class of cultural or natural places or environments (representativeness).
✓	**CRITERION E** Importance of exhibiting particular aesthetic characteristics (aesthetic significance).
✓	**CRITERION F** Importance in demonstrating a high degree of creative or technical achievement at a particular period (technical significance)
	CRITERION G Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. This includes the significance of a place to Indigenous peoples as part of their continuing and developing cultural traditions (social significance).
	CRITERION H Special association with the life or works of a person, or group of persons, of importance in our history (associative significance).

STATEMENT OF SIGNIFICANCE

What is Significant

The Former GMH Complex Fishermans Bend at 241 (part), 251-259 and 261 Salmon Street; part of Bayside Avenue and part of Central Boulevard, Port Melbourne, is significant at State level. This includes parts of the GMH Complex constructed from 1936 to 1948, the 1964 Technical Centre, and additional southern bay to Plant 3 (refer to extent plan).

Buildings of significance are the Australian Headquarters, Victorian Administration Building, Plant 3, Technical Centre, Social Centre and Plant 5.

Parts of the site planning are significant, including:

- The original complex layout demonstrated by the frontage to Salmon Street, division into three equal plots by two internal roadways (now Central Boulevard and Bayside Avenue).
- The front fence and garden setting of the Australian Headquarters and the Victorian Administration Building.
- The relationship of Plant 3, the Social Centre, and Plant 5.

More details are provided in the 'Levels of Significance within the Site' section above.

How it is Significant

The Former GMH Complex is of State significance and of local significance to the City of Melbourne. At State level, the Complex has historic value and is a representative example of a wartime and early post-war manufacturing plant. The Australian Headquarters, Victorian Administration Building and Social Centre also have aesthetic value at State level and the Technical Centre has aesthetic value to a lesser degree. Plants 3 and 5 have technical value for their design and structural system, which was an exemplar for the period.

Why it is Significant

The establishment of the GMH site at a grand scale in 1936, with three blocks south of Lorimer Street, and construction of the Australian Headquarters and the Victorian Administration Building, was a gesture that showed confidence in the future of Australia. It was borne out by GMH becoming an iconic Australian company, with the Fishermans Bend site as the Australian headquarters, and in continual use for about 80 years. (Criterion A)

The GMH Complex pioneered the industrialisation of Fishermans Bend and made an important contribution to Victoria becoming Australia's major manufacturing state. The GMH Complex was the realisation of the Metropolitan Town Planning Commission's vision for Fishermans Bend with GMH being the first industry established. Subsequently, Fishermans Bend became an important industry, war effort, and employment and migration hub. (Criterion A)

The GMH Complex is an important example of a purpose-built Australian factory on a greenfields site, built between 1936 and 1948. The design of the buildings, equipment and services by GMH local staff established a rational grid, created a standardised design for the initial factory buildings and allowed for future expansion. It included the design of an optimal structural steel unit for trusses and columns, which are still evident in Plant 3 and Plant 5, and was a contemporary factory exemplar. It contrasts with other major manufacturers who imported their factory designs, including Ford in Geelong, which replicated an American factory. (Criteria A and F)

GMH Fishermans Bend made an important contribution to the war effort and in Australia's increasing manufacturing capabilities during WWII. (Criterion A)

GMH emerged from the war effort with a highly skilled workforce, a well-established toolroom and machine shop, a full-scale foundry and the production capacity which enabled production of an all-Australian car in 1948. This was the realisation of the vision of Laurence Hartnett, GMH's first managing director, when he established the company in 1939. (Criterion A)

The GMH Complex demonstrates the principal characteristics of a war time and early post-war manufacturing plant in its layout and buildings. The 1936 Australian Headquarters and Victorian Administration Building on Salmon Street presented a very progressive, moderne public face for the company that was later complemented by the 1964 architect-designed Technical Centre. Within the site, plants were more utilitarian but very carefully designed for functionality and to optimize space. The provision of staff services, including the cafeteria in the Social Centre and the medical centre, were important aspects of large industrial complexes of the period. (Criterion D).

The Australian Headquarters, Victorian Administration Building and the Social Centre are accomplished examples of the stream lined moderne style. The Technical Centre has aesthetic value at a lesser level as an example of the Late Twentieth-Century International Style, including the entry lobby and theatrette spaces. The 'History of Transport' murals by GMH employee Eileen Robertson within the Social Centre, also have aesthetic value. The architectural styles reflected the car industry's obsession with modernity and the conceptual link between futuristic transport and progress. (Criterion E)

RECOMMENDATIONS

Figure 38: The extent recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme as an individually significant place and for nomination for inclusion in the Victorian Heritage Register

Recommendations for the Schedule to the Heritage Overlay (Clause 43.01) in the Melbourne Planning Scheme:

Melbourne Planning Scheme

EXTERNAL PAINT CONTROLS	Yes
INTERNAL ALTERATION CONTROLS (some parts)	Yes
TREE CONTROLS	No
OUTBUILDINGS OR FENCES (Which are not exempt under Clause 43.01-3)	No
TO BE INCLUDED ON THE VICTORIAN HERITAGE REGISTER	Recommended
PROHIBITED USES MAY BE PERMITTED	No
NAME OF INCORPORATED PLAN UNDER CLAUSE 43.01-2	-
ABORIGINAL HERITAGE PLACE	No

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PREVIOUS STUDIES

Southbank and Fishermans Bend Heritage Review 2017	<u>Recommended as places of State heritage significance</u> - Plants 3 and 5, Social Centre at 241 Salmon Street - Australian Headquarters at 251 Salmon Street - Victorian Administration Building at 261 Salmon Street <u>Recommended as a place of local heritage significance</u> - Engine and Manufacturing Plant at 241 Salmon Street and 61-85 Cook Street

5.6 Shed 21 Citation

SITE NAME	Shed 21, Berth 21 South Wharf
STREET ADDRESS	206 Lorimer Street, Docklands
PROPERTY ID	712644

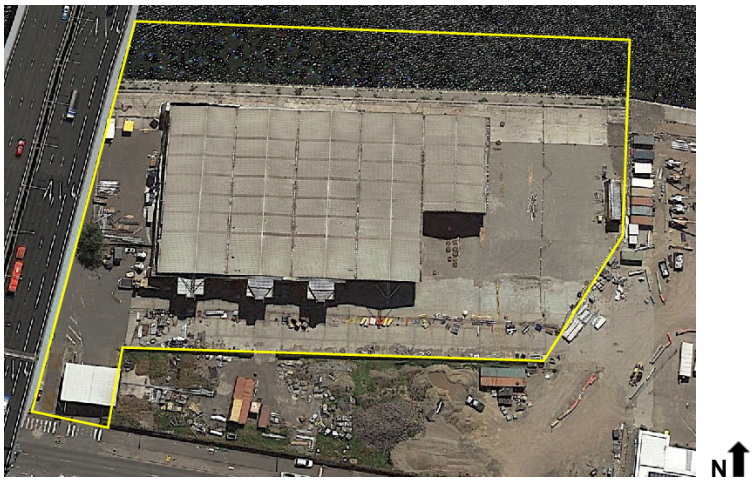

Figure 1: Extent of assessed site shown in yellow

Figure 2: View from Lorimer Street of the 4.5 bays that remain(P Mills, 03/04/2018)

Figure 3: View from south-west showing the road alignment and extension past the building(P Mills, 03/04/2018)

SURVEY DATE: 3 April 2018

SURVEY BY: Helen Lardner, HLCD with Dr Peter Mills

HERITAGE INVENTORY	No	**HERITAGE OVERLAY**	Proposed
PROPOSED CATEGORY	Local significance	**PLACE TYPE**	Wharf, building and road
DESIGNER / ARCHITECT / ARTIST:	Melbourne Harbour Trust engineers	**BUILDER:**	Melbourne Harbour Trust
DESIGN STYLE:	Postwar Period (1945-1965)	**DATE OF CREATION / MAJOR**	1955 wharf apron, 1956 shed

THEMES

HISTORIC THEMES	DOMINANT SUB-THEMES
3. Connecting Victorians by transport and communications	3.2 Linking Victorians by water
5. Building Victoria's industries and workforce	5.8 Working

RECOMMENDATIONS

Recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme as an individually significant place.
Extent of overlay: Part of the site. Refer to figure 12 in the recommendations section of the citation.

SUMMARY

21 South Wharf was established as a berth from 1908. As part of an ambitious 1950s plan to increase port capacity, Shed 21 was constructed in 1956 for mechanised handling of steel. Steel was seen as vital to the economic growth of Victoria and, for 27 years, Shed 21 played a major role in its importation.

Shed 21 was large and included distinctive transverse cranes that travelled on tracks beyond the extent of the shed on both the Yarra River and road sides for loading. A port workers' amenities and office building was constructed between the road apron at the rear of the shed and Lorimer Street (demolished in 2006). In 1972, Shed 21 was also the site of the sinking of the car of Federated Australian Painters and Dockers Union welfare officer, Alfred 'Ferret' Nelson, whose body was never found.

In 1973, the shed was raised by 750mm by insertion of new pieces near the base of the columns. Use of 21 South Wharf for steel handling appears to have ceased by 1983, although other ships continued to use the berth until c1990. Overhead cranes were removed, as well as the extension of the crane tracks beyond the building over the wharf apron, possibly when steel handling stopped. The Bolte Bridge, constructed in 1999, and the development of Docklands, meant that freight ships no longer used the wharves to the east of the bridge.

In 2016, two and a half bays from the eastern end of the shed were demolished. The section of the wharf apron where the cranes ran, which was on timber piles, was also removed and a narrow dropped-level apron introduced at the waterside. The reduced intactness of Shed 21 means that it is only significant at the local level, despite its historical role in Victoria's growth.

HISTORICAL CONTEXT

21 South Wharf Berth

There are mentions of 21 South Wharf as a specific location beginning in the shipping news in 1908, when the steamer 'Kolya' unloaded Jarrah from Western Australia (*The Argus*, 5 October 1908, p.2). The Anglo-Australian liner 'Port Caroline' berthed there in 1909 (*The Age*, 20 March 1909, p.10). The steamer 'Strathearn' arrived at 21 South Wharf from Puget Sound in 1912, with 3,600,000 feet of timber (*The Argus*, 5 February 1912, p.8).

By the 1930s, coal was being unloaded from both the South and North wharves. On the south side, coal was unloaded from around the vicinity of 21 South Wharf to the west up to 30 South Wharf (Airspy photo SLV Acc. No. H91.160/255). Ships such as 'Koonda', brought coal to 21 South Wharf from Newcastle (*The Age*, 7 July 1930, p.8).

Construction of Shed 21

As early as 1952, the Melbourne Harbor Trust made plans for raising the cargo-handling capacity of the Melbourne waterfront by 50% over eight years, at a total cost of £8,000,000, which was half of the cost of the port to date. 8,500,000 tons of cargo had been handled in 1951, and 12,000,000 tons was expected by 1960 (*The Age*, 27 September 1952, p.3). One component of this programme was the construction of a £400,000 berth at 21 South Wharf for mechanised handling of steel, which would also release four previous steel-handling berths for general cargo handling (*The Age*, 27 September 1952, p.3). Steel was currently being unloaded at Berths 1-3 at Victoria Dock (*PMQ*, April-June 1956, p.16). In 1953, to aid in this programme, the Cain government increased the Harbor Trust's borrowing power from £10,000,000 to £13,000,00. The Premier Mr Cain singled out the proposed works at Berth 21 as a particularly interesting feature of the programme (*The Age*, 31 December 1953, p.3).

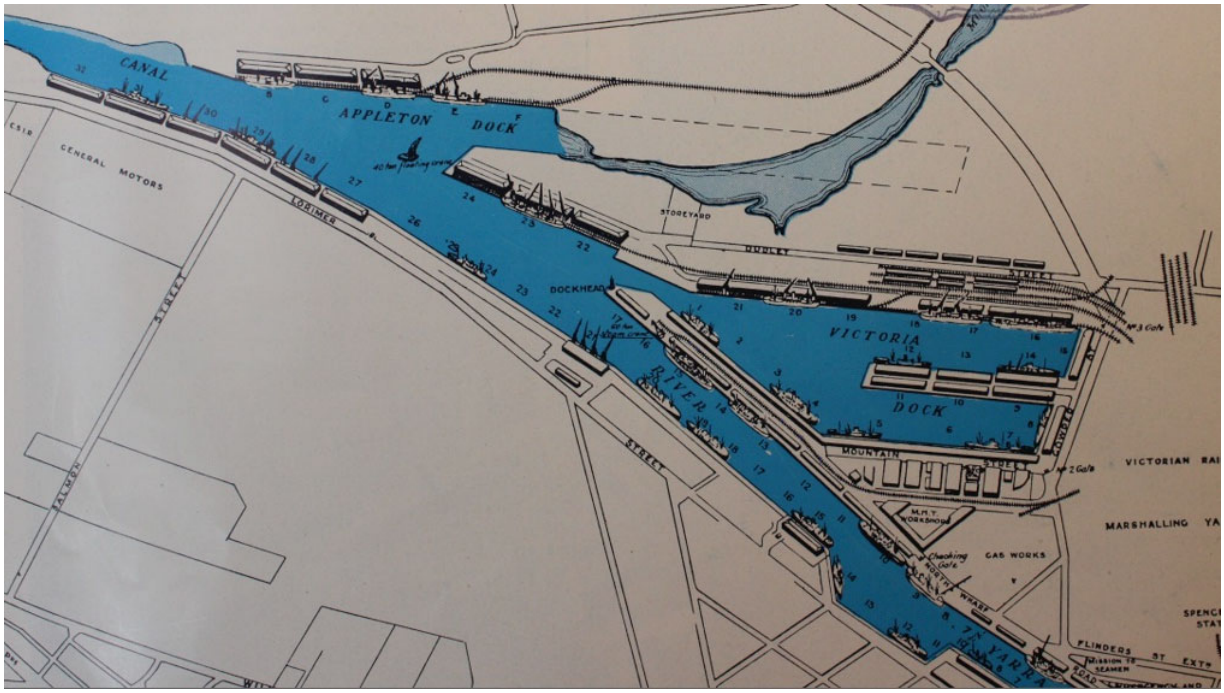

Figure 4: Detail of Port Melbourne as planned in 1956, with 21 South Wharf and its cranes at centre (*PMQ*, October-December 1956, pp.26-27)

The new facilities were designed by Melbourne Harbor Trust engineers to cater for rapidly increasing steel imports from Newcastle and Port Kembla. Works began at 21 South Wharf in April 1952. A new concrete road 100ft wide had already been laid to the rear of the site at a cost of £15,500 (now Lorimer Street). The new berth was to be "completely mechanical" as a part of the Trust's policy of mechanisation of the wharves. Four 6-ton electric level-luffing cranes were to be installed on the wharf apron. The seven-bay shed would feature seven 6-ton overhead-bridge cranes to take steel from the wharf cranes and load vehicles on the road behind. The shed was to be large enough to allow a vessel to discharge steel while cargo was still being cleared from other sections (*The Age*, 24 April 1952, p.3). Pig-iron and scrap could be handled by electromagnets on both wharf cranes and overhead cranes (*PMQ*, January-March 1959, p.15). The first vessel to use the new facility was BHP's 'Iron Knight', on 17 August 1958 (*PMQ*, January-March 1959, p.16). The transverse alignment of the overhead cranes across the shed was unique in the port – all other overhead cranes ran longitudinally in their sheds (*PMQ*, January-March 1959, pp. 13 and 15).

Figure 5: Loading a truck on the south side of the shed, 1958 (*PMQ*, January to March 1959, p.14)

When chief engineer of the Harbor Trust J.B.O. Hosking retired in 1959, he nominated the steel handling facilities at 21 South Wharf as one of the two outstanding projects that gave him special pride (*The Age*, 22 October 1959, p.9). Statistics on the visit of BHP's bulk ore carrier 'Iron Spencer' showed the efficacy of the new facility. The majority of the record 9,486 tons of steel cargo on this ship was unloaded in two days, with 4,500 tons unloaded in to the transit shed in a 24-hour period with "simultaneous clearance by road transport" (Buckrich, p.170). A more typical figure was 3000 tons per day (*PMQ*, October-December 1962).

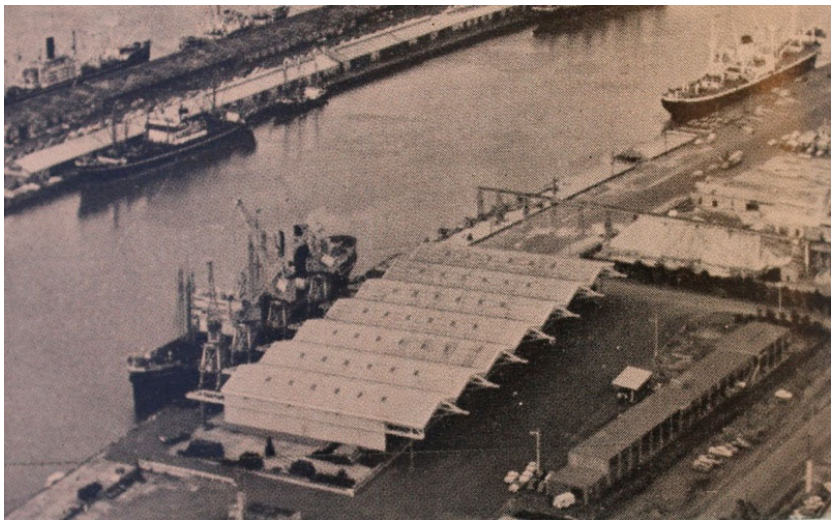

Figure 6: 21 South Wharf, including the amenities and office block in c1962 (*PMQ,* January-March 1963, p.32)

1956 Port Workers' Amenities and Office Buildings

Simultaneously with the construction of the steel handling facilities, the Harbour Trust built a new port workers' amenities and office building between the road apron at the rear of the shed and Lorimer Street. In the late 1950s, the Trust was providing improved workers' facilities at a number of sites in the port. These amenity blocks typically provided dining rooms serving up to 200 workers, along with showers, washbasins and toilets, and in some cases cafeterias (*PMQ*, October-December 1958, pp.34-37).

1972 Alfred ‘Ferret’ Nelson’s Car Sunk at 21 South Wharf

21 South Wharf was also the site of the sinking of the car of Federated Australian Painters and Dockers Union welfare officer, Alfred ‘Ferret’ Nelson. Nelson disappeared in December 1971, on the eve of an election for the union. The Union’s head office nearby in Lorimer Street was burnt out on the same night. Nelson’s Valiant Charger was fished out from 10 metres of water next to 21 South Wharf in January 1972 (*The Age*, 25 January 1972, pp.1 and 3). Nelson’s body was never found.

1973 - Present

In 1973, the whole shed at 21 South Wharf was raised by around 750mm through the insertion of extra pieces of column near the structure’s base (*The Age*, 1 July 1972, p.91). Use of 21 South Wharf for steel handling appears to have stopped by 1983, with the last visit by the ‘Iron Duke’ in May of that year (*The Age*, 24 May 1983, p.19). After a two-year hiatus, the wharf came to be used at a lower frequency by ships unrelated to steel carrying, such as the Department of Transport’s ‘Rig Seismic’ in June 1985 (*The Age*, 8 June 1985, p.19). This may have coincided with removal of the overhead cranes and removal of the extensions of the overhead crane tracks beyond the roof and over the wharf apron. Regular shipping use of the wharf ceased in c1990. With construction of the Bolte Bridge in 1999, and the development of Docklands, freight ships no longer used the wharves to the east of the bridge.

The Port Workers’ Amenities building was demolished in 2006. Two and a half bays from the eastern end of the shed were demolished in 2016. At the same time, the section of the wharf apron where the cranes ran (that was on timber piles), was also removed. A narrow dropped-level apron was introduced at the waterside (Google satellite historical view).

SITE DESCRIPTION

The site is on the south bank of the Yarra River, immediately east of the Bolte Bridge. It comprises the wharf apron, a steel framed, open shed, hard stand and a road apron at the rear. To the west of the shed, it extends to the alignment of the Bolte Bridge and includes the driveways to Lorimer Street and a bitumen apron. To the east of the shed, it includes a 5 metre buffer. The land between the road and Lorimer Street, which once housed the Port Workers’ Amenities building, is excluded. Refer to the area outlined in red on figure 12.

The shed is made up of a series of four gabled bays running at right angles to the river for a length of 150 feet (45.72 metres), and the eastern bay that is half that length. Each bay is 60 feet wide (18.28 metres), and is a welded steel framed structure supported on rows of four columns. Flat parallel chord trusses define each bay and provided tracks for traveling cranes. They have been cut off at the building line on the river side, and their supporting columns have been demolished (figure 7), but still show the transverse alignment of the seven traveling bridge cranes that have been removed, which were unique to the port for their alignment.

The pitched roof trusses have parallel chords with a central cambered section that supports the central tray extending past the building to the south (figure 8). This tray at the apex, is related to a system to transfer electricity to the moving overhead crane. At the wharf end, these wires finished at the end of the shed roof while the cranes extend onto the wharf. At the loading bay, the electricity supply came from a sliding current collector supported on an arm extending past where the crane was unloading. Consequently, at the road side the ends of the wires had to be extended out on steel arms to accommodate this arrangement. Hence, the retention of the extended arms helps to demonstrate the operation of the transfer cranes and their interaction with the wharf cranes.

The recent metal roof cladding is on timber rafters and has translucent panels. The earlier roof cladding is just visible in old photos, and appears to be metal. Timber lining remains under the valley gutters. Circular downpipes are attached to the columns on the southern side and discharge to the lower loading area.

Corrugated iron fascias remain to the north and south, and a corrugated wall on timber framing was recently removed from the west elevation. The wall position is marked by a slight level change to the west apron. On the south side, a reinforced concrete retaining wall, with some extant timber, provides evidence of the undercover truck-loading bay.

Figure 7: The flat, parallel chord trusses originally extended past the building towards the Yarra River, and were supported on columns that have now been severed. They once supported the seven bridge cranes that have been removed. The reinforced extension of the columns can be seen near the base (P Mills, 03/04/2018)

Figure 8: The tray, supported on the cambered part of the roof truss still extends to the south over the truck loading bay, and provides evidence of the electrical supply. Original light fittings are still evident (P Mills, 03/04/2018)

Beneath Shed 21 the surface is concrete with column base plates bolted to concrete pads. Steel columns are branded ‘Kembla’ and some fittings remain, including ladder bars. On the river side, the four level-luffing cranes have been removed. The timber wharf was demolished and replaced by concrete in 2013.

INTEGRITY

Intactness: refers to the degree to which a place retains its significant fabric. Intactness should not be confused with condition as a place may be highly intact, but the fabric may be in a very fragile condition.

Integrity: refers to the degree to which the heritage values of the place are still evident and can be understood and appreciated. (*Victorian Heritage Register Criteria and Thresholds Guidelines*, p.4)

Shed 21 has a high degree of integrity in its fabric and setting. Its ongoing connection to the Yarra River to the north, and the truck loading and road to the south**,** are important in demonstrating the significant scale and innovation of the Shed’s steel handling facilities, including transverse crane alignment allowing simultaneous loading and unloading.

Shed 21 has only moderate intactness due to the loss of the following elements:

- c1985 -Extensions of the overhead crane tracks and supporting columns to the wharf side of the shed. Overhead-bridge cranes were probably removed from the sheds at the same time;
- c2006 -Demolition of Port Workers' amenities and offices building; and
- 2016-17 -Demolition of the wharf apron on timber piles, and removal of two and a half bays from the east end of the shed.

COMPARATIVE ANALYSIS

There are no sheds that are directly comparable with the transverse loading system or the steel handling capability of Shed 21. Other sheds from a similar period include:

- Appleton Dock;
- Sheds 27, 30 and 31 South Wharf;
- Sheds 22 and 24 Victoria Dock; and
- 5 North Wharf.

Figure 9: Appleton Dock on Appleton Dock Road, West Melbourne (Google imagery, March 2013)

The largest sheds built at Appleton Dock in 1956, were 600 ft. long by 150ft wide. These were considerably larger than Shed 21. The E and F Berths at the Appleton Dock were constructed for bulk unloading of coal, and considered to have a "high degree of mechanization" that would allow all of the port's industrial coal to be unloaded there (Ruhen, p.279). They are no longer used for this purpose, and it appears that all related infrastructure has been removed (Google satellite view). The layout and materials of the shed and loading method is very different to Shed 21. Appleton Dock includes what appears to be an original dock with later additions, including a concrete platform and dolphin buffers. The timber wharf is 1.8 km long. (http://vhd.heritagecouncil.vic.gov.au/places/13903).

On the south side of the Yarra River, only Sheds 2, 4-9, 21, 27, 30 and 31 remain. Shed 27, built in 1946 is clad with corrugated iron and has a brick, two-storey office and amenities section on the east end.

Figure 10: Shed 27, South Wharf at 641-713 Lorimer Street, Port Melbourne (Google imagery December 2017)

Figure 11: Shed 30 and 31, South Wharf at 593-629 Lorimer Street, Port Melbourne (Google imagery October 2017)

In 1956, new wharfs and sheds were being built at Nos.30, 31 and 32 South Wharf, near the General Motors - Holden plant. New amenities buildings were planned to accompany every new group of sheds (*PMQ*, July-September 1956, pp.22-25). Sheds 30 and 31 are corrugated iron clad sheds with sliding metal doors to each side. Both have two storey brick and steel-framed amenities sections within the main roof line; Shed 31 has an addition to the top floor seen in the photograph above.

Sheds at 22 and 24 Victoria Dock are welded steel, portal frame structures clad in corrugated iron with brick end walls. They belong to the last period of manual handling for ship cargoes (Biosis, p.201). Sheds 9 and 14 at Victoria Dock are significant as the first sheds at Victoria Dock to be re-designed to accommodate mechanical handling equipment in 1942 (http://vhd.heritagecouncil.vic.gov.au/places/3705). Constructed in c1948**,** 5 North Wharf is significant for its intactness as a conventional pre-container wharf.

ASSESSMENT AGAINST CRITERIA

✓	**CRITERION A** Importance to the course or pattern of our cultural or natural history (historical significance).
	CRITERION B Possession of uncommon rare or endangered aspects of our cultural or natural history (rarity).
	CRITERION C Potential to yield information that will contribute to an understanding of our cultural or natural history (research potential).
	CRITERION D Importance in demonstrating the principal characteristics of a class of cultural or natural places or environments (representativeness).
	CRITERION E Importance of exhibiting particular aesthetic characteristics (aesthetic significance).
✓	**CRITERION F** Importance in demonstrating a high degree of creative or technical achievement at a particular period (technical significance)
	CRITERION G Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. This includes the significance of a place to Indigenous peoples as part of their continuing and developing cultural traditions (social significance).
	CRITERION H Special association with the life or works of a person, or group of persons, of importance in our history (associative significance).

STATEMENT OF SIGNIFICANCE

What is Significant

Shed 21 South Wharf, comprising the wharf apron, a steel framed, open shed, hard stand and a road apron at the rear, constructed in 1956 for mechanised handling of steel, is significant at the local level.

How it is Significant

Shed 21 South Wharf is of local historical and technical significance to the City of Melbourne.

Why it is Significant

Shed 21 South Wharf is of historical significance as it represents an important phase of development of Melbourne's docks, being post-war expansion and mechanisation. Steel was seen as vital to the economic growth of Victoria and, for 27 years, Shed 21 played a major role in its importation. (Criterion A)

Despite the loss of the cranes, Shed 21 South Wharf is of technical significance for its demonstration of mechanisation in the mid-twentieth century. The transverse alignment of the overhead cranes across the shed was unique in the port, as all other overhead cranes ran longitudinally in their sheds with projections at the end for loading. The Shed 21 arrangement allowed simultaneous unloading of steel from the river berth and vehicles to be loaded directly in the southern bay.(Criterion F)

Shed 21 has some historical significance for its association with the Painters and Dockers Union, but not at the threshold level for local significance. There appears to be little fabric around Melbourne directly related to this union. The association with Shed 21 is limited to the dumping of a car and the demolished Port Workers' Amenities building.

RECOMMENDATIONS

The extent shown in red (figure 12) is recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme, as an individually significant place. It comprises the area outlined in red, including wharf, shed and road immediately behind the shed, to an eastern extent 5 metres beyond the building, and a western extent of the alignment with Bolte Bridge.

Figure 12: The recommended extent for inclusion in the Heritage Overlay of the Melbourne Planning Scheme

Recommendations for the Schedule to the Heritage Overlay (Clause 43.01) in the Melbourne Planning Scheme:

Melbourne Planning Scheme

EXTERNAL PAINT CONTROLS	No
INTERNAL ALTERATION CONTROLS	No
TREE CONTROLS	No
OUTBUILDINGS OR FENCES (Which are not exempt under Clause 43.01-3)	No
TO BE INCLUDED ON THE VICTORIAN HERITAGE REGISTER	No
PROHIBITED USES MAY BE PERMITTED	No
NAME OF INCORPORATED PLAN UNDER CLAUSE 43.01-2	No
ABORIGINAL HERITAGE PLACE	No

REFERENCES

The Age (Melbourne), as cited.

The Argus (Melbourne), as cited.

Biosis, *Southbank and Fishermans Bend Heritage Review 2017*, as cited

Buckrich, Judith R., 2002, *The long and perilous journey: a history of the Port of Melbourne*, Melbourne Books, Melbourne.

Herald (Melbourne), as cited.

Port of Melbourne Quarterly (*PMQ*), as cited.

Ruhen, Olaf, 1976, *Port of Melbourne: 1835-1976*, Cassell Australia, Stanmore, NSW.

Sydney Morning Herald (*SMH*), as cited.

PREVIOUS STUDIES

Southbank and Fishermans Bend Heritage Review 2017	Recommended as a place of local heritage significance

5.7 West Gate Bridge Citation

SITE NAME	West Gate Bridge
STREET ADDRESS	Port Melbourne to Spotswood, over the Yarra River
PROPERTY ID	30658; 638532; 644341

Figure 1: The West Gate Bridge spans the Yarra River

Figures 2 and 3: The Westgate Bridge and memorial to the 35 w orkers who died during its construction (H Lardner, 9/07/2018)

SURVEY DATE: 9 July 2018 SURVEY BY: Helen Lardner, HLCD with Dr Peter Mills

HERITAGE INVENTORY	No	**HERITAGE OVERLAY**	No
PROPOSED CATEGORY	State significance	**PLACE TYPE**	Bridge and memorial park
FORMER GRADE	Ungraded		
DESIGNER / ARCHITECT / ARTIST:	Freeman Fox & Partners Maunsell & Partners	**BUILDER:**	World Services & Construction Pty Ltd John Holland Constructions Pty Ltd
DESIGN STYLE:	N/A	**DATE OF CREATION / MAJOR CONSTRUCTION:**	1968-1978

THEMES

HISTORIC THEMES	DOMINANT SUB-THEMES
3. Connecting Victorians by transport and communications	3.4 Linking Victorians by road in the 20th century
6. Building towns, cities and the garden state	6.2 Creating Melbourne
8. Community life	8.5 Preserving traditions and commemorating

RECOMMENDATIONS

Recommended for nomination to the Victorian Heritage Register.
Extent of overlay: Refer to figure 14 in the recommendations section of the citation.

SUMMARY

The West Gate Bridge, constructed 1968-1978, spans the Yarra River and links the City of Melbourne with the Western suburbs and Victoria's southwest. It is a cable-stayed, box girder bridge of 28 spans, with five main river spans made up of steel box girders and approach spans of concrete box girders. The sinuous curve of the West Gate Bridge is one of its defining features. It has clean lines punctured by two pylons that anchor the cable stays for the river crossing section.

During construction on 15 October 1970, the span between piers 10 and 11 collapsed and fell, killing 35 construction workers and injuring 18 people. The Royal Commission that followed concluded that the collapse was due to the structural design by Freeman Fox & Partners, and the construction methods of contractors World Services and Construction. A memorial to the men who died was unveiled at the base of Pier 10 on 15 October 1978, by the workers who completed the job. In 2004, West Gate Memorial Park was established to honour the deceased. The fortieth anniversary of the collapse in 2010 was marked by exhibitions and a new dedicated Memorial Plaque. A lasting legacy from the disaster was the dramatic improvements made to workplace safety and post-incident procedures, following the Commission report. The West Gate Bridge disaster has come to symbolise the responsibility of industry to provide workers with a safe work place.

Many Melbourne families have a personal story about avoiding the bridge, either due to suspicion continued about its structural stability, or because they saw it as a sorrowful place associated with the construction disaster and as a notorious suicide location. The bridge also has positive associations, valued as the link between the city and the west. The West Gate Bridge has been celebrated through artworks, writing and performance as it looms large as a Melbourne landmark.

HISTORICAL CONTEXT

The Need for a Lower Yarra Crossing

Williamstown Council inaugurated a steam ferry crossing of the Yarra River from Newport in 1873. The aging ferry was replaced in 1907 by another steam ferry, which sank in the river in 1931. This was replaced by the 'Newport Steam Ferry No. 3', a steel-hulled steam vessel that used a pair of chains to pull itself across the river. The service ended in 1974. A bridge had been designed in 1906, and a tunnel was suggested in 1936 (Hitchings, pp.9-10). Proposals for Lower Yarra bridges generally failed because the development of Melbourne's river wharves and docks upstream meant that any bridge would have to be either tall enough to allow the largest ships to pass underneath, or would have to provide a complex opening span.

The 1954 Melbourne Metropolitan Planning Scheme, prepared by the city's planning authority, the Melbourne and Metropolitan Board of Works, included plans for a series of interlinking arterial roads for the city. A number of these were to radiate from the CBD, and others were to circulate around the city as ring roads. About 450 kilometres of road was proposed in the scheme, many of which was subsequently built as freeways (Anderson, pp.200-204). A crossing of the lower Yarra was implicit in this plan.

The increasing demands generated by motor vehicle travel resulted in the establishment of the Metropolitan Transportation Committee. Its 1964-1966, the Melbourne Traffic Plan prescribed a radical freeway-based remedy for Melbourne's transport problems. Within the decade, the South Eastern and Tullamarine Freeways had been constructed, and a start made on the West Gate Bridge Crossing, Eastern Freeways, and a network of reserves for future freeways were established (Anderson, p.206).

Local lobbying for a bridge on the lower Yarra was ongoing. In 1957, industries in Williamstown, Spotswood, Altona and Footscray formed the Western Industries Association to lobby for a crossing of some description across the Lower Yarra. Their efforts resulted in discussions in 1958 between the government, the association and interested municipalities. The Minister for Public Works intimated that there was no money available to build the crossing, suggesting it might be financed by private enterprise (RC,p.10).

A company called the Lower Yarra Crossing Company Ltd was formed in 1961 to pursue further negotiations with the government. In 1964, the government appointed a committee with representatives from the Harbor Trust, the Country Roads Board, and the Board of Works to examine the question of whether the crossing should be made by way of a bridge or a tunnel. The committee failed to agree on an answer, but in any case, Premier Bolte announced that the crossing would be a bridge (RC, p.10).

Under the Lower Yarra Crossing Authority Act 1965, the Lower Yarra Crossing Authority Ltd was authorized to borrow money on debentures to finance the construction of the crossing, to undertake compulsory acquisition of land, and to raise tolls on the bridge when completed (RC, p.11).

Consulting engineers Maunsell & Partners, who had previously investigated designs, suggested working with an English consulting and civil engineering firm with a worldwide reputation in this field, Freeman, Fox & Partners (FF&P). Maunsell and FF&P were selected as joint consulting engineers. The two engineering companies prepared an investigative report and then a more detailed report. (RC, p.11). The engineers recommended a cable stayed box-girder bridge design. Box-girder bridge design evolved rapidly during the period of reconstruction in Europe after World War II. It produced an economical design where the road surface followed the top of the girder. Its popularity may also have derived from a move away from suspension bridges after the Tecoma Narrows Bridge collapse in 1940 (Brady, 2016).

Tender documents for three separate contracts were issued in October 1967. The steel bridge works contract was awarded to World Services & Construction Pty Ltd (WSC), the Australian subsidiary of Netherlands-based Werkspoor Utrecht N.V. Both the concrete bridge works and the foundations contracts were awarded to John Holland (Constructions) Pty Ltd (JHC), a Melbourne-based company with extensive experience in concrete construction work (RC, p.12).

Construction

When construction commenced in April 1968, it was hoped that the bridge would be finished by the end of December 1970. However, in February the Authority gave notice to WSC to show cause for its slow progress or penalties would be imposed. A settlement was reached in which WSC continued to fabricate the steel box-girder sections on the ground, but JHC would be responsible for erecting the box girders and completing the roadway (RC, p.12; Hitchings, p.33). JHC, with no previous experience in box girder construction, was only prepared to undertake the work if responsibility for engineering decisions was shifted to FF&P (RC, p.80).

The main river span and two spans on either side, numbered spans 10-11 through to 14-15, were constructed of steel trapezoidal box girders. The 14-15 and 10-11 spans were erected in a previously-untried method involving fabrication on the ground into two longitudinally divided halves. The half-box units making up the box girders were fabricated in two workshops at the bridge site, and shifted close to their final span positions before being bolted together on temporary staging. The assembled half-spans were then jacked up, rolled into place over the pier and bolted together along their length. This method had never been attempted before (RC, p.16).

Figure 4: The West Gate Bridge under construction, photographed by John T Collins on 20 September 1970, less than a month before the tragic collapse of a span (SLV H98.250/2167, http://handle.slv.vic.gov.au/10381/234189)

On 2 June 1970, one cantilevered span of the Milford Haven Bridge in Wales collapsed during construction, killing four men. FF&P were the builders and designers, and this bridge had many features in common with the West Gate Bridge design. This collapse followed the 'failure' of another box-girder bridge, the Fourth Danube Bridge in Vienna, in November 1969. This bridge had sagged 3ft along its length. Questions were now asked about the safety of the West Gate Bridge (RC, p.12).

After the Milford Haven collapse, FF&P took steps to strengthen the West Gate Bridge design to increase safety margins and provide a 'belt and braces' approach to critical members during construction. In other words, if one measure failed, another measure or measures should have protected the structure. They assured JHC that the bridge design was adequate during all stages of erection. The same assurance was used to allay the suspicions of the unions on questions of workplace safety. The Royal Commission later concluded that there was no proper basis for this assurance (RC, p.100).

At the time that JHC took over the steel contract, the two half-spans on the east side of the river between piers 14 and 15 were positioned on top of the pier, but not joined. During the lift, however, one of the spans had developed a considerable buckle in the top free flange, where insufficient temporary stiffening had been applied. Rather than fix this on the ground where loads could be taken off the span, the lift was completed. The buckle was repaired in situ

by removal of bolts from the transverse splices of the box units to relieve the stress, followed by re-bolting. As a result, the bracing of the free flanges of the western half-spans was increased, and the top flange further stiffened. After completing the longitudinal joining, JHC commenced the cantilevering for the 13-14 span (RC, p.13; Brady, 2016).

The Collapse

The two half-spans between piers 10 and 11 were lifted into place. When the two half-girders were brought into close proximity, there was a difference in camber of about 4½ inches (114.3mm). The longitudinal jointing was less than one third completed. JHC proposed that time might be saved if the vertical difference of level was taken out by using kentledge (heavy weights) to push down the north half span relative to its south counterpart. This kentledge was added on 5 September 1970.

On the following day it was found that a major buckle had developed in one of the inner upper panels of the north span. The remaining camber difference of 1 inch (25.4mm) was taken out with jacks and the inner diaphragms were connected to the south span, but one section of the upper flange was so buckled that the inner transverse beam at box 4 could not be bolted to the diaphragm. The kentledge was removed. Before completion of the longitudinal splice of the upper and lower flanges, FF&P ordered an attempt to remove the buckle with a method similar to that used earlier on the 14-15 span (RC, pp.13 and 22-23).

On 15 October 1970, several bolts were removed from the transverse splice between the fourth and fifth box units, which flattened the buckle, but the buckling spread into adjacent panels and the web plate. At 11.50 am, span 10-11 collapsed (RC, pp.24-25). At the time of the collapse, men were working on the span in various capacities. Other men were in or near some huts which had been placed immediately beneath the span, and onto which the span fell. Of the men on the bridge, or beneath it, 35 were killed outright, or died as a result of their injuries. Many other workers were injured. The Commissioners concluded that this was the worst industrial accident in Victoria's history (RC, p.9).

Following the crash, those close at hand gave emergency aid to the injured. As news of the crash hit Melbourne, the government activated Stage 2 of the State Disaster Plan, and all available firemen, ambulance officers and police officers were called in. Many other people became directly involved at the scene. Cranes were brought in to attempt to free those trapped under the fallen span. Some bodies were not recovered for several days after the collapse (RC, pp.9-10).

Figures 5 and 6: The Collapse of the West Gate Bridge and the frantic efforts to locate survivors (Photographers unknown, The West Gate Bridge Memorial website http://www.westgatebridge.org/)

The Royal Commission

On the following morning, 16 October, the Premier Henry Bolte announced that a Royal Commission would be set up immediately to investigate the cause of the disaster. The Royal Commission into the Failure of the West Gate Bridge, chaired by Mr. Justice Barber, began on 28 October 1970. The commissioners completed collecting the evidence from the 52 witnesses in May 1971, after sitting for 73 days. The report was released in the Victorian Parliament on 3 August 1971. The Royal Commissioners summed up very succinctly their findings on the cause of the disaster:

> *The disaster which occurred at noon on the 15th October, 1970 and the tragedy of the 35 deaths was utterly unnecessary. That it should have been allowed to happen was inexcusable. There was no sudden onslaught of natural forces, no unexpected failure of new or untested material.*
>
> *The reasons for the collapse of span 10-11 are to be found in the acts and omissions of those entrusted with building a bridge of a new and highly sophisticated design.*
>
> *The various companies who supplied the materials used were not shown to be in any way at fault and must be held blameless. However, among those engaged upon the design and construction of the steel spans there were mistakes, miscalculations, errors of judgment, failure of communication and sheer inefficiency. In greater or less degree, the Authority itself, the designers, the contractors, even the labour engaged in the work, must all take some part of the blame. Error begat error, and the events which led to the disaster moved with the inevitability of a Greek tragedy (RC, p.97).*

The disaster at the West Gate Bridge, and the two other bridge failures before it, forced a reevaluation of box-girder bridge construction around the world.

Completion

The Lower Yarra Crossing Authority sacked Maunsell and Partners and FF&P. A new directorate of engineering took over. Construction was to be by a new consortium, led by Redpath, Dorman, Long, who had built bridges including the Sydney Harbor, Auckland Harbor, Forth in Scotland and Severn in Wales. The consortium included John Holland Construction. An advisory panel of top-line experts was on call. Major modifications were made to strengthen the design and improve the method of erection (Hitchings, pp.108-111). A new pier 11 was commenced in July 1972. Within three months a worker died falling from steelwork. (Hitchings, pp.120 and 123).

On the third anniversary of the collapse, a memorial plaque, paid for and erected by the bridge workers, was attached to the base of pier 10. The bronze plaque dedicated to the memory of the workers who died in the collapse was mounted on a red granite backing. Families, friends and workmates have gathered at this spot every year since to remember them (Hitchings, pp.129-30; the West Gate Bridge Memorial website).

Ultimately, the project took 10 years to complete and cost $202 million. On 15 November 1978 the bridge was officially opened to traffic by Premier Hamer, who paid tribute to those who lost their lives: “they died that those of us who remain might step more safely into the future”. Widows of the men killed in the collapse were seated on the dais. 20,000 cars passed over the bridge in the first six hours (*The Age*, 16 November 1978, pp.1 and 4).

The bridge toll was never popular, and because alternative existing routes were still attractive, traffic volumes on the bridge did not meet projections. A three-month campaign was started in May 1979 by the West Gate Bridge Authority who employed racing driver Jack Brabham to persuade radio listeners to save fuel by using the bridge (*The Age*, 23 May 1979, p.3). The impost of the toll became the subject of stories. In 1980, Footscray based parents of young athlete Robyn Strong spent over $300 a year on tolls taking her to training at Olympic Park (*The Age*, 10 January 1981 p.22). The government removed the tolls in 1985 (*The Age*, 30 November 1985, p.4).

The 'Lower Yarra Freeway' had been built from the Princes Highway to Altona North by 1969, but continuation across the Yarra had to wait until the bridge opened in 1978. By this time, the Country Roads Board (CRB) was responsible for the construction of highways and bridges in the Metropolitan area. The freeway was renamed the West Gate Freeway. By 1979, the CRB had spent $15m on the western freeway approach (CRB, 1979, p.9).

In 1988, the 3.6 km long 'West Gate elevated highway', which linked the eastern end of the West Gate Bridge through to Kingsway, Sturt Street and St Kilda Road, was completed under the Road Construction Authority. The elevated section included twin bridges, each 1.85 km long (Anderson, p.240). In 1997, the Western Ring Road was connected to the West Gate Freeway, and in 1999 the Melbourne City Link connected the West Gate Freeway with the Tullamarine Freeway (via the Bolte Bridge) and South Eastern Freeway (renamed the Monash Freeway).

A major widening of the West Gate Freeway between Altona North and the West Gate Bridge was completed in 2000. In 2002 the west side concrete approach span girders were strengthened by the application of carbon-fibre reinforcing strips to allow widening of the Williamstown Road on-ramp by an additional lane.

The West Gate Bridge Memorial Park Association was formed c2000 with representatives from unions, business, community groups and local and State government, to create a memorial park in the neglected area around the memorial. The Association aimed to "encourage awareness in the community of workplace accidents by encouraging debate and action with government, industry and the trade union movement to promote safe work environments". It included the Spotswood Yarra Sewer Tunnel collapse of 1895 in its purview (*The Age*, 15 October 2000, p.13).

The 34th anniversary of the disaster in 2004 was marked as usual by families, friends and workmates, but also included the opening of the West Gate Bridge Memorial Park. The $1 million park was funded by Work Cover, Parks Victoria, Vic Roads and the Community Support Fund. It included a screened area around the original memorial, and a boardwalk where the span fell designating a 'sacred zone'. The boardwalk was edged by 35 symbolic sculpted pillars (The West Gate Bridge Memorial website).

In 2008, with traffic flows reaching an average of 160,000 vehicles a day, the West Gate Bridge was nearing its maximum capacity and work commenced on a major upgrade. A fifth lane was added in either direction for use in peak hour traffic flows, requiring strengthening of the outer edge of the decking. 'Anti suicide' safety barriers were installed in response to the bridge being used for this purpose, and a new traffic management system was employed.

SITE DESCRIPTION

The West Gate Bridge is now part of the West Gate Freeway that links the central city with the western suburbs and Victoria's southwest, particularly the regional city of Geelong. It spans the Yarra River from Port Melbourne to Spotswood, not far north of the river estuary. It is currently the only western river crossing for vehicles, although the West Gate Tunnel Project is under construction. The West Gate Freeway is an important part of Melbourne's infrastructure. From 1997, it connected to the Western Ring Road to the north and, from 1999, Melbourne City Link provided connections to the Tullamarine Freeway via the Bolte Bridge and the Monash Freeway through two tunnels under the Yarra River.

When the bridge opened in 1978, it provided a route for the growing residential populations of the east, which by-passed the city centre to the industrial west, and holiday locations such as Geelong and the Great Ocean Road. It

originally consisted of two four-lane carriageways and an emergency lane in either direction. Now a fifth lane has been added to each side.

The sinuous curve of the West Gate Bridge is one of its defining features. It has clean lines punctured by two pylons that anchor the cable stays for the river crossing section. Victorian and Australian flags were added to flagpoles on the top of the pylons by the Victorian government in 2007.

Figure 7: The distinctive curve of the West Gate Bridge and its central pylons with cable stays (https://www.melbournepoint.com.au/information/west-gate-freeway/)

The West Gate Bridge is a cable-stayed box girder bridge. It has 28 spans with five across the Yarra River. There are both concrete and steel box girders, but the main river spans are steel. The bridge is supported by concrete and steel piles extending down to solid rock. The cable stays support the wide and tall spans that allow the passage of ship traffic on the river to and from the Port of Melbourne.

Figure 8: Lifting of a box girder during construction (Laurie Richards Studios, 1969, MOV Item MM 55221)

An assessment report by the National Trust of Australia (Victoria) records that the overall length of the bridge is 2582.6 metres with the main river span of 336 metres. The piles extend up to 60 metres high from solid rock. Over 90,000 cubic metres of concrete and 13,000 tonnes of reinforced steel were used in its construction.

There have been a number of modifications to the bridge, including major works in 2008 when the outer edge of the decking was strengthened to allow the fifth lane for each direction during peak use. For example the low road

barriers, and the original mushroom shaped lighting on tall slender stanchions placed in the central median, which was replaced by VicRoads in the early 1980s (figure 9).

Figure 9: The West Gate Bridge just prior to opening. Note the low side rails and distinctive mushroom-shaped lighting on tall, central stanchions (https://www.reddit.com/r/melbourne/comments/54dylg/westgate_bridge_pic_during_construction/)

Figure 10: The West Gate Bridge in 2018 after works to strengthen the outer edge for an additional traffic lane and taller safety barriers. (H Lardner, 09/07/2018)

The tragic collapse of the bridge during construction is now commemorated in a number of ways. A memorial plaque was paid for and erected by bridge workers, and unveiled on 15th October 1978, to honour those who died as a result of the bridge collapse. It is on pier 10, the site of the collapse, and faces Hyde Street. The inscription reads:

> '*Construction workers employed on West Gate Bridge erected and dedicated this memorial to their 35 workmates who were killed when a span of the bridge collapsed during construction at 11.50 am on 15th October 1970.' It alphabetically lists the names of the men who lost their lives, ending with the dedication 'In memory of workers of all lands who are killed in industrial accidents'.*

The West Gate Bridge Memorial Park, opened on the 34th anniversary of the disaster, is located on the site of the collapse. As well as the West Gate Memorial on pier 10, it includes a boardwalk lined with 35 granite pillars, which provide a modern interpretation of the traditional cemetery symbol of a broken column representing a life tragically cut short. The Memorial Park includes a separate tribute to 'Joe' Owens, a rigger who was tragically killed during construction on 7th December 1972. The area is landscaped and sign posted to encourage contemplation for visitors.

Figure 11: The West Gate Bridge Memorial Park includes 35 symbolic sculptured pillars in a landscaped setting in the area w here the actual tragedy occurred. (H Lardner, 09/07/2018)

There are other reminders of the tragedy away from the scene of the collapse, including a section of box girder in West Gate Park immediately north east of the bridge. The Clayton Campus of Monash University has fragments from the collapsed section of the West Gate Bridge in its West Gate Garden. According to the website, Monash University was asked to participate in the investigation into the cause and 'it is said that these twisted fragments were placed in the West Gate garden to remind future engineers of the consequences of errors' (https://www.monash.edu/about/our-locations/clayton-campus/gardens-at-clayton/west-gate-garden)

THE SYMBOLIC IMPORTANCE OF THE WEST GATE BRIDGE

The Tragedy and its Legacy

The West Gate Bridge disaster has progressively come to symbolise the vulnerability of all Australian workers in the workplace, and to act as a reminder of the ongoing need for vigilance. The connection of the West Gate Bridge disaster to industrial and work-place safety more generally, which was started by the families, friends and workmates of those who died soon after the disaster, has persisted and expanded. The dedication on the 2010 Memorial Plaque 'In memory of workers of all lands who are killed in industrial accidents' was a clear message about the universality of their commemoration. The West Gate Bridge Memorial Park website states that the Park:

> *'embraces the existing West Gate Bridge Memorial and Sculpture, the Spotswood Sewer Tunnel Memorial, and complements (the) Industrial Deaths Support and Advocacy (IDSA) Workers' Memorial erected at Victorian Trades Hall Council. Located on the actual site of the bridge's collapse, the Memorial Park is evocative of the tragedy of workplace accidents while honouring the notion of work.'*

The Royal Commission outcomes played a large part in establishing a positive legacy, particularly through improving institutional responses to disaster (Koperberg, p.vii).

In 2015, the Labor government ordered the lowering of the West Gate Bridge flags to half-mast each year at the anniversary of the collapse. In the press release on this occasion the Finance Minister Robin Scott stated: "The West Gate Bridge disaster serves as a historic reminder of the need to concentrate on safety at work" (https://www.premier.vic.gov.au/tribute-to-victims-of-westgate-bridge-tragedy/, accessed 10 July 2018).

As well as its role in commemorating lives lost and as the place of one of Australia's worst industrial disasters, many Melbournians have a personal story about how the bridge has touched their lives and become part of their biography. Typically, stories relate to family members avoiding the bridge, either because suspicion continued about its structural stability, or as it was a sorrowful place as a result of the disaster and as a notorious suicide location. Unfortunately the sense of tragedy continued with the death of a Melbourne girl, Darcey Freeman, aged 4, who was thrown from the bridge by her father in January 2009. Following this incident, temporary barriers and then permanent 'suicide prevention barriers' were installed along the length of the bridge.

The West Gate Bridge disaster and its connotations serve as persistent reminders of the possibility and danger of loss. Melbourne journalist and academic Lawrie Zion`. wrote in 2011, "… for all its grace, for all the skill involved in the construction and now the strengthening, the bridge is a powerful reminder of our weaknesses, vulnerabilities, failures and fears" (Zion, 2011).

The fortieth anniversary of the collapse in 2010 was marked by exhibitions about the disaster including 'West Gate: Images from the Police Archives' at the Victoria Police Museum, which displayed forensic photos taken by police at the scene and used in the Royal Commission inquiry (Victoria Police Museum website, http://www.policemuseum.vic.gov.au/exhibitions/past-exhibitions, accessed 10 July 2018).

Kate Luciano, curator of the Public Records Office of Victoria's *West Gate Bridge Collapse: 40 years on* exhibition at the Old Treasury Building said the bridge changed the city of Melbourne, and the collapse is intertwined with its story. To tell the story from a wider perspective, Luciano collected artworks, including several pastel-toned strip-shaped gouaches by Fred Williams, which show the bridge half-constructed, to the point where it collapsed. Another painting, by Victorian artist Tony Lloyd, showed the bridge's massive supporting pylons and the roadway from underneath, cutting through a blood-red sky.

The only good to come out of the collapse, Luciano stated, was the better understanding of the dramatic improvements in workplace safety and post-incident procedures. At the time, the workers themselves spent all day and night digging for their mates in the mud and rubble. Then, as one survivor told the interviewers: "The bridge collapsed on the Thursday, we got sacked on the Tuesday and then we started going to funerals". Because the site was shut down, the workers lost their jobs with no compensation or counselling. This was not rectified until after a public outcry. A proper memorial park was not opened until 2004.

Luciano believed that anyone who was alive at the time remembers where they were when it happened because of the death of 35 men and the importance of the bridge itself. "It was a September 11 moment for Melbourne," she stated. (Sinclair)

Other Cultural References to the West Gate Bridge

There are countless other references to the bridge in popular culture. As well as the art works mentioned above, Williams painted other views of the bridge (figure 12) and artist Rick Amor sketched metalworkers there in the 1970s, and painted it repeatedly in his waterfront series.

Don Henderson's album *Ton of Steel* (1971) featured 'The Westgate Bridge Disaster,' written by Henderson at the union's request as a memorial to the 35 men who died (https://adb.anu.edu.au/biography/henderson-donald-james-don-15169). Mark Seymour's song 'Westgate' is described on the album as it 'tells the tale of one man's survival story, Eddy Halsall, the luckiest man alive, who narrowly escaped death during the collapse of the West Gate Bridge in 1970'. The independent band Sleepy Township, had a song about the tragedy and Melbourne choreographer Lucy Guerin took the ideas of physical tension and collapse in her 2006 bridge-themed dance *Structure and Sadness*, which was restaged at the Malthouse Theatre in 2010.

Both the bridge and the disaster have appeared in fiction. Peter Temple's multi-award-winning crime novel *Truth* (2009), opens with two policemen on the West Gate Bridge, one telling the other how his grandfather survived the collapse: "Never go over here without thinking," he says, going on to say his grandfather "rode the dunny all the way down". Interestingly, a celebrated 2018 novel, Enza Gandolfo's *The Bridge,* takes the factual event of the West Gate Bridge collapse and the aftermath through the decades and turns it into a story about a fictional rigger, Antonello.

The curve of the West Gate Bridge features in the original *Mad Max* film (1979) and other successful local films. In *Head On* (1998), the central protagonist 'circles and approaches Melbourne across the mammoth West Gate Bridge, serving to signify the divide between the west and the centre'. In *Angel Baby* (1995), the lead figure Kate goes to the bridge, a place notorious for suicide and the construction tragedy, and 'spreads her arms and calls like a bird, soaring above her troubles'. But her happiness is short lived and in the closing moments of the film, her partner Harry 'returns to the West Gate, summoning the memory of Kate's joyful gesture as a bridge to his own future'. (World Film Locations ed. Neil Mitchell)

Even in sport, for many Melburnians there was a sense that the West Gate Bridge was significant as a 'place of passage', an important part of journeys out of, or into, the city. It was a symbolic link between the *west and the rest*. This was evident in the then Victorian Football League (now AFL) when a defeat by Geelong, the only team in the competition not based in Melbourne suburbs, made the trip home unbearable. When St Kilda lost by 100 points at Geelong in 1981, an attendant told a driver who happened to be a supporter "you wouldn't want to be a St Kilda supporter after today's effort, would you?" The driver wrote "I pitied the dozens of St Kilda supporters with whom he had joked that Saturday afternoon. As if a 100-point defeat was not enough …" (*The* Age, 15 June 1981 p.24).

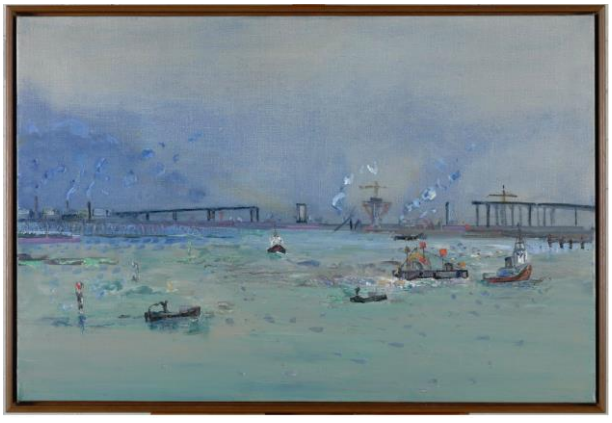

Figure 12: 'West Gate Bridge under construction II' painted by Fred Williams (1927-1982) in 1974 (SLV H2010.186/2, http://handle.slv.vic.gov.au/10381/94334)

INTEGRITY

Intactness: refers to the degree to which a place retains its significant fabric. Intactness should not be confused with condition as a place may be highly intact, but the fabric may be in a very fragile condition.

Integrity: refers to the degree to which the heritage values of the place are still evident and can be understood and appreciated. (*Victorian Heritage Register Criteria and Thresholds Guidelines*, p.4)

The West Gate Bridge, Memorial Plaque and West Gate Memorial Park all have high integrity.
The West Gate Bridge is highly intact as an example of a large span, cable-stayed box girder bridge.
The changes to fabric from the 1978 opening include:

- Lighting, safety barriers, structural strengthening to allow a fifth lane in each direction, and
- Additions such as suicide prevention barriers, signage, cameras, terrorist boom gates etc.

These changes are largely superficial and do not detract from the heritage values of the place. They are to be expected with a working piece of infrastructure. The loss of the distinctive mushroom-shaped lighting on tall, central stanchions (see figure 9) detracts from the original aesthetic design of the bridge.

COMPARATIVE ANALYSIS

The West Gate Bridge is of technical significance as an example of a large span, steel cable-stayed, box girder bridge. There are only a few cable-stayed bridges in Australia. The Batman Bridge over the Tamar River Tasmania, built in the 1960s, was the first cable-stayed truss bridge. The Anzac Bridge at Pyrmont, NSW, completed in 1995, is a cable-stayed, concrete bridge with a 345 metre main span. The main span of the West Gate Bridge is 336 metres and it was completed 17 years earlier. When completed in 1978, the West Gate had the third longest span of any cable-stayed bridge in the world. Today there are many other examples of cable-stayed bridges and spans with around 400 metres being common. (National Trust of Australia [Victoria]).

According to Biosis, there are no other bridges in Australia that are of a scale and a construction form comparable with the West Gate Bridge. The two bridges of the same design and construction method, both involving Freeman Fox & Partners, were Milford Haven in the UK and Fourth Danube Bridge in Austria. After the tragedies at Milford Haven and the West Gate bridges, many later bridges adopted the design, but rarely the same construction method. As well as the Anzac Bridge mentioned above, there is also the Eleanor Schonell Bridge (2006), which is a 390 metre long bridge across the Brisbane River.

In the City of Melbourne, the Seafarers Bridge might be seen as taking its cable-stayed form from the West Gate Bridge, as well as referencing the mast stays of sailing ships. It is a footbridge, constructed in 2009, which links Docklands and South Wharf.

Figure 13: The Seafarers footbridge (2009) is a cable-stayed form like the West Gate Bridge on a much smaller scale (http://www.fitzgeraldconstructions.com.au/projects/bridge-construction/seafarers-bridge)

In terms of iconic bridges, the West Gate Bridge has never been the site of significant celebrations and actions, such as the use of the Sydney Harbour Bridge for the Reconciliation Walk in 2000, or as a platform for fireworks in celebrations, such as New Year's Eve. However, as the place of one of Australia's most disastrous losses of life, it

resonates very strongly with Victorians. As described above, Victorians who were alive in 1970 remember where they were when they heard of the tragic collapse. In this way, it is like the Port Arthur massacre in Tasmania (1996) as both were the scenes of great tragedy and both left a valuable legacy in community awareness; gun control arising from Port Arthur, and work place safety from the West Gate Bridge collapse.

As a landmark that signifies Melbourne, the West Gate Bridge is one of few featuring repeatedly in media like film, writing and performance art. Arguably, there are others like the Art Centre Spire and, increasingly, Federation Square, but the West Gate Bridge remains a well-recognised Melbourne landmark. It provides a sense of passage – a coming home to Melbourne or an escape from the city centre. Although it is now part of an integrated road network, the early date of construction, and the link over the Yarra River to the industrial west mean that the West Gate Bridge more strongly denotes a sense of arrival and departure than other Melbourne infrastructure, like the freeways. Its curved and spare form are distinctive and celebrated in film and paintings as both immediately representing Melbourne and demonstrating passage to and from the city.

ASSESSMENT AGAINST CRITERIA

✓	**CRITERION A** Importance to the course or pattern of our cultural or natural history (historical significance).
	CRITERION B Possession of uncommon rare or endangered aspects of our cultural or natural history (rarity).
	CRITERION C Potential to yield information that will contribute to an understanding of our cultural or natural history (research potential).
	CRITERION D Importance in demonstrating the principal characteristics of a class of cultural or natural places or environments (representativeness).
✓	**CRITERION E** Importance of exhibiting particular aesthetic characteristics (aesthetic significance).
✓	**CRITERION F** Importance in demonstrating a high degree of creative or technical achievement at a particular period (technical significance)
✓	**CRITERION G** Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. This includes the significance of a place to Indigenous peoples as part of their continuing and developing cultural traditions (social significance).
	CRITERION H Special association with the life or works of a person, or group of

persons, of importance in our history (associative significance).

STATEMENT OF SIGNIFICANCE

What is Significant

The West Gate Bridge, a cable-stayed, box girder bridge opened in 1978, between Port Melbourne and Spotswood over the Yarra River, is significant at the State level. In 1970, during construction, the span between piers 10 and 11 collapsed killing 35 workers and injuring 18 people. The West Gate Bridge between the eastern and western abutments, the Memorial Plaque on Pier 10, and the Memorial Park established in 2004 where the accident occurred, are significant to the State of Victoria. (Refer to extent plan)

How it is Significant

The West Gate Bridge, the Memorial Plaque and the Memorial Park are of historical significance to Victoria due to both the bridge itself, and the importance of the construction tragedy. The bridge design has aesthetic significance and is a technical achievement for its period. The social significance of the bridge focuses on the tragedy and its lasting legacy. The West Gate Bridge is also a Melbourne landmark that provides a sense of arrival or passage from the city. These aspects of its social significance are valued by contemporary communities and demonstrated in Victoria's art and culture.

Why it is Significant

The West Gate Bridge, constructed 1968-1978, was a major piece of infrastructure associated with Melbourne's expansion, and the opening up of connections from the city to the Western suburbs and Victoria's southwest. It influenced patterns of development for Melbourne and Victoria. For many Victorians, the bridge is a landmark that has a strong association with leaving or returning to the city from the west. (Criteria A and G)

The collapse of a span of the bridge during construction, on 15 October 1970, killed 35 construction workers and injured 18 people. A memorial to the men who died was unveiled at the base of Pier 10 in 1978 by the workers who completed the construction project. In 2004, West Gate Memorial Park was established to honour the deceased. A lasting legacy was the dramatic improvements in workplace safety and post-incident procedures following the Royal Commission report into the disaster. (Criterion A)

The West Gate Bridge disaster has come to symbolise a collective responsibility to provide workers with a safe work place. In 2010, a new Memorial Plaque for the 40th anniversary of the collapse was dedicated 'In memory of workers of all lands who are killed in industrial accidents'. For many Victorians, the West Gate Bridge is associated with tragedy because of the collapse during construction, as a symbol of workers' deaths that may be preventable, and because it was a notorious suicide place for many years. (Criteria G)

The West Gate Bridge is a strong visual landmark over the Yarra River. The sinuous curve of the bridge is one of its defining features. It has clean lines punctured by two pylons that anchor the cable stays for the river crossing section. The distinctive aesthetic characteristics of the bridge, as well as its association with tragedy, have been celebrated through artworks, writing and performances. (Criteria E and G)

The West Gate Bridge was a technical achievement for its time as an example of a cable stayed, box girder bridge with an early date of construction. It is notable for its 28 spans, with five main river spans made up of steel box girders and approach spans of concrete box girders. (Criterion F)

RECOMMENDATIONS

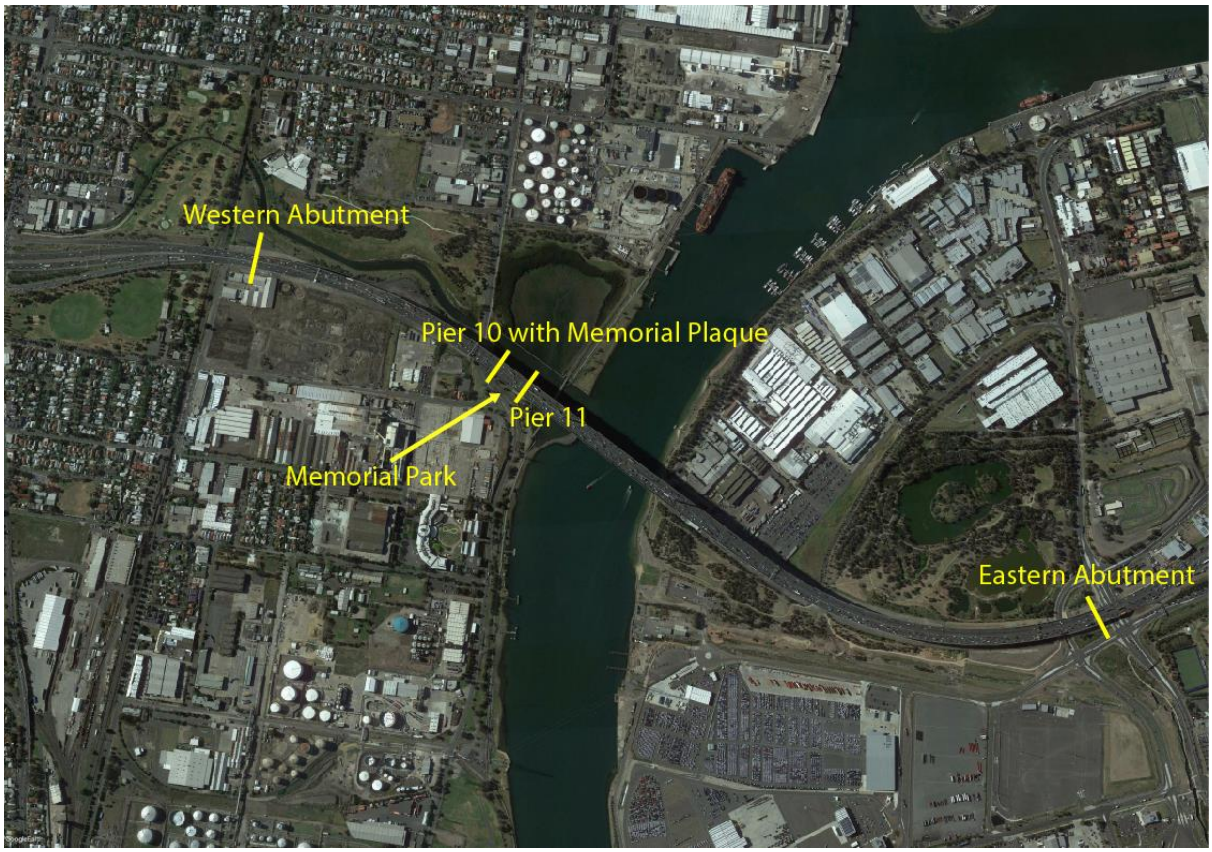

Figure 14: The extent recommended for nomination to the Victorian Heritage Register is the West Gate Bridge between the eastern and western abutments, the Memorial Plaque, and the West Gate Memorial Park

Recommended for nomination to the Victorian Heritage Register

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Zion, Lawrie, 2011, 'Our 'un-Melbourne' bridge?', 'Upstart' website, http://www.upstart.net.au/our-un-melbourne-bridge/ accessed 10 July 2018.

PREVIOUS STUDIES

Southbank and Fishermans Bend Heritage Review 2017	Recommended as a place of national heritage significance

5.8 West Gate Service Stations Citation

SITE NAME	West Gate Service Stations North and South
STREET ADDRESS	1 and 2 West Gate Freeway Port Melbourne
PROPERTY ID	110638 and 110639

Figure 1: West Gate Service Station North

Figure 2: West Gate Service Station South

SURVEY DATE: 23 May 2019 SURVEY BY: Helen Lardner, HLCD with Dr Peter Mills

HERITAGE INVENTORY	No	**HERITAGE OVERLAY**	Proposed
PROPOSED CATEGORY	Local	**PLACE TYPE**	Building
DESIGNER / ARCHITECT / ARTIST:	Graeme Law & Associates	**BUILDER:**	Spacetech Pty Ltd
DESIGN STYLE:	Late Twentieth Century International Style	**DATE OF CREATION / MAJOR CONSTRUCTION:**	1989

THEMES

HISTORIC THEMES	DOMINANT SUB-THEMES
3 Connecting Victorians by transport and communications	3.4 Linking Victorians by road in the 20th century

RECOMMENDATIONS

Recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme as an individually significant place.

Extent of overlay: Whole of each of the two sites. Refer to figures 30 and 31 in the recommendations section of the citation.

SUMMARY

The twin service stations were built to service the northern and southern carriageways of the West Gate Bridge in 1989 on land leased from the government. The design was the result of a competition by the Road Construction Authority to reflect the form and style of the bridge, and the importance of the major approach route to Melbourne. Shell was successful with a design by architects Graeme Law and Associates Pty Ltd, who formulated 'the concept of sail-like canopies, tension wires and structural towers', and worked with Tract Consultants Australia Pty Ltd and Peter Mummery & Associates, Consulting Engineers. On both sides, there is a linear canopy over the bowsers and a cone shaped canopy over the shop. The south side has an original restaurant building under a similar canopy to the shop, which is linked by a covered walkway. A separate building on the north side was a later addition. Corporate advertising is integrated with the lattice steel masts that extend well above the roofs. The tensile membrane structures are visually striking on the edge of the freeway.

The West Gate Service Stations are one of six substantial tensile membrane structures constructed in Melbourne from 1988 to 1990, when tensile membrane architecture was at the peak of its popularity. Compared to other examples, they demonstrate a high degree of creative and technical achievement as a response to the freeway location and service stations' function.

This is the only known application to a service station in Australia, and allows the features of tensile membrane structures, such as wide clear spans, light floating canopies, vertical structural elements and tie-downs, to be appreciated.

HISTORICAL CONTEXT

Contextual History of the Development of Tensile Membrane Structures in Australia

The Late Twentieth-Century Structuralist style has been characterised as partly a reaction to Brutalist concrete buildings and also a fascination with sculptural, non-rectilinear spatial enclosures (Apperly et al, date, p.256). The style focused on structural and particular steel and tensile systems, which created free floating enclosures above the site. The broader contextual development of the style is briefly outlined in this section as the West Gate Service Stations are an example.

Tensile structures emerged in the late 1950s, with the early examples consisting of cable web structures featuring a variety of infill panels. Tensile fabric structures were a later refinement. The 1959 Sidney Myer Music Bowl in Melbourne, designed by Yunken Freeman and Griffiths and Simpson, was among the earliest large-scale tensile cable-web structures in the world, and is included in the Victorian Heritage Register (VHR H1772).

Internationally, important examples are Eero Saarinen's Ingalls Hockey Rink at Yale University, built 1953-58, and Kenzo Tange's two stadia for the 1964 Tokyo Olympics. Frei Otto's West German pavilion at Expo 1967 Montreal, was one of the first tensile structures to use a PVC coated polyester membrane, which would become the industry norm. Otto designed large tensile membrane structures around the world including the Munich Olympic Stadium in 1969–1972. Otto was influential in Australia: his 1980 Australian lecture tour, in conjunction with a travelling exhibition of his work, prefaced the commencement of the main burst of tensile structure building activity in Australia. This exhibition had been travelling the world since 1971.

Prior to Otto's tour, two early examples of tensile fabric structures in Australia (as distinct from cable-web structures with infill panels) were in Victoria. The 1978 'Art House' at Ivanhoe Girls' Grammar was designed by Bryan Dowling and fabricated by Geodomes Pty Ltd using PVC-coated polyester fabric (*W&W*, 1988, No.4). St Anne's Church at Seaford Victoria 1978-82 (extant), incorporated a Teflon-coated fibreglass membrane (*SMH*, 19 May 1982:18). Both of these examples featured tensile fabric roofs over more conventional wall structures, and are detailed in the comparative analysis section (refer to figures 20, 21 and 22).

The Dean Park Sound Shell (now demolished, figure 5) in Townsville, built in 1980, was perhaps the first Australian example of a free-standing tension membrane structure, a type that would continue to prove popular for sound shells and would be an antecedent for the West Gate Service Stations bowser canopies (*W&W*, 1988, p.5; Mehler Texnologies, 2007).

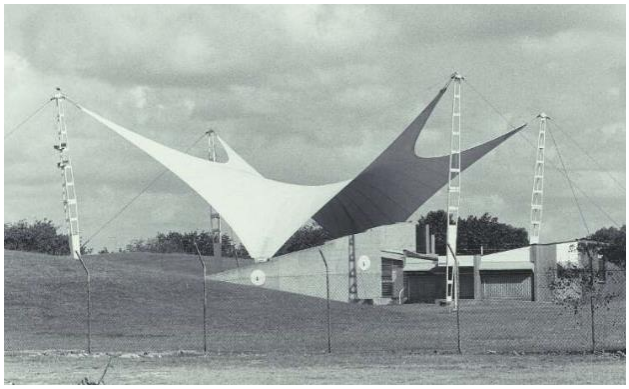

Figure 5: Dean Park Sound Shell, South Townsville, c1980 (Gordon Undy photo, NLA Bib. ID 2250879)

The 1980 Australian lecture tour by Frei Otto and the travelling exhibition of his work influenced tensile structure building activity. Australian architect Phillip Drew, who had written a book on Otto's work in 1976, designed an Otto-inspired "fishnet tent" temporary structure to house the exhibition (figure 6), which in Melbourne was sited in the Queen Victoria Gardens opposite the Victorian Arts Centre in St Kilda Road (*The Age*, 15 April 1980:10).

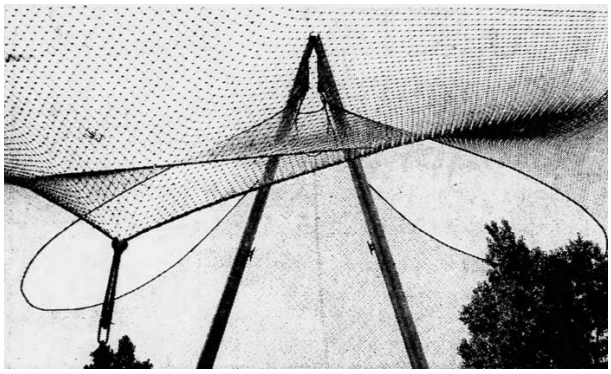

Figure 6: Newcastle architect Philip Drew designed a demountable "fishnet tent" to cover the 1980 exhibition of Frei Otto's work at Queen Victoria Gardens, Melbourne (*The Age*, 15 April 1980:10)

Both of these examples were small scale, however, a series of hotels in the 1980s incorporated tensile membrane roofs and were designed by Canberra architects Bryan Dowling and Associates. The 1981 Canberra International Hotel included a roof designed by German designer Erich Dollansky, another émigré who had worked with Otto on the Munich Olympic Stadium (*Canberra Times*, 3 April 1981:11). Extensions in 1984 added another membrane atrium roof similar to the original (*Canberra Times*, 16 March 1984:7).

The same architects designed The Pavilion Motor Inn in Wagga Wagga, 1985, (*The Age*, 23 September 1985:45), and The Pavilion Hotel Forrest, Canberra, 1984/5 (extant), which featured a tensile membrane atrium structure supplied by Space Structures Australia (*Canberra Times*, 8 April 1984:10). The Airport International Motor Inn in Queanbeyan (figure 7, extant), opened July 1985, was designed by Bryan Dowling and Associates with engineer Ray Franzi (*Canberra Times*, 23 July 1985:7; 4 August 1985:11).

Figure 7: The Airport International Motor Inn, Queanbeyan, 1985 (*https://www.trivago.com.au/queanbeyan-366096/hotel/airport-international%C2%A0queanbeyan-101884*)

A demountable open-air stage with a tensile membrane canopy was installed at the Domain, Sydney, in 1983. It featured lattice-truss steel masts and was included in the 1989 *Pictorial Guide to Identifying Australian Architecture* as an example of the "Late Twentieth-Century Structuralist style" (Apperly et al, 1989, p.258).

Perhaps the most celebrated use of tensile structures of this period was the 1984 Yulara Tourist Resort (figure 8), which featured an array of single sail elements supported on cable-stayed tubular steel masts. Designed by architects Philip Cox and Partners, the resort won the RAIA's Sir Zelman Cowan Award in 1985 (*SMH*, 2 November 1985:9).

Figure 8: Uluru (Yulara) Resort (Cox Architecture website photo)

Elsewhere in Australia in the mid-1980s, there were a number of small or medium scale examples of tensile membrane structures built, including the Port Lincoln Leisure Centre in 1985 (demolished), the Glenorchy (Tolosa Park) Sound Shell in Hobart, 1985 (extant, figure 9), and the Todd Street Mall in Alice Springs, 1986 (demolished) (Mehler Texnologies, 2007). A twin-conical tensile membrane roof was erected over the Mayfair Plaza in Sandy Bay, Hobart in c1987 (*W&W*, 1988, p.5). The roof membrane was renewed in 2015, and the plaza is now fully enclosed (*Mercury* [Hobart], 16 September 2015).

Figure 9: Tolosa Park Sound Shell, Glenorchy, Hobart (Google Street View 2015)

The 1988 Toowong Village atrium in Brisbane was covered by a Teflon/glassfibre membrane wrapped over steel-tube arches (*W&W*, 1987, No.2). The Roxby Downs Motel gained a 34m square conical PVC membrane roof in 1987 (*W&W*, 1987, No.3). The Lake & Oceans Hotel Lake Macquarie NSW was a twin conical structure completed by 1988 (*W&W*, 1988, No.5). The Marina Mirage Roof Sails at Southport Queensland (extant, figure 10) were completed by 1988 (*W&W*, 1988, No.5).

Figure 10: Marina Mirage sails, Southport, Queensland (Makris Group website, http://www.makris.com.au/property/marina-mirage-marina/ accessed September 2019)

The Bicentennial year produced two major temporary membrane structures. The tensile membrane sun sails at the World Expo 88 in Brisbane (figure 11), was the largest tensile membrane project in Australia to date. It was designed by West German Harald Muhlberger and fabricated overseas (*W&W*, 1986 No.1; 1987 No.2). The smaller Expo Gateway, designed and made in Australia, was a simple cable stayed and edged structure, with some similarities to the West Gate Service Stations bowser canopies (*W&W*, 1988 No.4). Expo 88 (as well as the Myer Music Bowl) was included as an example of the "Late Twentieth-Century Structuralist style" in the *Pictorial Guide to Identifying Australian Architecture* (Apperly et al, 1989, p.256).

Figure 11: Expo 88 Brisbane, with the main membrane structures in the background, and the Expo Gateway in the foreground (Expo 88 website http://www.celebrate88.com/tableofcontents.html accessed 10 September 2019)

The temporary Bicentennial Travelling Exhibition (figure 12), designed by Daryl Jackson and John Connell Australia, was fabricated by Geodome Space Frames. The structures included one large conical main tent and a series of smaller double conical structures that were carried between towns on a fleet of 70 semitrailers, which also served as part of the assembled structure (*Architecture Australia*, March 1989).

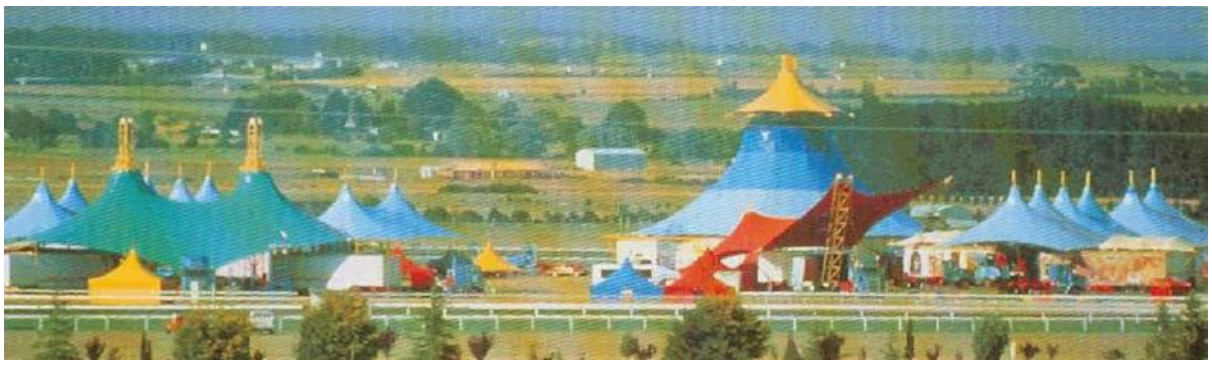

Figure 12: Bicentennial Travelling Exhibition, 1988 (*W&W*, 1988, No.4)

A small bicentennial structure in Canberra, the Bicentennial Sound Shell Stage 88 in Commonwealth Park (extant, figure 13), was designed by Philip Cox, Taylor & Partners and Ove Arup Engineers, and fabricated by Space Structures (Australia) Pty Ltd. The design featured two internal mushroom heads and a steel-web push-up arch, with catenary cable edges linked to masts and tie-downs (*W&W*, 1988, p.6).

Figure 13: Stage 88, Commonwealth Park, Canberra (Commonwealth Park in the ACT, Wikipedia entry, https://en.wikipedia.org/wiki/Commonwealth_Park accessed September 2019)

The 'Quadome recreational enclosure' designed by Brisbane firm Vesi Membrane Systems covered a pool at the Beaton Park Leisure Centre, Wollongong, in 1989 (extant, figure 14). The PVC coated membrane covered a large, high dome supported on a spider-like frame of triangular web tubular-steel trusses (*W&W*, 1989, No.7).

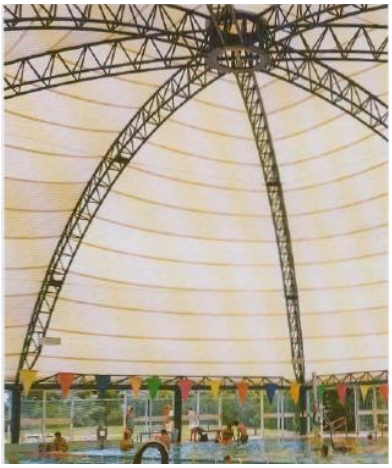

Figure 14: 'Quadome recreational enclosure' at Beaton Park Leisure Centre in Wollongong, 1989 (W&W, Issue 7 1989, p.3)

The period from 1988 to 1990 saw six substantial tensile membrane structures constructed in Melbourne. These were the Penguin Parade in Summerlands, Phillip Island built in 1988 (now demolished, figure 23), the West Gate Service Stations built by 1989 (figures 3 and 4 and the subjects of this citation), the Keysborough Golf Club Driving Range in 1990 (figures 24 and 25), the St Michael's Grammar School courtyard roof built by 1988 (figure 26), the Preston Market Redevelopment, also completed by 1988 (figures 27 and 28), and Silks Bar at Moonee Valley Racecourse in 1990 (figure 29). The Victorian examples are described in detail in the comparative analysis section.

The greatest growth in tensile membrane structures in Australia in recent decades has been more mundane, with shade-cloth structures multiplying over playgrounds, picnic areas and swimming pools, pedestrian malls and in backyards. The exceptions are two large structures built in Melbourne in 2006, which involved a major membrane component. The Grand Pavilion at Melbourne Showground, Ascot Vale 2006 (extant) was designed by Daryl Jackson Pty Ltd and Tensys Engineers Pty Ltd, and was the largest permanent tensile membrane structure built in Australia, and reputedly the largest in the southern hemisphere. The structural design of the steel supporting structure was similar to the tensile membrane structures of the 1980s (*Lightweight Talk*, August 2006).

The 2006 additions to the Melbourne Sports and Aquatic Centre (MSAC), constructed for the Commonwealth Games (extant, figure 15), were designed by Peddle Thorpe architects and Connell Wagner engineers, and included membrane roofs over a 50m competition pool and the accompanying grandstand. There were also tensile membrane structures on the north and east, which were later removed. This was a change in direction from previous tensile membrane structure designs, as they are relatively flat in profile and tied to lightweight steel beam and truss structures, with 'push up' elements providing the tension and double curvature to the membrane as opposed to the earlier use of masts and cables (*Steel Australia*, June 2006:14).

Figure 15: Melbourne Sports and Aquatic Centre competition pool and grandstand 2006 (Google Street View 2015)

In conclusion, the Late Twentieth-Century Structuralist style emerged internationally at the very end of the 1950s, and used steel and tensile structural systems to create sculptural, non-rectilinear spatial enclosures that floated above the site. Tensile fabric structures, like those of the West Gate Service Stations, have been used in Australia from the late 1970s as an innovation from the cable web designs with infill panels of the 1950s to 1970s. Some structures were temporary or have since been demolished. A few interstate hotels built in Canberra and NSW in the 1980s remain, along with the Yulara Resort at Uluru. The two major temporary membrane structures built for the Bicentennial may have partly inspired the six examples built in Victoria between 1988 and 1990, including the West Gate Service Stations. Since that period, there have been two substantial membrane structures built in Melbourne, both in 2006. One of these, MSAC, represents a further development from the earlier designs, while the Grand Pavilion at Melbourne Showgrounds is less innovative. Tensile fabric structures continue to be produced in Victoria, usually as shade structures over municipal or institutional recreation areas or private outdoor areas.

SITE HISTORY

The site history is taken from the 'The Motor Garage & Service Station in Victoria – a survey,' National Estate Grants Programme, Daniel Catrice and Michele Summerton for Heritage Victoria, February 1997, pp 86-90.

Completed in 1989 at a cost of $5.5 million, the Shell complex (now West Gate Service Stations) on the Melbourne side of the West Gate Bridge was called the Opera House among Australian service stations in *The Shell Report* (published by Shell Australia, June 1989, p.I). The twin installations straddling each side of the freeway were the result of a competition held by the Road Construction Authority (RCA) in 1986. Expressions of interest were invited from major oil companies and private developers to tender for the position and operation of twin vehicular and motorist service facilities, one servicing the north carriageway and the other the southern carriageway, on the former toll sites of the West Gate Bridge. The successful tenderer was to subsequently lease the government owned sites from the RCA. The major architectural requirements of the RCA brief were that the development should:

> *Achieve a standard of visual amenity commensurate with its proximity to the West Gate Bridge structure and the importance of the freeway as one of the major approach routes to Melbourne. The architectural style of the service buildings should consider the form and style of the adjacent bridge structure and should reflect in a general way such shape and form with the practical limits of the service functions that the centres are required to provide.*

The development was to also include; full fueling facilities, take-away food, free public conveniences, telephones, tourist information, accommodation booking facilities, a 60-seat restaurant facility on the southern side, an automatic carwash on the northern side, an auto accessory shop, and carparking and road transport vehicle parking (The Shell Company of Australia Ltd., 'Expression of Interest for West Gate Freeway Service Centres', 11 December 1986).

The Shell company approached architects Graeme Law and Associates Pty Ltd who formulated 'the concept of sail-like canopies, tension wires and structural towers' after observing 'the white sails of the craft on Hobson Bay and the cable stays to the bridge' ('Shell West Gate - A New Land Mark'**,** July 1990). Other team members at this stage included; Tract Consultants Australia Pty Ltd (Planners and Landscape Architects), and Peter Mummery & Associates, Consulting Engineers. The proposal, submitted by Shell in December 1986, sought to set a precedent in the design of Australian service stations and departed from conventional garage architecture:

> *The site represents a unique and exciting development opportunity for the construction of two 'landmark' service centre facilities. The design ought to be a thoughtful and innovative response unfettered by existing corporate company design practices. It is our intention that this development proposal is not merely another service station.* (Letter from Martin Breheny, The Shell Company of Australia)

In October 1987, the Minister for Transport, Mr Roper, publicly announced the acceptance of the Shell tender, stating that:

> *Originally it had been intended to simply grow grass on the toll plaza area, but on a weekend drive it occurred to me that a service centre type development would be both better economically for the State and for the motoring public. I asked the RCA which at the time had a policy against service development on highways to consider the best use of the area*. ('Victorian Transport News Release', Transport Minister Tom Roper, 8 October 1987).

In December 1987, the RCA and Shell signed an initial lease of ten years on the site with three options for five year extensions.

The design for the shape and form of the canopies was initially expressed in a rudimentary model made from nails and nylon. It evolved according to a number of issues within the brief and site constraints, which impacted upon the shape, such as the need to cover buildings of certain physical dimensions; the placement of petrol pumps and their required weather shelter; heights of articulated vehicles; points of entry/exit; and sight lines from cashier to petrol pumps. All of these issues pointed to the 'need for a lineal development with the form of the front canopy being cranked about the central axis to physically fit the development of the site'. The structures underneath the canopy were treated as 'simplistic gift boxes' or 'under canopy capsules' that are separate from the overhead canopy except for where they interlock at the major support towers, which penetrate the membrane through designed apertures. These tower masts 'were derived from communications network symbols' and intended to evoke the interconnectedness of this development with a larger, national Shell infrastructure. The Shell emblem surmounts the latticed masts to appropriately blazon the company image. ('Shell West Gate – A New Land Mark').

The extreme wind category of the site, with wind gusts of up to 180kph, directed that considerable attention be given to the canopy design and fabric, as well as structural load. After the final model was approved, five tent models made by the canopy design engineers, Connell Barrow McReady, were tested in the Vipac Boundary Layer Wind Tunnel at Port Melbourne, in April 1988 (Connell Barrow McReady, 1988). Connell, an Australian pioneer in lightweight structural design with experience dating from the 1970s, had been involved in the design and development of spaceframe systems and tensioned fabric applications, and had worked on the successful Expo 1988 tensile exhibition structures in Brisbane. A range of fabric materials were researched for their durability and cost, leading Shell to finally select a PVC coated polyester fabric trademarked Polymar 6601 Grade III, which was acrylic lacquered on both sides ('Shell West Gate – A New Land Mark')

Because of the differing conditions on each site, the major 75m long bowser roofs required individual designs, so exact duplication of the buildings was not possible. Following the opening of the West Gate service centre in 1989, Shell's International Marketing Manager from the United Kingdom, described the development as 'the best vehicle service facility in the world' ('Shell West Gate – A New Land Mark') . Shell no longer operates either of the West Gate Service Stations.

SITE DESCRIPTION

Two service stations are located on opposite sides of the West Gate freeway. On both sides there is a linear canopy over the bowsers and a cone shaped canopy over the shop. On the south side there is a restaurant building under a similar canopy to the shop and linked to the shop by a covered walkway, which was part of the original design, figure 16.

Figure 16: The service station on the south side included a restaurant under a similar canopy linked to the shop. (City of Melbourne Interactive Maps, accessed March 2020)

The separate KFC outlet on the north side with a conic membrane canopy was a later addition, figure 17.

Figure 17: On the north side, the restaurant seen in the left of the photograph was a later addition. (City of Melbourne Interactive Maps, accessed March 2020)

Figure 18: Underside of canopy over the bowsers (Melbourne's Biggest Shade Sail', 1800 Shade U website, https://1800shadeu.com.au/blog/shade-sail-inspector/melbournes-biggest-shade-sail accessed September 2019)

The canopy over the bowsers, shown in figure 18, are approximately 65m by 20m on each side. It has a single, double-cranked steel-cable ridge supported on four tubular-steel main masts, with flat sails on either side attached to catenary cut edge cables. It is unusual among membrane structures in featuring a catenary cable ridge. Visually, it perhaps best resembles much smaller tarpaulin and ridged tent designs. The style sits within the "Late Twentieth-Century Structuralist style" defined by Apperly et al in 1989, who describe how "by their very nature, Late Twentieth-Century Structuralist buildings often serve specialised functions and look exciting and different …" (Apperly et al, 1989: 256). While it was only built the year this style was defined, it certainly fulfils this role.

The end main masts are anchored to the ground by twin cables. There are four outer struts with cable tie-downs on the outside of the curve of the roof. The three struts on the inside of the curve have cable tie-downs. The two outer struts on the outside of the curve also have cable tie-downs, while there are two columns / bollards without cable tie-downs opposite the service centre building. These bollards also serve to anchor two of the six outer endpoints of the canopy over the service centre building. The canopy is catenary cut at the ridge and at the outer-edge cable connections.

Figure 19: Canopies over the service building and bowsers (Melbourne's Biggest Shade Sail', 1800 Shade U website, https://1800shadeu.com.au/blog/shade-sail-inspector/melbournes-biggest-shade-sail accessed September 2019)

The single mast sails over the station buildings feature conical tensile membrane structures. Square section steel lattice masts support teardrop looped cable connections to the fabric. The masts extend higher than structurally necessary to carry corporate signage, as seen in figure 19.

The pedestrian link between the shop and the canopy over the bowsers is not sheltered by a sail, but instead by a low flat-roofed porch extending out from the service station building, which is supported at the junction by the two steel bollards and is cantilevered under the bowser canopy. A similar link leads between the shop and the restaurant on the south side. The later addition of a restaurant on the northern site is a discrete building.

INTEGRITY

Intactness: refers to the degree to which a place retains its significant fabric. Intactness should not be confused with condition as a place may be highly intact but the fabric may be in a very fragile condition.

Integrity: refers to the degree to which the heritage values of the place are still evident and can be understood and appreciated. (*Victorian Heritage Register Criteria and Thresholds Guidelines*, p.4)

Both the West Gate Service Stations, North and South, retain a high degree of integrity as easily appreciated high tensile membrane structures in the Late Twentieth-Century Structuralist style, and in a prominent location next to the West Gate freeway. They retain their original function, which is expressed in the design with the canopies to the petrol bowsers and the cone shaped canopy over the shop, along with the steel lattice masts that extend vertically carrying signage. The service centre on the southern site retains its original restaurant under a similar canopy that is linked by a covered walkway. The restaurant on the north side is a later addition that it is sited separately and does not detract from the original design.

In terms of intactness, there appears to have been a fairly high level of change or renewal of the fabric. The membrane itself is likely to have been replaced more than once, along with the bowsers, the shop and restaurant fittings and signage. However, the structural system of steel lattice and tensile members is likely to be original. Generally tensile membranes are replaced periodically and this should not be seen as detracting from their significance. They still retain the design and structural system, but the fabric itself may need renewing. Similarly, the application to a petrol station and service centre remains important although the fittings, signage and bowsers may be updated.

COMPARATIVE ANALYSIS

The contextual history of tensile structures in Australia was described earlier. The comparative analysis assesses the West Gate Service Stations against other examples in Victoria and within the City of Melbourne. Of the examples identified within Victoria, the 1959 Sydney Myer Music Bowl is outstanding and included on the Victorian Heritage Register (VHR H1772). However, its construction as a mesh steel cable structure with inserted plywood and aluminium sandwich panels is a forerunner to, and different from, tensile membrane structures as demonstrated in the West Gate Service Stations.

The West Gate Service Stations are comparable to other tensile membrane structures constructed in Melbourne from 1988 to 1990. These are the Penguin Parade, Summerlands, the Keysborough Golf Club Driving Range, St Michael's Grammar School courtyard roof, the Preston Market Redevelopment and The Silks Bar, Moonee Valley Racecourse which are discussed below.

St Anne's Catholic Church Seaford 1978-1982 (HO43)

Figure 20: St Anne's Seaford (Graeme Butler, 1992-3)

Figure 21: St Anne's Seaford (Google Street View 2016)

An early application of a tensile fabric structure, claimed as the first in Australia, is the St Anne's Church (figures 20 and 21), which made use of a Teflon-coated fibreglass membrane (*SMH*, 19 May 1982:18). The basis of the 'first' claim may be that it was the first council-approved membrane structure in Australia, or possibly that it was the first "freeform" permanent tensile membrane structure. Council approval to build was obtained in 1978, with construction commencing in May 1981, and the first mass held in April 1982. The architects were Payne Pattendon and the

engineers were the O'Neill Group. The church was refurbished in 2007 (https://stannes.com.au/our-history/ accessed 9 September 2019).

The church provided seating for 500 people and cost $600,000. The design incorporated religious symbolism with 12 support masts and the whole structure literally hanging from the cross. The building featured on the front cover of a contemporary issue of *Engineers Australia*, where it was labelled "a first for Victoria". It was commended in the new buildings' category of the Institute of Architects annual awards in 1983. The building was described in the 1995 *Frankston Heritage Study* as "too striking a concept to ignore in any appraisal of the city's architecture" (Royal Australian Institute of Architects website, ://dev.architecture.com.au/awards_search?option=showaward&entryno=2009037080, accessed 9 September 2019). St Anne's Catholic Church (HO43) is included in the heritage overlay in the Frankston Planning Scheme.

'Art House' at Ivanhoe Girls' Grammar, 1978 (HO5)

Figure 22: This aerial view shows the 'Art House' at Ivanhoe Girls' Grammar, visible as a white square roof behind heritage buildings facing Marshall Street. (Google Images 2020)

Constructed earlier than St Anne's, the first tensile fabric structure in Australia (as distinct from cable-web structure) appears to have been a modest affair. The 'Art House' at Ivanhoe Girls' Grammar, figure 22, was built in 1978 at the rear of a heritage home at 129 Marshall Street that was used for school purposes. The "daylight" roof for the arts studio was designed by Bryan Dowling and fabricated by Geodomes Pty Ltd using PVC-coated polyester fabric (W&W, 1988, No.4; Mehler Texnologies, 2007; *The* Age, 1 June 1979:16).The design is very simple in form and does not compare to the ingenuity of the Church. The 'Art House' is within the Marshall Street/ Thoresby Grove/ Sherwood Road Precinct (HO5) in the heritage overlay of the Banyule Planning Scheme. The precinct is recognised for the earlier houses.

Penguin Parade, Summerlands, Phillip Island, 1988 (Now Demolished)

Figure 23: Membrane structure at Penguin Parade Phillip Island (demolished in late 2019) (Gambitek photo, 2006, 'Phillip Island Penguin Parade exterior', Wikimedia Commons website, https://commons.wikimedia.org/wiki/File:Phillip_Island_Penguin_Parade_exterior.jpg accessed September 2019)

The visitors' centre for the Penguin Parade at Summerlands on Phillip Island, seen in figure 23, was opened on 14 November 1988 (*The Age*, 15 November 1988:3). It was described in *Warp & Weft* as "two complexly curved, paired interactive structures". The architects were Daryl Jackson Pty Ltd, and the engineers were the Connell Group (*W&W*, 1989, No.6). Two offset layers of blue-tinted membranes were suspended from a single square-section lattice mast in tubular steel. On the outside were catenary cables attached to tubular steel struts and tie down cables anchored to the ground. The overlapping membranes produced a layered effect. The independent lightweight structure served to shelter and shade the main entrance to the facilities buildings, which radiated out in a series of stepped skillions from the focus of the canopy and steel tower. This structure was demolished in late 2019 as construction started on a new visitor centre.

Keysborough Golf Club Driving Range (now 'Aces Sporting Club') 1990

Figure 24: The Keysborough Golf Club driving range roofs shortly after completion (*W&W*, 1990 No.8)

The Golf City Driving Range at the Keysborough Golf Course, figures 24 and 25, was opened in 1990. The membrane structure was fabricated by Spacetech, the structural engineers were Connell Wagner Vic. Pty Ltd, and the building was designed by Millar Sainsbury Mulcair Architects (*W&W*, 1990, No.8 and No.9).

Figure 25: Aces Sporting Club (former Keysborough Sporting Club) interior (Zomato website, https://www.zomato.com/photos/pv-res-16586708-r_TYxMjgxMDUxMjI)

The building also contained a state-of-the art 60-bay driving range (*The Age*, 16 May 1989:58). The membrane structure has a linked twin cone form suspended from masts that enclose a large two-storey space. The masts have conical caps. The internal space under the membrane structure is now a Chinese restaurant. The integrity of the building has been compromised by unsympathetic additions around the sides, and a new parapet for signage at the entrance / front. The Keysborough Golf Club Driving Range is not included in the heritage overlay of the Greater Dandenong Planning Scheme.

St Michael's Grammar School St Kilda, Courtyard Roof, 1988

The courtyard roof (extant, figure 26) enclosed an elongated court. Slender steel columns support segmental arch rafters with tensioned membrane between. The structure was built by B.J. O'Neill & Partners Pty Ltd (*W&W*, 1988, No.5). Although parts of St Michael's Grammar School are included in the heritage overlay of the Port Phillip Planning Scheme, this building with the tensile membrane roof is not.

Figure 26: St Michael's Grammar School courtyard roof (*W&W*, 1988, No.5)

Preston Market Redevelopment, 1988

The courtyards / alleys between stall buildings in the 1988 Preston Market redevelopment, figures 27 and 28, were covered with a series of linked conical tensile fabric structures, each approximately 7m square. There are over thirty of these elements. The fabricators were Geodome Space Frames Pty Ltd (*W&W*, 1988 No.5). The roofs are supported in a tubular steel frame and sit above and overlap the buildings, providing ventilation through the resulting gap. The Preston Market is not included in the heritage overlay of the Darebin Planning Scheme.

Figure 27: Courtyards of the Preston Market redevelopment (‘Photos for Preston Market’, Yelp website, https://www.yelp.com.au/biz_photos/preston-market-preston-3 accessed September 2019)

Figure 28: Exterior of the Preston Market redevelopment membrane structures (*W&W*, 1988, No.5)

The Silks Bar, Moonee Valley Racecourse, 1990 (HO379)

The architects of Silks Bar were E.F. Bilson & Associates, and the engineers were Connell Wagner Pty Ltd (*W&W*, 1990, No.9). The tensile membranes are visible from the Dean Street gates at the edge of the main mass of the racecourse buildings, and feature five linked conical membrane roofs rising from square perimeter beams (figure 29). The whole of the Moonee Valley Racecourse, including these buildings, is included in the heritage overlay as HO379 in the Moonee Valley Planning Scheme.

Figure 29: The roofs of Silks Bar, Moonee Valley Racecourse (*W&W*, 1990 No.9)

In conclusion, the West Gate Service Stations belong to a small group of examples in Victoria which were constructed in the late 1980s and early 1990s. The late 1980s was at the height of the use of tensile membrane architecture in Australia, possibly stimulated in part by the temporary, large-scale installations of the 1988 Bicentennial Travelling Exhibition and Expo 88 in Brisbane, along with prominent interstate hotels incorporating tensile fabric roofs.

St Anne's Catholic Church in Seaford is important for its early 1980s date, its free flowing form and the religious symbolism of the design. It is the only example from this period that is already included in the heritage overlay for its Late Twentieth-Century Structuralist form. The Penguin Parade at Summerlands on Phillip Island, was demolished in late 2019, and the Keysborough Golf Club Driving Range (now Aces Sporting Club) has been compromised by unsympathetic additions and changes.

None of the other four remaining examples have the visual prominence of the West Gate Service Stations next to the freeway, or the design response to function that they demonstrate. The 'Art house' at Ivanhoe Girls' Grammar was the first example, built 1978, but it is very modest in scale and concept. St Michael's Grammar School St Kilda has a more simplified form than the Service Station examples and, like the Preston Market Redevelopment, is appreciated more from the interior than the exterior. The five linked conical membrane roofs of The Silks Bar at Moonee Valley Racecourse can be seen from the exterior as well as the interior. However, against the backdrop of the other racing buildings it is not so visually striking or demonstrative of its function. It is possible that the three examples at St Kilda, Preston and Moonee Valley could potentially meet the threshold for inclusion in the heritage overlay. None of these sites are within the City of Melbourne.

Examples of more recent tensile membrane structures in Victoria include The Grand Pavilion at the Melbourne Showgrounds, and the two roofs at the Melbourne Sports and Aquatic Centre (MSAC), both constructed in 2006. While these are both large and impressive designs, particularly the MSAC roofs, they are significantly later than the West Gate Service Stations. The Showgrounds are included in the heritage overlay (HO221) and on the Victorian Heritage Register (VHR H1329). Similarly, the Albert Park Lake Precinct is included as HO446 in the Port Phillip Planning Scheme. In neither case would it appear that the tensile membrane structures are specifically identified. This may be because of their recent construction date.

The West Gate Service Stations therefore stand out as examples of tensile membrane architecture in the Late Twentieth Century Structuralist Style and for their creative and technical achievement from the 1980s in response to their location and function. They are not as significant as the Sidney Myer Music Bowl which was a particularly early exemplar of cable web structure with inserted panels, opened in 1959. However, they demonstrate the important period of the late 1980s to early 1990s tensile fabric structures and are a prominent example within the City of Melbourne. It is interesting that tensile membrane systems are often associated with recreational, hospitality or temporary uses and no other service station uses were identified. Because of the design brief, the West Gate examples are a strong departure from conventional service station architecture in Australia.

ASSESSMENT AGAINST CRITERIA

	CRITERION A Importance to the course or pattern of our cultural or natural history (historical significance).
	CRITERION B Possession of uncommon rare or endangered aspects of our cultural or natural history (rarity).
	CRITERION C Potential to yield information that will contribute to an understanding of our cultural or natural history (research potential).
✓	**CRITERION D** Importance in demonstrating the principal characteristics of a class of cultural or natural places or environments (representativeness).
	CRITERION E Importance of exhibiting particular aesthetic characteristics (aesthetic significance).
✓	**CRITERION F** Importance in demonstrating a high degree of creative or technical achievement at a particular period (technical significance)
	CRITERION G Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. This includes the significance of a place to Indigenous peoples as part of their continuing and developing cultural traditions (social significance).
	CRITERION H Special association with the life or works of a person, or group of persons, of importance in our history (associative significance).

STATEMENT OF SIGNIFICANCE

What is Significant?

West Gate Service Stations North and South, 1 and 2 West Gate Freeway Port Melbourne, are significant at the local level. On the south side, this includes the whole of the built structure, including the tensile membrane roofs to the bowsers, the shop and the restaurant buildings and associated walkways and canopies. On the north side, it includes the whole of the built structure, including the tensile membrane roofs to the bowsers and the shop with associated walkways and canopies. The restaurant which is located separately on the north side is not significant. For both service stations, the structural system, particularly the tensile membrane roofs and steel members, the built form and design is significant rather than the actual building materials which may have been renewed.

How it is Significant

West Gate Service Stations North and South, constructed in 1989, are of local significance to the City of Melbourne as a well-designed example of tensile membrane architecture then at the peak of its popularity. They demonstrated a high degree of creative and technical achievement as a response to the freeway location and service station function, and clearly display the principal characteristics of the tensile fabric design application as part of the Late Twentieth-Century Structuralist style.

Why it is Significant

Constructed in 1989, the West Gate Service Stations North and South were the result of a design competition by the Road Construction Authority to reflect the form and style of the West Gate Bridge and the importance of the major approach route to Melbourne. The design by architects Graeme Law and Associates Pty Ltd, who worked with Tract Consultants Australia Pty Ltd and Peter Mummery & Associates, Consulting Engineers, reflected 'the concept of sail-like canopies, tension wires and structural towers.' The tensile membrane structures are visually striking on the edge of the freeway and amongst the best applications of this technology in Victoria. (Criterion F)

The West Gate Service Stations demonstrate the principal characteristics of places designed in the Late Twentieth-Century Structuralist style which used steel and tensile structural systems to create sculptural, non-rectilinear spatial enclosures which floated above the site. The components of the service stations are represented in the design with a linear canopy over the bowsers and a cone shaped canopy over the shop. The south side has an original restaurant building under a separate cone-shaped canopy which is linked by a covered walkway. The advertising of the corporate identity is integrated with the lattice steel mast which extends well above the roofs. This is the only known application to a service station in Australia and allows the features of tensile fabric structures, such as wide clear spans, sail-like canopies, tensile cables, a vertical structural element and tie-downs to be appreciated. (Criterion D)

RECOMMENDATIONS

Figure 30: West Gate Service Station North – The recommended extent includes land 10 metres past the tie-down bollards on the east side to protect the setting of the freestanding conical structure. It includes the whole of the site from the west to facilitate protection of views to the Service Station forms.

Figure 31: West Gate Service Station South - The recommended extent includes land following the kerb to the west side of the freestanding conical structure to protect its setting. It includes the whole of the site from the east to facilitate protection of views to the Service Station forms.

The extent recommended for inclusion in the Schedule to the Heritage Overlay of the Melbourne Planning Scheme as an individually significant place is shown in figures 30 and 31.

Recommendations for the Schedule to the Heritage Overlay (Clause 43.01) in the Melbourne Planning Scheme:

Melbourne Planning Scheme

EXTERNAL PAINT CONTROLS	No
INTERNAL ALTERATION CONTROLS	No
TREE CONTROLS	No
OUTBUILDINGS OR FENCES (Which are not exempt under Clause 43.01-3)	No
TO BE INCLUDED ON THE VICTORIAN HERITAGE REGISTER	No
PROHIBITED USES MAY BE PERMITTED	No
NAME OF INCORPORATED PLAN UNDER CLAUSE 43.01-2	West Gate Service Stations
ABORIGINAL HERITAGE PLACE	No

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'Shell West Gate - A New Land Mark'**,** paper dated July 1990, written by Brian Dean (Connell Wagner) and Graeme Law (Graeme Law & Associates).

The Shell Company of Australia Ltd., 'Expression of Interest for West Gate Freeway Service Centres', 11 December 1986.

Letter from Martin Breheny, The Shell Company of Australia., dated 11 December 1986, accompanying Shell's 'Expression of Interest for West Gate Freeway Service Centres'.

PREVIOUS STUDIES

Southbank and Fishermans Bend Heritage Review 2017	Identified as a place for further assessment
The Motor Garage & Service Station in Victoria – a survey 1997	Identified as potentially of State significance