ENVIRONMENT ACT

OLD CANBERRA BRICKWORKS YARRALUMLA

Condition report to formalise handover from Environment ACT to Infrastructure and Asset Management

Prepared by:

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12.0 Introduction

This report records the current status of a number of planning and management aspects of the Yarralumla Brickworks that are relevant to short term management and longer term development.

1.1 Site description

The site has an area of 9.6ha with access off Denman Street Yarralumla. The site comprises the whole of Blocks 1 and 20 Section 102. It includes kilns, chimneys, fan houses, machinery sheds and brickpits and survives as a unique example of the evolution of brick making technologies from 1913 to 1976.

1.2 Heritage status

The site is listed on the Register of the National Estate. Details of the site as contained on the Australian Heritage Commission's database are described in Appendix 1.

The site is listed on the Interim ACT Heritage Places Register. Draft Variation to the Territory Plan No 118 proposes the site be placed on the Heritage Places Register. A copy of the draft variation that is currently being reviewed by PALM prior to release for public comment is included as Appendix 2.

2.0 Departmental files and other relevant reports

The following files, which have been held by Environment ACT, are forwarded with this report:

97/21461 ACT Heritage, Yarralumla Brickworks - Tenants Thor's Hammer.
97/10340 ACT Heritage, Yarralumla Brickworks

In addition to the reports included as Appendices to this report a copy of Lester Firth and Associates June 1986, *Old Canberra Brickworks Conservation Plan* is also attached.

3.0 Existing tenancy arrangements

In the few years immediately following the Commonwealth's purchase of the lease in September 1984 a number of tenants occupied the site and it was a popular weekend attraction with the antique and craft markets and model train. Rental revenue in the early 1990's is reported to have been in excess of $30,000 per annum.

As a response to health and safety concerns, and in attempt to create a site unencumbered by long term tenants, all established tenants were served with notice to vacate the site in June 1996. For various reasons the following users have remained at the site but have not paid rent since 1996.

• Thor Diesendorf	Thor's Hammer recycled timber
• Paul Lynzaat	Mud brick maker
• Adam Herbst	Ornamental iron work
• Peter Vandermark	Sculptor
• Marie Hegarty	Artist
• Alan Reid	Builder
• Steve Burroughs	Builder
• Canberra Historical Society	
• ACT Heritage	Storage of a shipping container that is a repository for local artefacts.
• Chris Snedden	Retired builder, associate of AR Marr.

Thor's Hammer and Paul Lynzaat are the two most visible users who are increasing their impacts over the site. The two builders use small parts of the site for storage and are rarely ever seen. The artists and sculptors are often travelling overseas but maintain a presence on the site when in Canberra.

Thor's Hammer installed and maintains a back to base security system and a telephone service. Other than that the Government pays all service costs including electricity, water and sewage. This is not a 'normal' tenant / landlord relationship but has been tolerated in the belief that a presence on site is important for security from vandalism. Given talk of impending development combined with health and safety concerns that inhibit payment of rent the users are fully aware that their occupation of the site is tenuous. A letter from Gary Humphries MLA to Lucy Horodny MLA dated 29 November 1996 gives some indication that termination of existing uses will be resisted. A copy of that letter is included as Appendix 3.

The latest correspondence between the Territory and the major tenant, Thor's Hammer, is included as Appendix 4. The draft Agreement attached to the Territory's letter of 1 June 1998 was never finalised.

4.0 Utilities

4.1 Electricity

The site is serviced with electricity and the account is in the name of Environment ACT. In a report dated 16 June 1999 that is included as Appendix 5, Building Electrical and Plumbing Control states:

> *If in the future the Brickworks site is such that the majority of existing buildings are retained, its electrical installation with a few minor exceptions requires decommissioning and replacing with a new installation.*

Given the fact the Territory pays all costs of electricity consumed on the site and the need for substantial upgrading of the wiring and switchboard, disconnection of power at some time in the future may be warranted.

4.2 Telephone

Thor's Hammer have the only phone connection on the site and they pay all costs associated with that service. The phone number is 6282 9900.

4.3 Water and sewage

The site has water and sewage and the Territory absorbs all associated costs.

A public toilet block was established in building T1 as part of the Marr development in the late 1970's. Toilet facilities remain in reasonable condition and serve as the only toilets on the site. Maintenance of the toilets is the responsibility of site users.

5.0 Protection of heritage fabric and short term works program

An asset condition report dated 26 July 1998 is included as Appendix 6. A review of the condition report and compilation of a schedule of urgent minor works is recommend in order to avoid further deterioration in the heritage fabric of the site. The full scope of restoration work will only be known once a Conservation and Management Plan is prepared as a prerequisite to any redevelopment on the site. That plan would define the level of work required on different elements in the context of the proposed adaptive reuse.

Several specific areas for urgent work have been identified and these are described below.

5.1 Stabilisation of tall chimney

Appendix 7 is a report on the condition of the tall chimney prepared by Spratt and Jordan in June 1998. The report describes the urgent need to repair lightning damage to the top 10 - 12 metres of the 46 m high brick chimney. The report also identifies the heritage significance of the chimney and recommends that earthquake modelling be carried out at some time in the future to determine how the chimney would collapse under earthquake conditions. Such modelling could influence the location of new buildings in the event of redevelopment of the site.

In response to the public safety issues associated with unstable brickwork at the top of the chimney Environment ACT commissioned the preparation of tender documents which are included as Appendix 8. An amount of [redacted]s held as an advance by Totalcare Projects, and Totalcare project officer Mr Owen Brown, phone 75459 has been asked to proceed with the calling of tenders. Provided the budget of

[redacted] is sufficient, the stabilisation work has been requested to be completed by the end of May 2000.

In order to provide a clean break with the site, Environment ACT recommends Treasury and Infrastructure liaise directly with Totalcare and that the advance of [redacted] be transferred to your office for use at the Brickworks.

5.2 Stabilisation of kilns

Appendix 8 includes a schedule of the 20 chambers of the 1915 Staffordhire kilns. Significant work is required throughout the structure but of most concern is the loss of arch formation in Chambers 7 and 8. Further structural investigation is recommended and temporary propping of the chambers is required.

If any funds remain available following repairs to the chimney, propping of the worst Staffordshire kilns is recommended. Totalcare can advise on this work.

6.0 Public safety

ACT WorkCover recommend in a report included as Appendix 10 that a full structural engineering report be undertaken of the site. The purpose would be to clearly identify areas where businesses could safely operate and those areas that should be fenced off to protect the public from injury resulting from structural failure or other accidental cause. On 4 May 1999 tenants were advised of the need to restrict their activities to areas unaffected by WorkCover recommendations. A copy of that advice is included as Appendix 12.

The two projects described in section 5 above respond in part to that recommendation but no further work has been done to address occupational health and safety.

Appendix 11 is a Fire Safety Report prepared by ACT Fire Brigade. The main recommendations of the report are:

- Repair and reinstatement of two fire hydrants on the eastern side of the site. This has not occurred due to the cost of replacing the water mains that were decommissioned due to excessive leaking.
- High fire fuel load caused by the storage of recycled timber around the site and the build up of fire fuel load around the site. Thor's Hammer has been advised of the need to consolidate their activities on the hard stand area and not to expand into new areas on the edges of the buildings.

The report concludes that the site's current low level usage does not present a high level of risk provided recommendations are addressed. If the current usage of the site increased, a comprehensive review to upgrade fire safety systems would be required.

7.0 Site contamination

Appendix 13 describes a process for the assessment and management of contaminated sites and recommends an investigation be carried out to identify any planning constraints posed by contamination at the Brickworks.

Some contaminants are known to exist on the site. For example, a large quantity of asbestos cement roof sheeting was removed and replaced with metal sheeting by AR Marr. The asbestos cement material was placed along the western side of the site that is now covered by blackberries. Coal tar is known to be present in some of the kilns. This is a known carcinogen that may restrict future opportunities for adaptive re-use of the kilns.

8.0 Security arrangements

A 2 metre high security fence surrounds the site and access is provided through locked gates off Denman Street. The caretaker regularly inspects the fence and damage to the fence is repaired as required.

An internal fenced compound defines the area occupied by Thor's Hammer, which houses a lot of expensive and privately owned machinery. In order to protect his capital investment Thor's Hammer maintains a back to base security system, which covers the internal compound. The Territory does not maintain a regular security patrol.

9.0 Caretaker

Environment ACT has retained the services of a caretaker on an as required basis. Contact details for the caretaker are:

Mr Bruce McDonald
15 Rene Street
CHAPMAN ACT 2611
Phone 6288 7759

Mr McDonald first became involved in the site when A.R. Marr Pty Ltd was put into provisional liquidation in January 1980. He was subsequently employed as a permanent caretaker when the Commonwealth accepted surrender of the lease in September 1984.

Mr McDonald charges his time at [redacted] an hour and inspects fences, arranges grass mowing and reports on issues regarding the occupants of the site. On average he bills for about 40 hours or [redacted] per quarter ([redacted]).

Mr McDonald has a keen interest in industrial history and in the history of the Brickworks in particular. He has a very thorough knowledge of the site and adds

considerable value to any discussions about past and future directions for the Brickworks.

10.0 Recurrent operational costs

Currently the site does not generate any income. Annual recurrent costs are summarised in the table below:

11.0 Valuation

Currently the building assets represent a net liability. The cost of essential repairs would exceed any rental return that the site would generate through the existing use for light industry and warehousing. For example, the market rent for warehouse use may be $40 m² but the Territory may need to spend several hundred thousand dollars upgrading infrastructure in order to meet all the responsibilities that might normally be expected of a 'landlord' for that type of use.

For the longer term, a valuation will only be useful once development opportunities are better defined. The cost of heritage conservation, remediation of contamination and infrastructure provision, which will no doubt amount to several million dollars, will need to be deducted from any likely yield for development rights. A great deal of investigation is still required before a likely land value can be determined.

12.0 Recommended priorities for management action

The Brickworks is a complicated site that is likely to constitute a net cost to the Territory in order to protect the heritage core that is widely acknowledged as being unique in Australia. In order to help resolve future management the following key milestones need to be achieved:

- Establish planning principles for the site through the heritage overlay to the Territory Plan that will shortly be the subject of public consultation;
- Carry out urgent stabilisation works as described in Section 5 of this report;
- Commission key investigations such as contamination and structural sufficiency;

- Invite large scale development interest that must include preparation of a Conservation and Management Plan as a pre requisite to any development. Preparation of a Conservation and Management Plan in the absence of an end use will have little purpose given the funding mechanisms for realising the objectives of the Plan will remain unknown.
- If large scale development opportunities are constrained in the short to medium term, investigate low key use that will generate some income that can be reinvested in the maintenance of the assets.

Australian Heritage Commission
Register of the National Estate Database

Details of Indicative Places for State Agencies for Comment
State: ACT

Name of Place:	Yarralumla Brickworks (extended area)
Other Names:	Canberra Brickworks
Database No:	101439
File No:	8/01/000/0039
Legal Status:	Indicative Place
Admin. Status:	Under assessment

Property Information
Blocks 1 and 20, Section 102.

Location/Boundaries
About 9.6ha, off Denman Street, Yarralumla. Area comprises the whole of Blocks 1 and 20, Section 102. Includes former kilns, chimneys, fan houses and brickpits.

Nominator's Statement of Significance
The ACT's first manufacturing building No 1 kiln (1915) is the only Staffordshire type extant in Australia, No 2 (1927) and No 3 (1953) are Hoffman type. The chimney (1953) is a fine industrial structure unequalled in the ACT and surrounding regions. No 4 kiln (1963) is reputed to be the largest downdraft type in the southern hemisphere. The manufacturing buildings (1913-76) are complete although stripped of machinery. The brickworks is a rare survivor.
The Yarralumla brickpits are the type locality for the Yarralumla Formation, a marine sequence of tuffaceous siltstone, sandstone, mudstone and limestone. Here the Yarralumla Formation is considered to be most typically developed and is therefore the reference section against which all other outcrops are compared.

Description
HISTORY
The Minister for Home Affairs, Mr O'Malley, announced Government plans in 1910 to erect brickworks to provide bricks for the construction of the new Federal Capital. Following experiments on shale in the region, Campbell's Yarralumla property was found to be the most suitable and in 1913 the land was acquired for the brickworks site. In June 1913 a temporary plant was established and operational, comprising a grinding pan, brickmaking machine, elevator and portable steam engine. By August 1913 four open kilns were in use. This temporary plant had an output of 44,000-50,000 bricks per week, producing bricks for the Kingston powerhouse and setting aside others for the permanent brickworks.
A temporary plant was established and operating in June 1913. The first stage of the permanent brickworks, consisting of a single Staffordshire kiln, was approved in December 1913. This kiln was to produce bricks for two further kilns. The Staffordshire kiln, crushing and processing equipment and brick presses were completed and ready for production in 1916, however the commitments of the First World War and a restricted Canberra works program and coal strike led to the brickworks closing in late 1916.
In 1917 a Royal Commission investigated the brickworks following complaints from Walter Burley Griffin. A number of interesting points emerged as a result of the Commission's investigation. It found that 250,000 bricks made in the temporary kiln were of inferior and defective quality so were used for filling and lining drains and for the new kilns, and not for building work as planned. In addition, the Staffordshire kiln contained substantial evidence of construction errors in estimating

Description (continued)

and design.
At the end of 1920, the Government decided to proceed with the building of Canberra and the brickworks reopened in 1921. The brickworks railway was constructed in 1923 linking the works to the provisional Parliament House, the Kingston Power House and Hotel Canberra. A tramway also extended into the Civic Centre. The tramway was removed prior to the opening of Parliament House in 1927.
Throughout the 1920s the brickworks was expanded. Production was severely curtailed in 1929 however with the economic depression, and the railway was fully removed. Production subsequently ceased with the brickworks closing in February 1931. The brickworks opened again in 1935 only to close with World War Two as activity was diverted to works associated with the War. The brickworks reopened in 1944 and beginning in 1954 major upgrading of the brickmaking facilities was undertaken including the construction of a 20 chamber 'Hoffman' kiln. Following the creation of the National Capital Development Commission in 1958, the two temporary downdraft kilns were demolished and replaced with three new kilns.
In 1960 the control of the brickworks was transferred to Commonwealth Brickworks (Canberra) Ltd. By 1973 the brickworks were considered to be in need of extensive modernisation. However upgrading proposals prepared by Commonwealth Brickworks were rejected by the National Capital Development Commission on environmental grounds and, in 1976, all reusable material was moved to a new site in Mitchell, ACT. The decision to relocate the brickworks was justified economically by anticipating the redevelopment of the site in a way which would recover relocation costs.
A private developer, A R Marr Pty Ltd, proposed to redevelop the site and adjacent land as a major tourist complex and in July 1979 the brickworks reopened as a tourist attraction. Extensive work was undertaken at the site but by 1980 A R Marr Pty Ltd was in provisional liquidation and in 1984 the lease was surrendered to the Commonwealth.
PHYSICAL DESCRIPTION
The features intrinsic to the heritage significance of the place are as follows (the numbering is consistent with the Old Canberra Brickworks Conservation Plan and the ACT Heritage Council citation):- Kiln - Staffordshire (K1), Fan House for Staffordshire Kiln (F1), Office (O), Power House (PH), Quarry (Q), Geological Feature A, Geological Feature B, Geological Feature C, Geological Feature D, Fan House for Hardy Patent Kiln (F2), Chimney Stacks (S1-4), Kiln - Hardy-Patent (K2), Kiln - Hardy-Patent (K3), Kilns - Downdraft (K4), Machine Bay for Staffordshire and Downdraft Kilns (M1), Machine Bay for Hardy-Patent (M2), Machine Bay for Hardy-Patent (M3), Workshop (W), Large Crusher House (C2), Primary Crusher House (C3), Small Crusher House (C1) and the Elevator Conveyor (E).
The brickworks consists of a range of buildings, machinery and equipment associated with the production of bricks. Archaeological remains would also exist at the site. There are other buildings on the site which relate to subsequent uses of the place. To the east of the buildings is the remnants of the clay pits or quarry. There is a small lake at the northern end of the pits.
The Staffordshire Kiln (K1) is a two storey structure originally built in 1914/15 with a brick base and upper walls and a galvanised iron roof. It was one of the first of this type to be built in Australia. In c1924 it was surrounded by an upper verandah for drying tiles. The Staffordshire kiln type is characterised by a series of separate side by side chambers which enabled a single chamber to give special treatment to its contents. Prior to this, separate kilns had been needed. Other advantages to this kiln were complete quality of control over temperatures, a cost reducing drying technique and lower fuel consumption.
The Staffordshire Kiln fan house (F1) was constructed in conjunction with the Staffordshire Kiln approximately 20 metres to the west. The use of fans enabled kilns to be fired independently of atmospheric conditions which had previously restricted firing times. The building is a single storey brick Federation style.

Description (continued)

The Hardy Patent Kiln (K2), also known as a modified Hoffman Kiln type, is a two storey building dating from 1927. The lower storey is constructed of brick and the upper storey of corrugated iron. Due to the collapse of some major walls, the kiln was almost totally rebuilt in 1955 and extended from 18 to 20 chambers with the openings enlarged to enable access for forklift vehicles.

The Fan House (F2) is comprised of two identical small scale galvanised iron sheds constructed 25 years apart to house fan equipment for the Hardy Patent Kiln. They are located approximately 20 metres west of the kiln. The other Hardy Patent Kiln (K3) constructed in 1953 is almost identical, but retains its original second storey superstructure.

In the early 1960s three down draft (dome) kilns (K4) were constructed of brick with large fire brick lined metal doors with a number of penetrations along the sides of the kilns enabling the kilns to be fired and checked.

There are four chimney stacks on the site. The first (S1) is constructed of red bricks and was built adjacent to the Staffordshire kiln in 1915. Another chimney stack (S2) was built in conjunction with the fan house in 1927 to service the Hardy-Patent kiln. In about 1953 a further stack (S3) was built. Its height of 55 metres was to allow for the use of natural drafts to exhaust heat and fumes from the kiln (K3). This was unsuccessful as drafts to the chimney were blocked by the surrounding terrain and a fan house had to be installed twelve months later. The fourth stack is associated with the three down draft kilns and was built in 1925 for the two earlier down-draft kilns. About 15 metres tall, it has a small steel door on the southern wall and a large opening in the eastern wall approximately 2.5 metres above ground level.

As part of the upgrading of the brickworks in 1955 and to meet the post World War Two production increases, three machine bays were built. One was a galvanised iron clad steel and concrete structure built on the site of the 1915 workshop and tile plant. Two others were built to service the Hardy-Patent kilns, both two storey steel framed structures clad in corrugated iron with concrete slab floors. As part of the upgrading a workshop (W) for general repairs and maintenance of machinery was also built. It is steel frame construction with metal cladding on the walls and roof. A crusher house (C1) of steel framed construction with corrugated iron cladding was also built as part of the upgrade. A second crusher room (C2) housing a crusher on the site of the original crusher is located to the east of the first Machine Bay. The primary crusher house (C3) is a small building located on the site of the original crusher to the east of Machine Bay 1. Material was crushed here in the first instance and then conveyed to the other crushers for recrushing. The building was a steel frame construction with metal cladding and a large concrete retaining wall on the eastern side.

In 1955, a conveyer elevator (E) as constructed. Shale was conveyed to the pan room where it was ground and screened then loaded onto the conveyor/elevator which carried the raw material to a distribution hopper. The distribution hopper is an enclosed elevator system with walkway constructed with steel frame and supports.

The original galvanised office for the brickworks was removed for uses associated with the original machine shed. The construction of the present office building (O) is believed to date from 1916, the same date as the powerhouse (PH). The office is constructed as a small brick and tile gable ended building. Over the years extensions have been added mostly with flat roofs to meet the needs of the expanding brickworks.

Prior to the commissioning of the Kingston Powerhouse in 1916, the brickworks was powered by a steam engine housed in a temporary detached corrugated iron building. The 1916 permanent building has an exposed concrete floor, exposed brick walls and high corrugated metal ceiling. The western wall had two screened openings. Entry to the substation is through two pairs of doors at either end of the building.

Earthworks outside the brickworks delineate the route of the Brickworks railway which once connected the brickworks to the Kingston railway yards, the Provisional Parliament House and Civic. The track exits the brickworks at the southern boundary and is identified by the ditch and

Description (continued)

bank formation. As the track turns eastwards it follows a manmade bank.
Land located in the far west of the site is reported to have been the site of an early quarry, and has subsequently been used for waste from the brickworks operation.
The quarry lies to the east of the brickworks building from which shale was extracted for the brickmaking process. A 2ft (610mm) narrow gauge tramway was constructed in the quarry area so that loaded trucks ran downhill to the works. The empty trucks were returned to the quarry area using manpower. The tramway was very portable requiring little effort to move as the quarry face advanced.
The quarry site is the type locality for the Yarralumla formation. It is the locality where the formation is considered to be most developed and is thus the reference section against which all other outcrops of that unit are compared. Its importance results from its being the only fossiliferous, marine unit within the extensive volcanic marker horizons of South Canberra. The stratigraphy of the volcanic rocks and its fossil fauna provide evidence for the age of these volcanic. Within this place, three localities are of particular significance.

Condition
The structures comprising the brickworks range from good to poor condition. (1997)

Bibliographic References
Lester Firth Associates Pty Ltd 1986 'Old Canberra Brickworks Conservation Plan'
ACT Heritage Council, Citation for Yarralumla Brickworks, Yarralumla

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APPENDIX Z.

ACT Government

PLANNING AND LAND
MANAGEMENT GROUP
URBAN SERVICES
DEPARTMENT

LAND (PLANNING AND ENVIRONMENT) ACT 1991

DRAFT VARIATION TO THE TERRITORY PLAN

No. 118

Response of the ACT Heritage Council

HERITAGE PLACES REGISTER

Yarralumla Brickworks, Yarralumla
FCC Type 15 House

February 2000

INTRODUCTION

The Planning and Land Management Group (PALM) of the Urban Services Department (incorporating the functions of the ACT Planning Authority) is proposing a draft Variation which, if adopted, would enter a further two places onto the Heritage Places Register. The Heritage Places Register is included at Appendix V of the Territory Plan Written Statement.

Subject to consideration of responses received, PALM proposes to submit this draft Variation to the Executive in accordance with the provisions of the *Land (Planning and Environment) Act 1991,* (the Land Act).

This document is divided into three sections - an Explanatory Statement and two Attachments:

- The Explanatory Statement describes the proposed changes and why they are being proposed. It is one of the Background Papers to the draft Variation.
- Attachment A is the draft Variation. It identifies the precise changes to the Territory Plan Map and Written Statement that are intended to be recommended to the Executive for varying the current Territory Plan.
- Attachment B includes the remaining Background Papers to the draft Variation.

People wishing to comment on the proposal must lodge their submission in writing by ?? March 2000. Submissions should be addressed to:

The Executive Director
Planning and Land Management Group
Urban Services Department
GPO Box 1908
CANBERRA ACT 2601

Attention: Mr Phil Harris
Telephone: 6207 1763
E-mail: terrplan@dpa.act.gov.au

EXPLANATORY STATEMENT

The Proposal

This draft Variation proposes to enter two additional places onto the Heritage Places Register as part of the Territory Plan. If the Variation is approved, the Heritage Places Register at Appendix V of the Territory Plan Written Statement will be amended to include the following places:

68. Yarralumla Brickworks, Yarralumla
69. House at 15 Arthur Circle - Forrest

In Appendix V to the Territory Plan, the index showing all the places entered on the Register to date will also be updated to include the new places. It is also proposed to amend the Territory Plan Map by adding the Heritage Places Register overlay to these sites. The proposed changes are detailed at Attachment A (Part a and Part b).

Reason for Proposal

The above sites were included on the interim Heritage Places Register on 5 December 1997 and 27 February 1998 respectively. These places on the interim Heritage Places Register were submitted to PALM by the Heritage Council in accordance with section 63 of the Land Act on 30 June 1998. PALM has considered the submission and agrees to include the places on the Heritage Places Register in Variation No.118 to the Territory Plan. In preparing this draft Variation, PALM has reviewed the entry in the Interim Heritage Places Register and made several amendments in consultation with the Heritage Council. These amendments include:

- for Yarralumla Brickworks, amendment to the area of the place to bring the place in line with the entry on the Register of the National Estate; and amendment to the figure identifying the intrinsic features on the place to clarify their location and significance.
- for the House at 15 Arthur Circle, Forrest change to identification of the place to clarify the place of significance; and amendment of the Figure identifying the place to include the house and its immediate surroundings
- amendments to the statements of significance to clarify the significance of the features intrinsic to the heritage significance of the place (Yarralumla Brickworks, House at 15 Arthur Circle Forrest)
- standardisation of the sequence of the specific requirements to conform with the headings in the Heritage Places Register
- Schedule 2 elements at the Yarralumla Brickworks are now termed as being of moderate significance rather than 'considerable'.
- The Yarralumla Brickworks Conservation Policy now reflects the necessity to seek out an appropriate reuse of the place so as to ensure the long term retention of its heritage values, and the need for a Conservation and Development Plan to be prepared to ensure the heritage values of the place are not diminished in any future adaptive reuse.
- The Yarralumla Brickworks Specific Requirements have been expanded to conserve the landscape values of the place including the spatial relationships and settings of the intrinsic features, and the machinery and equipment. The adaptive reuse of the interiors of the

Schedule 1 elements and the whole of the Schedule 2 is permitted as it is unnecessary to preserve all of the fabric of the place in conserving the primary heritage values of the place.

- The title of the register entry previously entitled 'House at 15 Arthur Circle' has been changed to 'FCC Type15 House', reflecting its importance as the sole example of this design.
- minor amendments to the specific requirements of the House at 15 Arthur Circle to conserve the setting and architectural values of the residence and ensure wording is consistent with standard clauses in the Heritage Places Register in the Territory Plan
- for the House at 15 Arthur Circle, change to requirements for internal components of the house, as these are not identified in the criterion of significance attached to the citation for this place
- amendments to figures to clearly identify the features of intrinsic significance.

Section 54 of the Land Act requires that each entry on the Heritage Places Register should include specific detailed information. In particular the contents of the Register must:

(a) identify the place to be entered in the Register;

(b) identify elements of the place intrinsic to the heritage significance of the place;

(c) set out the statement of significance for that place; and

(d) specify the requirements for the conservation of the heritage significance of each identified place, including any requirements for the conservation of features identified as intrinsic to that heritage significance.

PALM has prepared this draft Variation in accordance with these requirements. The citations published by the Heritage Council are provided as Background Papers at Attachment B. The Conservator of Flora and Fauna was consulted and made no recommendations in relation to this draft Variation.

ATTACHMENT A

DRAFT PLAN VARIATION

a) Variation to the Territory Plan Written Statement

Appendix V of the Written Statement is varied by adding at the end of the specific requirements for the last entry in the Register, the following new Places in numerical order:

IDENTIFICATION OF THE PLACE:

68. **Yarralumla Brickworks, Yarralumla**

Location:

District of Canberra Central, Division of Yarralumla, Section 102 Block 1 (part) as identified in Figure 1 and indicated on the Territory Plan Map by the Heritage Places Register Overlay H68.

FEATURES INTRINSIC TO THE HERITAGE SIGNIFICANCE OF THE PLACE:

The place comprises the elements listed in Schedule 1 (rated as possessing exceptional significance) and Schedule 2 (rated as possessing considerable significance).

SCHEDULE 1 ELEMENTS OF EXCEPTIONAL SIGNIFICANCE
1) Kiln - Staffordshire (1915)
2) Fan House for Staffordshire Kiln (1915)
3) Kiln - Hardy-Patent (1927)
4) Fan House for Hardy Patent Kiln (1953)
5) Kiln - Hardy-Patent (1953)
6) Kilns - Downdraft a, b, c (1963)
7) Chimney Stacks for Staffordshire Kiln (1915)
8) Chimney Stack for Hardy Patent Kiln (1927)
9) Chimney Stack for Hardy Patent Kiln (1953)
10) Chimney Stack for Downdraft Kiln (1963)
11) Quarry
12) Geological features A, B, C, D

SCHEDULE 2 ELEMENTS OF MODERATE SIGNIFICANCE
1) Office (1916)
2) Power House (1915)
3) Machine Bay for Staffordshire and Downdraft Kilns (1955)
4) Machine Bay for Hardy-Patent (1955)
5) Machine Bay for Hardy-Patent (1955)
6) Workshop (1955)
7) Large Crusher House (1955)
8) Primary Crusher House (1955)
9) Small Crusher House
10) Elevator Conveyor (1955)

STATEMENT OF SIGNIFICANCE:

Operational from 1913 to 1976, the Yarralumla Brickworks is of historical value as the first industrial manufacturing facility within the ACT, and for its integral role in providing the base materiel used in the construction of the early buildings in the National Capital.

The Yarralumla Brickworks is a relatively intact representative example of a large urban brickworks from the early 20th Century, a type which is becoming increasingly rare nationally and internationally. The Brickworks comprise a vast cultural landscape where the remaining buildings, structures, equipment and landscape features have the ability to demonstrate the evolution of a range of industrial processes associated with brick and clay production-over a 60 year period.

The Yarralumla Brickworks is of considerable technical value from the presence in the one location of a number of different kiln types: Staffordshire (1915), Hardy-Patent (1927) and Downdraft (1953) kilns, which demonstrate an unusually wide range of firing processes. The Staffordshire kiln is especially significant as the only surviving example of this kiln type in Australia. This variation to a Hoffman design of kiln allowed bricks, tiles and pipes to be fired in cycles and utilises an unusual fan-forced draft system to aid firing.
The largest chimney stack (S3) is of aesthetic and social value as a prominent landmark in the central urban area, visible from the Lake Burley Griffin foreshores, New Parliament House and mountain lookouts around the City. Additional aesthetic value is associated with the composition and sculptural forms of the built elements, specifically the kilns, stacks and larger elements of equipment.

The Yarralumla Brickworks is one of a broad thematic group of remnant industrial and engineering heritage places that were built to facilitate the initial development of Canberra including the Cotter Dam and Pumping Station and the Kingston Power House.

The brickpits have historical value as a primary source of clay and are also of considerable geological value as the type locality for the 'Yarralumla Formation', dating from the Silurian Period 425 million years ago. The scheduled stratigraphic rock units constitute the reference section against which all other outcrops within the Formation are compared. It is the only fossil ferrous, marine unit within the extensive volcanic marker horizons of South Canberra. Sites A and D show excellent examples of an anticline in calcareous siltstone, Site B shows a typical tuffaceous mudstone and siltstone of the Yarralumla Formation and Site C shows abundant fossils of mainly gracitiopods, trilobites, coral and a simple crinoid preserved in a bedding plane.

SPECIFIC REQUIREMENTS:

In accordance with s54(1) of the *Land (Planning and Environment) Act 1991* the following requirements are identified as essential to the conservation of the heritage significance of the place. These requirements are prepared to implement the following conservation policy for the place:

> The identified heritage values and intrinsic features of the place shall be conserved whilst allowing for the integrated and sympathetic redevelopment of the place as a single entity, consistent with contemporary practices for the adaptive reuse of industrial and commercial heritage places. In conserving and developing the place, its significant historical use as an industrial site for the production of bricks and clay products shall continue to be evident and accessible to the public.
>
> Redevelopment of all or part of the place shall be subject to the preparation of a Conservation and Development Plan to the satisfaction of the approval authority. The following specific requirements shall be subject to review within the Conservation and Development Plan for the Yarralumla Brickworks.

(i) Landscape Setting

(a) The quarry landform (Schedule 1: 11) should be retained in a manner whereby it is clearly evident to be a man made excavation, associated with the industrial use of the site. Revegetation, enhanced hard and soft landscaping and low-medium density built development with a high proportion of landscape open space may be permitted in the vicinity of the quarry. The shape of the quarry may be altered in a minor manner, however access points into and out of the quarry area should utilise existing openings and gradients within the landform. The

historical linkage between the quarry and kiln areas shall be expressed in any new development.

(b) The geological features (Schedule 1: 12 A-D) shall be integrated within any site landscaping treatment. Disturbance of the immediate surface shall be limited to works that protect, stabilise or enhance the interpretation of the geological values. The immediate environs of the geological features shall be retained as landscape open space.

(c) To reflect historical usage patterns at the site and protect the setting of significant elements, the immediate environs of the kilns (Schedule 1: 1, 3, 5, 6) as identified below shall be retained as landscape open space, clear of any major structures. Minor structures and landscaping treatments that retain the kilns, stacks and fan houses as the dominant visual elements to the space may be permitted:

- The open concourse running north-south from the Hardy Patent Kiln (Schedule 1: 5) to the Downdraft Kilns (Schedule 1: 6a-c), between the kilns and fan houses (Schedule 1: 2, 4),
- The spaces between the kilns: (Schedule 1: 5-3, 3-1, 1-6)
- The immediate environs of the chimney stacks (Schedule 1: 7, 8, 9, 10), fan houses (Schedule 1: 2, 4) and primary crusher house and elevator conveyor (Schedule 2: 8,10) to a distance of the order of 10m.

(d) New hard and soft landscaping treatment should generally express the historical spatial relationships and movement patterns of brickmaking operations about the site.

(ii) **Built Structures - including alterations and additions**

(a) The existing large chimney stack (Schedule 1: 9) shall be conserved and maintained in its current form as a prominent urban landmark.

(b) The external form, arrangement of openings and detailing that reflects the industrial use of the built elements in Schedule 1 (1-10) and the Primary Crusher House (Schedule 2: 8) shall be retained.

(c) Minor external alterations and additions and major internal alterations to the built elements in Schedule 1 may be permitted to suit a new use where the proposed works will not adversely affect the heritage significance of the elements or the place as a whole.

(d) Alterations and additions to the original built fabric in Schedule 1, including alterations to external finishes, shall complement the historical industrial use and architectural style of the place.

(e) The elements listed in Schedule 2 may be conserved to interpret the historical use of the place or adapted to suit a new use for the place. Subject to the recommendations of the Conservation and Development Plan, these buildings may be replaced with new construction that is generally consistent with the scale, form, external materials and industrial character of the original building.

(f) Relocation of the Powerhouse and the Office (Schedule 2: 1, 2) elsewhere within the place may be permitted, subject to the relocation process being fully documented and full reconstruction of the buildings taking place within a specified period.

(g) Construction of new buildings or elements in the place may be permitted if any new building(s) or element(s) do not significantly diminish the heritage value of the place. The scale, form, detailing and external materials of any new buildings or structures shall be consistent with the architectural style and industrial character of the built elements in Schedule 1.

(iii) **Industrial Equipment**

(a) Major equipment and machinery associated with the historical industrial use of the place shall be retained and conserved in situ. Minor equipment should be retained and conserved but may be relocated to a new location within the site for interpretative purposes and/or its own protection.

(b) The Primary Crusher House (Schedule 2, 8), including the integral equipment and machinery, and the Elevator Conveyor (Schedule 2: 10) shall be conserved for their ability to demonstrate and interpret industrial processes and secondary aesthetic values.

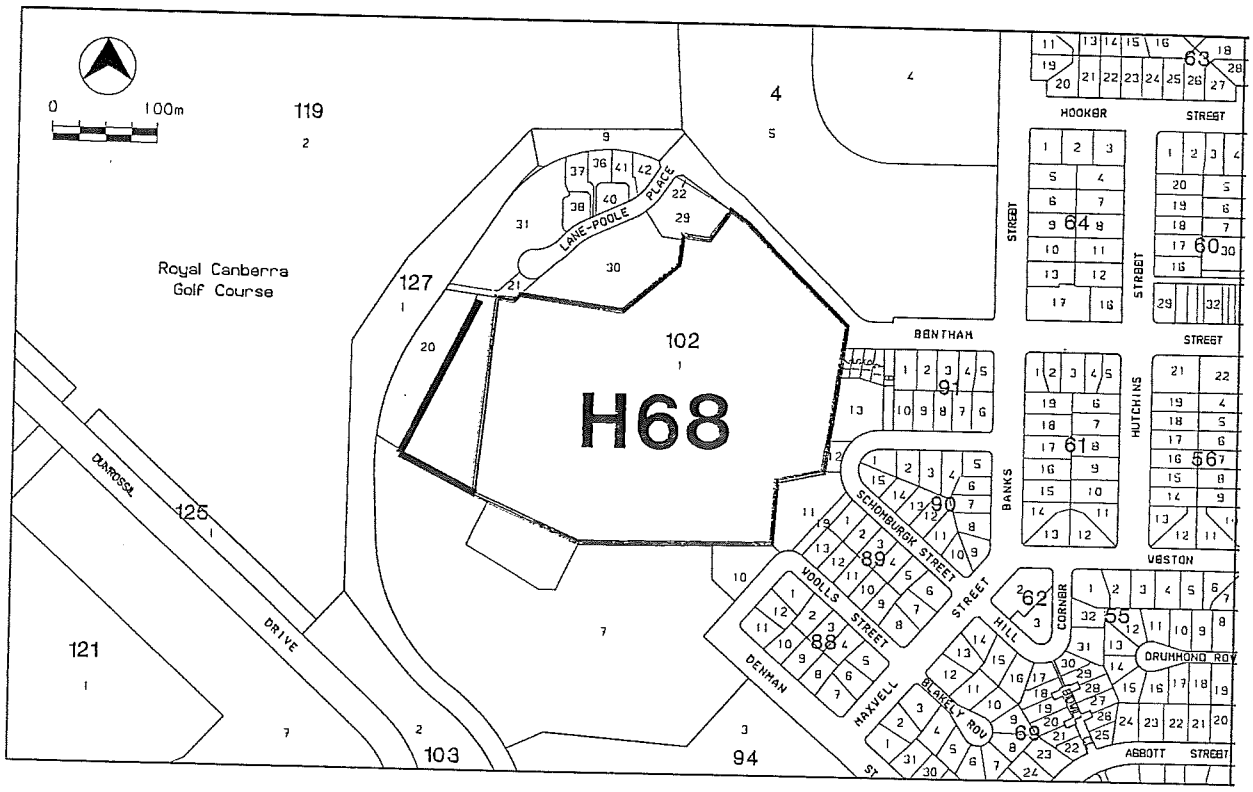
(iv) **Demolition**

(a) Subject to (iv)(b) and (c) demolition of elements listed in Schedules 1 shall not be permitted, other than in exceptional circumstances, including circumstances in which the building or structure is structurally unsound and beyond economic repair or where there are significant public health and safety reasons to warrant demolition. Demolition shall not be permitted unless it can be demonstrated that there is no prudent and feasible alternative.

(b) The demolition of the original internal fabric of buildings within Schedule 1 or original built fabric of elements listed in Schedule 2 shall only be permitted in the context of sympathetic alteration and additions, as identified within the Conservation and Development Plan.

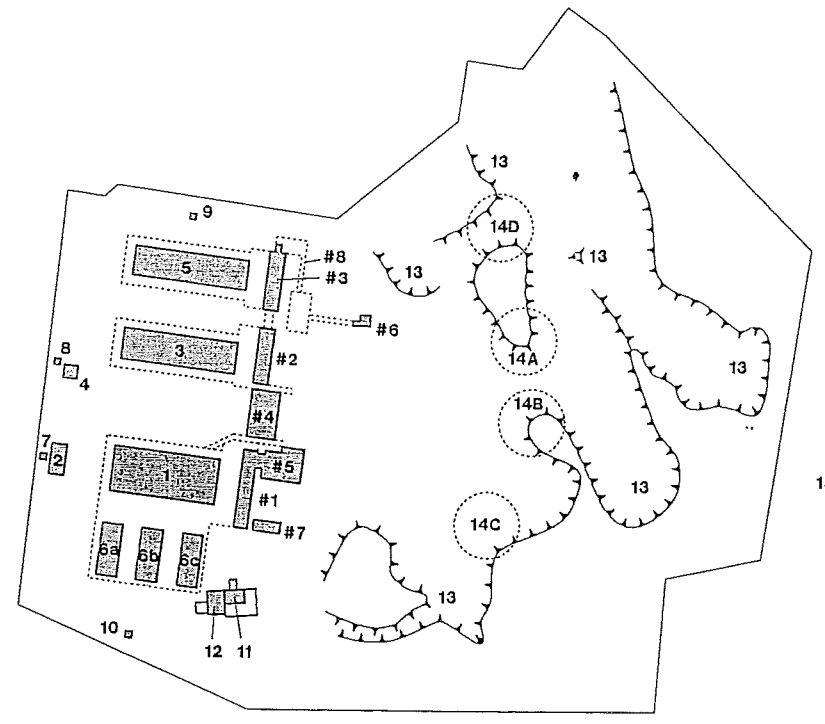
(a) Comprehensive recording of a building or structure shall be undertaken prior to any demolition or removal of fabric.

Figure 1
Yarralumla Brickworks, Yarralumla: Location



(Curtilage Boundary should extend to adjoining block 20, if not all of block 1)

Figure 2
Yarralumla Brickworks, Yarralumla: Significant Features
(Need to revise Schedules as per previous comments)



LEGEND:

Schedule 1 Features:

1	Staffordshire Kiln
2	Fan House for Staffordshire Kiln
3	Hardy-Patent Kiln
4	Fan House for Hardy-Patent Kiln
5	Hardy-Patent Kiln
6a-c	Downdraft Kilns
7	Chimney Stack for Staff. Kiln
8	Chimney Stack for H-P Kiln
9	Chimney Stack for H-P Kiln
10	Chimney Stack for Down. Kilns
11	Office
12	Power House
13	Quarry
14A-D	Geological features

Schedule 2 Features:

#1	Machine Bay for Staffordshire and Downdraft Kilns
#2	Machine Bay for Hardy-Patent
#3	Machine Bay for Hardy-Patent
#4	Workshop
#5	Large Crusher House
#6	Primary Crusher House
#7	Small Crusher House
#8	Elevator Conveyor

APPENDIX 3

Lucy Horodny MLA

Minister for the Environment, Land and Planning
Minister for Urban Services
Minister for Emergency Services
Minister for Arts and Heritage
Minister for Consumer Affairs

Member for Molonglo
Australian Capital Territory

29 NOV 1996

Ms Lucy Horodny MLA
Member for Ginninderra
ACT Legislative Assembly
GPO Box 1020
CANBERRA ACT 2601

Dear Ms ~~Horodny~~ Lucy

I refer to your letter of 28 July 1996 to the Chief Minister, Ms Kate Carnell, MLA concerning representations you have received from Mr Thor Diesendorf concerning the business he operates from the Yarralumla Brickworks. The Chief Minister has referred the matter to me as the Minister responsible for Arts and Heritage. I apologise for the delay in responding to your letter which was inadvertently mislaid.

Mr Diesendorf and a number of others operate businesses from the Yarralumla Brickworks. I understand that this arrangement has always been an informal one and that no tenancy agreements exist with the occupants. Each tenant undertook to pay one month's rent in advance and to quit the premises in 7 days.

You will be aware that the Brickworks presents major public safety risks. These are risks both associated with the very nature of the place as an industrial site and from alterations made to the premises by the occupants. There are extremely serious electrical hazards associated with unauthorised wiring, overloading of power outlets and inappropriate use of existing circuitry. Consequently, I have terminated the arrangements with all occupants of the Brickworks and asked them to vacate their premises within 30 days.

I have directed the Department of Business, the Arts, Sport and Tourism to assist the occupants to relocate to new premises. ACT Heritage has arranged for the occupants of the kilns to be offered alternative space at the old Kingston Bus Depot and their initial reaction has been favourable. Some work is required to make the premises safe, and subject to a satisfactory agreement between the occupants and the Department of Urban Services which manages the property, I expect the antique dealers to set up shortly.

ACT Legislative Assembly,
London Circuit, Canberra ACT 2601
GPO Box 1020, Canberra ACT 2601

Phone (061) 205 0133 Fax (061) 205 0427

In respect to Mr Diesendorf ACT Heritage is making separate arrangements with the industrial occupants for their eventual vacation of the site. Because the areas occupied by the industrial users is not subject to same degree of risk as the kiln areas, I am prepared to allow them to remain for the time being, but they should be aware that there are commercial groups interested in the development of the site and there is no certainty of any long term tenure.

I understand that ACT Heritage will be writing to the occupiers shortly advising them of these facts, and offering a written month-to-month occupancy agreement for a period of twelve months.

Yours sincerely

Gary Humphries MLA
Minister for the Arts and Heritage

ENVIRONMENT ACT

ACT GOVERNMENT

File Ref: *97/21461*

Mr Thor Diesendorf
Thor's Hammer
The Brickworks
Denman Street
YARRALUMLA ACT 2600

Dear Mr Diesendorf

Re: Tenancy at the Yarralumla Brickworks

I refer to your letter of 22 April 1998 and our meeting on 14 May 1998 to discuss the possibility of your firm entering into a lease in relation to space at the Yarralumla Brickworks.

Since our meeting I have been pursuing a number of issues relating to your proposal. These include a number which continue to remain unresolved, including:

1. Permitted Uses

Planning and Land Management Group in the Department of Urban Services has been requested to provide advice on the ability for the Yarralumla Brickworks to continue to be used for light industrial purposes in the context of the permitted uses under the Territory Plan.

2. Other Future Uses

The possibility of the redevelopment of the Brickworks was discussed at our meeting on 14 May. A tenancy agreement cannot proceed until there is confirmation that no redevelopment is proposed in the near future. The tenancy agreement will need to be clear about arrangements for the cessation of the agreement should site redevelopment be approved.

3. Tenancy Agreement

The draft tenancy agreement (Attachment A) has been referred to the ACT Government Solicitor for advice about its legal correctness, especially in terms of the recently introduced amendments to the landlord and tenant legislation in the

ACT DEPARTMENT OF URBAN SERVICES

ACT Heritage
Level 1, Homeworld Building, Anketell Street Tuggeranong ACT 2900
PO Box 1036 Tuggeranong ACT 2901 • Telephone: (02) 6207 2161 • Fax: (02) 6207 2200
Homepage http://www.arts.act.gov.au

Territory. In the meantime, I would also appreciate any comments you may have on the draft of the agreement.

I understand that you will be meeting with me today at the Brickworks to confirm the areas to be occupied.

Yours sincerely

John Feint
A/g Manager
1 June 1998

between the AUSTRALIAN CAPITAL TERRITORY, a body politic established by section 7 of the *Australian Capital Territory (Self-Government) Act 1988* (Commonwealth)

("the Territory"

and [redacted]

("the Tenant"

THE PARTIES AGREE AS FOLLOWS:

1. INTERPRETATION

In this Agreement, unless the contrary intention appears;

"Gaming Machine" has the same meaning given to it in the Gaming Machine Act 1987.

"Improvements" means all plant and equipment mechanical or otherwise, fixtures, furniture and furnishings of whatsoever nature including window and floor coverings, blinds, light fittings in or upon the Premises or any part of the Premises and the chattels specified in Item 8 of the Schedule and any further improvements or extensions supplied or erected by the Territory on the Premises from time to time.

"Non-Profit Community Organisation" includes an individual person carrying out non-profit activities for the community.

"Premises" means such part of the Land described in Item 1 of the Schedule and the Improvements.

"Schedule" means the schedule to this Agreement.

"tenancy" means the occupation of the Premises by the Tenant under the terms and conditions set out in this Agreement.

"Tenant" includes its successors and permitted assigns.

The headings of clauses will be for convenience only and will not be used for interpretation purposes.

2. GRANT

2.1 The Territory hereby grants to the Tenant the right to use the Premises as a Tenant from month to month subject to the terms and conditions in this Agreement. Such monthly tenancy may be determined at any time by either Tenant or Territory giving to the other 1 month's notice in writing. The Tenancy will commence on the date specified in Item 2(b) of the Schedule to this Agreement.

3. SUBLEASE OR ASSIGNMENT

3.1 The Tenant will not sublet, licence, assign, transfer or mortgage its interest in this tenancy without the written consent of the Territory.

3.2 The Tenant shall be responsible for the whole of the Premises notwithstanding the use and occupation of parts of the Premises by other persons permitted by the Territory.

4. RPOSE

4.1 ıe Tenant will only use the Premises for the purpose described in Item 3 of the Schedule.

5. USE OF PREMISES

5.1 The Tenant shall not carry or permit to be carried on or in the Premises any illegal dangerous or offensive business or activity or do or permit anything in the Premises which may be a nuisance annoyance or danger to the tenants or occupiers of other premises in the building or which may have effect of vitiating or prejudicing any policy of insurance in respect of the Premises.

5.2 The Tenant shall have the right to use in common with other occupiers of the building of which the Premises is part the passage ways and toilets identified in blue colour on the sketch plan attached and marked 'A'. The areas identified in blue colour shall be kept clear at all times, and any use of these areas for any purpose other than movement of people or materials from place to place shall be paid for by the Tenant at the rate set out at Item 4 in the Schedule.

6. RENT

6.1 The Tenant agrees to pay the rent as set out in Item 4 of the Schedule or such rent varied in accordance with clause 6.2 at the time and in the manner described in Item 5 of the Schedule or as the Territory otherwise directs in writing.

6.2 Rent review

The Territory will review and vary the rent on the date specified in Item 6 of the Schedule in accordance with such rates of rent as may be charged by the Territory to similar organisations occupying a Territory facility at the time of review.

7. TELECOMMUNICATION AND ELECTRICITY CHARGES

7.1 The Tenant will pay all telecommunication charges including the costs for connection of such services to the Premises and all costs and expenses associated with fire protection in respect of the Premises.

7.2 The Tenant will pay for any electricity supply metered to the premises described in Item 1 of the Schedule. The Tenant will be notified monthlyof the period charge by not later than the 21st day of the current month and make this payment at the time of payment of the following months' rent.

8. REPAIRS, MAINTENANCE AND CLEANING

8.1 The Tenant will at all times during the term of this tenancy keep, and at the termination of this tenancy yield up, the Premises in good and substantial repair and condition (including structural damage to the Premises caused by the insured risks) fair wear and tear excepted.

8.2 The Tenant's liability in respect of each item of repair as approved by the Territory will be limited to the amount set out in Item 7 of the Schedule PROVIDED THAT the Tenant shall pay the full cost for any item of repair which in the opinion of the Territory is necessary because of failure by the Tenant to take proper care of the Premises.

8.3 Where any damage is caused to the Premises which is covered by a policy of insurance and those moneys are paid to either the Tenant or the Territory then those moneys will be used to repair the damage caused to the Premises.

8.4 The Tenant will at all times during the term of this tenancy and at its own expense keep the Premises in a thoroughly clean and tidy condition (including garbage removal and window cleaning) to the reasonable satisfaction of the Territory.

8.5 If and whenever the Tenant is in breach of its obligations under subclauses 8.1 or 8.4 the Territory may be notice in writing to the Tenant specifying the repairs, maintenance and works needed require the Tenant to effect the necessary work in accordance with the notice. If the Tenant does not carry out the required work within the time specified by the Territory any person or persons duly authorised by the Territory with such equipment as is necessary may enter the Premises and carry out the necessary work. All costs and expenses incurred by the Territory in carrying out the work will be paid by the Tenant to the Territory on demand and until paid will be a debt due and payable to the Territory by the Tenant under this Agreement.

9. INSURANCE AND INDEMNITIES

The Tenant will, in the joint names of the Territory and the Tenant, effect and maintain

(a) a public liability insurance to the value specified in Item 8(a) of the Schedule; and

(b) such other insurance policies as specified in Item 8(b) of the Schedule.

9.2 The Tenant will provide evidence to the Territory of the currency of the insurance policy referred to in clause 9.1 within 1 month from the commencement of this tenancy and thereafter every 12 months and as requested by the Territory from time to time.

9.3 The Tenant will take all reasonable precautions against the outbreak of fire in the Premises and immediately notify the Territory in the event of any fire occurring in the Premises which does damage to the Premises. The Tenant will notify the Territory of any damage caused to the Premises whether covered by a policy of insurance or not. The Tenant authorises the Territory to conduct all negotiations with the insurer to settle any claim whether for damage to the Premises or public liability. The Territory may by notice in writing to the Tenant permit the Tenant to negotiate and settle any claim contemplated above.

9.4 The Tenant will indemnify and keep indemnified the Territory against all loss or damage to the Improvements arising out of the use or occupation of the Premises or any part of the Premises by the Tenant or any other person.

9.5 The Tenant will indemnify and keep indemnified the Territory against all losses damage claims suits or other actions arising out of the use or occupation of the Premises by the Tenant or any other person.

10. OTHER RIGHTS AND OBLIGATIONS

10.1 Right of Entry

The Tenant will permit the Territory or any person or person duly authorised by the Territory to enter upon the Premises at any reasonable time or times for the purpose of inspection or effecting any repairs to the Premises.

10.2 Signs

The Tenant will not display erect or permit or suffer to be displayed or erected upon the Premises or any part thereof any advertisement sign or hoarding whatsoever without the prior written consent of the Territory.

10.3 Heavy Equipment

The Tenant will not without the prior written consent of the Territory (which consent will not be arbitrarily or unreasonably withheld) bring on to the Premises or permit any other person to bring on to the Premises any mechanical or heavy equipment or storage device which might (in the case of a storage device, when filled) overload the floor of the Premises.

10.4 Gaming Machines

The Tenant will not install suffer or permit the installation or use of any Gaming Machines in or on the Premises.

10.5 Sale of Alcohol

The Tenant will not sell or suffer or permit the sale of any alcoholic beverages on or in the Premises without the prior consent in writing of the Territory.

10.6 Make Good

The Tenant will upon the expiration or sooner determination of this tenancy take down remove and carry away any fitting, fixture, furnishing, installation, plant, machinery, or other improvement supplied or installed in the Premises by the Tenant and the Tenant will restore and make good to the satisfaction of the Territory any damage to the Premises caused by such removal.

10.7 Determination of Tenancy

Subject to any law of the Territory to the contrary, the Tenant agrees that the Tenant will not be entitled to receive any compensation from the Territory upon the expiration surrender or determination of this tenancy in respect of any improvements on the Premises.

10.8 Abandoned Property

The Territory may remove and dispose in any manner the Territory thinks fit any property left on the Premises by any person after the vacation of the Premises or may place any property so left in storage. The Tenant agrees to meet all reasonable costs involved in the disposal or storage of such property provided that if the Territory has disposed of the property by sale and the costs of such a sale any other amounts owing by the Tenant to the Territory however incurred will be deducted from the proceeds of such sale.

10.9 Alterations to Premises

The Tenant will not, nor permit any person to, install any fittings, fixtures or equipment in the Premises or make any alterations or additions to the Premises without the prior written consent of the Territory. Any installation alteration or addition consented to by the Territory will be carried out by a qualified person in a proper and workmanlike manner in accordance with approved plans and in accordance with the relevant laws applicable to such works in the Australian Capital Territory and such terms and conditions as may be determined by the Territory.

10.10 Compliance with Laws

The Tenant will comply with all Acts, Regulations and Ordinances including building codes and practices, occupational health and safety legislation and health legislation in force in the Australian Capital Territory relating to the use of the Premises.

10.11 Legal costs and stamp duty

The Territory and Tenant will bear their own legal costs in relation to the preparation of this Agreement and the Tenant will pay all stamp duty assessed as payable in respect of this Agreement.

10.12 No Waiver

All rights, remedies and powers of the Territory under this Agreement will remain in force notwithstanding any neglect forbearance or delay in the enforcement of such rights, remedies and powers.

11. QUIET ENJOYMENT

11.1 If the Tenant pays the rent and complies with the covenants and conditions of this Agreement the Tenant will be entitled to quietly enjoy the Premises without interruption by the Territory or any person lawfully claiming from or under or in trust for the Territory.

12. DISPUTE RESOLUTION

12.1 The parties acknowledge that in order to minimise any dispute in relation to this tenancy they should first, without delay and in good faith, attempt to resolve such dispute by way of informal negotiations prior to commencing any proceedings.

13. TERMINATION

13.1 If:

(a) any rent payable under this Agreement remains unpaid for 30 days after the date payment is due;

(b) the Tenant fails to observe or perform any other of the covenants or obligations of this Agreement and does not remedy such a failure within 30 days from the date of service on the Tenant of a written notice from the Territory specifying the nature of the failure,

(c) where the Tenant is a corporation or an incorporated association, action is taken by way of an order, decision or resolution for the winding up or cancellation of the registration of the Tenant; or

(d) the Tenant is insolvent or becomes subject to any form of insolvency administration,

the Territory may determine this Agreement without prejudice to any claim which the Territory may have against the Tenant for any breach of the covenants by the Tenant.

13.2 The acceptance of rent or other monies by the Territory during or after any period referred to in paragraph 13.1(a) shall not prevent or impede the exercise by the Territory of the powers conferred upon it under subclause 13.1.

13.3 Without any prejudice to the rights and remedies accrued in favour of each party, either party may terminate this Agreement at any time by giving at least 1 months' notice in writing to the other.

14. NOTICES

f this tenancy will be
linary prepaid mail or
-- referred to in clause

on of that

.or the purposes

10.10 mpliance with Laws

The Tenant will comply with all Acts, Regulations and Ordinances including buildir practices, occupational health and safety legislation and health legislation in force ir Capital Territory relating to the use of the Premises.

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(c) where the Tenant is a corporation or an incorporated association, a order, decision or resolution for the winding up or cancellation of or

(d) the Tenant is insolvent or becomes subject to any form of insolve

the Territory may determine this Agreement without prejudice to any cla have against the Tenant for any breach of the covenants by the Tenant.

13.2 The acceptance of rent or other monies by the Territory during or after paragraph 13.1(a) shall not prevent or impede the exercise by the Territ it under subclause 13.1.

13.3 Without any prejudice to the rights and remedies accrued in favour of terminate this Agreement at any time by giving at least 1 months' noti

14. NOTICES

14.1 Any notice, payment or receipt required or permitted to be given for the purposes of this tenancy will be deemed to have been duly given if delivered personally, or left at, or posted by ordinary prepaid mail or where appropriate sent by facsimile transmission to the address or facsimile number referred to in clause 14.3.

14.2 A notice, payment or receipt:

(a) if posted, will be deemed to be received three days after posting; or

(b) if sent by facsimile transmission, will be deemed to be received upon completion of that transmission.

14.3 Until otherwise notified the address and facsimile number of the Territory and Tenant for the purposes of this tenancy is as set out in Item 10 of the Schedule.

EXECUTED by the parties on the date first written above:

Signed for and on behalf of the)
AUSTRALIAN CAPITAL TERRITORY)
by)
the person performing the duties of)
Senior Officer Grade B Position No.13274,) _____
in the presence of:

_____
Signature of Witness

_____
Name of Witness

The Common Seal of [redacted])
[redacted])
was affixed in accordance with its rules)
and constitution in the presence of:) _____

_____ _____
Signature of Authorised Officer Signature of Authorised Officer

_____ _____
Name of Officer Name of Officer

SCHEDULE

ITEM 1 Premises: The area identified in red colour on the sketch plan attached and marked 'A', being an area of [redacted] square metres [redacted] on the prop[redacted]

ITEM 2

(a) Term: monthly;

(b) Commencement date: [redacted];

ITEM 3 Permitted use: [redacted];

ITEM 4 Rent payable: $[redacted] per square metre per annum [redacted] for [redacted] m^2 per annum) until [redacted], and then reviewed;

ITEM 5 Manner and place of payment of rent: To be paid in equal monthly instalments in advance on the first day of each month to:

The Manager
ACT Heritage
PO Box 1036
TUGGERANONG ACT 2901

ITEM 6 Rent review date: If the Tenant continues in occupation for a period of [redacted] years or more from the commencement of the lease, rent shall be reviewed every [redacted] years from the commencement date specified in Item 2(b);

ITEM 7 Repair liability: First $500.00 for each item of repair;

ITEM 8

(a) Public Risk Liability Insurance: $5 million;

(b) Other insurance: Nil;

ITEM 9 Chattels: Nil;

ITEM 10 Notices:

The Territory:

The Manager
ACT Heritage
PO Box 1036 TUGGERANONG ACT 2901

Facsimile number: (06)207 2200

The Tenant:

[redacted]

Facsimile number:

APPENDIX 5. 35

URBAN SERVICES

ACT-BEPCON
Contact Officer: Dennis Harvey
Telephone: 02 6207 7161
Facsimile: 02 6207 7750
Email: dennis_harvey@dpa.act.gov.au

KB 18/6/99

Kathy Binns
Manager, Heritage Unit
Environment ACT
PO Box 144
LYNEHAM ACT 2602

Attention: Judy Banker

Dear Kathy

ELECTRICAL SAFETY AT THE DISUSED YARRALUMLA BRICKWORKS

I refer to your request for an electrical safety inspection to be conducted at the brickworks.

On Friday 4 June 1999, I inspected the Brickworks electrical installation with Judy Banker from the Heritage Unit and the site supervisor Bruce Macdonald. We surveyed the site and I noted that part of the sub mains in the existing installation provides power to several tenants and the site office used by Bruce. These tenants currently are: Thor's Hammer Recycled Timber, Splinters Theatre Group located in building W and the painter's studio above the detached toilet block. Power is also available at the unoccupied K4 kilns that are closest to the main entrance gates and the workshop outbuilding (R1) in the eastern quarter. The disused portions of the installation are isolated and are safe.

In 1996 BEPCON recommended to the Department of Business, the Arts, Sports and Tourism that the installation required substantial upgrading to meet compliance with the Australian Wiring Rules. The main switchboard within the electrical building and due to its old technology, is a safety concern. Specifically, the main switchboard has accessible exposed energised busbars behind the switch-fuses that could be hazardous to unlicensed persons inside the electrical building.

The building is currently secure and has an electrical danger sign attached to one of its access doors. The danger sign is only temporary and if power continues to be supplied from the existing main switchboard, any replacement electrical safety sign for the installation should be made permanent and non-removable.

Recommendation

If the future for the Brickworks site is such that the majority of existing buildings are retained, its electrical installation with a few minor exceptions, requires decommissioning and replacing with a new installation. The new main switchboard could be situated in the existing electrical building where there is ample space and practical access for new submains to supply a number of remote distribution boards. A licensed electrical contractor will be required for any proposed electrical renewal project at the Brickworks.

Should you require further assistance with the electrical installation at the old Brickworks please contact me on the above telephone number

Yours sincerely

Dennis Harvey
Electrical Safety Officer
16 June 1999

Asset Condition Report CANBERRA BRICK WORKS 26 July 1998

Site	Date of work	Assessment/Comments
Machine Bay for Staffordshire and Downdraft Kilns M1		Satisfactory. Missing corrugated iron wall and roof cladding. Windows broken - vandalised.
Machine Bay for Hardy-Patent M2		Satisfactory. Missing corrugated iron cladding on walls and roof. Windows broken - vandalised.
Machine Bay for Hardy-Patent M3 Workshop		Satisfactory. Missing corrugated iron cladding on walls and roof. Windows broken/missing.
Workshop W		Satsifactory. Missing corrugated iron cladding on walls and roof. Windows broken/missing.
Small Crusher House C1		Satsifactory. Missing corrugated iron cladding on walls and roof. Windows broken/missing.
Large Crusher House C2		Satsifactory. Missing corrugated iron cladding on walls and roof. Windows broken/missing.

APPENDIX 6.

Asset Condition Report CANBERRA BRICK WORKS 26 July 1998

Site	Date of work	Assessment/Comments
Geological Feature A		Good condition
Geological Feature B		Good condition
Geological Feature C		Good condition
Geological Feature D		Good condition
Chimney Stacks S1		Good Condition. Blackberry bushs growing at base of chimney
Chimney Stacks S2		Good Condition
Chimney Stacks S3	1997 1997	Good Condition Lightning conductor installed Crack in bricks at top left corner of stack assessed as safe. Weeds growing at base of chimney.
Chimney Stacks S4		Good Condition

Asset Condition Report CANBERRA BRICK WORKS 26 July 1998

Site	Date of work	Assessment/Comments
Fan House for Hardy-Patent Kiln F1		Unsatisfactory. No doors, frames only. All windows are broken, vadalised. Wooden celing lining missing boards poor condition. Corrugated iron cladding on walls and roof missing. Basement floors covered in mud and water possible rising damp. Eaves rotting. Window glass broken - vadalised.
Fan House for Staffordshire Kiln F2		Unsatisfactory. Corrugated iron wall and roof sheeting rusted or missing.
Office O - external - Electricity - Plumbing - Telephone		Unsatisfactory. Eaves are missing and rotting, need re-painting. Guttering rusted needs replacing.
Office O - - Electricity - Plumbing - Telephone		Good condition.
Power House PH - External		Unsatisfactory. Eaves are missing and rotting, need re-painting. Guttering rusted needs replacing
Quarry Q		Good condition

Asset Condition Report CANBERRA BRICK WORKS 26 July 1998

Site		Date of work	Assessment/Comments
Kiln - Staffordshire K1 - Galvanised Iron - Brickwork - Roof Trusses - Doors			Satisfactory. Loose bricks, cracks in mortor. Verandahs - north side small section has been restored. remaining verhadahs decayed flooring, partly collapsed and rusty. Decayed louvres, broken vandalised windows. Iron sheeting on West side rusty.
Kiln - Hardy-Patent K2			Satisfactory Window glass broken and vadalised.
Kiln - Hardy-Patent K3			Satisfactory. Surface rust on corrugated iron roof. Eave on North West and West wall has been removed offering no protection to kiln wall. All window glass broken vandalised. Roof littered with broken pieces of bricks - vadals.
Kilns - Downdraft K4			
	KILN 1		Loose bricks over top of Southern doorway arch. Cracks in side walls
	KILN 2		Loose bricks over top of Southern doorway arch. Loose bricks and minor cracks to side walls.
	KILN 3		Loose bricks over top of Southern doorway arch. Loose bricks and minor cracks to side walls.
	Corrugated Iron Roof		Good Condition - The above 3 Kilns are enclosed by a steel framed, corrugated iron roof structure. The walls are clad half way down the overall height of the structure.

Asset Condition Report CANBERRA BRICK WORKS 26 July 1998

Site	Date of work	Assessment/Comments
Large Crusher House C3		Unsatisfactory. Semi-derelict state. Most of the corrugated iron cladding on walls and roof is missing. Timber decking in poor condition. Exposed timber wall and roof frame in poor condition. ?weeds ?rubbish Windows broken/missing.
Elevator Conveyor E		Unsatisfactory. Semi-derelict state. Missing corrugated iron cladding on walls and roof. Timber walkway in poor condition. Steel frame covered in rust.
Quarry		Good Condition.
Open Spaces - vegetation		Unsatsifactory. Large contained areas of balckberries. Blackberries also growing around base of chimney stacks. Weeds generally growing in between cracks in concrete
Open Spaces general		Some areas are tennanted and are being used for storage areas. eg. anntique and old wares, recycled timer etc.
Perimeter Fence		Satisfactory. South fence starting to fall due to erosion and weed infestation. Barbed wire is loose in places and needs restraining.

ASSESSMENT COMMENTS

Assesment is rated as follows: ● Good Condition ● Satisfactory ● Unsatisfactory

Please note details of the work carried out in this report may be referenced in File No.: 97/10340, 97/5034

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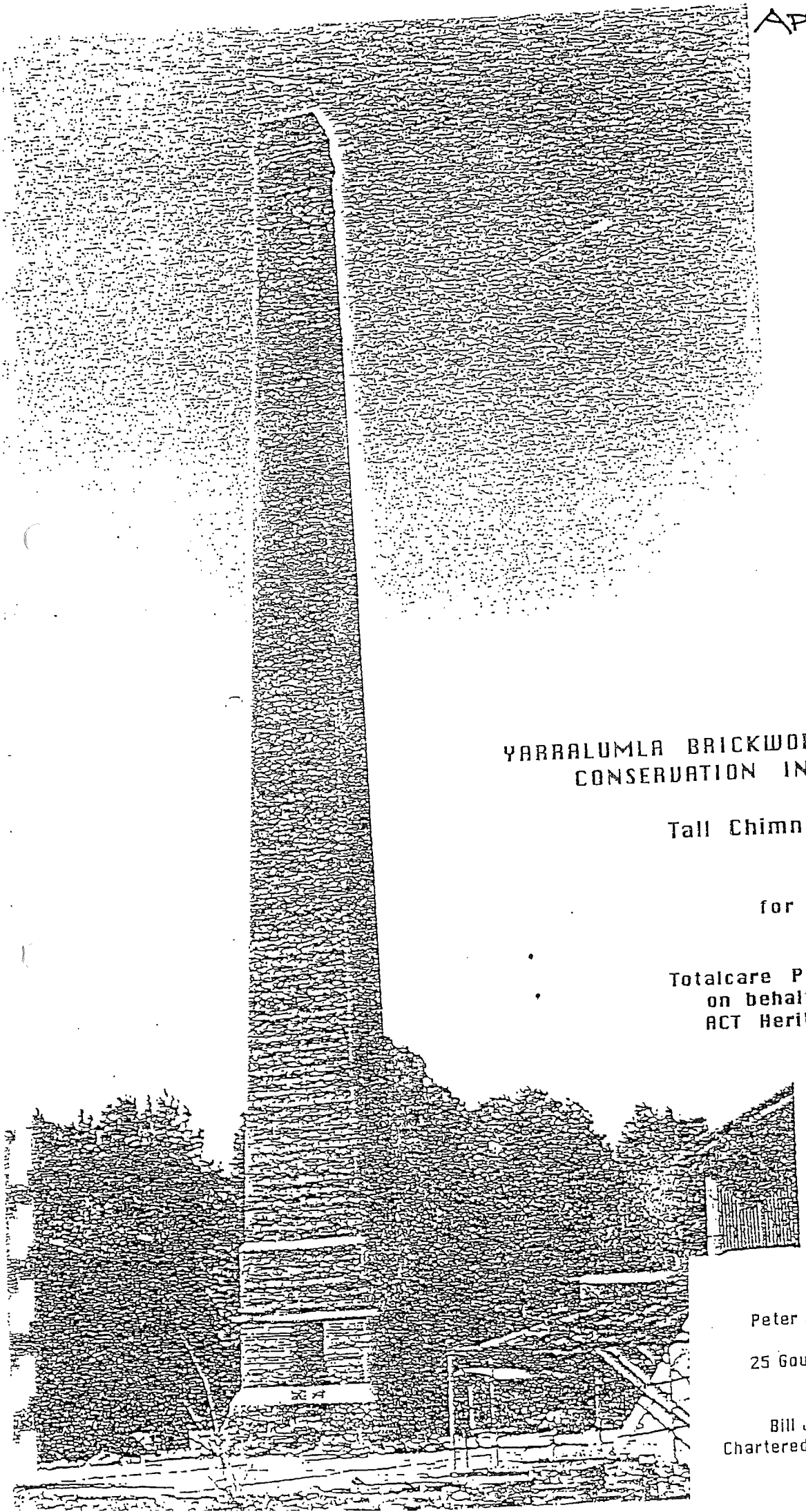

YARRALUMLA BRICKWORKS, YARRALUMLA CONSERVATION INVESTIGATION

Tall Chimney S3

for

Totalcare Projects
on behalf of
ACT Heritage

June, 1998

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Consulting Engineers
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YARRALUMLA BRICKWORKS, YARRALUMLA

Conservation Investigation
Tall Chimney S3

CONTENTS

YARRALUMLA BRICKWORKS, YARRALUMLA
CONSERVATION INVESTIGATION
Tall Chimney S3

1.00 INTRODUCTION

1.01 Background

Totalcare Projects on behalf of ACT Heritage commissioned this investigation to :

- Determine the structural and fabric condition, defects, safety issues, heritage considerations, and options for making good and for restoration, including cost estimates.
- Consider the Chimney stability against wind and earth quake with recommendations and costings.
- Consider lightning protection.
- Consider methods of working on the chimney, the safety of workers and adjacent property.

1.02 The Investigation

The investigation was carried out jointly by Consulting Engineers Peter Spratt of Peter Spratt & Associates, and Bill Jordan of Bill Jordan & Associates, with both principals attending the site on 11th, 12th and 13th May last.

Totalcare provided a cherry picker crane for access, with Project Officer David Nagle, and Manager Fitout & Minor Works, Owen Brown, being present for the crane inspection.

The crane was used to inspect the chimney on all sides for its full height and to install a second lightning conductor. Lightning conductor installation and earthing was checked during the investigation.

A conductivity meter was used to check for salt concentrations in the chimney parging and a covermeter to determine whether steel reinforcement was built into the chimney blockwork.
No uncovering works were done and only small pieces of detached render likely to fall were removed from the chimney top.

1.03 Special Considerations

The chimney has several important differences from other Heritage sites, which require special consideration as :-

- It is an industrial construction.
- It has no end use as distinct from a used building and hence faults are not routinely noted and corrected.
- It is built close to and towers above adjacent houses.
- It is a local landmark because of its height.
- Its height and construction make it susceptible to lightning strike.
- Its height and exposure make it subject to high wind loads.
- Its height and construction of non ductile materials make it susceptible to seismic vibration.

2.00 CHIMNEY SIGNIFICANCE

2.01 Introduction

Retaining objects from the past gives people a sense of security, identity and community. People value objects for a variety of reasons irrespective of their age and condition.

Tall chimneys are major visual objects and when constructed brick by brick they inspire a sense of awe and raise questions about their nature, their reason for being and their links with their function and the people involved in their building and its operation.

Some chimneys may be rare surviving links with present past and future generations due to their design or size, their builders, building techniques, aesthetic qualities, or industrial or historical associations.

These are heritage values and it is important that future generations can inherit and appreciate these values.

It is also important that the present generation is able to assess heritage significance, where balance is needed between retention and the requirements of changing circumstances.

2.02 Registration

The chimney has been included by the ACT Heritage Council in the interim Heritage Places Register of the Yarralumla Brickworks.

The Brickworks are N°41/5 gazetted 5th December 1997, and this chimney S3 is given a significance rating A, as a feature intrinsic to the Heritage Significance of the Place, being a prime component of the aesthitics of an industrial site in a woodland setting.

The Registration requires elements of Significance Rating A to be retained and conserved excepting in exceptional circumstances in which the element is structurally unsound and beyond economic repair, or where there are significant public health and safety reasons to warrant demolition. Demolition shall not be permitted unless it can be demonstrated that there is no prudent and feasible alternative.

The chimney is included in the Yarralumla Brickworks listing on the Register of the National Estate and is classified by the National Trust of Australia (ACT).

2.03 Chimney Data

The Brickworks' first construction was in 1913 with chimney S3 being constructed in 1953. It contrasts with the other chimneys on site whose height was limited to below surrounding trees at the direction of Walter Burley Griffin. The other chimneys were designed as forced draught; this chimney was designed as a natural draught, hence its height. It was found that it still needed a forced draught for effective operation and draught fans were installed after 12 months' operation.

The chimney was measured during this investigation as 45.9m from concrete paving at its base to its top. It has a base 4.9m square and tapers to 2.2m at the top.

Information from Mr Terry Horan, the construction supervisor who still lives in Canberra, indicates the chimney to have been built using dry pressed bricks and quicklime mortar. Colonial bond with headers every four courses has been used for the chimney excepting for the section at the top above the decorative string courses which has been laid in English bond with every second course a header course.

Mr Horan has, in response to our query, advised that the chimney was built on a large concrete pad founded on shale some 2m below concrete paving level and extending 1m proud of the base all around.

It has been suggested that the original plans are still in existence in a Canberra Government Department. Every effort should be made to find and record them.

Figure 1 shows the chimney dimensions.

2.04 Criteria

The Burra Charter of Australia defines cultural significance as '*aesthetic, historic, scientific or social value for past, present and future generations*'.

The chimney meets the criteria in its own right on each of aesthetic, historic and social values. Its current registration states it to have the highest rating and states it to be a feature intrinsic to the heritage significance of the place.

At 45.9m it is not the highest chimney in Australia and it does not have any special quality of design or construction. It did not work as intended and it is of scientific interest to find out why. It may be the last brick chimney of its size constructed in Australia and may thereby be unique. These aspects are worth investigating and certainly its significance will be increased if it is found to be unique. Otherwise it has no scientific value.

2.05 Cultural Significance

This investigation concurs with previous assessments and finds no reason to alter or amend the current Statement of Cultural Significance.

3.00 CHIMNEY STRUCTURE & FABRIC

3.01 The Survey

The survey measured the chimney, noted its brick bonding, obtained information on its foundations and carried out tests for salt concentrations and for embedded steel reinforcement.

Crack locations and crack patterns were recorded.

The chimney dimensions are shown on attached Figure 1, and condition as Photographs 1-17 and Figures 2-5. Figure 6 shows chimney site location.

Totalcare at our request prior to the site investigation had undertaken lightning conductor earth testing and used the cherry picker crane to upgrade the conductor installation to current Australia Standards and to check the total installation to our direction.

3.02 Lightning

The cracking to the top of the chimney is characteristic of lightning strike.
Australian Standard AS1768 gives 20-40 days as an average annual thunderday occurrence for Canberra. It also gives a risk index calculation methodology and states that an index of 11 is the warrant index for a lightning conductor installation.
The index for the chimney, to AS1768 is :-

Item	Useage	Index Figure
Type of Structure	Historical non metallic chimney.	3
Construction	Masonry large size.	3
Height	46m	6
Situation	Flat area.	0
Lightning Prevalence	Up to 40 days/year.	5
		17

The Standard's highest rating is 14 and the Standard rates the risk as very great and the need for protection as essential at this rating.
Totalcare, at the request of the Consultants, under the direction of their electrical Engineer Mr Stephen Sih, carried out check testing of the earthing resistance for the

lightning conductor. It was found to be 20 ohms, which is twice the maximum allowed by the Standard. Mr Sih arranged for earthing connection to the adjacent water main at 4 ohms and additionally noted that only one down conductor was installed whereas the Standard called for two. He arranged for the second down conductor to be installed while the crane was on site for our inspection.

It was noted during the inspection that :-

- There is a join in the earlier down conductor near the top of the chimney with the top section being a different stranded wire from the lower section. .
  The join was tested electrically sound at our request during the inspection.

- Mr Bruce McDonald advised us during our inspection that the lightning conductor was broken near its base and was inoperative for an unknown period of time, until noticed by him and recently made good by Totalcare.

- We have a query on the present earthing of the two down conductors which are both connected to the water main. We noted that the report of the Contractors doing the earthing recorded rain immediately prior to the earthing work. We would expect the water main to be a good earth if in wet ground but not in dry, and suggest that it be checked again after a period of no rain and the earth made good as found necessary.

- The presence of shale at 2m or thereabouts below ground level indicates the chimney site is a poor earth area and suggests that the original earth installation was never effective. It is essential that a good earth be obtained and be operative at all times.

- Our previous experience of lightning damage together with the history of an ineffective and non standard installation gives no doubt whatsoever that the present cracking to the chimney top is due to lightning strike.

3.03 Salt Concentrations

Samples of the parging to the inside of the chimney were taken from top and bottom to determine salt concentrations to give a check on the likelihood of fabric decay from salt cyrstallization, and the likelihood of corrosion of metal fastenings to be used in future conservation works.

The samples were tested by crushing a 50g piece, immersing it in 50ml of water and reading the conductivity. Past testing and experience has shown that a reading above 0.1mA is an indication of sufficient salts to cause problems in underfired bricks. Well fired bricks have had no problems up to 1.0mA.

Constant readings were obtained as :-

Parging from top	0.25mA
Parging from bottom	0.90mA
Tap water	0.075mA

The readings show that the chimney should be capped to prevent rainwater entry. and that susceptible metals will corrode if embedded in the bricks. Discussion with

Mr Bruce McDonald with comment from Mr T.Horan indicates that the Brickwork bricks have been fired between 1025^{0}C and 1100^{0}C.

Our past research has shown that 1050^{0}C is desirable to produce a salt resistant brick. We note that there are around half a dozen underfired bricks evident in the chimney which are fretting and the general observation is that the chimney bricks have been chosen best quality and likely to have been fired above 1050^{0}C. There is some very minor fretting to some inside bricks near ground level in the chimney, hence the recommendation to cap the chimney.

3.04 Metal Content

A Micro Covermeter was used to determine if the chimney had hoop iron reinforcement in bed joints as was often used in industrial brick chimney construction.

The Covermeter showed that no steelwork was embedded in brick joints. A section of drummy render to the lower plinth on the centre of the east face indicated a rusting bolt to be located under the render in that location.

The absence of steelwork is good, as rusting steel gives a series of horizontal cracks which require the steel to be removed and for structural continuity to be restored at large expense. This chimney does not require that work.

3.05 Chimney Cracking

The chimney is extensively cracked in its top section as shown in the photographs and Figures 2 to 5.

Each face has multiple cracking extending down the chimney as :-

Crack Locations	Distance down Chimney (m)
East Face	6.74
West Face	7.34
North Face	4.58
South Face	6.54

The cracks suggest that the chimney has been hit by lightning at least three times and likely more. The cracks are both vertical and horizontal. There are very few broken bricks, with the chimney splitting along brick joints.

4.00 STRUCTURAL ASSESSMENT

4.01 Location

The chimney is located adjacent to a housing development, with the nearest dwelling being as close as 10 metres from the base. The housing development is about 15 years old. Figure 6 shows the chimney location.

Clearly there is a risk that any failure of the chimney structure could lead to damage to the nearby buildings, or even personal injury, hence it is necessary to assess the ability of the structure to resist loads which might act on it and lead to such damage.

4.02 Loadings

Loadings have been determined by reference to the Australian Standard Loading Code. Part 2 Wind Loads and Part 4 Earthquake Loads are of significance for this investigation.

Wind Loads. The Code uses a mix of research results and practical experience to give guidelines on the likely performance of structures under various regimes of wind.

Unfortunately little is known of tall brick chimneys, largely since they were never common and are no longer built. Their size and construction make them sensitive to dynamic effects which require modelling and analysis for accurate determination. We have made assumptions based on the data available in the Code but would need the modelling and analysis research for any design.

To give a preliminary indication of the likely outcome, an analysis was done using the dynamic analysis method in the Code, with assumptions for factors not covered in the Code.

The preliminary analysis shows that the chimney may not be safe under a 50 year return frequency wind loading with the wind coming from the north west, the highest velocity direction for Canberra. Whilst other directions of wind produce less severe conditions, it is noted that the nature of wind loading on tall structures is such that it cannot be assumed that the strongest winds will push the chimney away from the wind direction : lateral movement is also possible under wind loading on tall structures.

The survival of the chimney to date appears to be due to the mortar used for its construction being able to withstand tensile forces well in excess of those allowed in the SAA Masonry Code. A programme of research into the actual ability of the masonry to withstand such forces would be necessary to establish the actual behaviour.

Earthquake Loading. The Earthquake Code has no provision for a structure of this type, and more detailed analyses outside the scope of this Code will be required following further investigation. In any case, some form of strengthening to give the structure ductility will be required before the structure can be in any way made able to resist earthquake loads.

However, a simplified analysis using the static earthquake loading given in the Code for complying buildings has been carried out. This analysis indicates that the design earthquake forces are of similar magnitude to design wind forces, but dynamic effects would give the structure a higher risk of failure under earthquake loading than wind loading.

Safety under SAA Code Loadings

Uncertainties in the preliminary analysis outlined above do not allow precise values to be given for the factors of safety of the chimney against failure. However, the following results indicate the range of possibilities and show where additional data is required.

The analysis has assumed that the chimney is in sound condition. This is not the case near the top, where lightning damage has weakened it considerably. The small and even adverse factors of safety calculated emphasize the need to repair the top of the structure.

Loading	Tensile Mortar Strength (MPa)	"Factor of Safety"
Dynamic Wind Loading - permissible, along wind.	0.2	0.7
-do-	0.4	1
-do-	0.6	1.4
"Static"Earthquake Loading	0.2	0.6
-do-	0.4	0.8
-do-	0.6	1.1
-do-	0.8	1.3

The SAA Masonry Code allows, for certain elements of certain types of structures, a value of 0.2MPa for the tensile stress in a mortar bed due to bending from transient loads: values up to 1MPa are allowed for specially engineered masonry based on test results. Values given here are for illustration purposes only and do not imply that the values will be justified following more detailed analysis.

A factor of safety of at least 1.5 is desirable to reduce risk to an acceptable level. The factors for earthquake loading are not meaningful in themselves, but illustrate that if strengthening is carried out for wind loading, which also gives the structure the required ductility, then earthquake loading requirements may also be met.

The factor of safety is not uniform over the height of the chimney, and for both earthqake and wind loading it is at a minimum near the mid-height. This implies that, all factors being equal, a failure of the chimney under earthquake or wind loading would occur with a top section breaking off.

It is particularly important to emphasise that the chimney cannot be considered safe under earthquake loading for any possible value of mortar strength. The SAA Earthquake Loading Code only applies to ductile structures and a brittle structure such as the chimney has to be made ductile before earthquake loading can be legitimately considered under the Code.

5.00 OPTIONS FOR MAKING GOOD

5.01 General

The chimney, subject to checking the conductor earthing as 3.02 above, is now protected against lightning.

Lightning has, however, severely damaged the top section over 7m down and some of this brickwork is in danger of being dislodged.

This damage must be made good prior to any other works.

We note that the chimney has been in existence for 45 years and is likely to have experienced wind loads approaching that which the Code requires. We cannot detect any cracking attributable to wind loading, so that it can be assumed that the chimney as originally constructed is safe for all but the most extreme wind.

The occurrence of an earthquake is unpredictable with current knowledge; the chimney is not constructed for an earthquake and damage with perhaps falling masonry could be expected.

As a minimum measure we consider that the chimney needs to be returned to the structural condition that existed when it was built. We regard this as an immediate action.

5.02 Methods of Making Good
General Requirements

Whatever method of strengthening is considered, it needs to fulfil the following criteria :

i) The design life of the strengthening must reflect the heritage classification of the structure, hence
ii) any materials used must be either permanent or able to be monitored and maintained at reasonable cost.

Experience on similar heritage structures both in Australia and overseas indicates that the following materials meet these criteria :

- Cementitious grouts - no organic materials should be used if the work cannot be reversed, so no epoxy or similar grouts or adhesives should be considered.
- Any fixings embedded in the brickwork should be stainless steel and preferably grade 316.
- Galvanised steel can be used if it can be checked for corrosion over the life of the structure and readily removed for re-treatment (a coating available to special specification is considered to have a 150 year life in the Canberra environment).

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Present Cracking to Chimney Top

- Repair of the present cracking to the top requires drilling and stitching across the chimney width for the vertical cracking and vertical drilling for the horizontal cracking. The insertion of steel rods in this manner is a well proven technique used many times by us on similar works.

- The best proven stitching technique currently available is the 'Cintec' masonry anchoring and reinforcement system which has been developed in Europe and used worldwide including Australia specifically to meet the needs of heritage masonry structures. It uses stainless steel, and cementitious grout to bond the masonry to itself and to the steel.

- The presence of soluble salts dictates the use of 316 grade stainless steel for embedding in the masonry.

- We estimate the cost of scaffolding the chimney at around [redacted] including one week's hire, and including meshing and safety catching outriggers.

- We estimate the works of fixing the chimney top to take 5-7 days.

- The cost of a suitable cherry picker is [redacted] so that the cherry picker is very favourable as a working method, subject to safety considerations.

5.03 Safety

Safety involves the workers, public access to the site during and after the works, and adjoining property and persons on that property.
A summary of these considerations is :-

- The chimney, if handled properly, is safe to work on but is both a public access risk and adjoining property risk with its present shattered top.
- There are three methods of working on the chimney - scaffold, steeple jack and crane.

Scaffold

- A scaffold to full chimney height is needed if this method of work is used on the chimney. The scaffold will need to be fixed to the chimney at intervals and wind load on scaffold working platforms will impose lateral forces on the chimney at scaffold points of attachment. We believe scaffold attachment to the shattered top is very undesirable.

- A scaffold has the disadvantage of workers being under the cracked masonry with the possibility of being injured by masonry falling from above and of falling masonry damaging the scaffold, or of the scaffold directing falling masonry outwards from the chimney.
Whilst the masonry falling outwards can be avoided by chain wire meshing the scaffold and providing catching outriggers, the risk to workers and of scaffold damage remains. The risk is considered to be very small given the chimney

inspection, but it is, nevertheless, present and is exacerbated by scaffold attachment to the chimney.

- Scaffold advantages are secure working platforms with load carrying ability.

Steeplejack

- Steeplejack working is becoming common for tall building access to building faces.
- They require secure safe top anchorages and access to the top to enable the anchorages.
- They are limited to small operations with light equipment and with little load carrying ability.
- They cannot be safely used where the tops of structures are a hazard.

Cranes

- Cranes can be either suspended cage, where the cage swings freely from a suspended hook, or a working platform firmly attached to the crane arm as a cherry picker configuration.
- Both forms have the advantage, where working at the top of structures, that there is no danger from falling masonry to the workers, provided that the crane itself is not subject to destabilising impact.
- Working on the chimney requires the working platform to be stable. This favours the cherry picker as lateral working forces are taken by the crane, whereas the hanging cage requires fixing to the chimney.
- The cherry picker bucket allows moderate carriage of equipment and materials to the work site. Tools can be attached to the bucket and do not require fixing to the chimney.
- The cherry picker imposes no load on the chimney and as working forces are small there is no tendency to dislodge damaged fabric.

Best Choice

Best choice for the repair of the chimney top then is to stitch the cracked sections together with 316 stainless steel anchors and bars using the Cintec grouted anular system.

Public Safety

The presently cracked top sections are heavy, and compression loads are effectively holding them in place, requiring a substantial lateral force to cause them to fall. It is however our standard practice to wrap tie bands around affected sections prior to working on them. We use nylon or plastic woven bands and remove them once the work is completed.

5.04 Making Good for Wind & Earthquake

The method of repair chosen must have the effect of turning the chimney from a brittle to a ductile structure. Only then can it be made safe for earthquake loading in particular.

The methods of repair that can be considered are :

i) An internal steel or concrete structure that supports the chimney without a contribution from the masonry.

ii) An internal steel structure which acts compositely with the masonry.

iii) Reinforcement of the chimney structure by the drilling of the structure and the grouting of suitable reinforcement.

Considerations

i) The internal reinforcement, which would use grade 316 stainless steel, would be the most expensive but has the advantages of a design life of indefinite length and the finished appearance, both internally and externally, would not be altered.

ii) The internal steel frame acting compositely with the masonry can be built from relatively light galvanised steel sections also designed to support scaffold platforms and lifting devices as the work rises internally; no external scaffolding or cranes would be required. It has the disadvantage of requiring many large stainless steel fixings in the brickwork to provide the composite action.

iii) The full strength steel frame or concrete core is likely to need scafffolding and frequent use of a large crane. However, only a small number of small diameter fixings will be required into the brickwork.

We have noted above (4.02 and 4.03) that the chimney is outside the scope of the Loading Codes and accurate prediction of behaviour is not possible without specific modelling and analysis. The behaviour of the chimney has potentially great impact on the close adjoining houses and decisions need to be made on :-

- How accurately can the chimney behaviour be determined?
- There must be no risk of masonry falling on the houses if they are to remain.
- Can the houses be purchased and demolished?

The analysis and design to achieve composite action under 5.04 (ii) is pushing the bounds of present knowledge to the limits. A sophisticated computer package which uses a new technique known as discrete element analysis may be able to be used to ensure that the required safety of the chimney under earthquake loading is achieved.
If found possible, 5.04 (ii) using the internal steel frame offers very substantial cost savings.

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ture and the

olves the workers, public access to the site during and after the works, and property and persons on that property.
ary of these considerations is :-

l be the
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nimney, if handled properly, is safe to work on but is both a public access risk adjoining property risk with its present shattered top.
re are three methods of working on the chimney - scaffold, steeple jack and ne.

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Scaffold

A scaffold to full chimney height is needed if this method of work is used on the chimney. The scaffold will need to be fixed to the chimney at intervals and wind load on scaffold working platforms will impose lateral forces on the chimney at scaffold points of attachment. We believe scaffold attachment to the shattered top is very undesirable.

- A scaffold has the disadvantage of workers being under the cracked masonry with the possibility of being injured by masonry falling from above and of falling masonry damaging the scaffold, or of the scaffold directing falling masonry outwards from the chimney.
Whilst the masonry falling outwards can be avoided by chain wire meshing the scaffold and providing catching outriggers, the risk to workers and of scaffold damage remains. The risk is considered to be very small given the chimney

·sent Cracking to Chimney Top

·sent cracking to the top requires drilling and stitching across t for the vertical cracking and vertical drilling for the horizon nsertion of steel rods in this manner is a well proven technique us us on similar works.

oven stitching technique currently available is the 'Cintec' masor nd reinforcement system which has been developed in Europe and us including Australia specifically to meet the needs of heritage masor It uses stainless steel, and cementitious grout to bond the masonry to the steel.

esence of soluble salts dictates the use of 316 grade stainless steel ding in the masonry.

estimate the cost of scaffolding the chimney at around [redacted] including k's hire, and including meshing and safety catching outriggers.

e estimate the works of fixing the chimney top to take 5-7 days.

The cost of a suitable cherry picker is [redacted] so that the cherry picker is v favourable as a working method, subject to safety considerations.

Safety

Safety involves the workers, public access to the site during and after the works, adjoining property and persons on that property.
A summary of these considerations is :-

- The chimney, if handled properly, is safe to work on but is both a public access and adjoining property risk with its present shattered top.
- There are three methods of working on the chimney - scaffold, steeple jack crane.

Scaffold

- A scaffold to full chimney height is needed if this method of work is used or chimney. The scaffold will need to be fixed to the chimney at intervals and load on scaffold working platforms will impose lateral forces on the chimn scaffold points of attachment. We believe scaffold attachment to the shattered t very undesirable.

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turning the chimney from a
safe for earthquake loading in
the chimney without a
masonry.
the structure and the
el, would be the
length and the
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fold platforms
or cranes
s steel
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diameter
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pecific
act

present and is exacerbated by scaffold attachment

effect of turning the chimney from a
ne made safe for earthquake loading in

e :

orking platforms with load carrying ability.

g common for tall building access to building faces.

supports the chimney without a

with the masonry.

drilling of the structure and the

anchorages and access to the top to enable the

perations with light equipment and with little load

where the tops of structures are a hazard.

16 stainless steel, would be the
ife of indefinite length and the
uld not be altered.

spended cage, where the cage swings freely from a
king platform firmly attached to the crane arm as a cherry

e masonry can be built from
to support scaffold platforms
ternal scaffolding or cranes
g many large stainless steel

antage, where working at the top of structures, that there is
nasonry to the workers, provided that the crane itself is not
mpact.

y to need scafffolding and
number of small diameter

ey requires the working platform to be stable. This favours
ateral working forces are taken by the crane, whereas the
fixing to the chimney.

icket allows moderate carriage of equipment and materials to
can be attached to the bucket and do not require fixing to the

outside the scope of the
possible without specific
potentially great impact
on :-

mposes no load on the chimney and as working forces are small
y to dislodge damaged fabric.

are to remain.

ne repair of the chimney top then is to stitch the cracked sections
6 stainless steel anchors and bars using the Cintec grouted anular

)4 (ii) is pushing the
l computer package
s may be able to be
rthquake loading is

ery substantial cost

cracked top sections are heavy, and compression loads are effectively
n place, requiring a substantial lateral force to cause them to fall.
our standard practice to wrap tie bands around affected sections prior
1 them. We use nylon or plastic woven bands and remove them once
ompleted.

60

5.04 Making Good for Wind & Earthquake

The method of repair chosen must have the effect of turning the chimney fr brittle to a ductile structure. Only then can it be made safe for earthquake loadi particular.

The methods of repair that can be considered are :

i) An internal steel or concrete structure that supports the chimney withc contribution from the masonry.

ii) An internal steel structure which acts compositely with the masonry.

iii) Reinforcement of the chimney structure by the drilling of the structure anc grouting of suitable reinforcement.

Considerations

i) The internal reinforcement, which would use grade 316 stainless steel, would b most expensive but has the advantages of a design life of indefinite length an finished appearance, both internally and externally, would not be altered.

ii) The internal steel frame acting compositely with the masonry can be built relatively light galvanised steel sections also designed to support scaffold platf and lifting devices as the work rises internally; no external scaffolding or cr would be required. It has the disadvantage of requiring many large stainless fixings in the brickwork to provide the composite action.

iii) The full strength steel frame or concrete core is likely to need scafffolding frequent use of a large crane. However, only a small number of small dian fixings will be required into the brickwork.

We have noted above (4.02 and 4.03) that the chimney is outside the scope o Loading Codes and accurate prediction of behaviour is not possible without spe modelling and analysis. The behaviour of the chimney has potentially great in on the close adjoining houses and decisions need to be made on :-

- How accurately can the chimney behaviour be determined?
- There must be no risk of masonry falling on the houses if they are to remain.
- Can the houses be purchased and demolished?

The analysis and design to achieve composite action under 5.04 (ii) is pushin bounds of present knowledge to the limits. A sophisticated computer pac which uses a new technique known as discrete element analysis may be able t used to ensure that the required safety of the chimney under earthquake loadi achieved.
If found possible, 5.04 (ii) using the internal steel frame offers very substantial savings.

We can design a ductile structure as indicated above but can presently give no surety on the chimney behaviour. Surety is needed if the houses are to remain.
We consider the best choice action if the chimney is to remain and to be made good for Wind & Earthquake subject to the research modelling, is the internal steel frame of light galvanised steel and without using scaffolding.
To help with decision making we have prepared cost estimates as 6.00.

5.05 Adaptive Re-use

The consideration of adaptive re-use of a structure is an important element in any conservation study. By finding a new use for a heritage listed site which does not greatly detract from its cultural significance, its future can often be better secured.

There is no possibility that the chimney will ever be used for its original purpose again, not least because the practical means of strengthening it are not compatible with this use.

However, there is a possible use which may add to the value of the site. The top of the chimney commands panoramic views of a section of Canberra which is not provided with lookouts. A spiral stair could be built inside the chimney, incorporated with the strengthening frame. A platform could be built below the top, using the (strengthened) chimney top as a balustrade. We have included a budget cost for this work in this report, but its feasibility in terms of all aspects but the engineering ones would need further investigation and is outside the scope of this report.

6.00 RECOMMENDATIONS & COST ESTIMATES

We recommend that the following works be carried out or initiated :-

6.01 Immediate Action

Return the chimney to its original structural condition. **Max.** **Min**
Stitch the cracked brickwork together using a cherry picker crane and Cintec proprietary anchors.

Work
Crane Hire

Contingency
Fees
Contract Administration

[redacted]

Carry out modelling research & analysis on the chimney for wind loads & earthquake loads.

- Testing of existing masonry by others.
- Test boring to prove foundation & footing by others.
- Modelling & development of design & costings for alternative strengthening strategies, professional fees.
- Contract Administration.

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6.02 Ongoing Action

Determine costs of acquiring adjacent houses. $ Not yet known.

Carry out Earthquake stiffening works using steel composite frame Preliminary Estimate

[redacted]

Option 1. No Stairway.

- Final design fees, design & document of preferred alteration.
- Specialised analysis in UK if light steel composite frame alternative chosen (at current exchange rates).
- Site and other services during construction.
- Contract Administration.

Contingency

Total without stairway

Option 2. With Stairway.

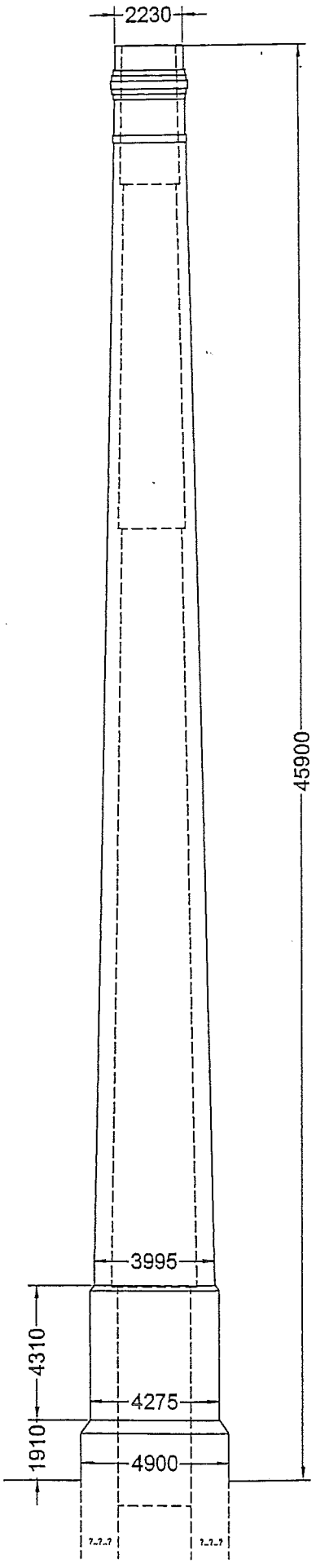
Additional cost of stairway.

- Fee for design & documentation.
- Site & other services during construction.
- Contract Administration.

Total with Stairway

REFERENCES

A Report on Canberra Brickworks	H.Macey, April, 1959.
Canberra Brickworks Chimney Lightning Protection	S.Sih, Senior Electrical Engineer Totalcare Projects, April, 1998.
Conservation Plan	Lester Frith & Associates, 1986.
Earthquake Loads	AS 1170.4-1993. SAA Loading Code-Earthquake Loads, Standards Australia.
Interim Heritage Places Register	Australia Capital Territory, Yarralumla Brickworks, Yarralumla, Nº 41/5. Includes Background Material Attachment A
Lightning Protection	AS 1768-1991 Lightning Protection, Standards Australia.
Old Canberra Brickworks	Bruce McDonald, Unpublished Paper, 21/3/1981.



Notes:
Section of chimney is square.
Structure uses dry-pressed bricks laid in lime/cement mortar.
All brickwork in Colonial bond except top section.
Openings near base not shown.

FIGURE 1

YARRALUMLA BRICKWORKS
CHIMNEY S3
ELEVATION

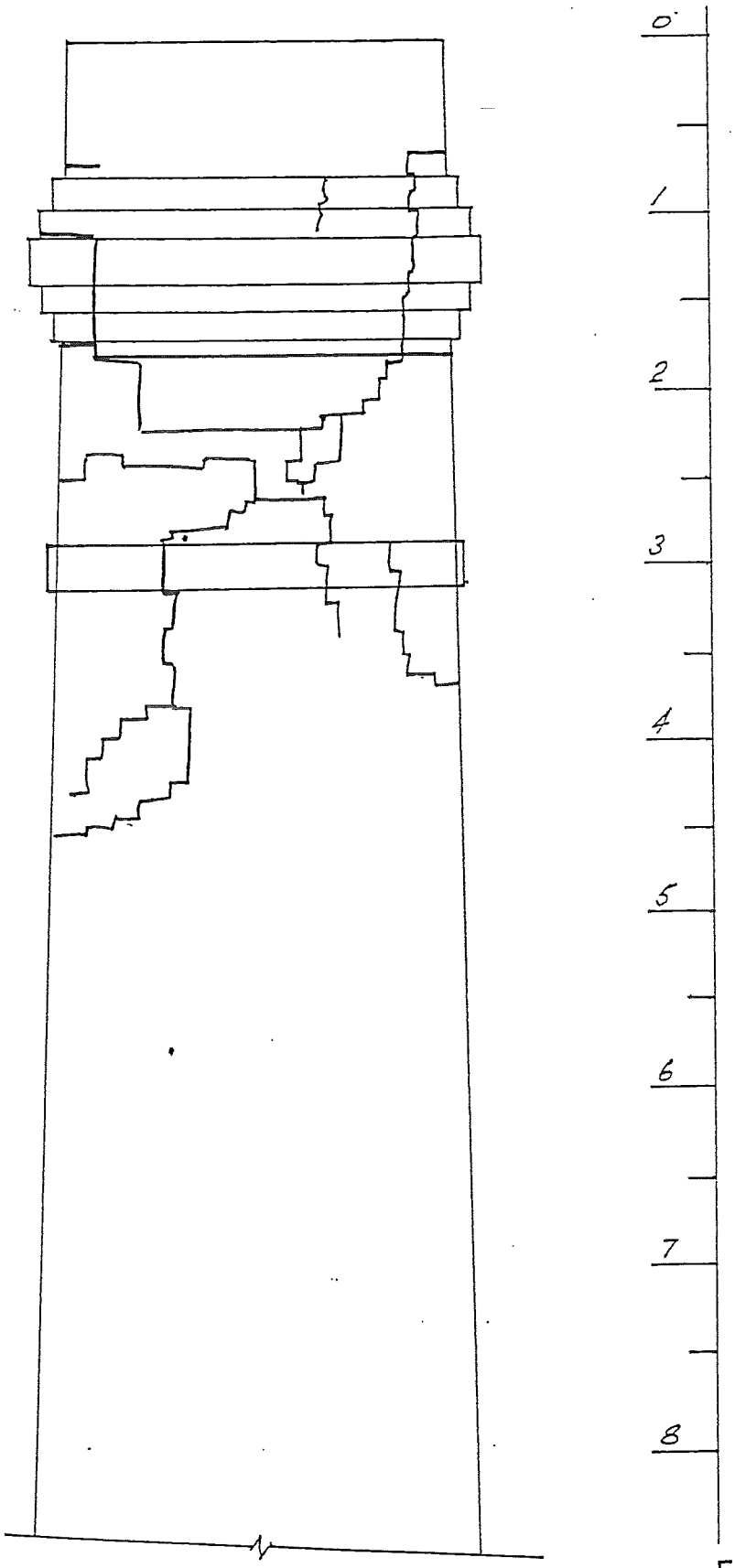


FIGURE 2

YARRALUMLA BRICKWORKS
CHIMNEY S3
INSPECTION - MAY 1998
NORTH FACE CRACKING

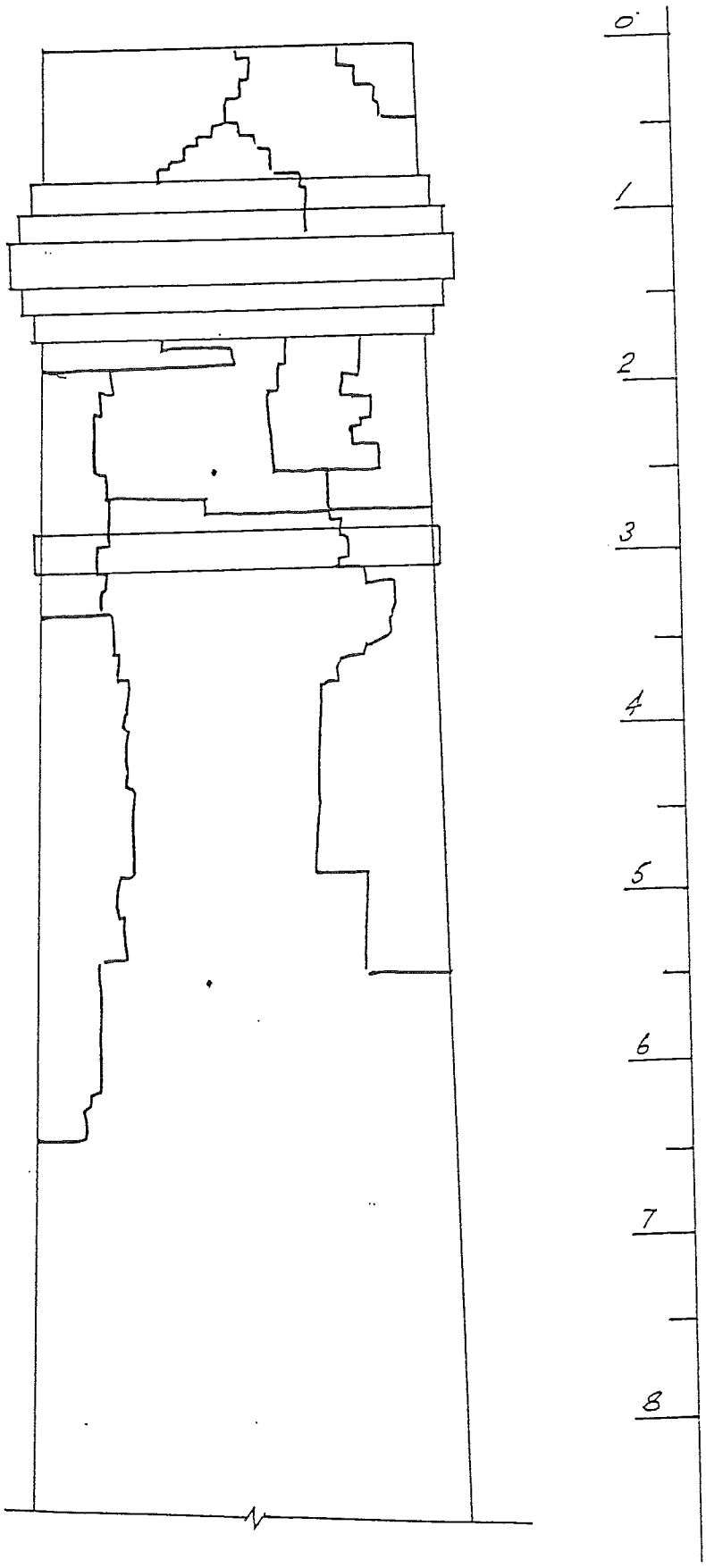


FIGURE 3

YARRALUMLA BRICKWORKS
CHIMNEY S3
INSPECTION - MAY 1998

Peter Spratt & Associates Pty Ltd
Bill Jordan & Associates Pty Ltd

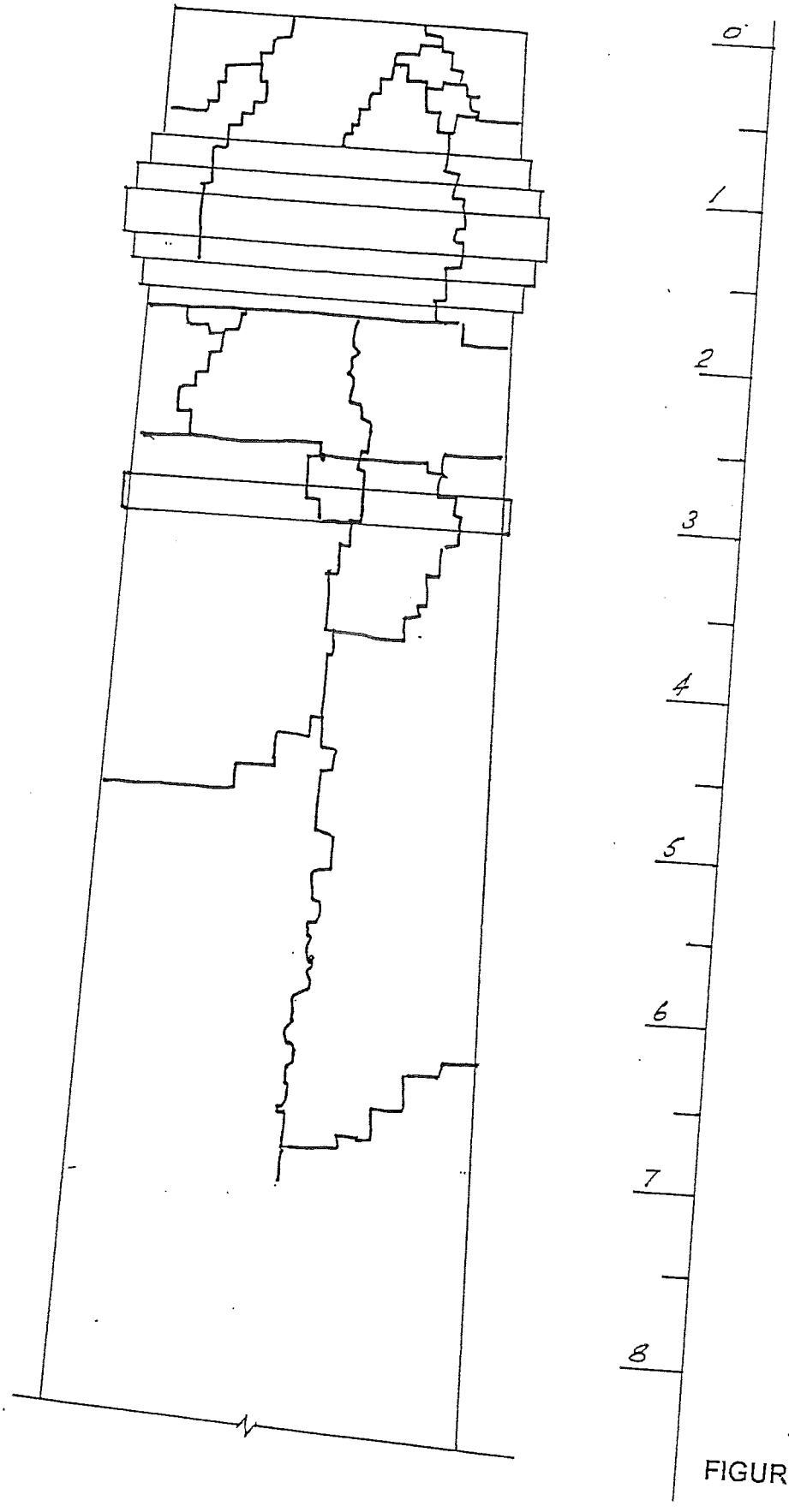


FIGURE 4

YARRALUMLA BRICKWORKS
CHIMNEY S3
INSPECTION - MAY 1998

Scale 1:40

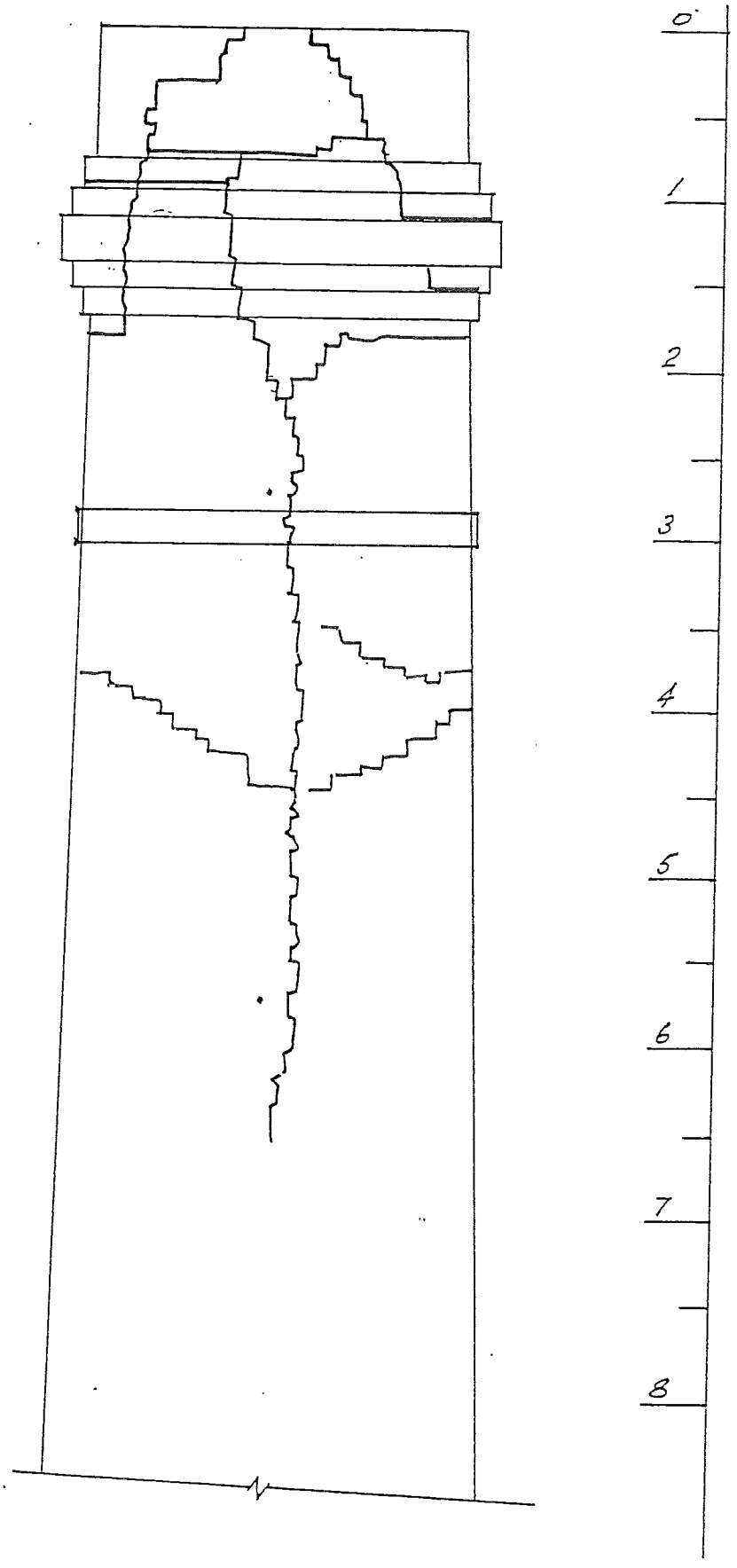


FIGURE 5

YARRALUMLA BRICKWORKS
CHIMNEY S3
INSPECTION - MAY 1998

Scale 1:40

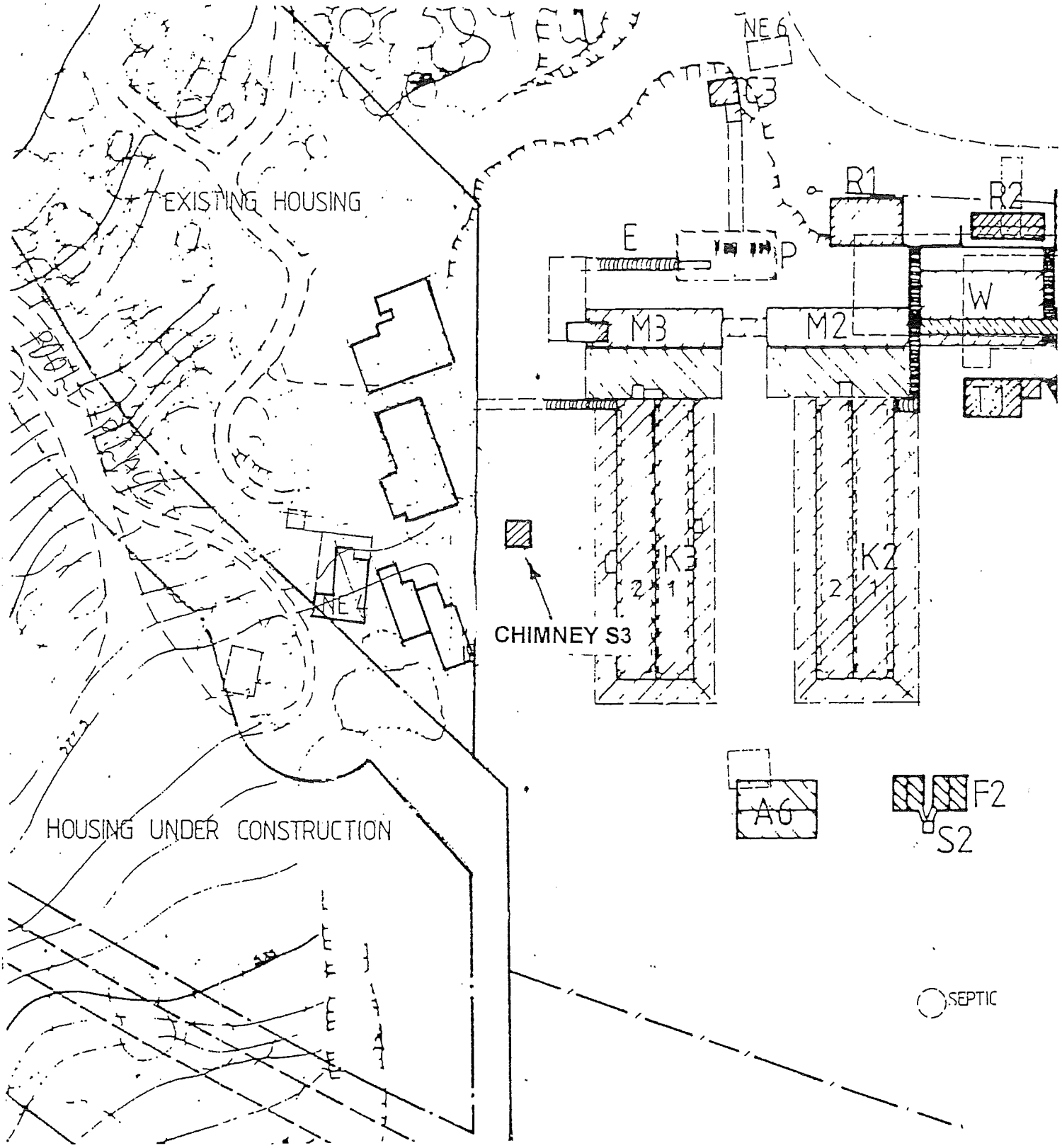
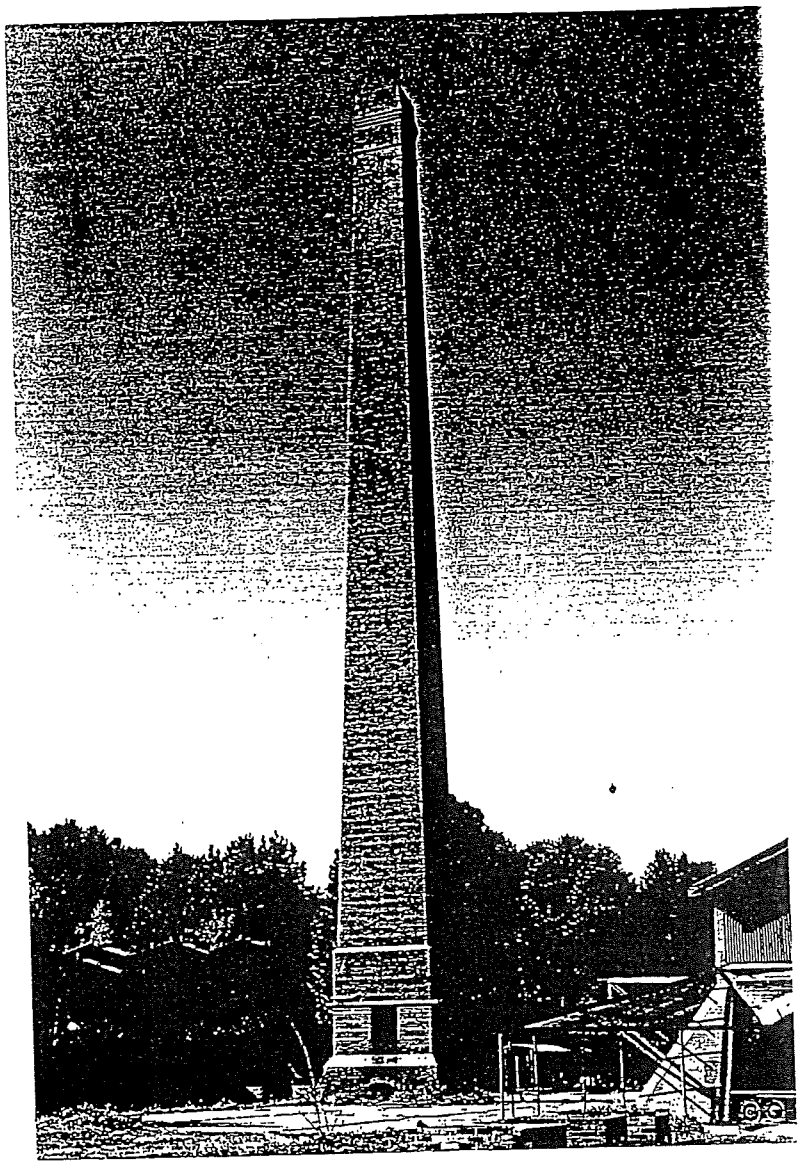
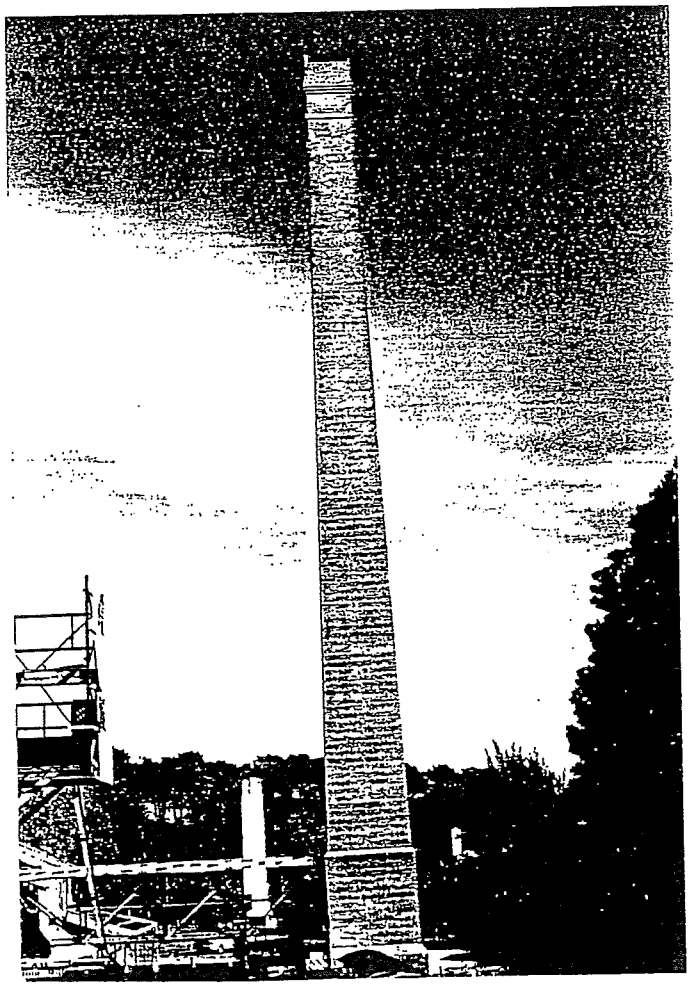


FIGURE 6

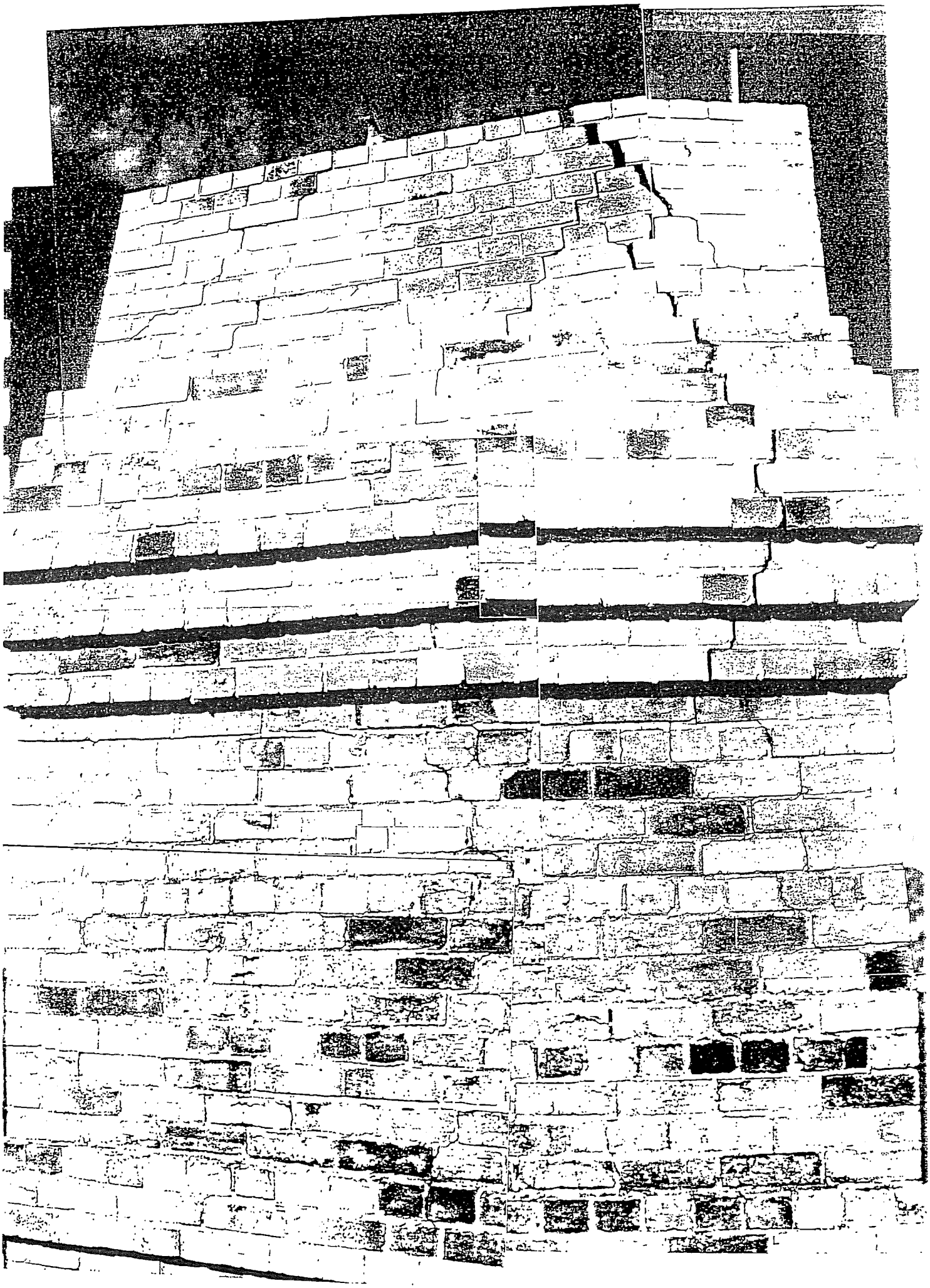
YARRALUMLA BRICKWORKS
CHIMNEY S3
INSPECTION - MAY 1998



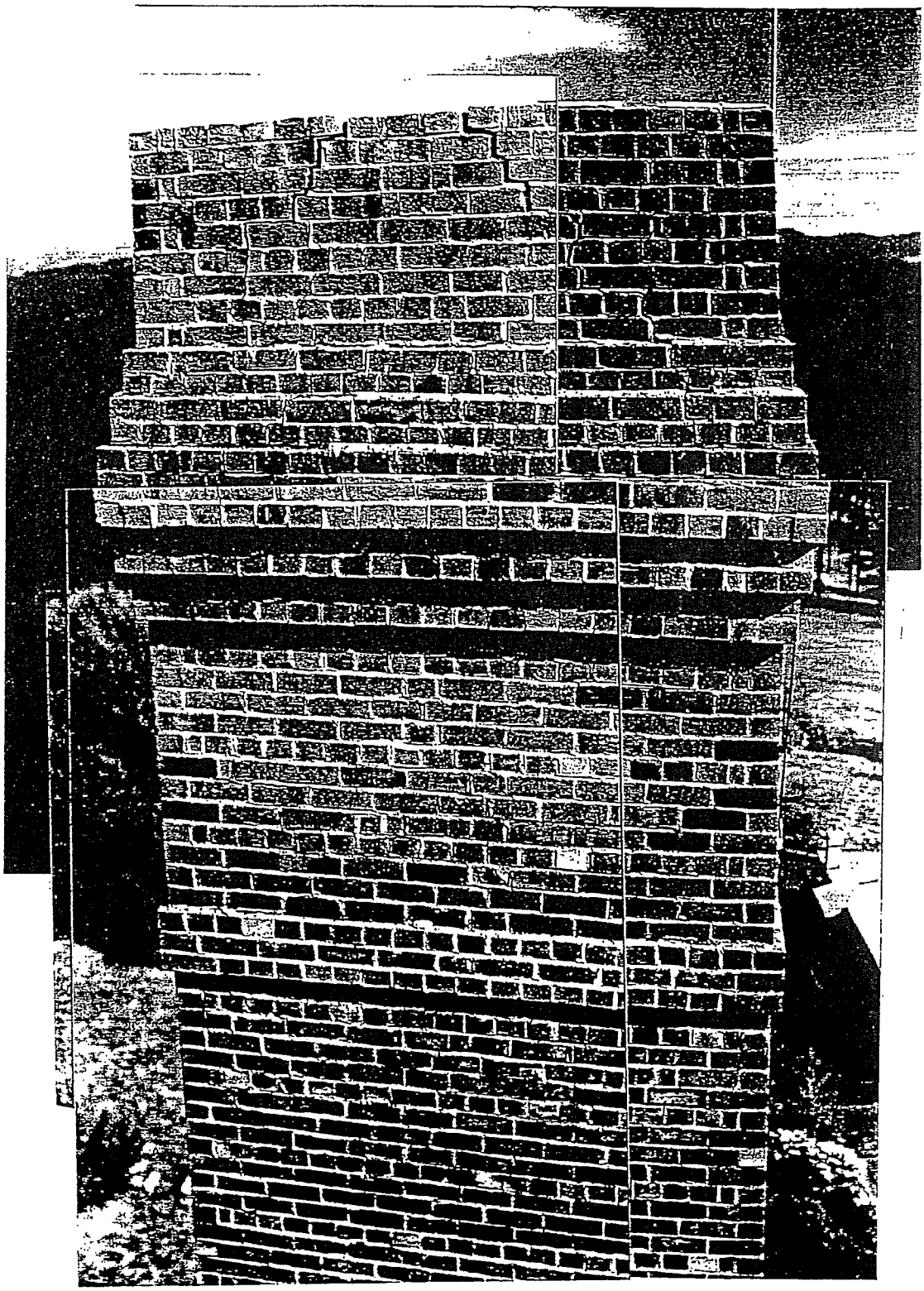
Photograph 1.
West face of chimney.



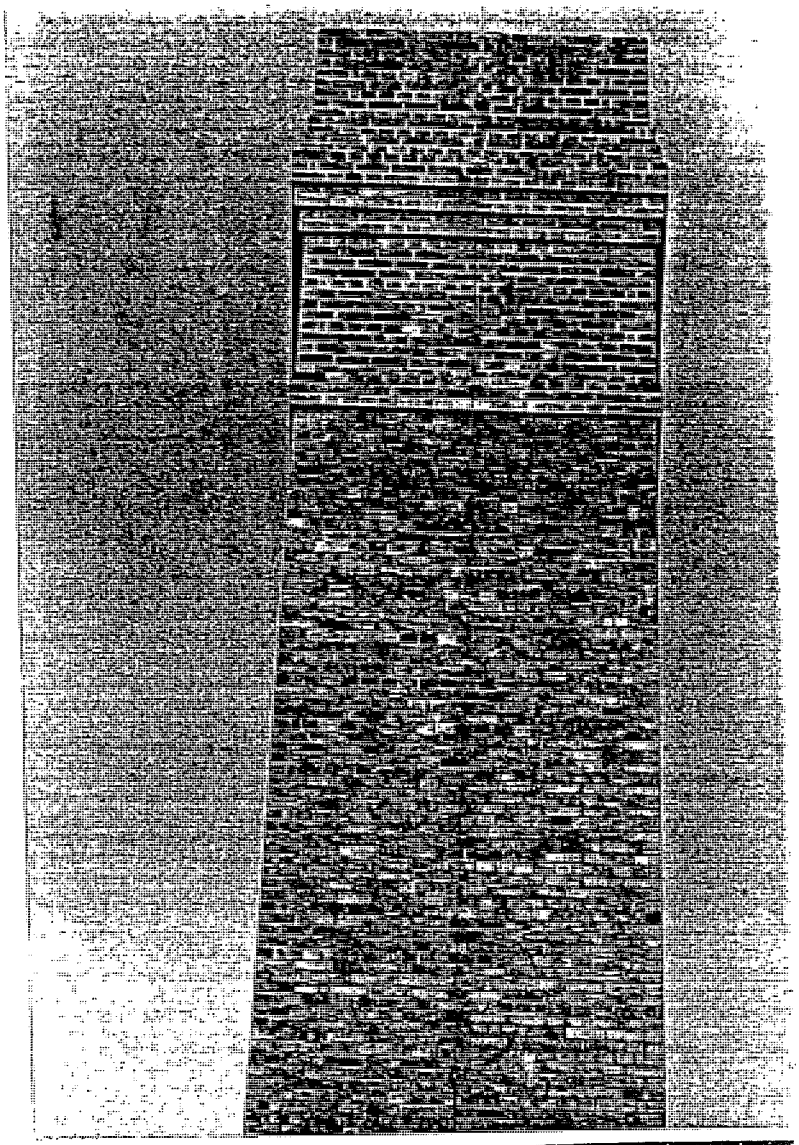
Photograph 2.
East face of chimney.



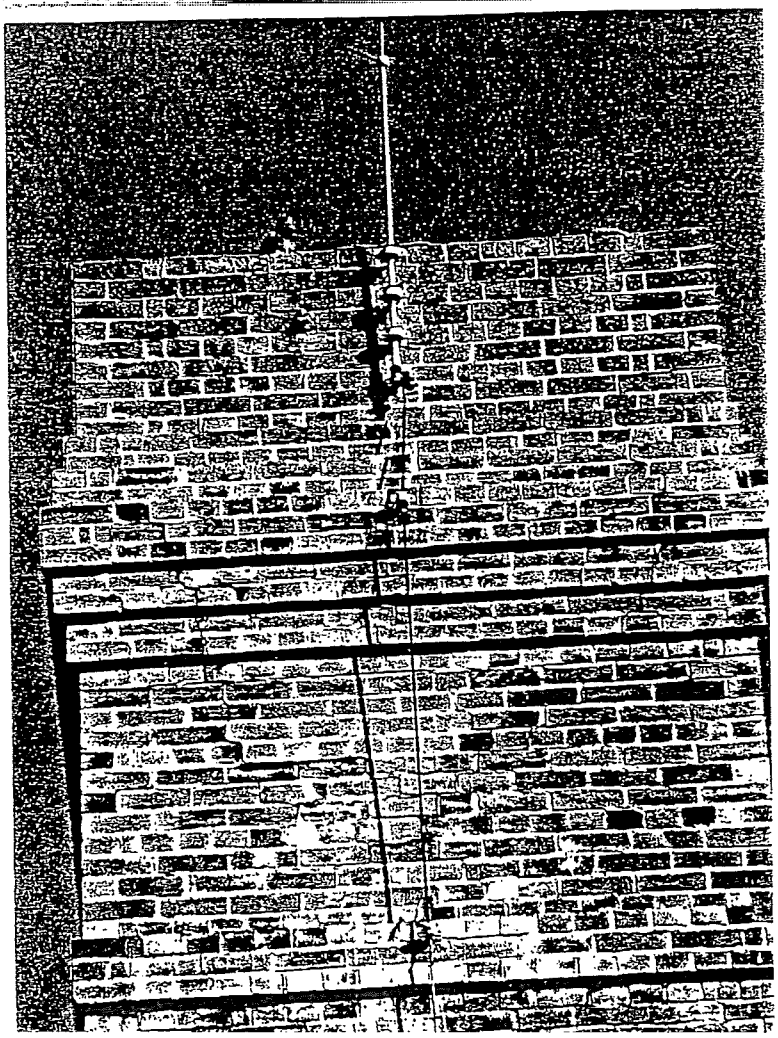
Photograph 3 . Detail of top west face.
New lightning air terminal is on right with original on left.



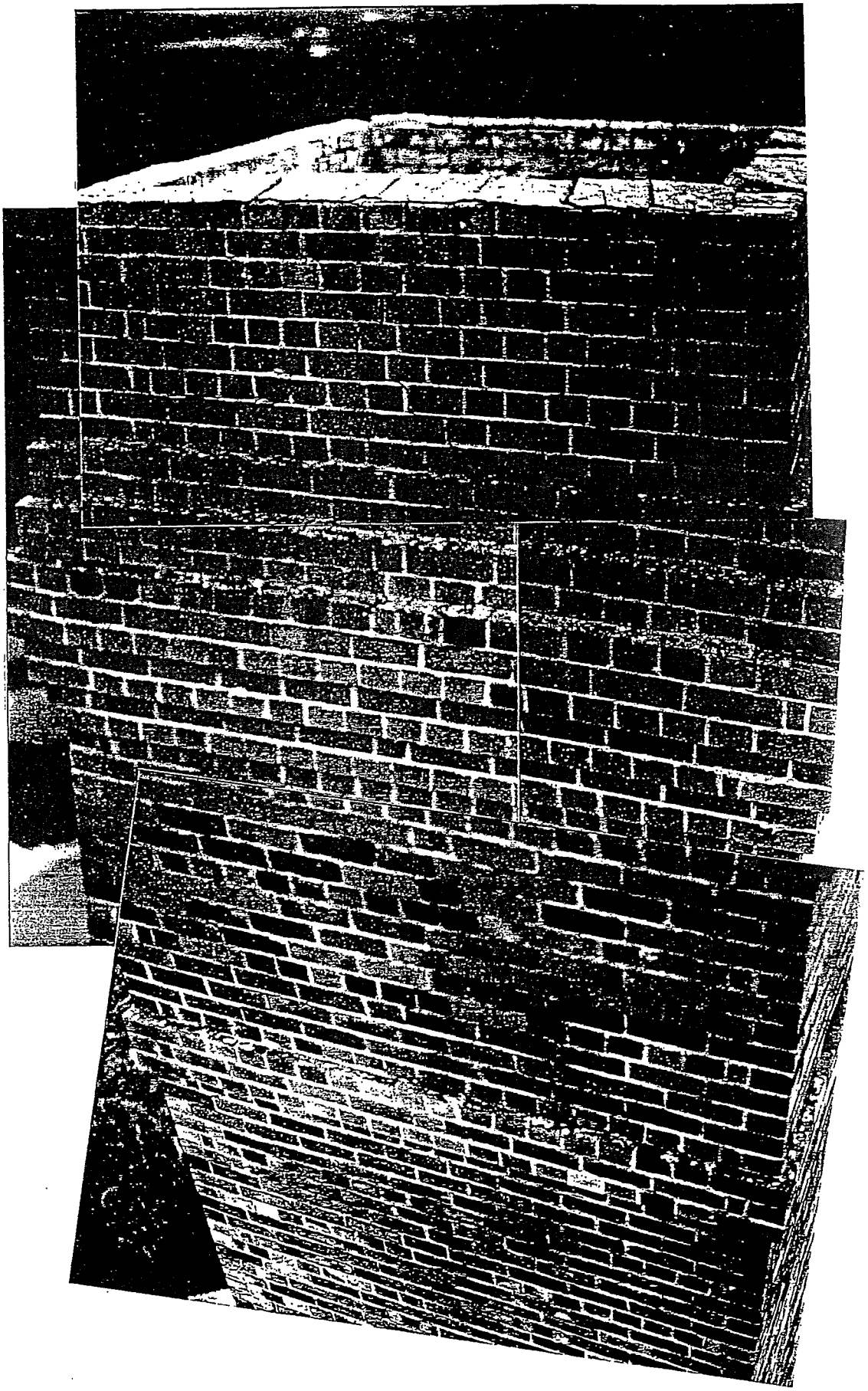
Photograph 4. Detail top east face.



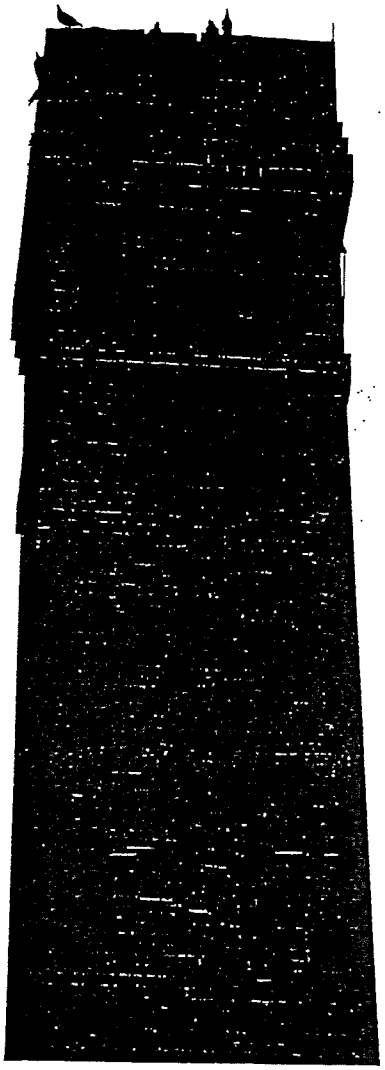
Photograph 5.
View of north face.



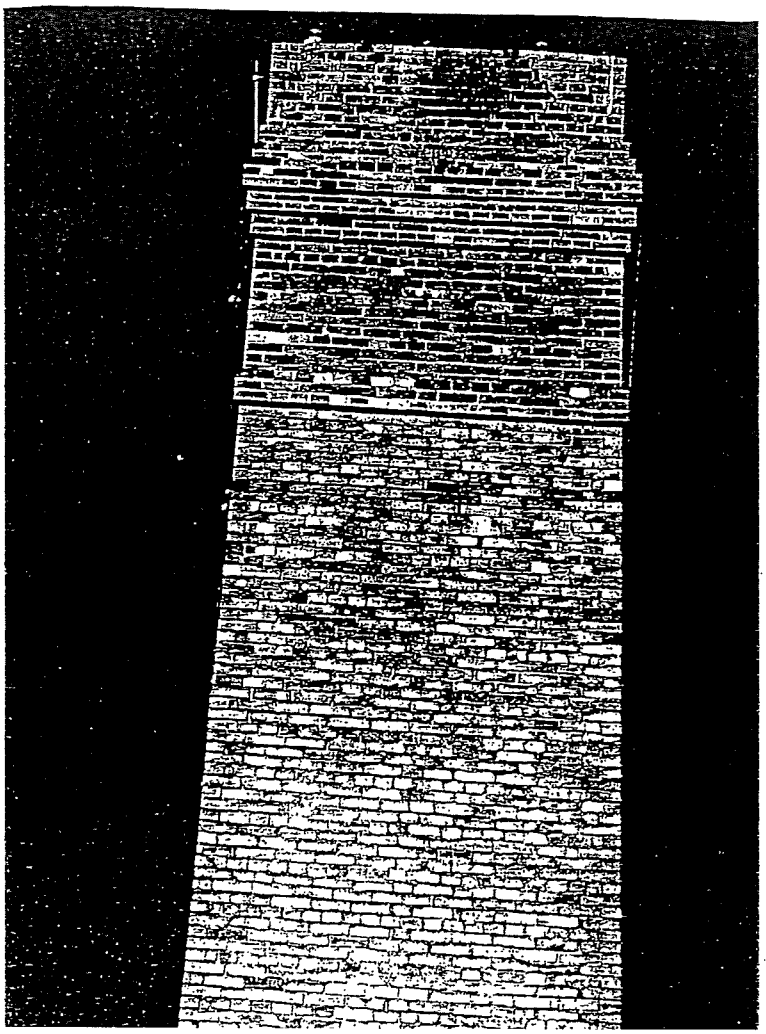
Photograph 6.
Detail of Photograph 5.



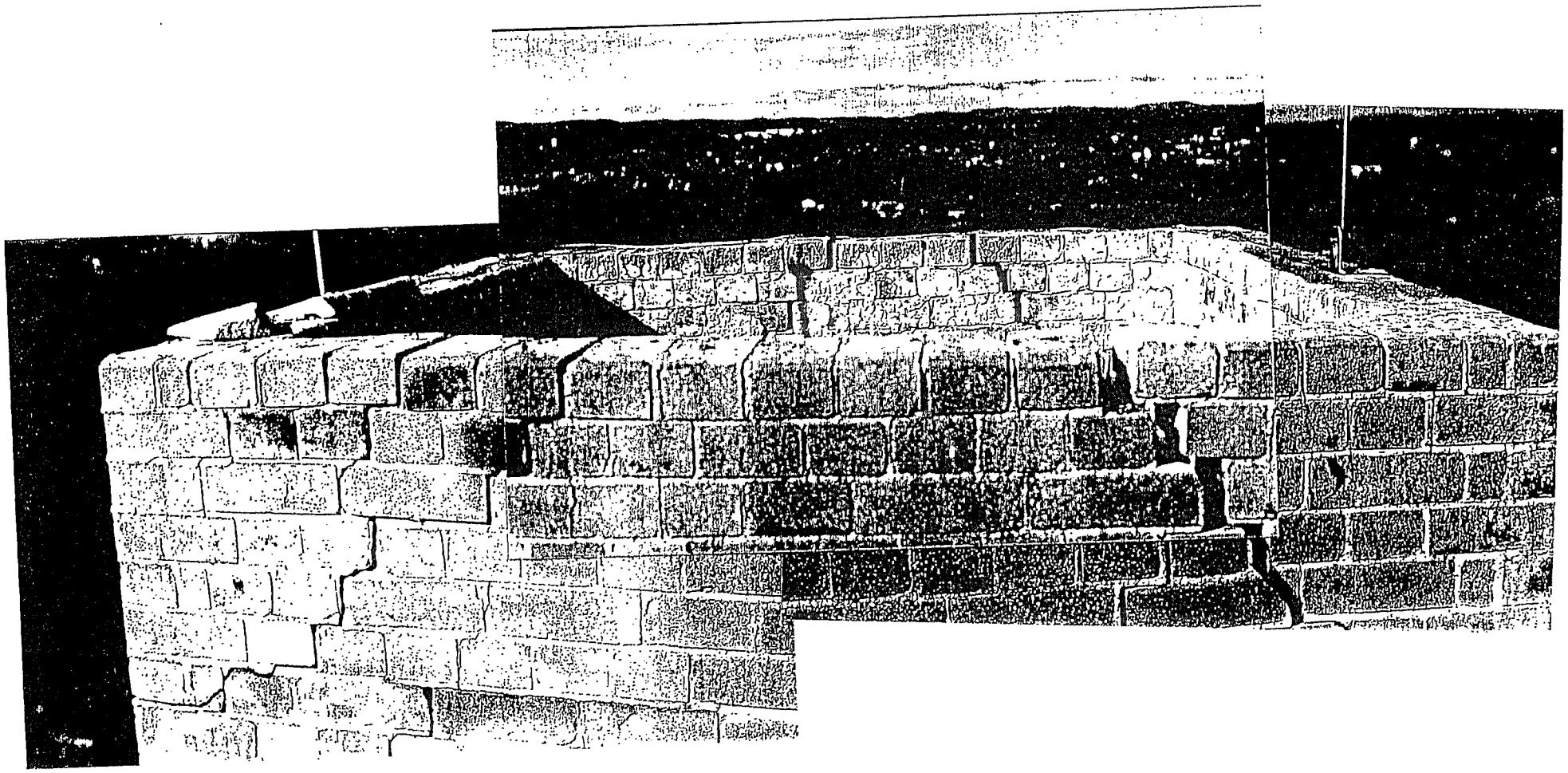
Photograph 7. View of south face.



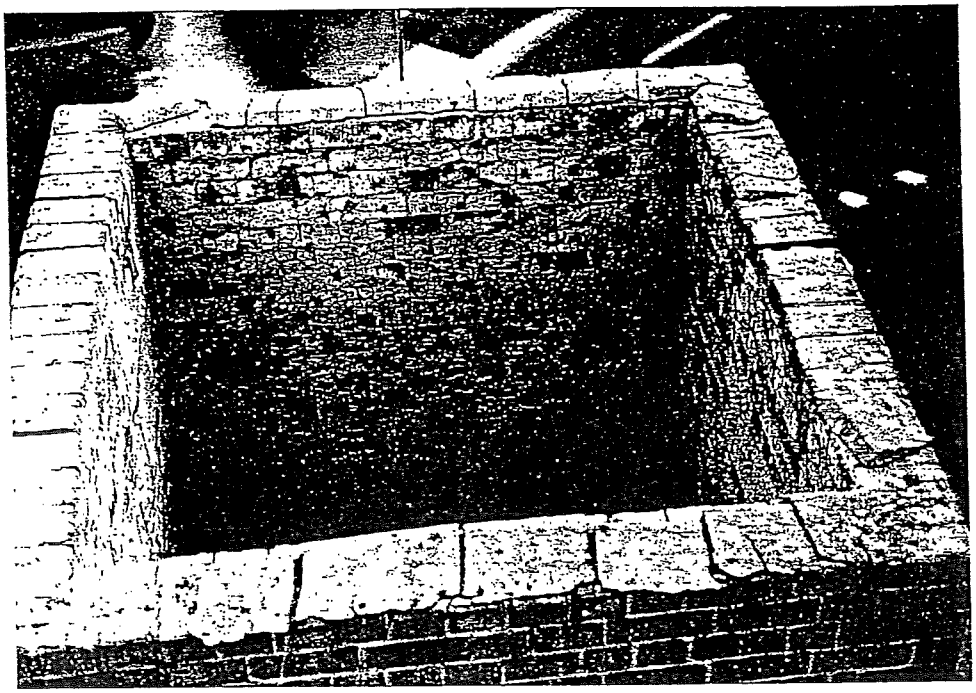
Photograph 8.
View of east face.



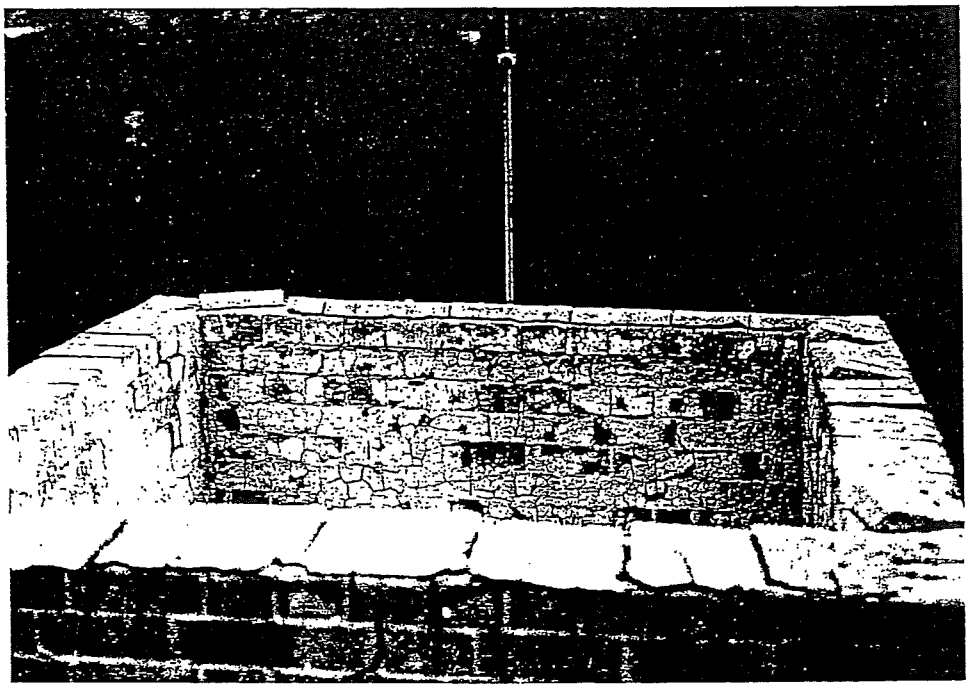
Photograph 9.
View of west face.



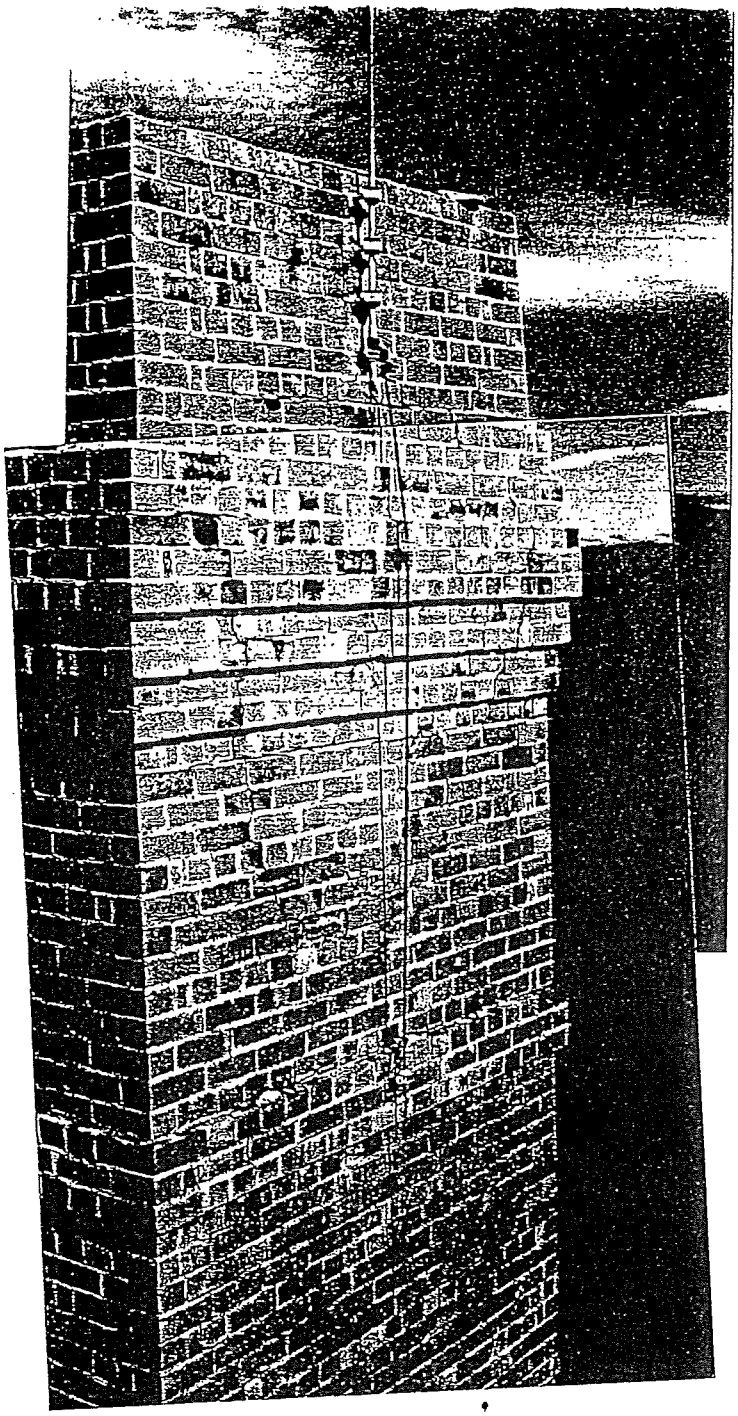
Photograph 10. View at top showing west face.



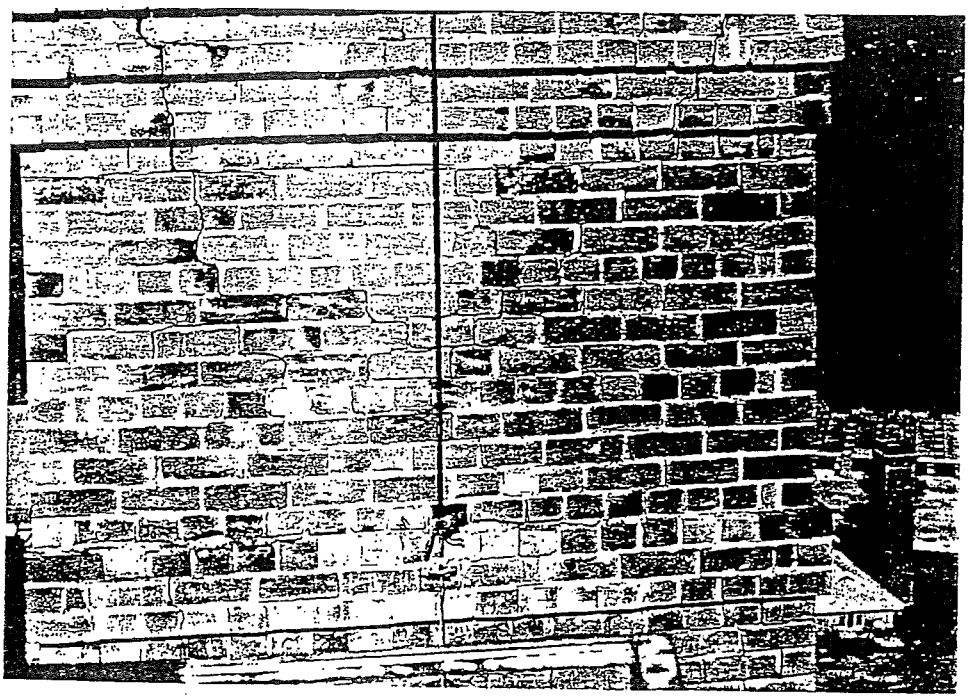
Photograph 11. Top view.



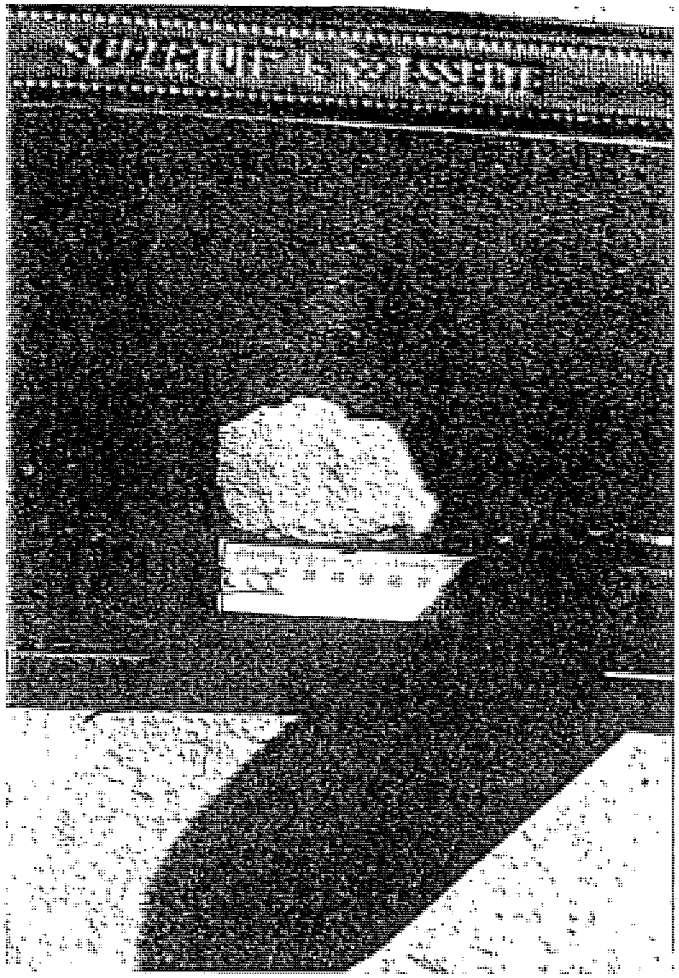
Photograph 12. Top view.



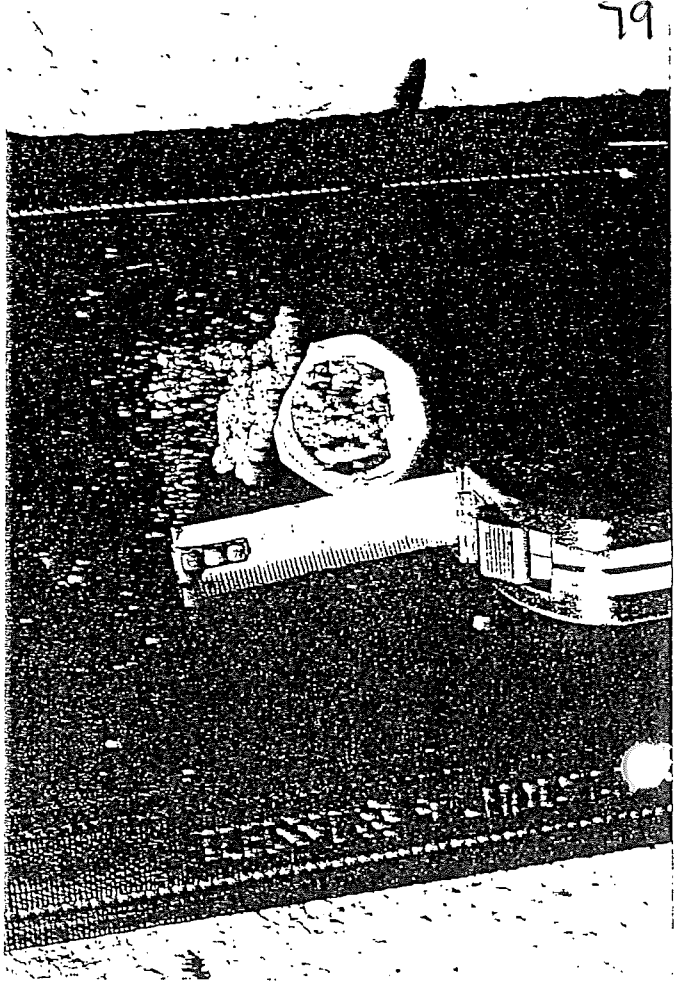
Photograph 13.
View of north face.



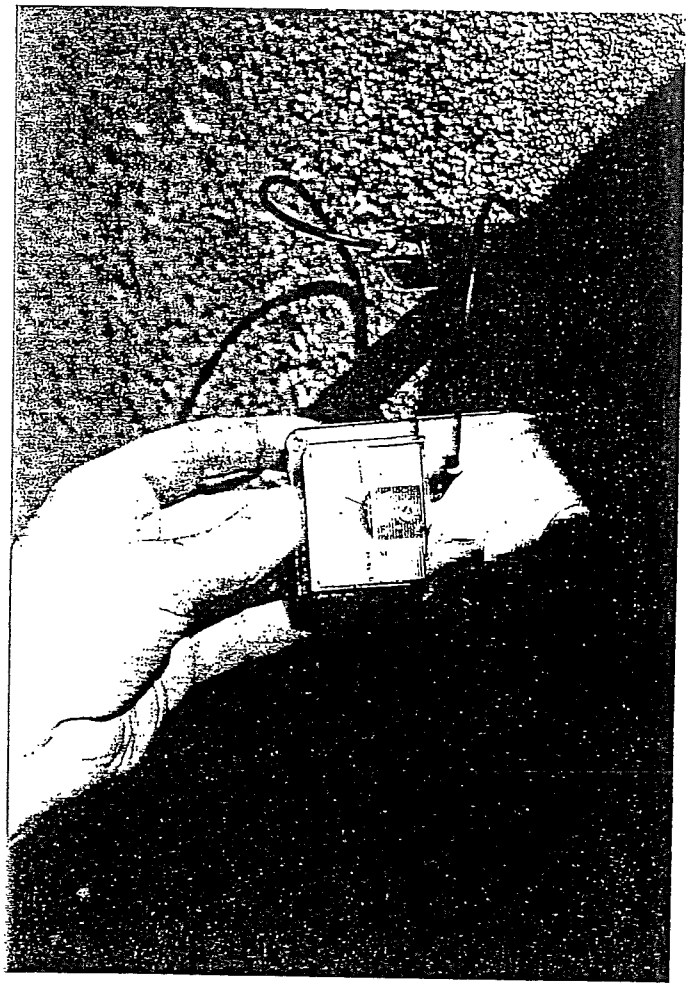
Photograph 14. Detail Photograph 13.



Photograph 15.

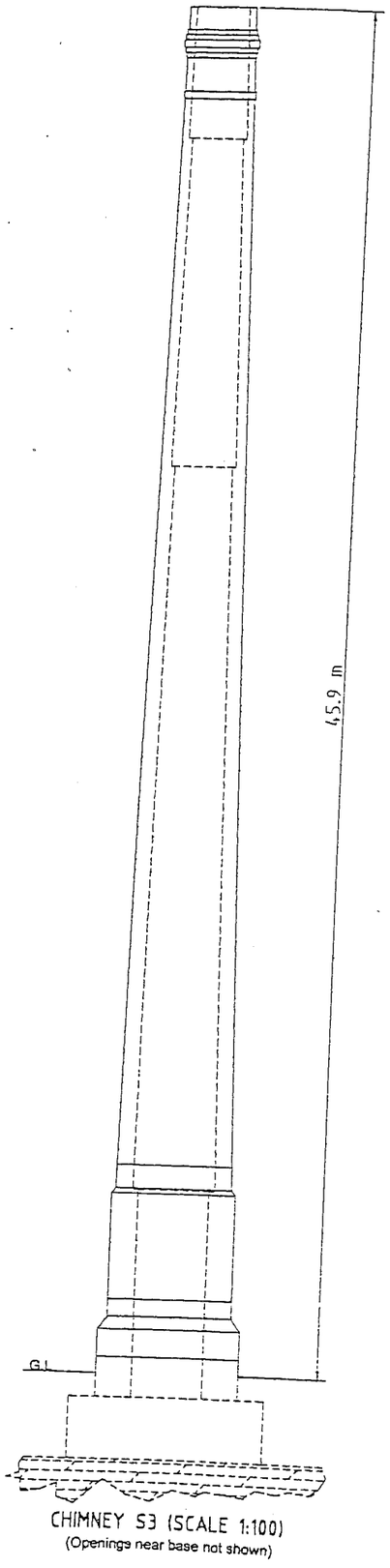


Photograph 16.

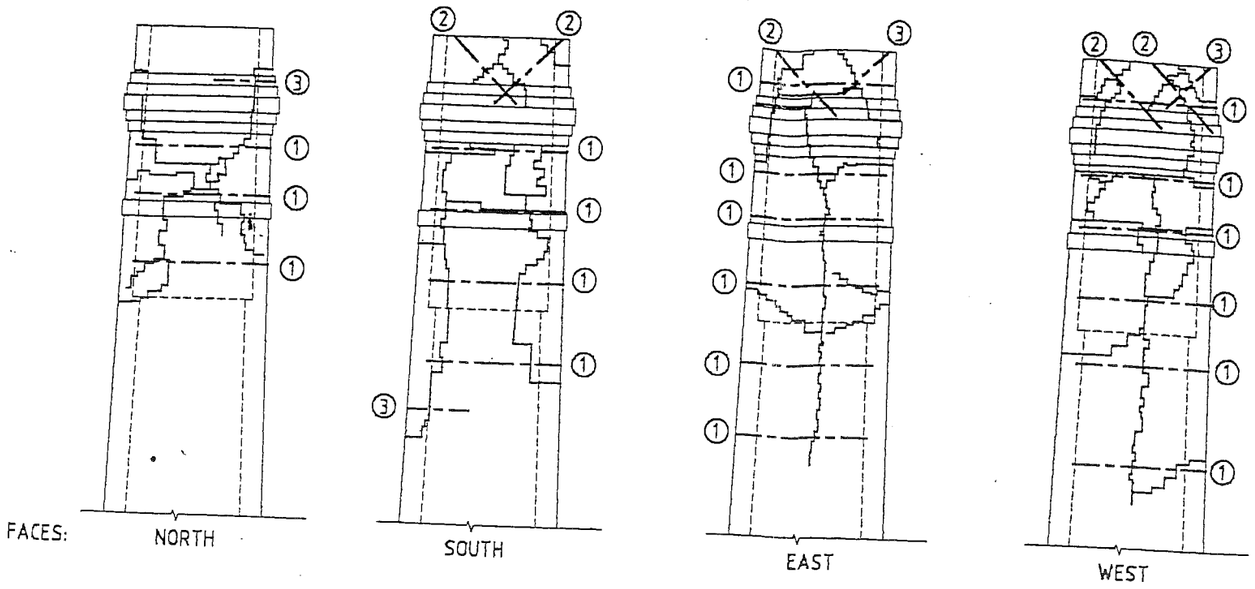


Photograph 17.

Photographs 15-17.
Parging removed from bottom of chimney showing 0.9mA conductivity reading.



CHIMNEY S3 (SCALE 1:100)
(Openings near base not shown)



CHIMNEY TOP ELEVATIONS SHOWING ANCHOR LOCATIONS (SCALE 1:50)

(Note: Crack locations are not necessarily accurate and anchor locations may need to be adjusted to suit.)

"Cintec" 316 stainless steel cementitious masonry anchors to be installed by trained and accredited installer in accordance with manufacturer's specification.
All anchors to be type CHS10 and as follows:

(1) 2200 mm long in 32 mm diam. hole

(2) 1500 mm long in 32 mm diam. hole

(3) 1000 mm long in 24 mm diam. hole

Note: 2200 mm long anchors can be installed from either end to suit site conditions.

INSTALLATION PROCEDURE

1. Top of chimney to to be temporarily stabilized by binding with strapping prior to drilling. Strapping to be placed around hardwood timbers at corners and elsewhere as required to secure all loose brickwork. Strapping to be tightened to close up cracks where possible.

2. All anchors to be at centre of wall with tolerance of ±20 mm.

3. Where anchors are shown as intersecting, and drilled holes are found to intersect, such anchors to be all inserted prior to grouting.

4. Anchor drill entry holes to be plugged with 1:2:9 mortar coloured to match adjacent bricks. No synthetic resins or bonding agents to be incorporated in mortar.

5. Following anchor installation, cracks to be repointed on outside with 1:2:9 mortar (see masonry notes), and render to be repaired on top of chimney.

MASONRY NOTES

M1 All workmanship and materials shall be in accordance with AS 3700.

M2 All mortar used for repairs shall be type M2 to AS 3700 in proportions 1 cement : 2 lime : 9 sand.

M3 Mortar admixtures shall not be used without the written approval of the Engineer.

M4 Any masonry anchors used for temporary fixings shall be made from grade 316 stainless steel or be completely removed on completion of work.

REDUCED SIZE PRINT DO NOT SCALE

MARK	DATE	AMENDMENT

DRAWING STATUS Unless there is an authorised signature in coloured ink below, this drawing is not to be issued for construction.

NORTH

Bill Jordan & Associates Pty Ltd
A.C.N. 003 320 652
Chartered Civil & Structural Engineer
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Ph.: (02) 4929 4841; Fax: (02) 4929 7933
Liability is limited by the Professional Engineers Scheme

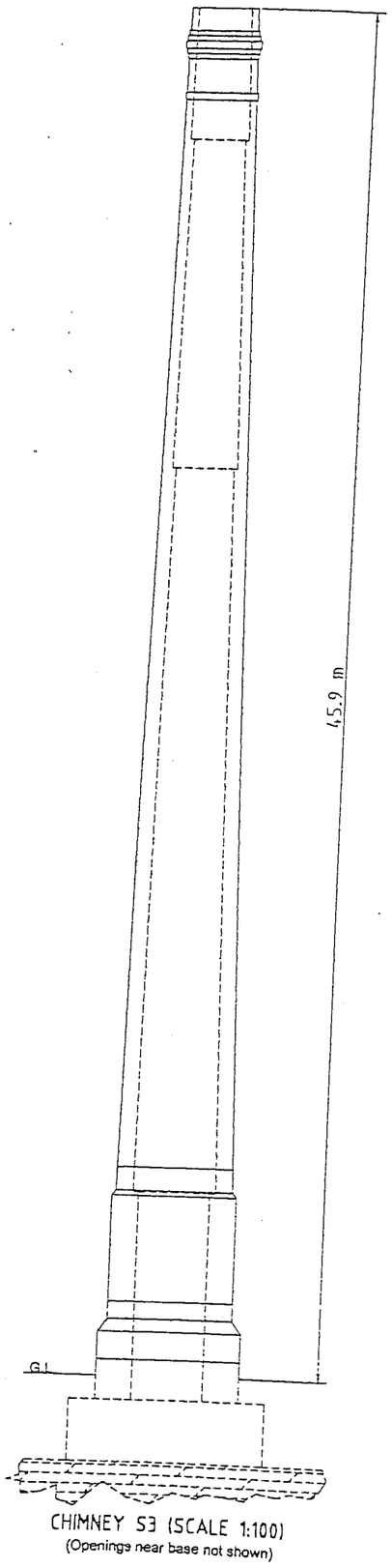
SIGNED . . . . . DATE . . . . .
J.W. JORDAN FE AUST. NPER Reg. No. 101488

PROJECT
Yarralumla Brickworks
Chimney S3

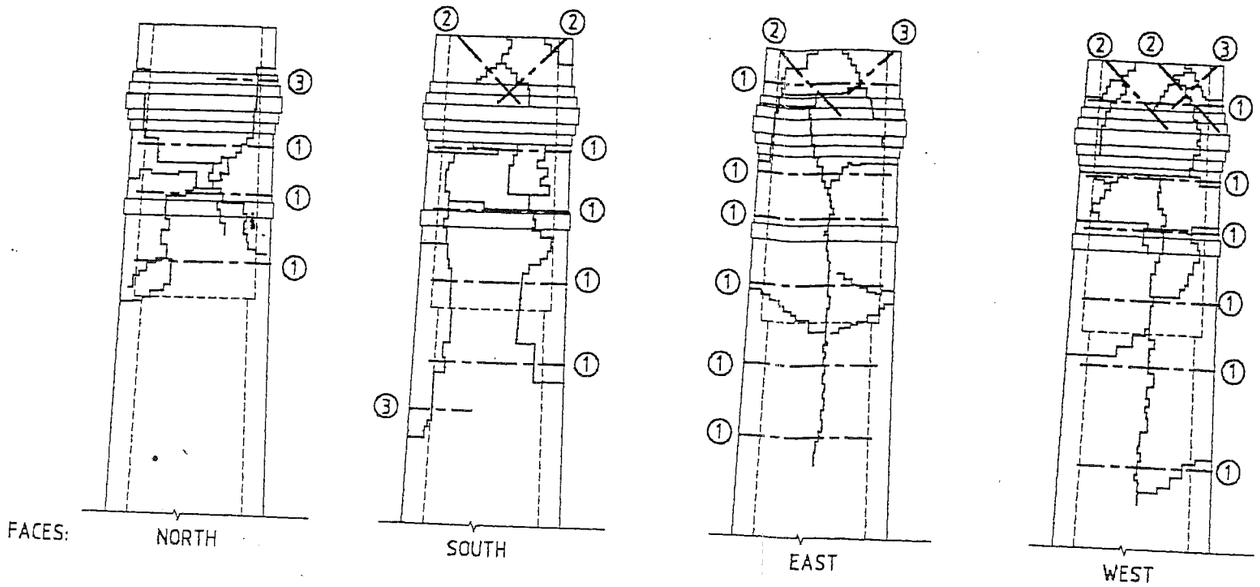
THIS DRAWING
Repair and strengthening of lightning damage

CLIENT
Environment ACT

SCALE	DATE	PROJECT No.
1:100, 1:50	Nov. 1999	G011
DRAWN	CHECKED	SHEET No. / AMENDMENT
		S1



CHIMNEY S3 (SCALE 1:100)
(Openings near base not shown)



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PROJECT
Yarralumla Brickworks
Chimney S3

THIS DRAWING
Repair and strengthening of lightning damage

CLIENT
Environment ACT

SCALE	DATE	PROJECT No.
1:100, 1:50	Nov. 1999	G011
DRAWN	CHECKED	SHEET No. / AMENDMENT
		S1

APPENDIX 8.Cont

Bill Jordan & Associates Pty Ltd
A.C.N. 003 320 652
Chartered Civil & Structural Engineer
Heritage Consultant
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NEWCASTLE NSW 2300
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E-mail: bill.jordan@hunterlink.net.au

16 November 1999

Our Ref.: G011
Your Ref.:

Mr Rod Baxter
Environment ACT
PO Box 144
LYNEHAM ACT 2602

Dear Mr Baxter,

Re: Chimney Stack S3 and Staffordshire kiln at Yarralumla Brickworks

Following my site visit last week, I have prepared a drawing for the first stage repairs of chimney S3 and have carried out some research on the Staffordshire kiln with a view to being able to better advise you on the conservation of the kiln.

Chimney S3

Attached is a reduced size drawing of the proposed repairs to the top of chimney stack S3. Following your review and its printing in full size, this drawing will be suitable for the calling of tenders.

The repairs to the top of the chimney are specified using the "Cintec" masonry anchoring system as noted in the earlier report prepared in conjunction with Peter Spratt and Associates. This is the only system available worldwide which is known to be able to fulfill all the requirements for this type of work in masonry structures of heritage importance.

Would you please advise whether your Department has any other requirements for incorporation on the drawing.

Staffordshire Kiln

Repair

As stated on site, I do not believe that an expenditure of [redacted] will be adequate to stabilize the whole of this kiln to permit public access. However, during the site visit I logged the apparent condition of each chamber of the kiln and a schedule is appended giving details. In this schedule an opinion is given as to which kiln chambers can be used safely, which could be made structurally safe with little work and which require further investigation prior to possible major work. It should be noted in this regard, however, that structural safety is only one issue: the chemical composition of any residues needs to be investigated and any chemical hazards identified. Many carcinogenic compounds are believed to have been identified in the tarry residues from coal firing.

Where reinforcement and repair of the entrance arches is noted in the schedule, this could be done using the system proposed for the top of chimney S3.

Vegetation growing in the brickwork should be removed and rotted timbers from the former verandahs should be secured, or removed following adequate recording, before public access of any type is allowed.

Securing entrances

As requested, a sketch is also attached showing a means of securing the entries of the kiln chambers without significantly affecting the heritage significance of the structure. Standard pipe used for chain mesh fencing should be able to be adapted and bent to secure the entrances. Of most concern is the fixing of a base plate without disturbing kiln fabric (an air entry port is possibly located on the ground in front of the kiln entrance). If the anchoring of a post base plate would disturb kiln fabric, a thick steel plate (say 16 mm) could possibly be laid on the ground for post attachment and secured away from any area of concern. At the top of the steel posts, damage to the new brickwork is of little concern: a timber baulk is shown spanning between roof columns. Pipe rails can be attached to the posts with standard fittings and bent to touch the brickwork at their ends to close off the gap. Chain mesh can then be secured to the framework in the usual way.

Propping kiln chambers internally

Some of the kiln chambers have bad distortions of the vault, and propping of the distorted part of the vault is recommended as a safety measure. 150 mm x 150 mm second hand hardwood would be suitable, placed under the distorted portion, in a line parallel to the chamber sides at 1.5 m centres.

Conservation Management Plan

In the long term, I recommend the commissioning and preparation of a proper Conservation Management Plan for the kiln, and the other kilns at the site, which addresses the issue of continuing maintenance and/or adaptive reuse of the structures. From the extracts from the existing Conservation Report made available to me (Lester Firth, 1987), it appears that whilst the significance of the structures has been established for listing purposes, future management of the site was not really addressed. It is my opinion that until a Conservation Management Plan is produced, based on adequate research and consultation, then any work on the kilns possibly will be wasted (except where public safety is an issue).

I have tracked down a number of references which should lead to an understanding of the operation of the Staffordshire Kiln. Once such an understanding is gained, stabilization work can be planned which has least chance of interfering with significant fabric. In the meantime, it is recommended that the structure be secured and that a Conservation Management Plan be commissioned. Such a Plan will be able to explore the options available for the foreseeable future, which could vary from full structural conservation with adaptive reuse at one extreme, through securing and protecting but allowing gradual deterioration, to adequate recording followed by demolition at the other extreme.

Please let me know how you wish to progress from here.

Yours sincerely,
Bill Jordan & Associates

J.W. Jordan

Yarralumla Brickworks, Staffordshire Kiln

Preliminary assessment of condition

Chamber No.	Chamber body	Entrance arch	Comments
1	Appears sound	Needs repair	Reinforcing of entrance arch could be done at relatively low cost
2	Appears sound	Needs repair	- ditto -
3	Appears sound	Salt attack	Cause of salt attack to be identified (e.g. drainage failure); salt washed off with water only
4	Some distortion	Needs repair	Reinforce entrance arch, chamber otherwise appears safe
5	Some distortion	Needs repair - bricks could fall	Repair and reinforce entrance arch, chamber appears safe
6	Loose bricks	Needs repair	Both entrance and chamber vault require stabilization
7	Bad distortion, possibly unstable	Needs repair - bricks could fall	Further investigation required - possibly major work. Prop vault.
8	Possibly unstable	Needs repair - bricks could fall	Further investigation required - possibly major work. Prop vault.
9	Distortion	Needs repair	Reinforce entrance arch, chamber otherwise appears safe
10	Distortion	Needs repair	Reinforce entrance arch, chamber otherwise appears safe
11	Some loose bricks	Needs repair	Reinforce entrance arch, chamber requires minor stabilization
12	Appears sound	Needs repair	Repair and reinforce entrance arch, chamber appears safe
13	Loose bricks	Needs repair	Reinforce entrance arch, chamber requires minor stabilization
14	Appears sound	Appears sound	Structurally safe to use if access rendered safe; type of use will depend on analysis of residues.
15	Appears sound	Appears sound	- ditto -
16	Appears sound	Appears sound	- ditto -
17	Appears sound	Appears sound	- ditto -
18	Distortion & loose bricks	Appears sound	Chamber requires minor stabilization (secure loose bricks), but then could be used with restraints as above.
19	- do -	Appears sound	- ditto -
20	- do -	Appears sound	- ditto -

Bill Jordan & Associates
November, 1999

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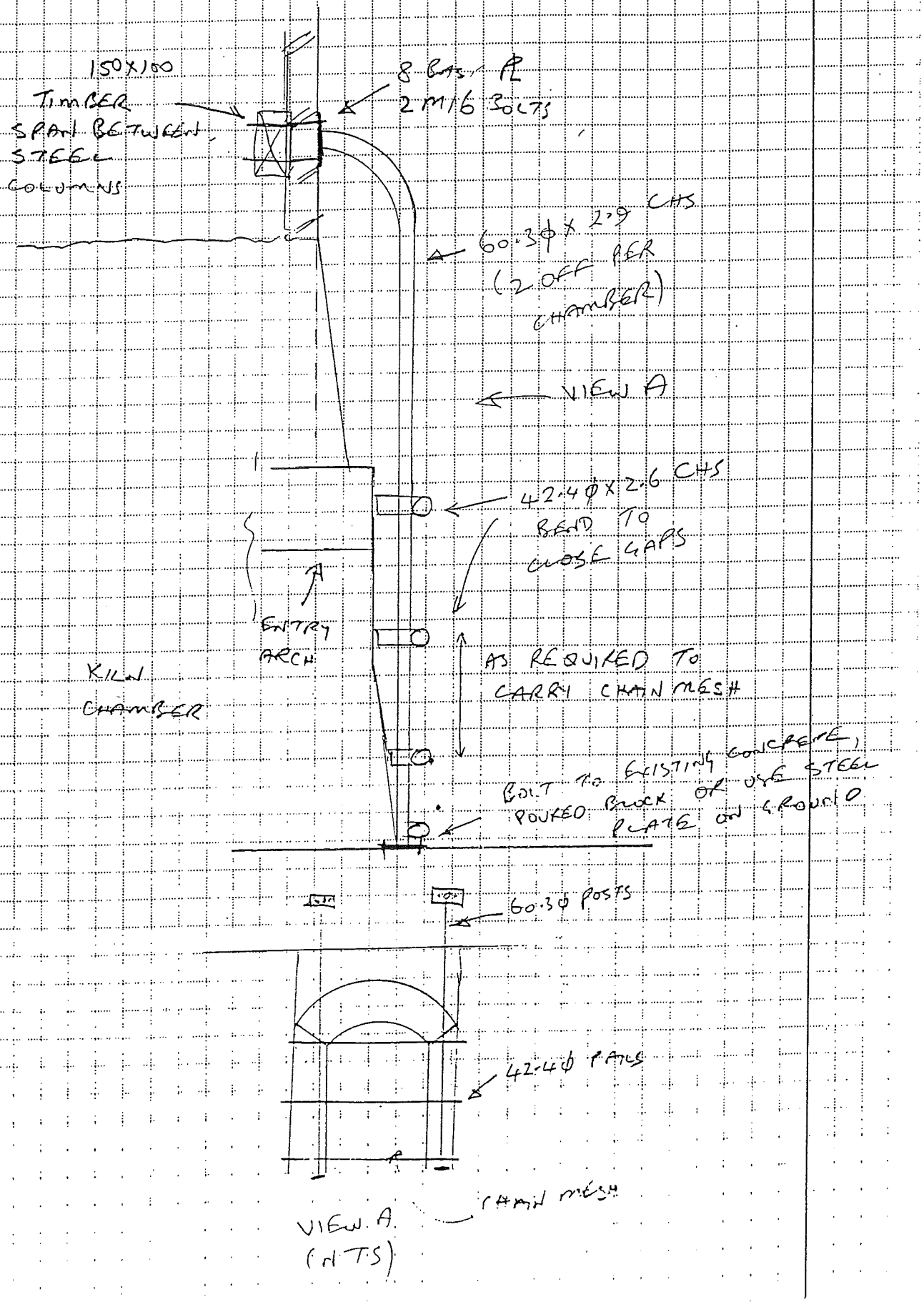
18/11/'99 — Date
JWJ — By
1 — Page
YARRALUMLA BRICKWORKS — Project
STAFFORDSHIRE KILN
- ENTRY BARRIER
6011 — Project No.



APPENDIX 9.

FAX MESSAGE

Bill Jordan & Associates Pty Ltd
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E-mail:bill.jordan@hunterlink.net.au

Date: 24 November 1999	**Reference:**
To: Environment ACT	**Fax No.:** 6207-2227
Attention: Rod Baxter	**No. of Pages (Incl. this one):** 1
Sender: Bill Jordan	
Subject: Yarralumla Brickworks	

Message:

Rod,

The following firms are capable of doing the chimney repairs:

Company	Address	Contact name	Telephone
Binutti Constructions Pty Ltd	PO Box 42 GARRAN ACT 2605	Mario Binutti	6285-1116
Australasian Concrete Services Pty Ltd	4/312 High Street CHATSWOOD NSW 2067	Sam Mansfield	9417-5800
Premier Waterproofing Pty Ltd	11 Ford Street GREENACRE NSW 2190	Derek Price	9642-5055
Maintenance Systems Pty Ltd	34 Derwent Park Road DERWENT PARK TAS 7009	Greg Muir	03-6273-4955

I can't guarantee that all will be willing to price it seriously. Particularly in the case of the Sydney based ones, they probably already have enough work to keep them going until the middle of next year.

I have successfully transferred the logo image to the drawing. If you have no further requirements, I shall have it printed full size and "For tender" and dispatch it to you. Please let me know.

Regards,

Bill Jordan

[redacted]

APPENDIX 10. 187

ACT WorkCover

3rd Floor, FAI House, London
Circuit, Canberra City,
ACT 2601

PO Box 224, Civic Square,
ACT 2608

Ms Kathy Binns
Manager
Heritage Unit
Department of Urban Services

Dear Ms Binns

YARRALUMLA BRICKWORKS

At our recent meeting the occupational health and safety aspects of the Yarralumla Brickworks a number of items were discussed in order to determine the suitability of the site for occupancy by businesses.

The Chief Inspector and I had visited the site previously and stated our concern at the meeting about the safety of the tall chimney stack as well as some overall safety issues.

Following our discussions the Chief Inspector offered to conduct a visual inspection to assist the parties in understanding possible safety concerns.

The Chief Inspector provided a verbal report to me after his visit. His report and my own observations are summarised as follows:

1. In the small sheds proposed for occupancy there were some structural issues where a door had been created and the overall electrical safety of the sheds needed to be brought up to standard.
2. There are serious safety issues to do with the kilns and drying ovens in terms of structural issues. It was noted that it appeared that there was still an occupant in this area although it had been previously ordered to be vacated by the Government.
3. There are observable structural problems with the tall chimney stack, including a large crack through which daylight can be seen. It was mentioned at the meeting that some work had been done to the chimney in relation to installing a lightening rod but it was not made clear what the remedial brickwork was and whether it met the requirements outlined in the engineering report that was undertaken in 1996/97.
4. There are some occupants in some of the more modern sheds on the site. Access and egress to these areas should be improved and be by a route away from the kiln area.

5. The timber business on the site has been requested to consolidate the wood storage in order to clear areas of the site.
6. The fence at the rear of the site had a large access hole cut into the mesh.
7. There is a lot of what appears to be vandalism in the form of broken windows and there were numerous footprints in the sand of the drying kilns nearest to the tall chimney.

These comments are not intended to be a site engineering report but are provided in relation to the request to make a preliminary assessment of the site, including the sheds where business occupancy was proposed.

Recommendations

Our strong recommendation is, (if it has not already been done), that a full up-to-date structural engineering report be undertaken of the site to clearly identify those areas where businesses could safely operate and those areas which should be fenced off to protect members of the public and business people and their employees who may have access to the site.

Given the potential for material to fall from the tall chimney an engineering report should be obtained as a matter of urgency to determine if the previous work has sufficiently stabilised the chimney.

The public should be prevented from entering the kilns and drying ovens and a fence should be constructed to prevent any access.

Please contact me if you require any additional information.

Yours sincerely

Jocelyn Plovits
General Manager and Registrar

25 February 1999

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APPENDIX 11.

Old Canberra Brick Works
Yarralumla

Fire Safety Report

On Behalf of the ACT Heritage Commission

Prepared by Station Officers

Peter Cartwright
Wayne Shaw

of the

ACT Fire Brigade
Fire Safety Section

TABLE OF CONTENTS

1. Introduction

The Fire Brigade was requested by the ACT Heritage Commission to conduct a general Fire Safety inspection of the Old Canberra Brickworks site.

Fire Safety Officers carried out the inspection on Tuesday 28 April, 1999.

The objective of this report is to give an overview of the site from a Brigade perspective from two approaches. Primarily, the layout of the buildings, their structural resistance to fire, installed fire safety systems, fire load and potential for fire was considered along with facilities for occupant intervention prior to notification of the Fire Brigade. Secondly, the Brigade gave consideration from an operational perspective in the event of a fire and the facilities available to augment the control and extinguishment of such a fire.

It should be noted that the on-site inspection was not a Building Code of Australia [BCA] compliance audit. This level of inspection was thought to be inappropriate as the building was constructed long before the introduction of the BCA. It is also understood to be beyond what was requested from the Heritage Commission, consideration however, was given to aspects of fire safety provisions that are referenced in the BCA.

The original buildings on-site were constructed in 1916, with further construction occurring through to mid 1960. There have been significant changes to regulations, even since the last constructed buildings were completed. Therefore, there is a wide variation in Fire Safety standards in the existing buildings compared to current standards. Where differences are significant and may effect the safety of current occupants, the Brigade have made recommendations within the body of the report and in the "Recommendations" list found on page 9.

A schematic drawing of the site showing building layout is included in Appendix #1

2. Summary of Report:

The site currently houses a number of occupants and includes two builders storing some tools and equipment and a small amount of building materials. One is located throughout a number of the kilns in building K1 and the other in building R2. Neither presents a high fire load, or a high risk of fire occurring. An artist's studio is located upstairs in building 'T1' above a disused toilet block. This is a small studio run by a solo artist and again is of minimal concern regarding the risk of a fire starting or high fire load.

"Thor's Hammer" (a timber recycling business) has a large quantity of stored timber, spread over the site. The workshop for this business is located in building M1 and on the day of inspection was clean and tidy with no obvious build up of sawdust or other combustible materials. Two water extinguishers and one 3.5 kg extinguisher were located within the workshop. The tenant expressed a willingness to install a fire hose reel to provide additional first attack capabilities. The extinguishers require maintenance in accordance with Australian Standard 1851. The storage of recycled timber throughout the site could be addressed to improve access, egress and general housekeeping.

Apart from two functional hydrants on the western side of the site and two water extinguishers in "Thor's Hammer" there is no other functional, installed fire safety equipment. In the event of a fire there is no automatic notification back to the Brigade. It is therefore probable that a fire occurring at the site could take hold prior to the arrival of the Brigade (and with the apparent limited water supply available on-site) prove difficult to control and extinguish.

3. Scope of Inspection

3.1 Fire Hydrants

There are four external hydrants found on the site. Two hydrants on the western side of the site appear functional however water flow seems only modest. Hydraulic testing is recommended to determine if flows are adequate for the site. The two hydrants on the eastern side of the site have been disconnected and it is not known whether these can be easily re-instated. The services of a hydraulic engineer would need to be consulted for expert opinion in this area.

Vehicular access to the western hydrants is adequate however all weather access to the eastern hydrants, if they were re-instated would need further investigation.

Hydrants need to be cleared a minimum of 1 metre radius of vegetation and clearly marked to be easily identifiable in an emergency including at night. Storz couplings should be fitted to hydrants.

3.2 Fire Hose Reels [FHR] & Fire Extinguishers

There are no FHR functional throughout the complex and only one disconnected FHR was located.

'Thor's Hammer' in building M1 contained one CO^2 and two water extinguishers, which were the only extinguishers located on site.

3.3 Emergency Lighting and Exit Signage

There is no emergency lighting or exit signage in the complex.

3.4 Thermal/Smoke Detection System

No facilities for automatic notification of the Brigade are installed in the complex.

3.5 Fire Compartmentation

Resistance to fire spread within buildings does not exist. There is resistance to the spread of fire achieved by physical separation of some buildings.

3.6 Means of Escape

In the current occupied areas means of escape appears adequate. Occupant numbers are small, they are familiar with their own tenancies and travel distances to available exits in these areas is not excessive. Exit signage and emergency lighting is not provided.

CK+

4. Current tenanted areas

4.1 Building M1

This is the workshop area for "Thor's Hammer". The building is of steel frame construction clad with iron. The building contains some wood working machinery and small quantities of timber used for processing. The area is clean and tidy with good access and egress. The build up of sawdust, timber off cuts or other combustibles was not evident at the time of inspection. The area has a relatively low fire load. Possible ignition sources include heating appliances, electrical malfunction and carelessly discarded smokers material.

The area contained two water extinguishers and the tenant produced a CO^2 extinguisher when questioned. None of the extinguishers are being regularly serviced and require correct mounting on the wall for easy access. No fire hose reel exists, however the tenant expressed a willingness to install one if requested to do so.

A suspended concrete mezzanine area is above the tenanted area of this building. The mezzanine is accessible via stairs but is not currently used. Structural adequacy would need to be confirmed if this area was to be used for storage.

4.2 Building T1 - known as "The Old Canteen"

The building is of double brick construction with a disused toilet block on the ground floor and an artist's studio on the level above. There is minimal fire load on the ground level due to its tiled brickwork construction and this area is not occupied. Potential for fire to occur is minimal. The artist's studio, known as "Maries Studio" on the first floor, is approximately 10 metres by 5 metres in dimension. There is a single exit via timber stairs. A small quantity of combustible matter was stored on the stairs at the time of inspection. It is understood that there is only one occupant. The occupant was advised to remove these items to enhance ease of escape.

Fuel load is moderate but includes small quantities of oil based paints, thinners and flammable cleaning fluids.

Possible ignition sources include heating appliances, electrical malfunction and carelessly discarded smokers material. Electrical equipment present at the time of inspection were electric fan heater, electric jug and other items substantially of a domestic nature.

4.3 Buildings M2 & M3

These buildings are of non-combustible construction consisting of steel frame sheeted with iron. The buildings however contain a high fire load consisting of timber bundled to a height of approximately 1.5 metres. It is understood that it belongs to "Thor's Hammer". Care needs to be taken with its placement to ensure clear access and egress paths are maintained.

4.4 Buildings K1, K2 & K3

These buildings are of non-combustible construction consisting of solid brick kilns but with a verandah attached to both sides constructed of timber frame sheeted with iron. There is also a mezzanine area above the kilns, which is showing signs of deterioration in its timber. The stairs have been removed from K2 & K3 however K1 still has access stairs. This area appears unstable and would be safer if access is barred. There were no combustibles stored on the mezzanine of K1.

K1 has a small number of areas being used by a builder to store steel formwork and other builder's items. These are of minimal fire load and would not be expected to threaten the building in the event of a fire.

K2 has a number of small sections being used as storage space by a theatrical group. Fire load is minimal and the building structure would not be threatened in the event of a fire.

The kiln part of K3 is vacant and contains no fire load, however parts of the verandah are being used by "Thor's Hammer" for storage of timber to a height of approximately 1.2 metres.

K1, K2 and K3 show signs of cracking and brick movement in some arches of the kilns. While there appears little danger of collapse, there is still a risk of falling bricks. A structural engineer needs to check these areas.

4.5 Building K4

The area known as K4, was the last completed construction in the complex, the structure is mainly steel-framed with iron cladding. It contains disused oil fired kilns with large steel access doors to the kilns. These are chained and locked to prevent access. Above the doors in the lintel brick movement and cracking is evident. Some remedial work appears to have been conducted though some bricks appear unstable and a qualified structural engineer should check the building.

"Thor's Hammer" are storing large quantities of bundled timber to a maximum height of approximately 2 metres in this building.

4.6 Boiler House and Substation

Both buildings are of double brick construction. The boiler house is vacant and the sub-station is locked and maintained by ACTEW to provide power to the site.

4.7 Old Site Office

The building is approximately 18 metres by 10 metres of solid brick construction. Apart from the caretakers office the building is vacant.

4.8 Workshop - shown on plan as Building W

The building is of steel-framed construction with iron cladding with approximate dimensions of 20 x 13 metres. There is a timber-framed partition adjacent to the temporary spray booth creating a room of approximately 6 square metres. Roof height is approximately 7 metres. This area of the site is of most concern and has the greatest potential for fire to occur.

There are two areas in this building one is used by a steel fabricator and the other by a sculpture.

Welding, grinding and cutting of steel with resultant sparks and hot metal filings occur within this building. Spray painting in a temporary plastic spray painting booth also occurs. Approximately 80 litres of flammable liquid were stored within the general area of this building. The storage of this flammable material is in contravention of the Dangerous Goods Act. The spray painting booth is also operating in contravention of the Occupational Health and Safety Act.

There is evidence of heat and fire being used in sculpting work; remains of burnt paper were found on the floor. There appears to be poor house keeping practices with accumulated rubbish in piles and unemptied bins in the building. There are no extinguishers or hose reels available.

This building is not fire separated from the adjacent buildings. There is a timber walkway suspended off the ground linking this building to the adjacent buildings. There is a high potential for fire to occur in this building and spread to the adjacent premises.

5. Fire Brigade Operations – Fire Fighting Considerations

Available water supply for fire fighting is limited to two functional hydrants on the western side of the complex. It is doubtful that sufficient water would be available from these hydrants to quickly extinguish a fire once it had taken hold in piles of timber and/or any combustibles in the building structure.

Access to the western side of the site for fire appliances appears adequate, however all weather access to the eastern side of the site is doubtful.

The current random spacing of timber throughout some buildings may make access for fire fighting difficult.

This area has a high risk of fire spread due to the high fire load in some buildings listed in section 4 of this report and also the close proximity of some buildings. Particularly those linked by a combustible walkway.

6. Recommendations

1. Consideration should be given to reinstating the two eastern fire hydrants.

2. Existing hydrants need to be clearly marked and vegetation from around them removed to increase their visibility and ease of access.

3. Provide and install suitable extinguishers to Building W to comply with the appropriate Australian Standards.

4. Provide and install suitable extinguishers to Building T to comply with the appropriate Australian Standards.

5. Current Extinguishers in M1 should be serviced and installed in accordance with Australian Standard AS1851.

6. Flammable liquids in Building W must be removed or stored in accordance with the relevant dangerous goods code. Improved general house keeping and removal of combustible rubbish on a daily basis should be commenced.

7. Fire Safety education on the use of naked flames and other high risk activities in workshops should be implemented.

8. Training in the use of extinguishers should be conducted.

9. The site, as inspected, presents itself as a safety risk to the general public if they were allowed access to it. The site is currently secured with a 2.0 metre

high barbed wire topped fence. The caretaker advised us that this is checked on a regular basis. The gates to the site appear to be locked at most times. Even with the site's current limited use, hazards still exist and measures should be taken to prevent persons visiting the site and wandering into unsafe areas. The crusher house in particular is an area of potential danger. It is understood that a separate Occupational Health and Safety Report is being prepared by Workcover therefore no further comment is offered on this aspect.

10. If the current number of tenants or further areas of the complex were to be utilised by existing tenants, consideration would have to be given to provide appropriate fire safety equipment and systems to these areas.

11. It appears that sawdust from the timber workshop is being stored in piles on site outside the workshop. As this adds to the combustibles on site it is recommended that this practice cease and the sawdust stored elsewhere.

12. The random storage of timber over the site presents itself as a hazard. The fuel load in some buildings is high, particularly in building K4 where the building structure would be threatened in the event of a fire. Due to limited water supplies available on site it is doubtful the Brigade would have sufficient water available to extinguish such a fire once it had taken hold. A substantial loss of or damage to buildings would be the most likely outcome. Consideration should be given to limit the fuel load.

13. Advice from a structural engineer should be sought regarding cracked and spalling brickwork in kilns and their structural adequacy.

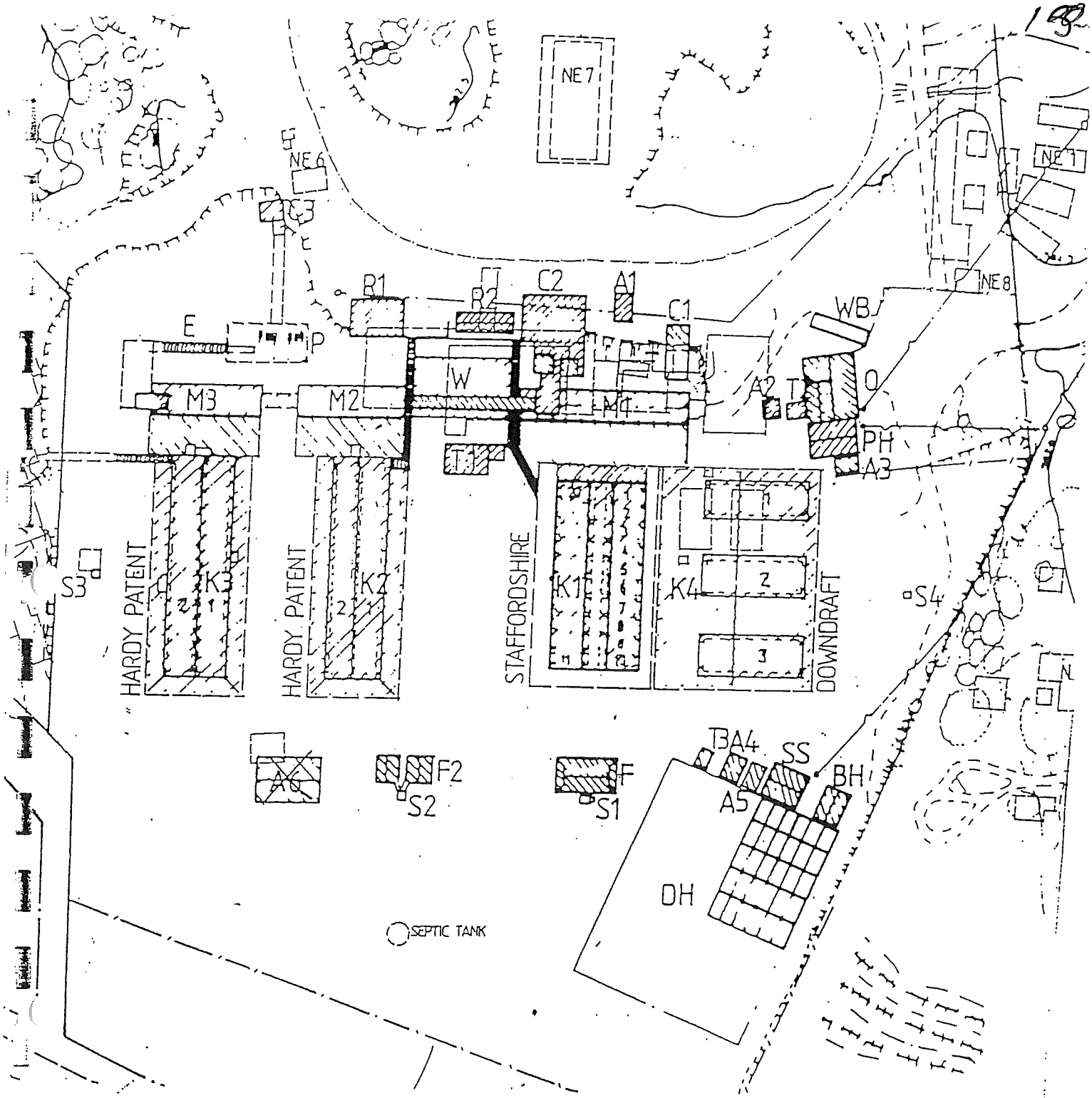
14. A licensed electrician should perform inspections on all electrical equipment and facilities on site to ensure the safety of all persons.

7. Conclusion

The site is currently used by a limited number of tenants. Provided the recommendations of this report are implemented, the site's current limited public access does not present a high level of risk
If the current usage of the site were to change, a comprehensive review to upgrade fire safety systems would be required.

8. Appendix #1

(see attached map)



DETAIL OF KILN AREA

KEY

- Kiln . Staffordshire c 1915
- Kiln . Hardy Patent c 1927
- Kiln . Hardy Patent c 1953
- Kiln . Downdraft c 1961
- Pan House for Staffordshire c 1915
- Pan House for Patent c 1927
- Chimney Stack for Staffordshire c 1915
- Chimney Stack for Patent c 1927
- Chimney Stack for Patent c 1953
- Chimney Stack for Downdraft c 1961
- Machine Bay for Staffordshire and Downdraft c 1955 (also Brick Press Building 1)
- Machine Bay Patent c 1955
- Machine Bay Patent c 1955
- Workshop c 1955
- Small Crusher House (Masonry)
- Large Crusher House (or Pan Building) c 1955
- Quarry Crusher House c 1955
- Pan Building Site c 1955
- Elevator Conveyor c 1955
- Offices c 1916
- Power House c 1915
- Lighbridge c 1960's
- Toilet Block (lockers, lunch & meal old) c 1947/50
- Minor toilet block
- T1 Minor toilet block
- B1 Boiler House c 1971
- SS Sub Station and Control Room c 1971
- DH Drying House and Slab c 1971
- R1 Railway (model) Workshop c 1979
- R2 Railway (model) Storage Shed c 1979
- O Quarry Brickpit
- A Geological Monument
- B Geological Monument
- C Geological Monument
- D Geological Monument
- A1 Ancillary Building Storage Shed c 1958
- A2 Ancillary Building Studio/Shed
- A3 Ancillary Building Studio/Shed Former Burners Hut
- A4 Ancillary Building Studio/Shed
- A5 Ancillary Building Studio/Shed
- A6 Forklift Shed c 1965
- NE1 Site of 1913 Temporary Open Kilns and Workshop
- NE2 Site of Brickworks Camp (Accomodation village)
- NE3 Site of Explosives Store
- NE4 Site of Weatherboard Cottage
- NE5 Site of oil tank/coal store
- NE6 Site of Cottage and associated Buildings
- NE7 Site of Clay Storage Area (shed)
- NE9 Site of Carpenters Shed

Old Canberra Brickworks

ELEMENT LOCATION PLAN

Lesley Firth Associates Pty Ltd

0 10 20 30 50 100 m

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APPENDIX 12.

OLD CANBERRA BRICKWORKS

To : Judy Becker

From: Bruce Macdonald

3234

Re : Brickworks safety and security directive

17/5/99

A copy of the notice has been issued to each of the undermentioned users by the method stated.

Name	Method
Thor Diesendorf	Hand delivered
Adam Herbst	Hand delivered
Peter Vandermark	Hand delivered
Marie Hegarty	Hand delivered
Alan Reid	Hand delivered
Steve Burroughs	Mail
Chris Snedden	Mail

Bruce Macdonald

14/05/99

ENVIRONMENT ACT

File No: 97/21971

To: All users of the Yarralumla Brickworks Site

As you may be aware officers from ACT Workcover have recently inspected the Brickworks.

They have notified us of their concerns for your safety, and the safety of your invited guests.

To diminish the risks we request that you restrict your movements in the property to those areas of your direct involvement, entering and leaving those areas by the safest route. Please enter the site by the main gate and follow the vehicular roadway via the short chimney, past the old fan-house and turning directly to the workshop and toilet block area. This route must also be used by foot traffic.

The main gate must be kept closed and locked at all times other than when entering or exiting. The safety of visitors is a concern. They will need to be admitted by you, by appointment.

These measures are more restrictive than the convenient informality that has existed at the site. However, they are considered essential to ensure your safety and the safety of your visitors.

As users of the site it would be appreciated if the premises, particularly the toilets could be kept in a clean and sanitary condition.

If you wish to discuss these matters please feel free to contact Bruce Macdonald on 62887759, or Judy Becker at the Heritage Unit on 6207 2167.

Yours faithfully

Kathy Binns,
Manager
4 May 1999

URBAN SERVICES

Environment ACT • Heritage Unit
Third Floor Annex, Macarthur House, 12 Wattle Street Lyneham ACT 2602
PO Box 144 Lyneham ACT 2602 • Telephone: (02) 6207 2161 • Fax: (02) 6207 2200
Helpline Telephone: (02) 6207 9777 • Homepage http://www.act.gov.au/environ

ACT GOVERNMENT

ENVIRONMENT ACT

MINUTE APPENDIX B.

File Ref: 99/2645
Contact Officer: Daniel walters
Phone: 76770

SUBJECT: Yarralumla Brickworks – Burley Griffin LAPAC Report

Helen McKeown
Environment ACT Coordination

- Manager HC 23/11
  Environment Protection Unit

Purpose

To provide comments for incorporation in a response to PALM concerning future development of the Yarralumla Brickworks.

Background

The Contaminated Sites Monogram Series "Identification and Assessment of Contaminated Land - Improving Site History Appraisal" indicates that Brickworks have the potential for significant contamination.

Although the Environment Protection Unit has no specific information that would indicate contamination, activities during and following the use of the site as a brickworks could have caused contamination. Specific activities which could result in contamination include hydrocarbon and coal based fuel storage and use and backfilling of excavated sites.

Guidelines for the assessment and management of contaminated sites indicate that assessments would normally be triggered at the change of land use purpose or at the change of the use of the land to a more sensitive use. Residential land use is considered to be amongst the most sensitive.

Issues

It would be prudent for an assessment to be undertaken prior to more detailed planning for the redevelopment of the site. The purpose of the investigation would be to identify any contraints posed by contamination. This should be conducted by a consultant experienced, and preferably accredited, in the assessment and management of contaminated sites. Any assessment should be conducted in consultation with the Environment Protection Unit.

ACT DEPARTMENT OF URBAN SERVICES

Environment ACT • Environment Protection Unit
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E-mail: daniel.walters@act.gov.au • Homepage http://www.act.gov.au/environ

Recommendation

I recommend that you include, in the comments to PALM from Environment ACT, a recommendation that an assessment of potential contamination be undertaken in accordance with the established national guidelines. Any assessment undertaken must be in consultation with the Environment Protection Unit.

Daniel Walters
Project Officer
Environment Protection

23 November 1999

Canberra Brickworks
Denman Street, Yarralumla, Canberra

Conservation Management Plan

Date	Document status	Prepared by
April 2010	Final	Lovell Chen
March 2010	Final draft	Lovell Chen

Cover: View of the Canberra Brickworks looking west, 1929 (National Archives of Australia)

Canberra Brickworks
Denman Street, Yarralumla, Canberra

Conservation Management Plan

Prepared for
Land Development Agency

April 2010

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Executive Summary

Background

This Conservation Management Plan (CMP) for the former Canberra Brickworks site and complex in Yarralumla has been commissioned by the Land Development Agency (LDA), Canberra. The subject site is currently included in the ACT Heritage Register pursuant to the *Heritage Act, 2004* (Part 3).

The CMP has been developed in accordance with the *Australia ICOMOS Burra Charter*, 1999, (as adopted by Australia ICOMOS) and its guidelines.

The Commonwealth Government established the Canberra Brickworks in order to support the development of Canberra as the new Federal Capital. The project was announced in 1910 and work began on the development of the complex in 1913. The complex supplied the bricks for the construction of buildings in Canberra in the early period of the establishment of the capital, including Canberra's major public buildings of the 1920s. Bricks and other specialty lines were produced at the site from this time until the closure of the complex in 1976. Production capacity at the site varied in response to fluctuations in demand for bricks and the Brickworks was expanded in a number of key phases, notably in the 1920s and the 1950s.

Following closure of the plant in the mid-1970s, the site was adapted for a range of uses (of varying duration) but other than for the subdivision of land and associated residential development on the perimeter of the site, relatively little physical change has occurred since this time. The surviving complex includes brick manufacturing infrastructure including kilns, stacks and ancillary buildings, with a quarry (brickpit) to the east. Currently, part of the complex is occupied by a timber recycling company.

This Conservation Management Plan builds on work previously undertaken by Lester Firth & Associates in 1986 (*Old Canberra Brickworks Conservation Plan).* In particular, the CMP incorporates historical and other research from the earlier Lester Firth study, acknowledging this material as is appropriate. The CMP includes an updated and expanded history, including detailing the recent history of the site (1986-2010) and updates the physical and descriptive material based on a detailed site survey.

While referencing this early work and other assessments as appropriate, in all other respects, this CMP constitutes a 'first principles' review and assessment of the heritage values of the Brickworks and, based on this, establishes a conservation planning framework (comprising conservation policies and management strategies) for the place. The policies in this CMP recognise and accept the challenge of establishing compatible and feasible long-term use or uses for complex redundant industrial heritage sites such as this one, and allow for the consideration of different approaches within the overall conservation management framework. This conservation management framework should be a key consideration in the future management of the place and in assessing any proposal for adaptation and/or redevelopment works.

Assessment of Significance

The assessment of significance for the site as a whole and for its component parts (refer to Chapter 7) was undertaken with reference to the Burra Charter values, and was also underpinned by a comparative analysis of other surviving brickworks across Australia.

Reference has been made to applicable criteria including those for the National Heritage List (under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999) and the Australian Capital Territory Heritage Register (under the *Heritage Act* 2004).

The conclusion of this assessment is that the Canberra Brickworks is of a relatively high order of significance, with its heritage values variously assessed as either at a State/Territory level or a local level.

The place has been assessed as having historical, scientific (geological and technological), aesthetic and social values as summarised in the table below.

Burra Charter Value	**Level**
Historic	
• Role in the early history of Canberra • Commonwealth brickworks – first Territory based industrial facility	State/Territory
• Role in the history of the local Yarralumla area	Local
Scientific	
• Geological	State/Territory
• Technological	
Kiln design	State/Territory
Extensive surviving brickworks complex	State/Territory
Aesthetic	
• Industrial complex	State/Territory Local
Social	
• Focus of local interest and action and broader community sensitivity	Local
Spiritual	*N/A*

The ACT Heritage Places Register Statement of Significance has been reviewed and a new Statement of Significance prepared for the Brickworks based in part on the existing statement but expanded and recast based on the analysis and assessment in this CMP.

Conservation Policy and Management Plan

The conservation policies and management strategies contained in this CMP (refer to Chapter 8) are wide-ranging and address issues related to the conservation of significant fabric, those related to curtilage and setting, the care and conservation of significant fabric, maintenance and repairs, adaptive reuse and site development. The policies are focussed on the physical conservation and retention of key heritage values of the place but are also directed at

providing a framework within which possible future uses and development associated with the site can be considered and assessed.

The principal objectives of the conservation policy are:

- The conservation (preservation, restoration, reconstruction and adaptation) of fabric of core and supporting significance, within a policy framework that is robust, easily understood, and consistent in its approach;
- to ensure that future works to the site are compliant with Burra Charter principles and responsive to the statutory heritage constraints;
- to maintain an understanding of the original function of the site; and
- in support of a sensitive approach to potential future change and the implementation of an adaptive reuse and redevelopment strategy that is both feasible and will support the long-term conservation of the core heritage values of the place.

Given the multiple values associated with the site, it is recognised that in addressing the conservation policy objectives, there will be options for future management, including for restoration and reconstruction, demolition, adaptation and site development.

It is also recognised that various elements on the site can be identified on the basis of their role in the history, operation and development of the place and/or on the basis of their contribution to particular values associated with the place or with the individual elements themselves.

The elements have variously been identified as 'core' or 'supporting' elements, and 'incidental' elements. These designations recognise that:

- A group of elements is associated with the establishment and operation of the Canberra Brickworks in the period 1915-1940. These elements are central to an understanding and appreciation of the operation and history of the site in this early period including its relationship with the early history and development of Canberra. These are generally designated as core elements.
- A number of elements are of individual scientific (geological or technological) significance in their own right. These have also been designated as core elements.
- A group of elements relate to the further development of the brickworks complex as it was expanded and evolved from the 1940s through to the 1970s and are able to demonstrate aspects of this expansion and the operation of the site in this period. These elements are generally designated as supporting elements.
- A further group has been designated as incidental elements. This group comprises buildings of the post-WWII period which while related to the expansion of the complex, were originally minor in nature, reflect ancillary uses rather than core manufacturing processes and/or are altered. In addition this group includes a small number of buildings that were introduced to the site following its closure as a brickworks.

The policies reflect and make reference to these designations. Specific policies are provided for individual core and supporting elements. For each of these elements, both a conservation policy and a comment on adaptation are provided.

Another key recommendation of the CMP is the establishment of Heritage Management Zones. These zones reflect the analysis of the key heritage issues of curtilage and setting as

they apply on this site and on land immediately abutting, and identify areas of greater or lesser significance and sensitivity. Explicit reference is made to these zones in the CMP policies for site development and new works, and it is recommended these are considered in any assessment of development proposals within or directly abutting the site.

The CMP also includes policies that address matters relating to the management of the place including statutory frameworks and other matters of a more practical nature which have the potential to impact on heritage significance and values.

1.0 INTRODUCTION

1.1 Background and brief

This Conservation Management Plan for the Canberra Brickworks, Canberra has been commissioned by the Land Development Agency (LDA), Canberra. The Brickworks is designated Block 1, Section 102 in the Territory Plan. The document also has regard for land adjacent to the Brickworks: Blocks 7 and 20, Section 102 in the Territory Plan.

The Canberra Brickworks includes former brick manufacturing infrastructure, comprising kilns, stacks and ancillary buildings, with a quarry to the east. In general, the manufacturing infrastructure and quarry (also referred to as 'brickpits') are referred to collectively as Canberra Brickworks or 'the Brickworks' throughout this document.[1]

The Canberra Brickworks has been the subject of numerous development and adaptive re-use proposals since it was decommissioned in 1976. A scheme to develop the site as a tourism and retail facility with housing to the east and north was partially realized in the early 1980s. The site is presently occupied by a timber merchant and a number of artists. The quarry is a secure area.

This CMP constitutes an update of the *Old Canberra Brickworks Conservation Plan*, prepared by Lester Firth Associates Pty Ltd (1986). The 1986 *Conservation Plan* provides a history of the Brickworks; datasheets for the individual site components, with an emphasis on history rather than physical analysis; and an assessment of significance for the site. In addition it identifies potential future uses for the Brickworks, and constraints and opportunities related to development and adaptive re-use. It also includes a limited Conservation Policy (Section 4) and Conservation Plan (Section 5.).

The content of the 1986 *Conservation Plan* that relates to the history and operation of the Brickworks has been drawn upon for this CMP, with additional information and detail provided by Lovell Chen. In addition, the limited descriptive detail in the datasheets (Appendix 2) has been used as a guide for the updated datasheets in this CMP. The sections that reference research by Lester Firth Associates are identified throughout, including original sources where cited.[2]

The CMP also follows other reports on the site and the adjacent land, including:

- National Capital Development Commission, *Canberra Brickworks, South Canberra, Policy Plan*, October 1988;
- Connell Wagner Pty Ltd, *The Old Canberra Brickworks and Environs Development Control Plan*, February 2001; and
- Susan Conroy & Munns Sly Architects, *The Yarralumla Brickworks & Environs Planning Review*, March 2005.

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1 The Brickworks have also been referred to as Old Canberra Brickworks, Westridge Brickworks, the Commonwealth Brickworks, the Government Brickworks and Yarralumla Brickworks. Throughout this document the site is referred to as the 'Canberra Brickworks' or the Brickworks.

2 Lester Firth Associates Pty Ltd, *Old Canberra Brickworks Conservation Plan* (1986) is an unpaginated document. References are cited by Section.

An Adaptive Reuse and Development Strategy for the Canberra Brickworks is also to be prepared. The Strategy, prepared by Lovell Chen Architects & Heritage Consultants, will address the potential of the site for adaptive reuse and development, and will provide guidance on the practical issues which will be confronted in the future use of the site.

1.2 Overview of methodology

This CMP broadly follows the format of the Australia ICOMOS (International Council on Monuments and Sites) guidelines for the preparation of conservation plans[3] and the principles set out in the *Australia ICOMOS Burra Charter*, 1999, adopted by Australia ICOMOS to assist in the conservation of heritage places.

As noted, this CMP follows the 1986 Lester Firth Associates' *Conservation Plan* and much of the material contained in that report has been reviewed, updated, and re-presented, with appropriate attribution to the original authors of that report. Where required, additional historical research was undertaken. A detailed physical survey was undertaken of the site to update and expand the information contained in the earlier study. The physical survey included an inspection of the exteriors and interiors of all buildings (with some minor exceptions) and a detailed review of the broader site.

The assessment of significance for the site as a whole and for its component parts was undertaken with reference to the Burra Charter values and was underpinned by a comparative analysis of other surviving brickworks across Australia. Reference has been made to applicable criteria including those for the National Heritage List (under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999) and the Australian Capital Territory Heritage Register (under the *Heritage Act* 2004).

The conservation policies and management strategies contained in this CMP are wide-ranging and address issues related to the conservation of significant fabric, those related to curtilage and setting, adaptive reuse and development. The policies are focussed on the physical conservation and retention of key heritage values of the place but are also directed at providing a framework within which possible future uses for the site can be considered and assessed. In developing the conservation policies, consideration has been given to the existing Heritage Register documentation for the site prepared by the ACT Heritage Council.

1.3 Report structure

Introduction (Chapter 1)

The Process of Brickmaking (Chapter 2)

This chapter provides a brief overview of the main processes involved in brickmaking, including a description of these processes as they occurred at this site. Chapter 2 also provides an overview of different brick kiln designs and types including those found on this site.

History and Physical Analysis (Chapters 3-6)

To reflect the primary phases in the evolution of the Canberra Brickworks, the History & Physical Analysis is divided into four chapters:

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3 J S Kerr. *The Conservation Plan*. passim.

- Chapter 3: Establishment Phase, 1911-1920
- Chapter 4: Expansion Phase, 1921-1940
- Chapter 5: Post-War World II Phase, 1944-1976
- Chapter 6: Post-Closure Phase, 1976-present

Chapters 3-6 each comprise an historical overview followed by datasheets for each extant building or element built during each of the four main phases. The location of these buildings and elements are shown on site plans included for each chapter. Demolished components from each phase are also described briefly at the end of each chapter.

Chapters 3-6 draw on the material in Section 2.1 ('Development of the Brickworks') of Lester Firth Associates' *Conservation Plan* (1986). In addition, detail in relation to specific site components draws on the datasheets that comprise the second appendix in the 1986 *Conservation Plan*. Additional information and detail is provided by Lovell Chen. References are included throughout.

Assessment of Significance (Chapter 7)

This chapter assesses the place for its historical, technical, aesthetic, social and scientific values. The ACT Heritage Places Register statement of significance has been reviewed and a new statement of significance prepared based in part on the existing statement but expanded and recast as considered appropriate.

The site is also assessed against the ACT heritage significance criteria (under the *Heritage Act 2004*) and the National Heritage List criteria (under the *Environment Protection and Biodiversity Conservation Act 1999* and its Regulations).

Conservation Policy and Management Plan (Chapter 8)

This chapter provides conservation policies and management recommendations for the site as a whole and for individual elements.

1.4 Limitations

1.4.1 *Historical Research*

As noted above, this CMP relies in large part on historical material from the 1986 Lester Firth Associates' *Conservation Plan.* Limited additional historical research was undertaken by Lovell Chen where this was considered to be required.

In many instances, the Lester Firth Associates material is not specifically referenced in a conventional manner to original documentary or other sources, however it was beyond the scope of this CMP to revisit all original primary source documents used in the 1986 study to confirm the findings of the 1986 study.

While there clearly is considerable scope to undertake further historical research in relation to this site, it is considered that sufficient research has been undertaken to inform the analysis, assessment and development of policies in this CMP.

1.4.2 *Technology*

As part of the preparation of this CMP, additional historical and other research has been undertaken into the processes and technologies associated with brickmaking, both in a

general sense and specifically as they occurred on this site. This research is sufficient as to allow for a broad understanding of brickmaking on the site, including the sequence of processes as they occurred across the site and in different areas and buildings within the complex. The research is, however, limited in its scope. No detailed research or assessment has been undertaken in relation to the machinery that was used on the site and has subsequently been removed, or in relation to the provenance of the limited remnants of plant and equipment that remain on site. Recommendations are made in the CMP for further investigation of the brickmaking technologies used on this site including the potential for undertaking an oral history with former employees.

1.4.3 *Comparative Analysis*

A comparative analysis has been undertaken in the course of preparing this CMP, with the objective of identifying other surviving urban brickworks complexes of comparable type, scale and age. This comparative analysis was predominantly desktop-based. While a small number of comparative sites were inspected, the majority were not.

1.4.4 *Physical survey*

There were some relatively minor limitations to access during the survey phase of the CMP. Access was not available to the interior of office complex (Building 7) and the upper level of the second Hardy patent kiln at the north of the site (Building 12) was not inspected due to OH & S concerns.

1.4.5 *Scope*

The scope of this CMP does not include a consideration of Aboriginal cultural heritage issues.

Consideration has been given to non-Aboriginal (post contact) archaeological issues in this CMP and a number of recommendations are made for further investigation of the archaeological potential of the site and abutting sites. The CMP does not in itself include a detailed predictive assessment of the archaeological potential of the sites.

Consideration has been given to the possibility of the place having social value to particular individuals or groups and this issue is discussed in Chapter 6 of the report. No detailed social value study has been undertaken in the course of the study.

1.5 Location

The Canberra Brickworks is located approximately 5km west of the Parliamentary Triangle in central Canberra. The site is bounded to the north and east by low density residential development (Woolls Street, Banks Street, Bentham Street and Lane-Poole Place). To the west, the site is bordered by the Royal Canberra Golf Course and Westbourne Woods, and to the south by open space. The Brickworks covers an area of approximately 9.6 hectares.

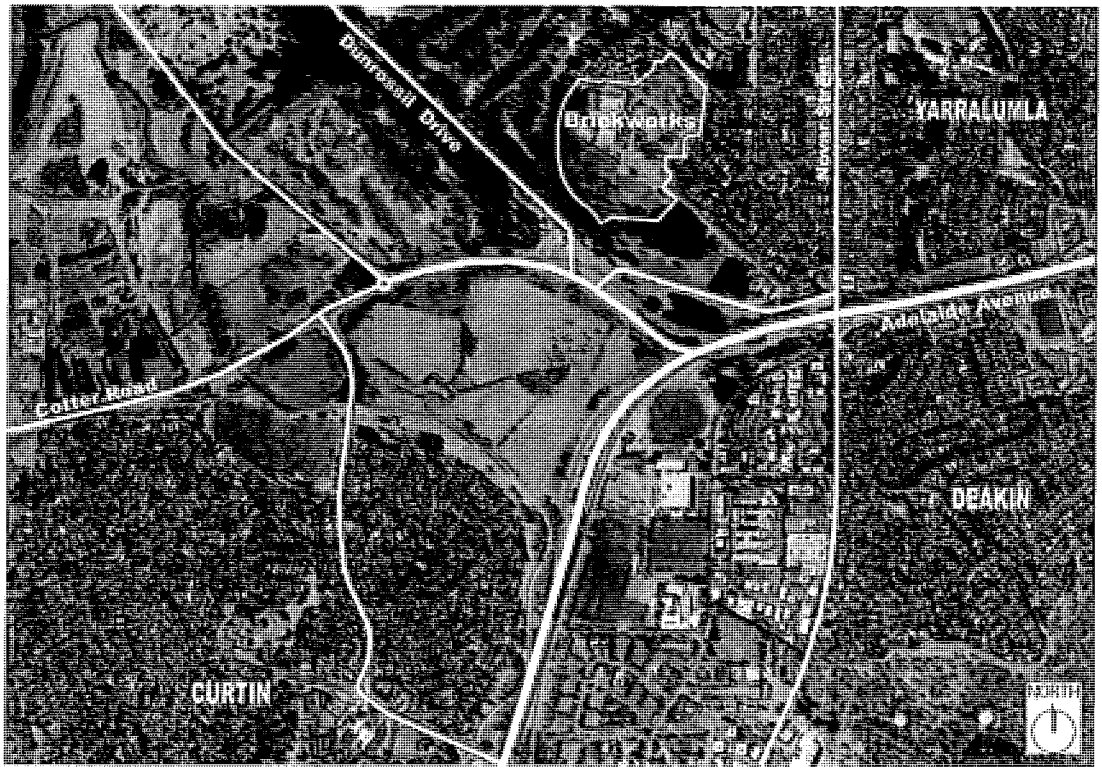

Figure 1 The location of the Canberra Brickworks site.
Source: Land Development Agency.

1.6 Heritage listings and controls

1.6.1 *ACT Heritage Register (ACT Heritage Act)*

Canberra Brickworks (Block 1, Section 102) is included in the ACT Heritage Register, maintained by the ACT Heritage Council, pursuant to the *Heritage Act, 2004* (Part 3). The entry to the Heritage Register is attached (Appendix A).

1.6.2 *National Heritage List & Commonwealth Heritage List (Commonwealth Environment Protection and Biodiversity Conservation Act)*

Neither the Canberra Brickworks nor the quarry are included in the National Heritage List or the Commonwealth Heritage List.

1.6.3 *Register of the National Estate*

Canberra Brickworks (Place ID 13318) was included in the Register of the National Estate as a registered place in 1982. The 'Yarralumla Brickpits' was also registered at this time (ID 13319), see Appendix A. The 1982 citation for the brickworks was amended in 1999, to take account of the site's landscape setting and its relationship with the surrounding area. The brickworks was subsequently re-listed as Yarralumla Brickworks Extended Area (Place ID 101439). The revised Statement of Significance expanded on the site's historical and aesthetic values (see Appendix A). The registered area was increased from approximately 8ha to 9.6ha, the additional area comprising the land to the west of the western alignment of

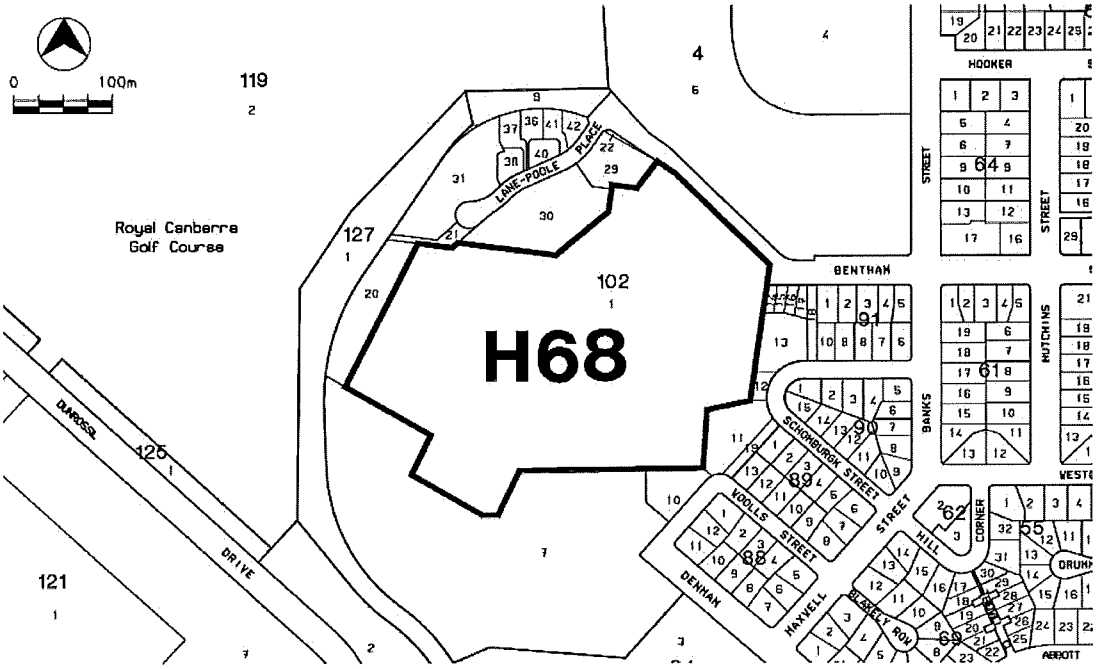

Figure 2 Extent of Heritage Register entry
Source: ACT Heritage Register

the fan house chimneys, and the land surrounding the former worker's hostel to the south-west of the site.

Following amendments to the *Australian Heritage Council Act 2003,* the RNE was frozen on 19 February 2007, meaning that no new places have been added or removed since that date. From February 2012, the RNE will cease to exist as a 'register' but will be retained by the Australian Heritage Council as a publicly accessible archive.

There are no statutory requirements relating to Canberra Brickworks as a consequence of these listings. Copies of the entries from the RNE are attached at Appendix A.

1.6.4 *National Trust of Australia (ACT)*

The 'Canberra Brick Works' was identified as a 'Classified' place by the National Trust of Australia (ACT) on 20 July 1981. The National Trust of Australia (ACT) does not maintain files or reports for classified places. There are no statutory requirements as a consequence of this classification.

1.7 Site documentation

1.7.1 *Numbering*

A new chronologically based numbering system has been used in this CMP. The following table includes the numbers of buildings/ elements in the CMP (left column), and the number (if applicable) of the corresponding building/ element in the ACT Heritage Places Register (H68).

The plan at Figure 3 shows the location of these site elements.

Number	Element
01	Quarry
02	Concrete retaining wall
03	Power House
04	Staffordshire Kiln (Kiln 1)
05	Fan house for Kiln 1
06	Chimney stack for Kiln1
07	Offices
08	Hardy patent Kiln (Kiln 2)
09	Fan house for Kiln 2
10	Chimney stack for Kiln 2
11	Amenities block
12	Hardy patent Kiln (Kiln 3)
13	Chimney stack for Kiln 3
14	Machine Bay I for Kiln 1
15	Machine Bay II for Kiln 2
16	Machine Bay III for Kiln 3
17	Workshop
18	Small Crusher House (Crusher House I)
19	Large Crusher House (White pan room / Crusher House II)
20	Primary Crusher House (Crusher House III)
21	Elevator / Conveyor
22	Downdraft Kilns (Kiln 4-6)
23	Downdraft kiln control room
24	Chimney stack for Kilns 4-6
25	Toilet block
26	Amenities block
27	Substation/control room
28	Boiler house
29	Ancillary storage building
30	Remnant of Extrusion plant (concrete pad)
31	Ancillary storage building
32	Storage shed
33	Model railway workshop
34	Model railway storage shed

Figure 3 Site plan showing location of elements

SITE ELEMENTS TABLE

No. in CMP (2010)	No. in ACT Heritage Places Register	Building/Element	Date/s of construction
01	11 (Geological features A-D, item 12)	Quarry	Extraction from c. 1913 until c. 1940
02	–	Concrete retaining wall	c.1915-16
03	14	Power House	1915-16
04	1	Staffordshire Kiln (Kiln 1)	1914-15
05	2	Fan house for Kiln 1	1914-15
06	7	Chimney stack for Kiln1	1914-15
07	13	Offices	c. 1925
08	3	Hardy patent Kiln (Kiln 2)	c. 1926, c. 1955
09	4	Fan house for Kiln 2	c. 1927, c.1955
10	8	Chimney stack for Kiln 2	c. 1927
11	–	Amenities block	c. 1950, c. 1977
12	5	Hardy patent Kiln (Kiln 3)	c. 1953
13	9	Chimney stack for Kiln 3	c. 1953, c. 2005
14	15	Machine Bay I for Kiln 1	c. 1955
15	16	Machine Bay II for Kiln 2	c. 1955
16	17	Machine Bay III for Kiln 3	c. 1955
17	18	Workshop	1955
18	21	Small Crusher House (Crusher House I)	c. 1958
19	19	Large Crusher House (White pan room/ Crusher House II)	c. 1955
20	20	Primary Crusher House (Crusher House III)	c. 1955
21	22	Elevator / Conveyor	c. 1955
22	6	Downdraft Kilns (Kilns 4-6)	c. 1960-3
23	–	Downdraft kiln control room	c. 1963

No. in CMP (2010)	No. in ACT Heritage Places Register	Building/Element	Date/s of construction
24	10	Chimney stack for Kilns 4-6	c. 1950s
25	–	Toilet block	c. 1960s
26	–	Amenities block	c. 1960s
27	–	Substation/control room	c. 1971
28	–	Boiler house	c. 1971
29	–	Ancillary storage building	c. 1971
30	–	Extrusion plant (remnants)	c. 1971
31	–	Ancillary storage building	c. 1960s
32	–	Storage shed	c. 1960s
33	–	Model railway workshop	c. 1979
34	–	Model railway storage shed	c. 1979
–	23	Remains of Brickworks Accommodation Village	1945

1.8 Terminology

The conservation terminology used in this report is of a specific nature, and is defined within The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the *Burra Charter*) as endorsed by all statutory and national heritage bodies (See Appendix A). The terms most frequently referred to are: place, cultural significance, fabric, conservation, preservation, restoration, reconstruction, adaptation and interpretation. These terms are defined in the revised charter as follows:

Place means site, area, land, landscape, building or other work, group of buildings or other works, and may include components, contents, spaces and views.

Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects.

Fabric means all the physical material of the place including components, fixtures, contents and objects.

Conservation means all the processes of looking after a place so as to retain its cultural significance.

Maintenance means the continuous protective care of the fabric and setting of a place, and is to be distinguished from repair. Repair involves restoration or reconstruction.

Preservation means maintaining the fabric of a place in its existing state by removing accretions or by reassembling existing components without the introduction of new material.

Restoration means returning the existing fabric of a place to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.

Reconstruction means returning a place to a known earlier state and is distinguished from restoration by the introduction of new material into the fabric.

Adaptation means modifying a place to suit the existing use or a proposed use.

Use means the functions of a place, as well as the activities and practices that may occur at the place.

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

Setting means the area around a place, which may include the visual catchment.

Related place means a place that contributes to the cultural significance of another place.

Related object means an object that contributes to the cultural significance of a place but is not at the place.

Associations mean the special connections that exist between people and a place.

Meanings denote what a place signifies, indicates, evokes or expresses.

Interpretation means all the ways of presenting the cultural significance of a place

2.0 THE PROCESS OF BRICK PRODUCTION

2.1 Introduction

A number of processes and elements related to brick production are common to large twentieth century brickworks. These are summarised below:

2.1.1 *Quarrying*

Because of the cost of transporting raw materials in both nineteenth and early twentieth century brickworks, the raw materials for brickmaking (clay, shale) were typically quarried close to the brickworks themselves.

In the case of the Canberra works, until c. 1940 the shale was quarried on site (though clay is thought to have been brought onto the site for tilemaking from the early 1920s). From c.1940, all raw materials were quarried elsewhere and delivered to the site. [4]

2.1.2 *Crushing, Grinding and Pressing*

Raw materials, quarried in lumps, were crushed to a manageable size in a crusher. In some brickworks, crushers might be located at the point of quarrying, with the material then conveyed to another location (closer to the brick presses) where it would pass through grinding mills and pugmills (and further refined, worked and mixed). The material was then fed into the brick presses themselves.

A series of conveyors and hoppers moved the materials between and within buildings and through the different stages of the process. In the nineteenth century the presses and other machinery were powered by steam, but this changed to the use of electricity in the twentieth century (electricity was the only source of power used for machinery at the Canberra brickworks).

2.1.3 *Firing*

Once pressed, the bricks were transported to the kilns (the means of transport varied on different sites) where they were loaded into the kilns. The loading was done by hand until the mid- to late-twentieth century, when the use of forklifts began (often necessitating the widening of the wicket openings to the kiln chambers).

In terms of the firing process itself there were a number of different kiln types used in Australian brickworks of the late nineteenth and twentieth centuries. Refer to section 2.4 below.

2.1.4 *Transport off site*

Once fired, bricks were rarely stored for any length of time or in large quantities, but rather, were generally transported off site relatively quickly. At many brickworks the bricks were transported by rail. At the Canberra Brickworks the bricks were transported for a period by

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4 Unlike their nineteenth century counterparts, the scale and investment required in twentieth century brickworks meant that they were able to survive the expiration of available raw materials on site. This occurred at Canberra, which imported raw materials from c. 1935 to 1976.

traction engine, and in the 1920s by a dedicated light rail line to the major construction sites in the centre of Canberra.

2.2 Operation of the Canberra brickworks, 1913-1940s

(The following section is from the *Conservation Plan* prepared by Lester Firth Associates, section 2.2 (Elements and Aspects), amended and with additional research by Lovell Chen.)

At the beginning of operations at Yarralumla, the raw material for brick making was obtained on site, primarily by levelling a knoll comprised a hard yellow shale to the north of the 'temporary' works. Minor quarrying also occurred on the western side of the site. Due to variety in the shale, material from various seams was mixed thoroughly to achieve a uniform colour in the bricks. Quarrying at the site was reported to be a complex process, and more costly than the average brickworks due to numerous seams of unusable material such as limestone and sandstone.

After spalling, the shale was conveyed to the works in tip trucks running on small gauge rails. It first passed through a jaw crusher that reduced the material to 75mm and then raised by bucket elevator to an overhead storage bunker. From the storage bunker, the crushed material was taken in one cubic yard truck leads to grinding mill hoppers. After grinding to pass through a fine mesh screen, the shale was elevated by bucket to a loft immediately above the brick presses and moved by gravity to the presses. Owing to the comparatively high lime content of the shale, a 'semi-plastic' pressing process was employed. The pressed bricks were then transported to the kilns for firing.

A description of the kilns, presses and output in the 1930s is given below:

> 1. 30 compartment 'Staffordshire,' with an output capacity of 125,000 per week [note this kiln had 20 not 30 chambers].
>
> 1. 'Hoffman' continuous kiln (Hardy Patent), with an output of 120,000 per week.
>
> 2. Single compartment down-draft kilns, with a capacity of 30,000 each per week.
>
> The downdraft kilns were used almost exclusively for the production of face and special bricks. The bricks presses were the 'New Era' semi-plastic type, made by Messrs Whittaker Bros, England.
>
> There were six brick making units, three for each of the two large kilns, and each unit consisting of a 10ft grinding mill, a 'New Era' brick press, and pug mixer, driven by a 150hp electric motor. The output of each unit is approximately 1,500 bricks per hour. Two units are required to serve each kiln, the third unit being a spare.
>
> In addition to ordinary bricks, wire-cuts and specials were made, and the attractive colour range which was produced was the subject of favourable comment from many quarters.[5]

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5 Cited as 'Ref.I.E. Aust. October 1938,' in Lester Firth Associates, 1986, Section 2.2.1.

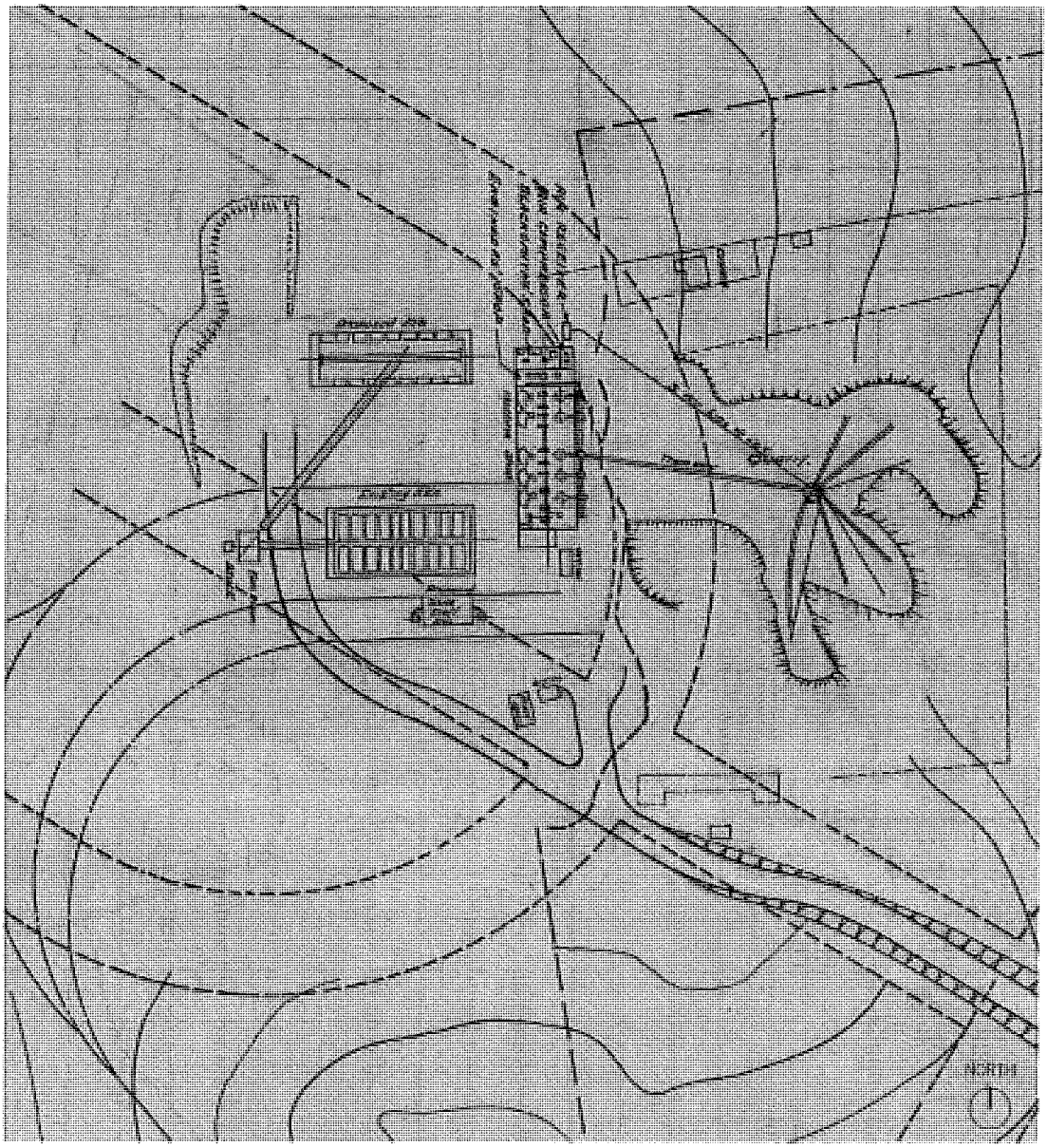

Figure 4 Site plan, 6 April 1926. On this plan, the processes occurred from east to west (right to left on this plan); the quarried material was transported via a tramway to machinery shop to be crushed, ground and pressed in the machinery shop in the centre and then to the kilns on the left. The plan shows both the existing Staffordshire Kiln and the proposed Hardy patent kiln to its north; it also shows the power house and office.
Source: National Archives of Australia.

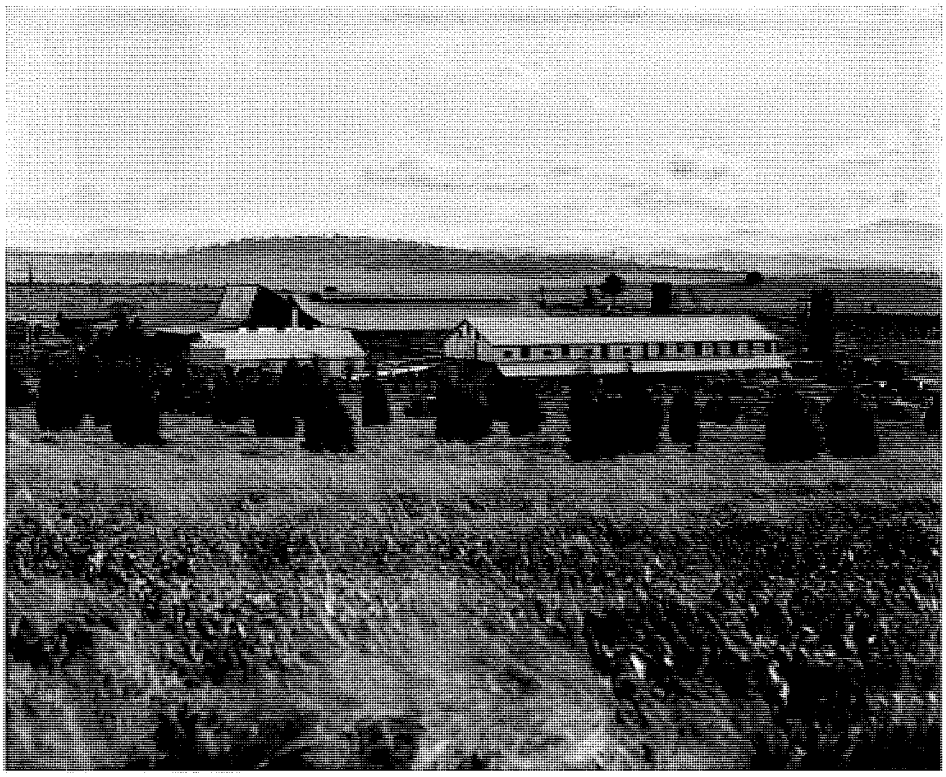

Figure 5 View from the north-east towards the brick processing buildings, c. 1927
Source: National Library of Australia.

Figure 6 Another view, c. 1927. Note the excavated quarry on the left.
Source: National Library of Australia.

Aspects of the brickmaking process as it occurred in this phase of the site's history remain legible through the overall site layout and key buildings and site elements remaining from the establishment and expansion periods (1913-1940s), however the early crushing, grinding and pressing buildings have all been removed as has much of the associated plant.

2.3 Operation of the Canberra Brickworks, 1950s-1976

While the major brick kilns on the site were retained, the major expansion of the Brickworks that occurred in the 1950s saw the replacement of other early plant and buildings (see Figure 8). The early machine shop was replaced with a series of brick press buildings (machine bays) and a workshop, all of which remain today. The Brickworks was also equipped with a series of new crushers and 'pan rooms' connected to a conveyor system.

A Hazemag crusher (Crusher House 1, Building 18) was located closest to the office building and was connected by a conveyor to the 'White Pan Room' (Building 19) where 10'6" diameter grinding pans were used to further reduce the shale. The White Pan Room could also be fed directly from the quarry area and had two hoppers. Material was crushed, elevated, sorted, re-crushed and then conveyed across to the brick press at the top conveyer level where it could be subsequently directed southwards into hoppers above the individual brick presses which were gravity fed.

The primary crusher house (Building 20) was located further to the north. This building had two hoppers, a Ross feeder and a 'grissly feeder,' with rail bars across the opening to allow manual crushing. A Jacques swing jaw crusher was located under the Ross feeder. Material was then fed by conveyer to a 'Pan Building' for further processing. Only the foundations of this building remain today. From this Pan building material was elevated by conveyor (partially demolished, Building 21) and could be stored in massive bins or taken into the northern end of the brick press buildings for distribution throughout the plant. The material was conveyed along the length of the press buildings on conveyors and could be manually diverted into hoppers directly above the brick presses. The conveyor system, hoppers, control panels and chutes remain today. The southern brick press building was subsequently extended by two structural bays to service the 1970s extrusion plant.

Brick presses in use from the 1950s were Anderson double re-press semi plastic presses. Bricks were pressed twice for additional strength. No brick presses survive at the site. It is possible that they were removed to the new brickworks at Mitchell following the closure of the Canberra Brickworks in 1976.[6]

To the extent that the majority of process buildings on the site from the1950s through to the 1970s still remain, more substantial evidence remains of the brick making processes as they occurred on the site in this later period, when compared with the earlier phase of the site's history. Accepting this, the complex as it existed in this period is not complete (the Red Pan Room and the conveyor linking this with the Primary Crusher have been demolished). Critically, while sections of the conveying system and associated hoppers remain in the

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6 Lester Firth Associates Pty Ltd, at Section 2.1.4 (Post War Growth) of the *Old Canberra Brickworks, Conservation Plan*, June 1986, notes that following the closure of the Brickworks, 'All useable material was moved to the new site [Mitchell] and the remainder offered for sale'. It has not been established whether the 'useable material' included the brick presses.

Figure 7 Aerial view, c.1976, at the time of the closure of the Canberra works. At this date, the raw materials had form many years been brought onto the site but the process continued to occur moving from east to west across the site. The 'spine' of process buildings (grinding, crushing, pressing) was located east of the kilns (between the kilns and the quarry).
Source: ACT Heritage Library

Machine Bays, the ability of the complex to demonstrate the processes themselves is limited following the removal of the majority of manufacturing plant itself (crushing and pressing machinery).

2.4 Major brick kiln types in Australia

2.4.1 *Intermittent kilns*

Prior to the 1870s all kilns in Australia were intermittent, which is to say the fires went out after each burning.

Clamp kilns

The earliest kilns were clamps, an ancient technique used the world over in which stacks of unfired (green) bricks with fire holes below are sealed, perhaps with mud, and fired in the open air (see Figure 10). In clamps, heat distribution is extremely uneven, and brick wastage unavoidably high. Clamps typically leave little archaeological residue, apart from a shallow depression in the ground, although channels and flues have survived in the more

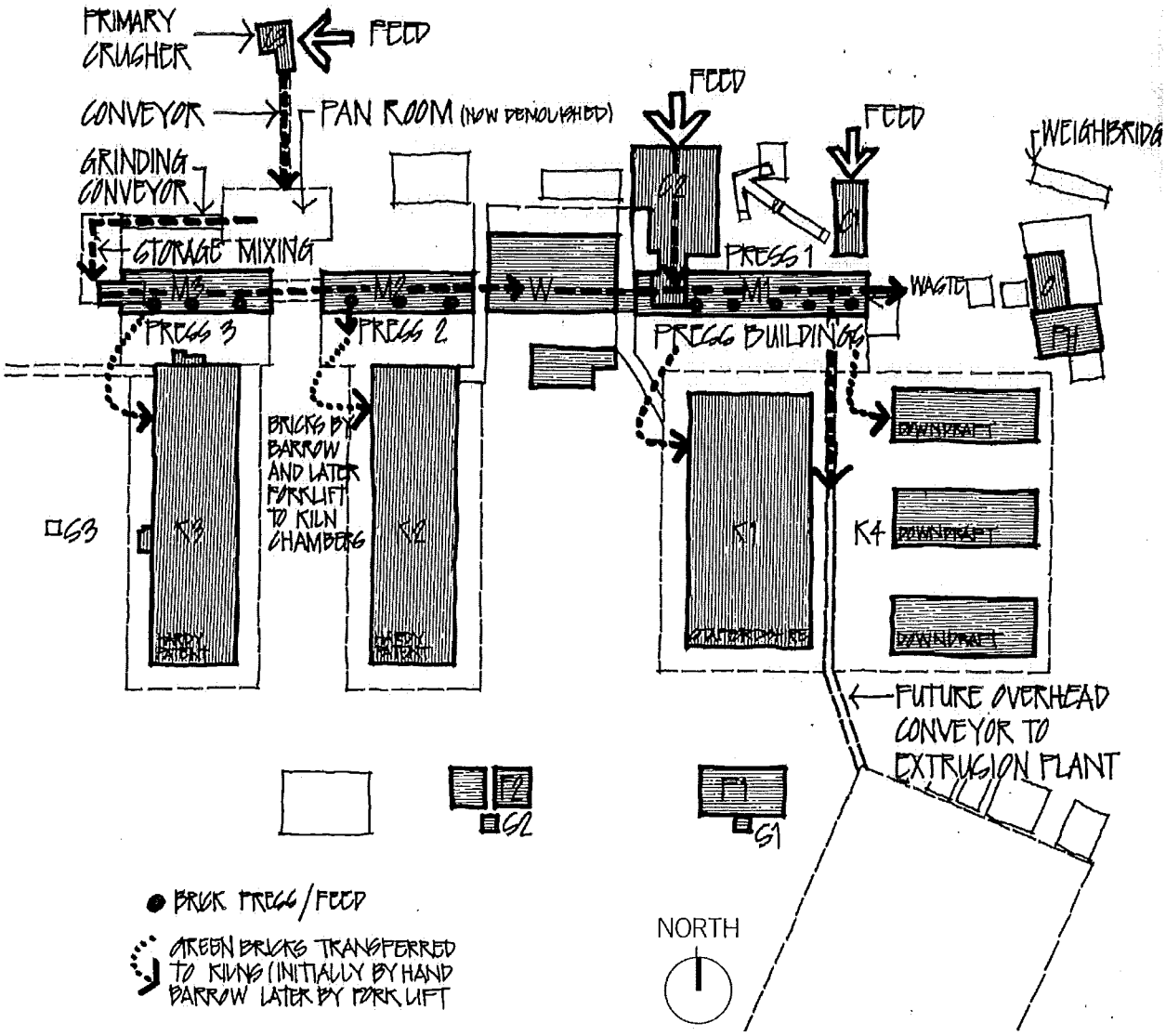

Figure 8 Sketch diagram of site operation c. 1960.
Source: Lester Firth Associates Pty Ltd, *Old Canberra Brickworks, Conservation Plan*, 1986, Section 2.2.1.

sophisticated examples.[7] Four clamp kilns were built at the Canberra Brickworks as part of the 'temporary' works, and these were operational by August 1913. The clamp kilns were located south-east of the present office building (see Figure 9).

7 Lester Firth Associates Pty Ltd, *Old Canberra Brickworks, Conservation Plan*, June 1986, Section 2.1.1 (Brick Firing Kilns).

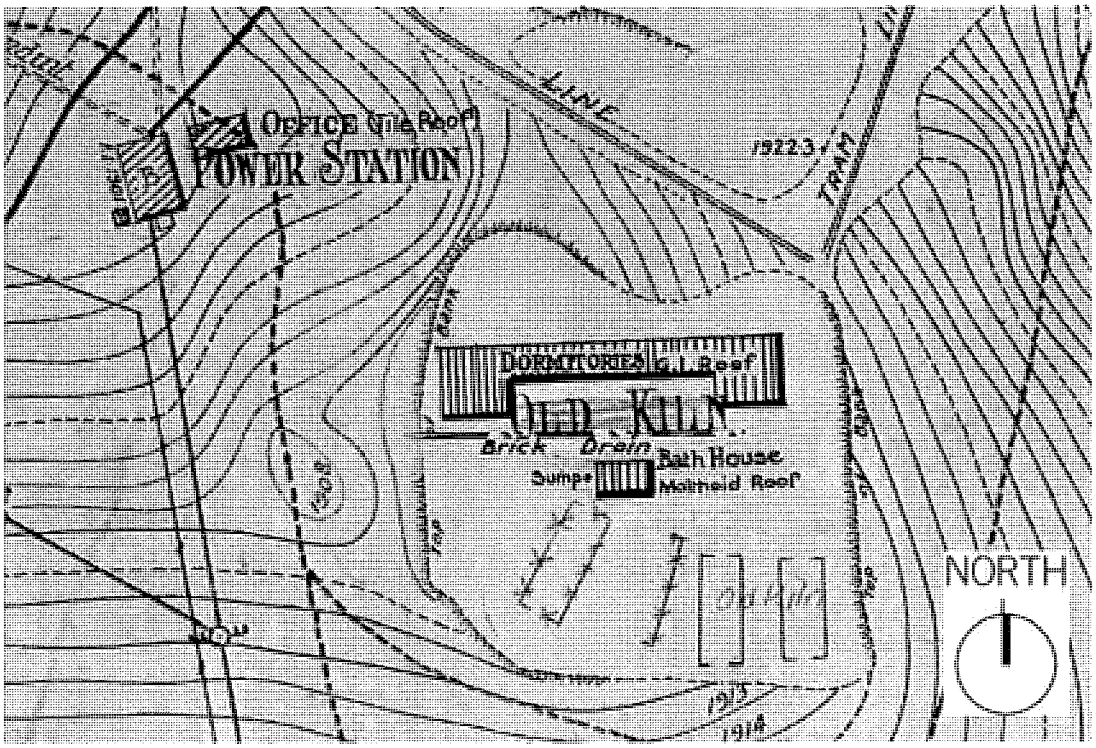

Figure 9 Detail of 'Detail of Contour and Detail Survey, Canberra Brick Yards, 20 December 1916'. Note the four clamp kilns ('Old Kiln') below the 'Dormitories' to the south-east of the Power Station.
Source: National Archives of Australia.

Scotch kilns

Among the first permanent kiln types to be constructed in Australia were 'Scotch' kilns, roofless constructions with three permanent walls and one temporary wall, which would be erected after the green bricks were placed in the kiln and demolished after firing (see Figure 11). The permanent walls directed the draught upwards. A Scotch kiln was in operation at Canberra during the mid-1920s (see Figure 12).

Downdraught kilns

The last of the broad typologies of intermittent kiln used in Australia was the Downdraught. Downdraught kilns are typically circular or rectangular in plan, with fire holes and wickets in the walls. Inside the single chamber the fire gases are funnelled to the roof through flues built against the side walls, and channelled out through underground flues to a detached chimney stack (see Figure 13). Two temporary Downdraught kilns were built at the Canberra Brickworks in 1925 (demolished 1958), close to the site of the present Downdraught kilns (Element 22), prior to the construction of the first of the Hardy-Patent kiln (Building 8). The present Downdraught kilns at the Canberra Brickworks (completed in 1963) are barrel vaulted, although circular kilns with domed roofs were also common. As occurred at Canberra, it was typical to build Downdraught kilns in groups, to enable consistent use through rotation.

Downdraught kilns were common prior to World War II, particularly in small country works. The three extant examples at Canberra are relatively late examples of the typology.

2.4.2 *Continuous kilns*

Continuous kilns are fired consistently, to enable full-time use and production. This is achieved through the principle of continuous burning around a fire passage, typically circular or rectangular. The passage accommodates a series of chambers, each with an opening (or wicket) through which the bricks were loaded and unloaded, and a branch flue leading to a main flue and chimney stack. The chambers can be set, burnt, cooled and emptied independently, with excess heat within the kiln used to dry green bricks prior to firing.

One of the earliest continuous kilns, and arguably the best-known, is the Hoffman kiln, designed by German Friedrich Hoffman in 1856, and patented in 1858 (Figure 15, Figure 16).[8] The Hoffman kilns in Australia are generally oval in form with straight sides and semi-circular ends, each kiln contains a continuous vaulted annular firing chamber which was filled with bricks for firing through wickets along the outer walls of the kiln. As for other continuous kiln types, Hoffman kilns are fired from above with the fire holes located in the roof of the vault and controlled from a first floor level above. Originally coal was dropped through the firing holes but later the kilns were adapted to use oil and subsequently gas, still from the firing holes.

The first Hoffman kiln in Australia was built in 1870 by the Hoffman Patent Brick and Tile Company at its works on Albert Street, Brunswick, Melbourne.[9] By the 1890s the Hoffman Company was claimed to be the largest enterprise of its kind in the Australian colonies.[10]

From the 1880s, multiple variations on the Hoffman concept were developed around the world. These are generally known as 'patent kilns', and involved subtle variations on the original Hoffman model. Modifications were related to achieving more even heat distribution, avoiding brick discolouration and more efficient regulation of heat to allow greater certainty about the quality of products.

Numerous patent kilns were developed in Australia in this period. In 1889, a patent for an 'improved kiln' was taken out by Isaac Button, Edward Peters and John Wesley Goodsell, all of Sydney. This was the 'Centennial Kiln,' which was built at the Croydon Brickworks in Sydney. Architectural historian Miles Lewis has described the form of the Centennial Kiln:

> Compared with the Hoffman kiln, [the Centennial kiln] was rectangular in plan, and consisted of two rows of chambers in parallel, none of them sweeping around at either end. The chambers were separately barrel vaulted, running in at right angles to the length of the kiln as opposed to the continuous vault of the Hoffman, and they were large enough for a dray or truck to be driven right into them for loading and unloading. Fuel was fed through holes in the top. The chambers at either end continued right across the kiln, with provision to divide them, but the rest were

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8 Martin Hammond, *Bricks and Brickmaking*, Shire Publications Ltd, Buckinghamshire, England, 1981, p. 23.

9 'Former Victorian Brickworks,' 72-106 Dawson Street, Brunswick, Victorian Heritage Database, vhd.heritage.vic.gov.au, accessed 18 January 2010; and G J R Line, *Industrial Awakening: A Geography of Australian Manufacturing 1788-1890*, ANU Press, Canberra, 1979, p. 265.

10 Nigel Lewis & Associates, *Brunswick Conservation Study*, Prepared for the City of Brunswick and the Australian Heritage Commission, Melbourne, 1982, p. 26.

> separated by a relatively long and narrow 'smoke chamber' along the spine, which connected with flues from either end of each chamber, and discharged to a stack. The kiln as built at Croydon had eighteen chambers, held 35,000 bricks, and was reckoned to turn out 200,000 bricks in a fortnight.[11]

Evidence indicates that the Centennial kiln was typically constructed with a long chimney or flue at one end of the main chamber.

Another variation on the Hoffman format was known as the 'Hardy patent' which was developed at around the same time as the Centennial kiln. From 1889 patent records in New South Wales and Victoria indicate that three Sydney men, Samuel Kirk, Thomas Kirk and John Richardson Hardy, had also developed an improved brick kiln design, specifically described as 'Improvements in the construction of kilns for burning bricks, tiles, pottery or other analogous materials,' for which they were seeking a patent.[12]

On 4 December 1891, the specifications of their application were accepted and the patent granted in Victoria.[13] The following year the men attempted to register the patent in New South Wales and Queensland.[14]

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11 Miles Lewis, Australian Building: A Cultural Investigation, see section 6.02.12, http://mileslewis.net/australian-building/.

12 Refer to correspondence with applicant Samuel Kirk, Thomas Kirk and John Richardson Hardy concerning invention entitled, 'Improvements in the construction of kilns for burning bricks, tiles, pottery or other analogous materials,' 1889, Series A4617/2, barcode 5150233, and 'New South Wales Letters Patent. Improvement in the construction of kilns for burning bricks, tiles, pottery or other analogous materials, Specification by Samuel Kirk and Thomas Kirk, item listing in series A4617/2, Barcode 4195049, National Archives of Australia. Samuel and Thomas Kirk, both of Croydon, in Sydney, were brick burners, while Hardy himself was listed as a contractor. See *Supplement to the Victorian Government Gazette*, 27 November 1891, p. 4658.

13 The patent was granted by Thomas Prout Webb, the Commissioner of Patents. See *Victorian Government Gazette*, 4 December 1891, p. 4683.

14 Application for Letters Patent by Samuel Kirk, Thomas Kirk and John Richardson Hardy titled - Improvements in the construction of kilns for burning bricks tiles pottery or other analogous materials, in Applications for Registration of Queensland Patents - Second system, Series A12572, barcode 7666027, National Archives of Australia.

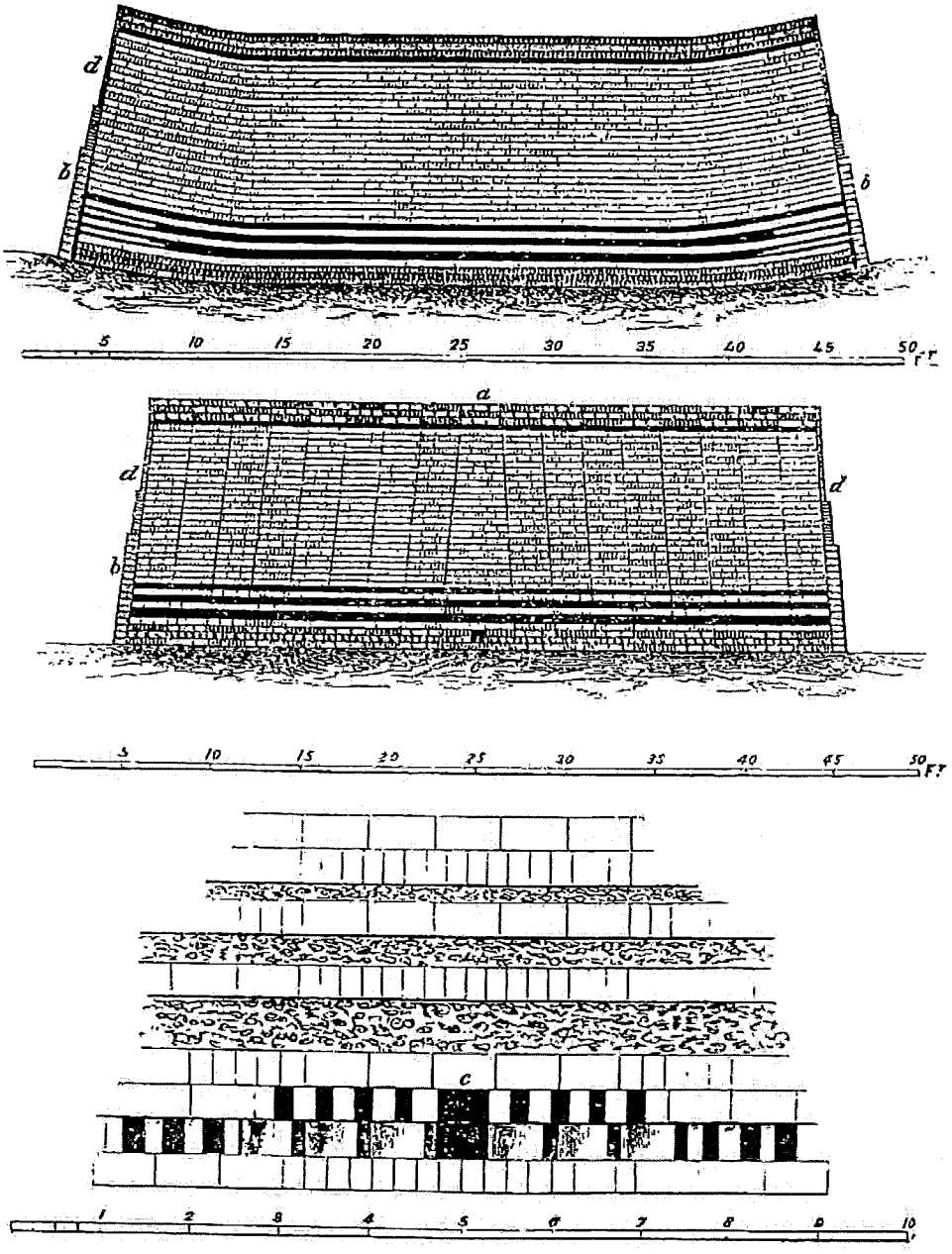

Figure 10 Sections through a clamp kiln, c. 1850, demonstrating the typical arrangement of bricks and fuel.
Source: Edward Dobson, *Rudimentary Treatise of the Manufacture of Bricks and Tiles*, 1850, copied from John Warren, *Conservation of Bricks*, 1999, p. 24.

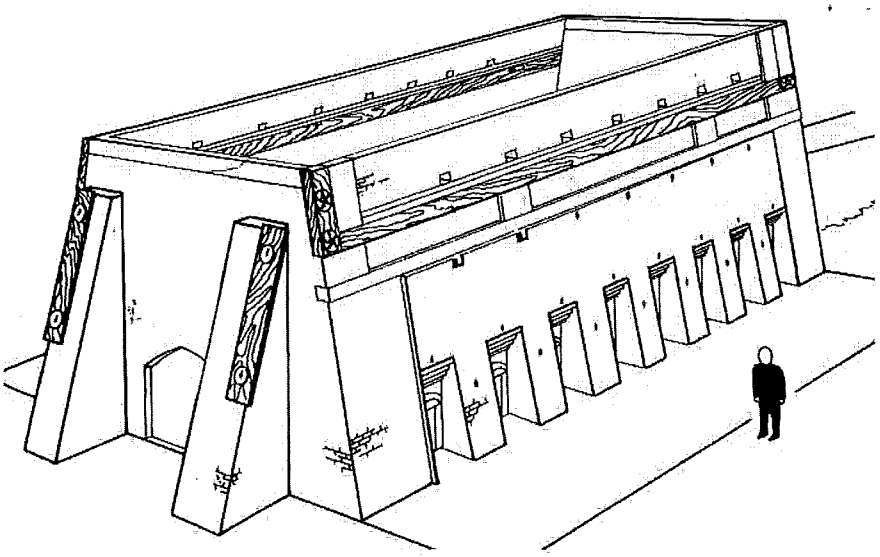

Figure 11 Sketch of Scotch kiln: roofless with three permanent walls to direct the draught upwards.
Source: Alan Cox, *Brickmaking: A History and Gazetteer*, 1979, p. 26.

Figure 12 Scotch kiln at Canberra (right), 1926. The first Hardy patent kiln is under construction at the rear of the picture.
Source: National Archives of Australia.

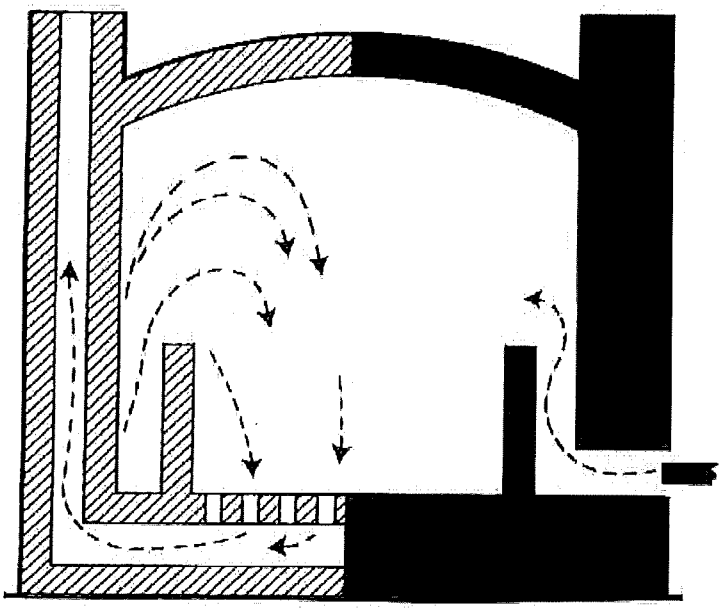

Figure 13 Section through a Downdraught kiln.
Source: Alan Cox, *Brickmaking: A History and Gazetteer*, 1979, p. 26.

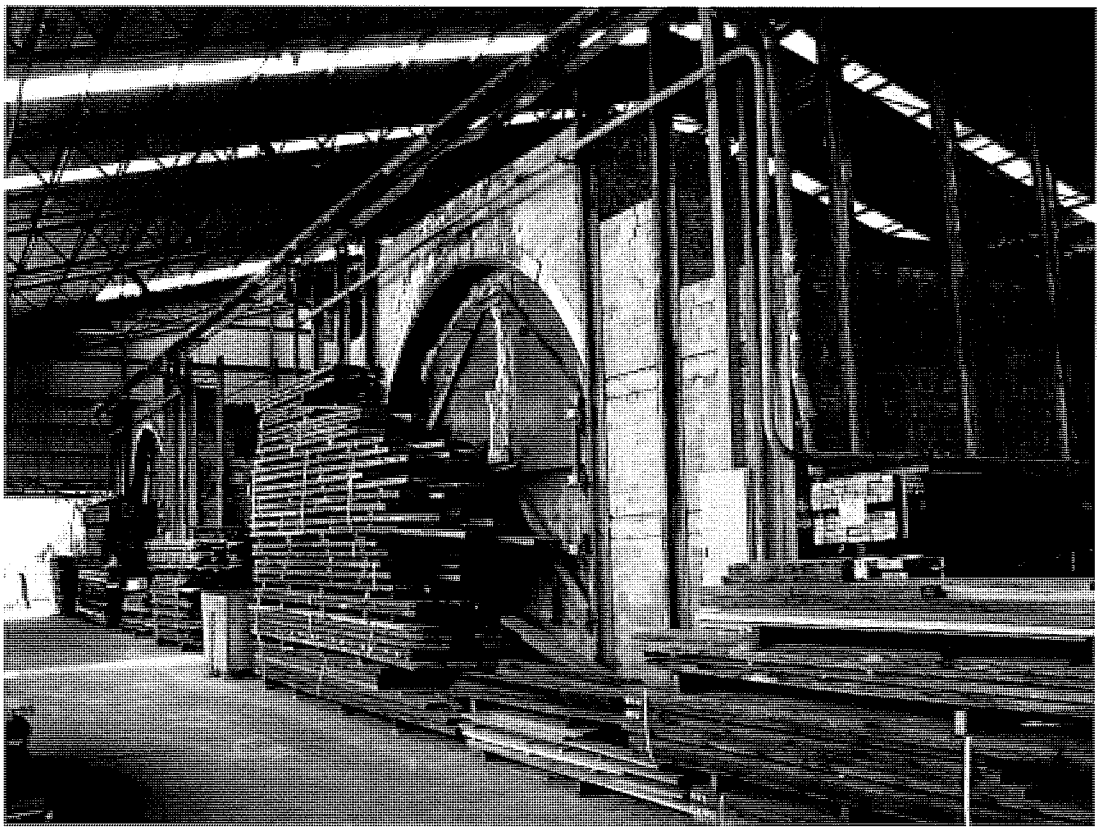

Figure 14 Downdraught kilns numbers 3 and 4 at Canberra Brickworks (Building 22).

Hardy patent kilns are distinguished by freestanding stacks, as opposed to the integrated and centralised stack of the standard Hoffman kiln.

Two Hardy patent kilns were constructed at the Canberra Brickworks. Both are associated with major expansions of the Brickworks. The first (Building 8, and its stack and fan house, respectively Buildings 9 and 10) was built in 1926-27, as part of the drive to double the output of the plant ahead of the relocation of Parliament and public servants to Canberra.[15] The second (Building 11 and its associated stack, Building 13, see Figure 19) was constructed in 1953 as part of the post-World War II expansion of the site.

Another variation to the Hoffman model of continuous kiln was developed in the 1890s, when the capacity of the kilns was increased through the introduction of transverse arches. The maximum arch span of Hoffman kilns previously had been around 5.5m; orientating the arches so that they lay across the flow of fire allowed the length of arches to be increased without increasing the distance that the fire was required to travel in a circuit.[16]

In 1904, Dean and Hethrington of Lancashire, England, patented the 'Staffordshire kiln,' incorporating transverse arches, a detached chimney stack and a complex system of flues and dampers (see Figure 23). This enabled combinations of chambers to be used at any time, thereby allowing the simultaneous production of a range of products, bricks, tiles and pipes.

It was on this model that the first of the permanent continuous kilns at the Canberra Brickworks was built in 1915 (Building 4), along with its associated fan-house and stack (Buildings 5 and 6). The fan induced draught of the Canberra example enabled even greater temperature control, and obviated the requirement for a tall stack.

The construction of a Staffordshire kiln at Canberra was commissioned in 1913, less than a decade after the model was patented (1904) by Dean and Hethrington of Lancashire, England (the kiln was completed and brought into service in 1915). At the time, Staffordshire kilns were at the leading edge of brick burning technology, offering the potential for firing multiple types of products simultaneously. Given its isolation from the major urban centres and suppliers of construction materials, this flexibility was ideally suited to the requirements of the nascent Federal Capital.

15 As noted in Chapter 3, the Hardy patent kiln (Building 7) failed and was substantially re-built in 1955.

16 Martin Hammond, *Bricks and Brickmaking*, p. 24.

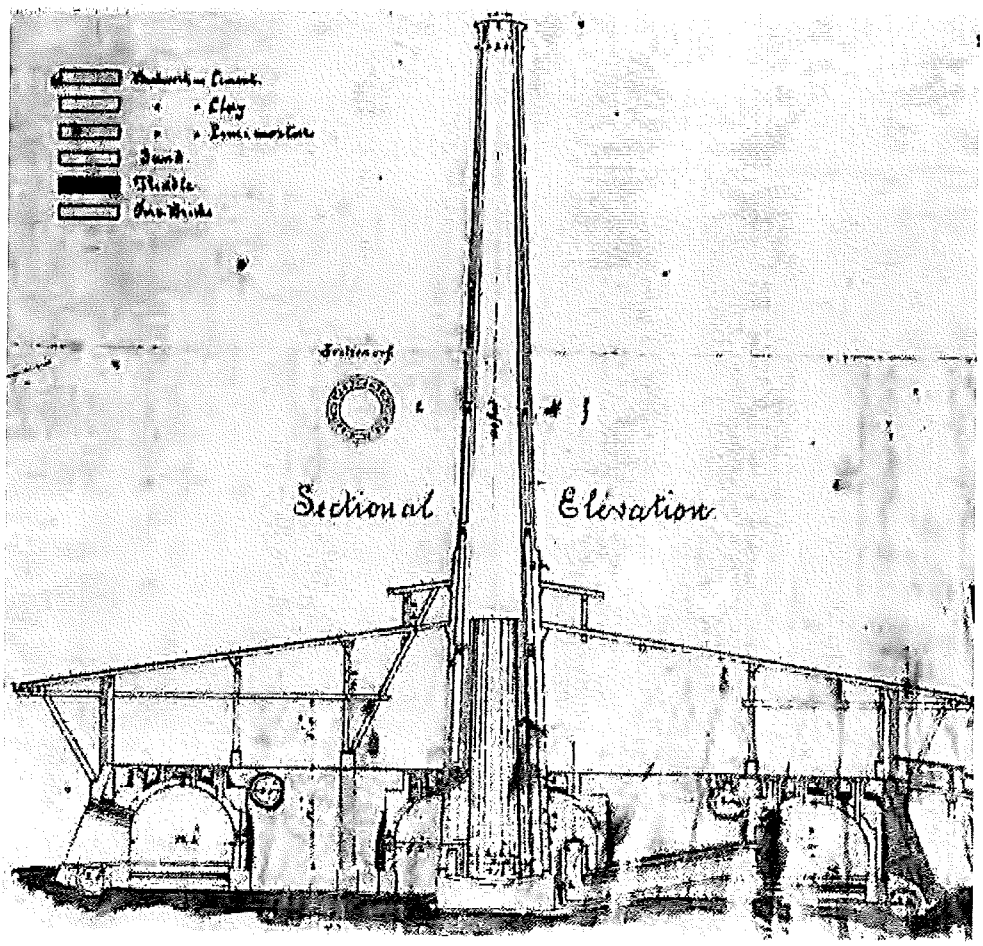

Figure 15 Section through a circular Hoffman kiln prepared by the office of Friedrich Hoffman, Berlin in 1875.
Source: Martin Hammond, *Bricks and Brickmaking*, p. 23.

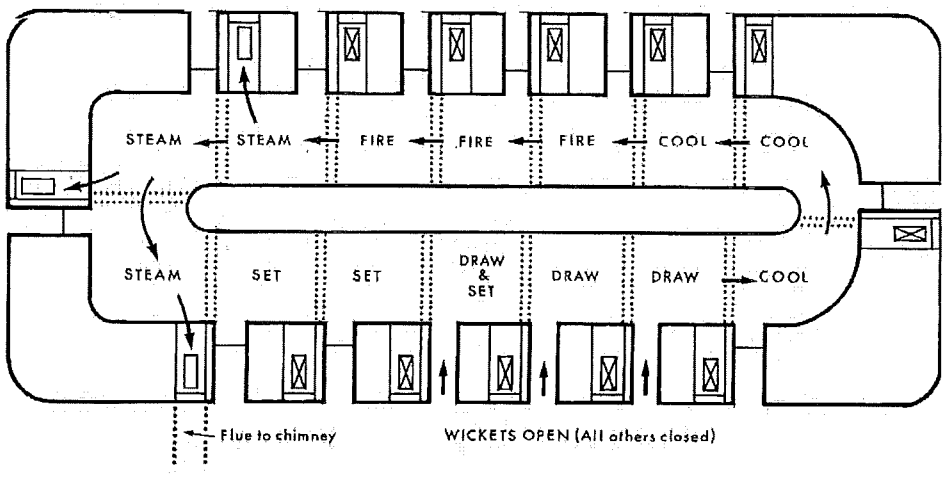

Figure 16 Plan of a rectangular 14-chamber Hoffman kiln.
Source: Alan Cox, *Brickmaking: A History and Gazetteer*, 1979, p. 43.

Figure 17 Hoffman kiln at the former Standard Brickworks, Box Hill (Victoria)
Source: Lovell Chen, January 2010

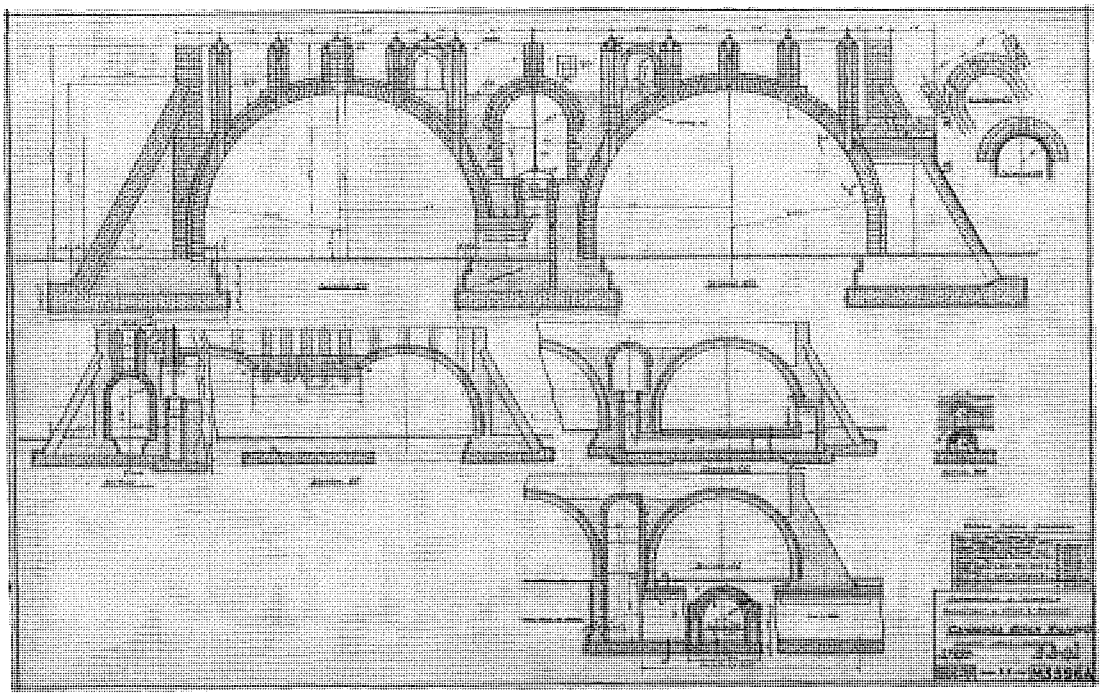

Figure 18 Cross section of the first Hardy patent kiln at Canberra Brickworks (Building 8), 1926.
Source: National Archives of Australia.

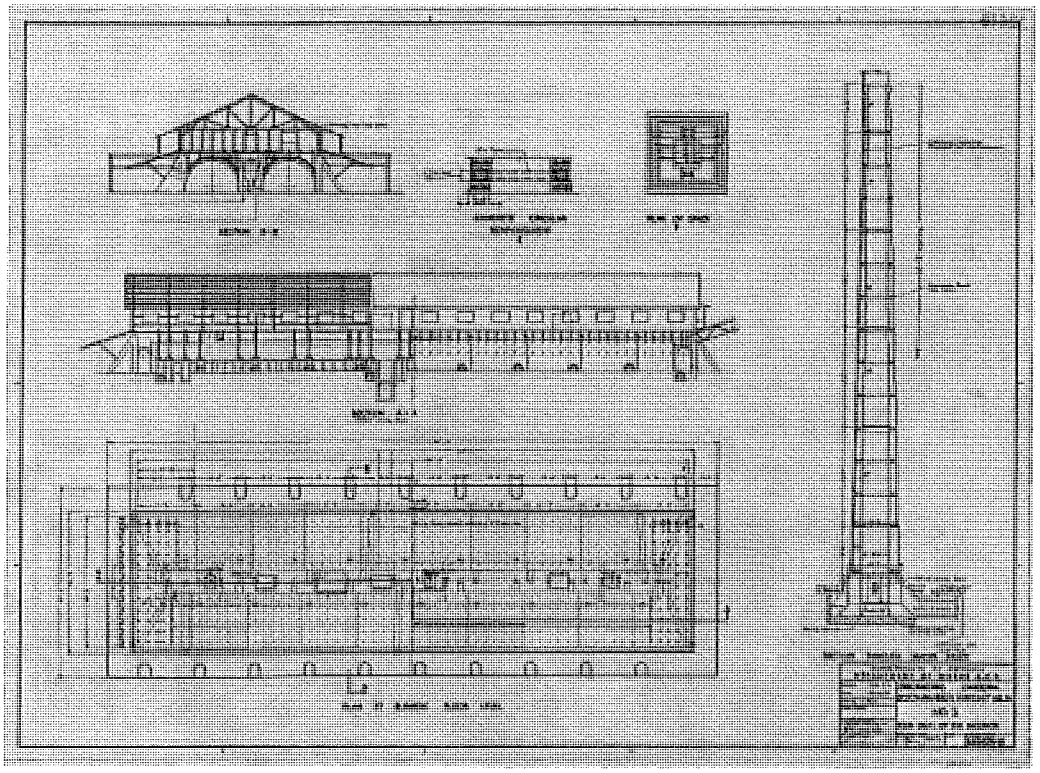

Figure 19 Drawing of 20-chamber Hardy patent kiln (Building 12), and stack (Building 13) at Canberra Brickworks, 1953.
Source: National Archives of Australia.

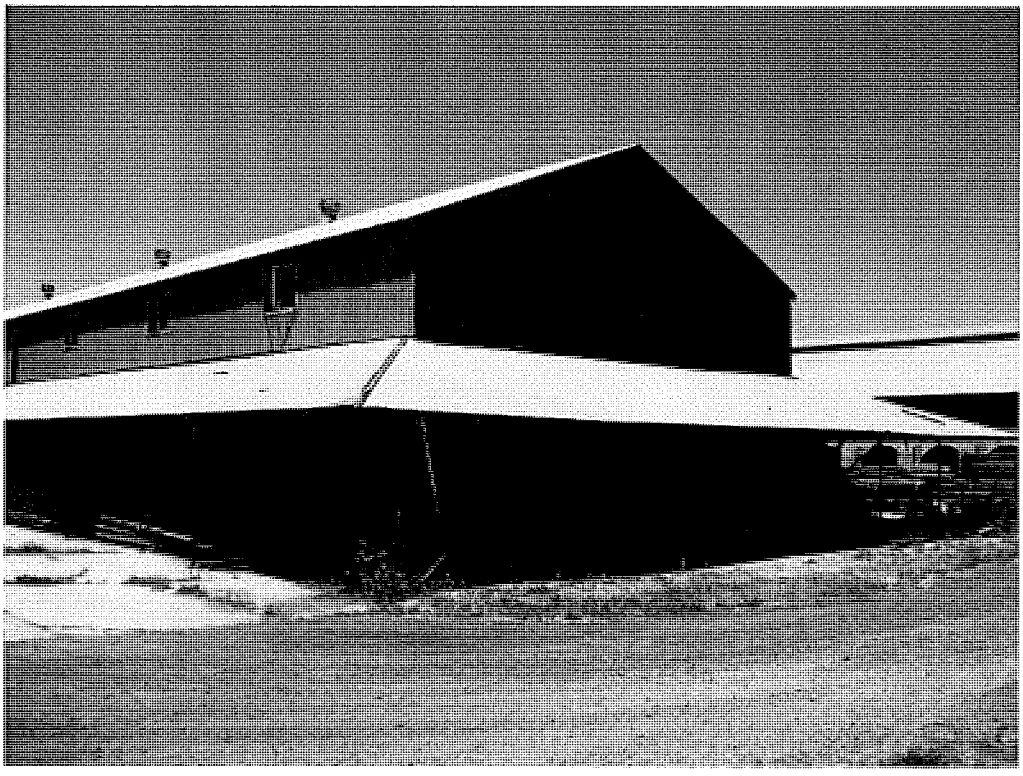

Figure 20 Hardy patent kiln, Canberra brickworks

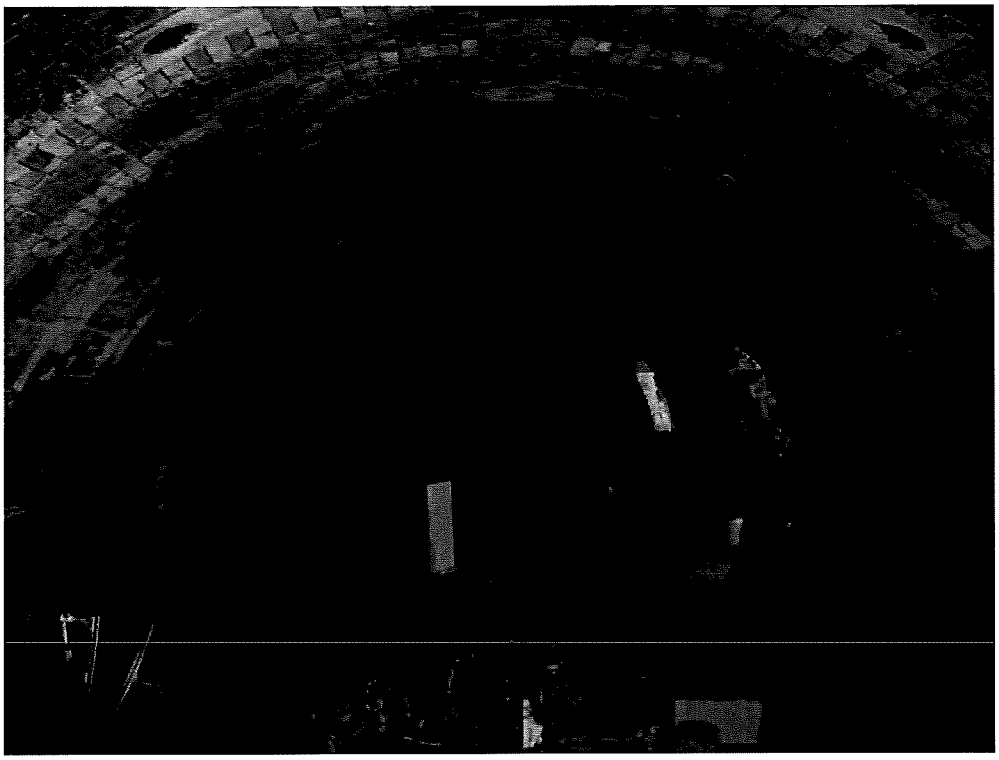

Figure 21 View into the firing chamber of one of the Hardy patent kilns at the Canberra brickworks. Note the wickets (openings) on the right from which the bricks were loaded and unloaded, and the firing holes in the ceiling/walls.

Figure 22 Interior of the firing floor to one of the Hardy patent kilns at the Canberra Brickworks

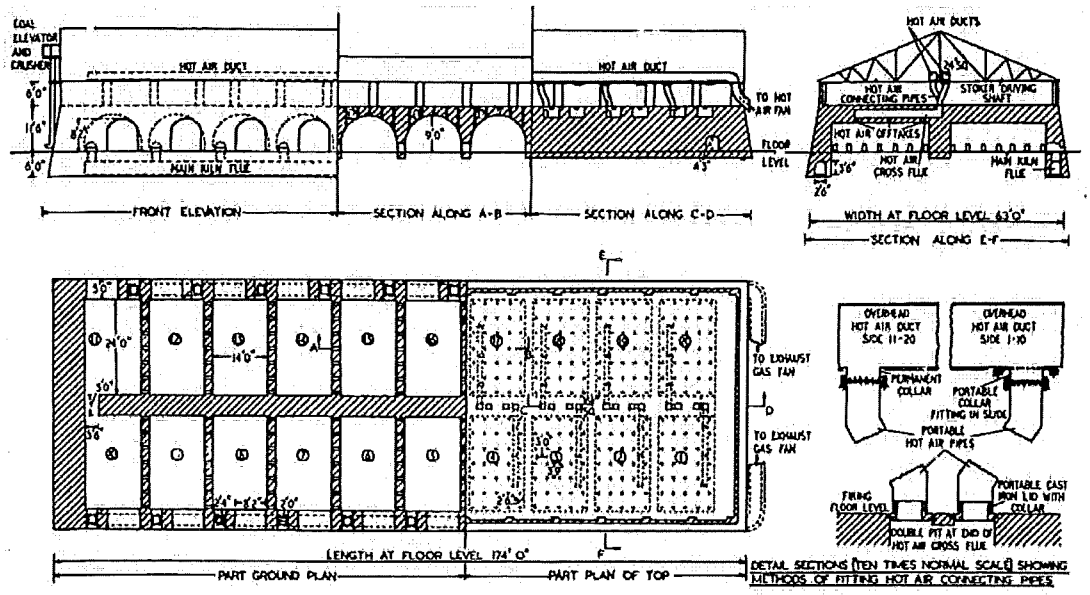

Figure 23 Plan, sections, front elevation and details of a Staffordshire kiln.
Source: Martin Hammond, *Bricks and Brickmaking*, p. 25.

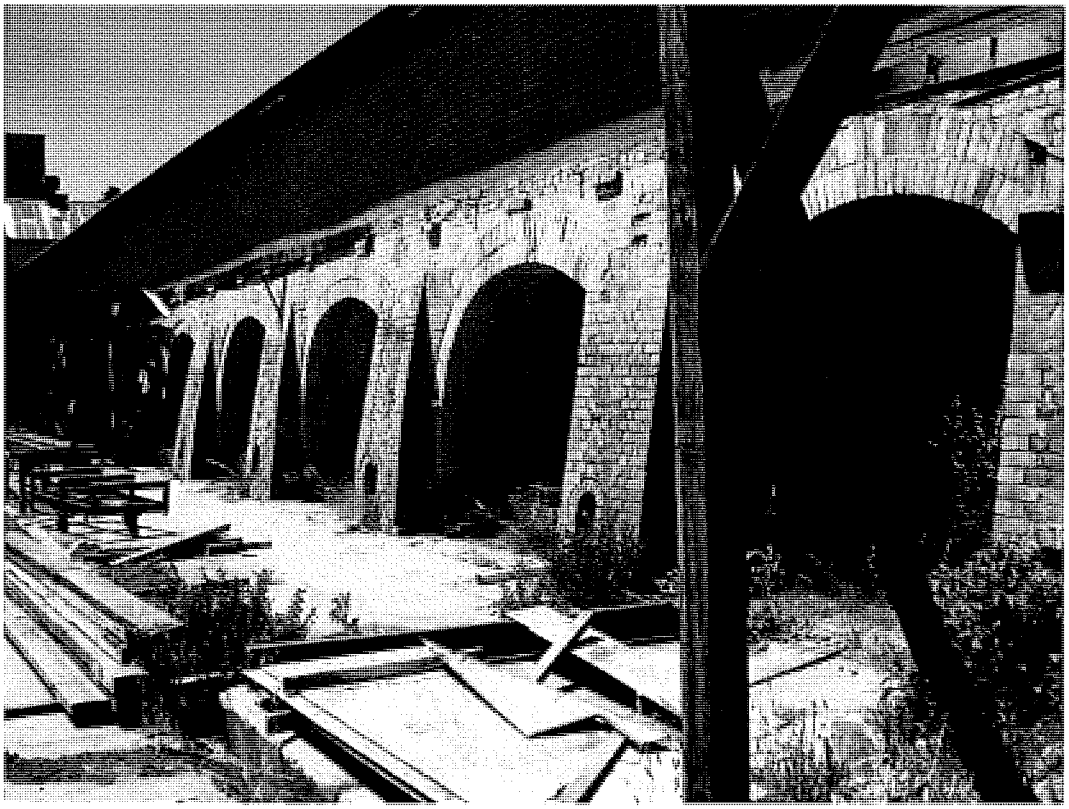

Figure 24 Staffordshire kiln at the Canberra Brickworks

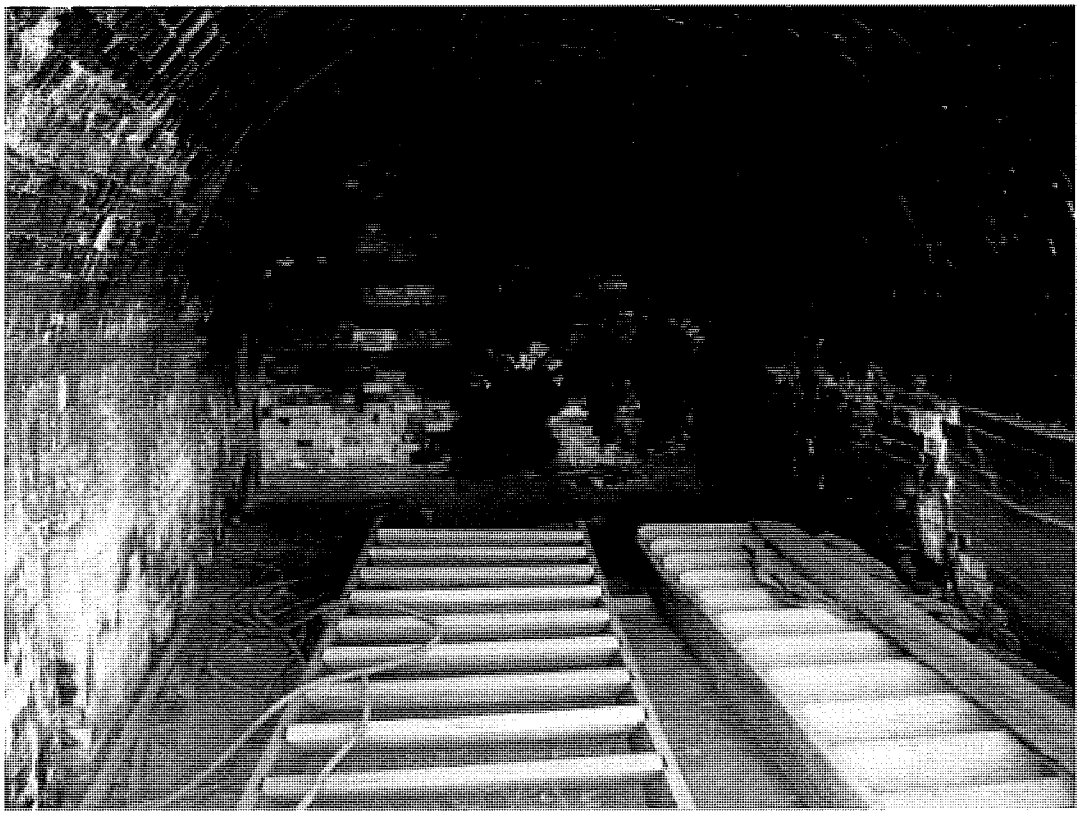

Figure 25 Interior of one of the chambers in the Staffordshire kiln.

Tunnel kilns (also referred to as car tunnel kilns) are a contemporary form of continuous kiln, albeit with eighteenth century origins. The model, used by the French Royal Porcelain Factory in 1751, comprises a pair of tunnels linked by flues.[17] Green bricks are set on cars and passed through the first tunnel, which is divided into zones for preheating, firing and cooling. Clean hot air from cooling zone of the kiln is channelled to the parallel drying tunnel. In England, until the 1970s, tunnel kilns were considered expensive to build and beset by technical problems, which outweighed the benefits of fuel saving and improved working conditions. Subsequent revisions have improved the model, which is now commonly used in industrial brick production, with kilns as large as 1.8m wide by 120m long.[18]

A tunnel kiln was planned and partially built at Canberra after World War II, before being abandoned in 1952. The foundations were incorporated into the second Hardy patent kiln completed in 1953 (Building 12).[19]

17 Martin Hammond, *Bricks and Brickmaking*, p. 25-6.

18 Martin Hammond, *Bricks and Brickmaking*, p. 25-6.

19 Department of Works, 'Canberra Brickworks No. Kiln, 20 Chamber Hardy Kiln Layout Plan,' drawing M8713c, National Archives of Australia.

3.0 HISTORY & PHYSICAL ANALYSIS: ESTABLISHMENT PHASE, 1911-1920

3.1 Historical background

3.1.1 *Establishing the National Capital*

The location of the capital of a federated Australia was debated for at least ten years before Federation was achieved (1901). The matter was raised at the Australian Federation Conferences (Melbourne, 1890 and Sydney 1891), and the National Australasian conventions of 1897-98.[20] The debates over the location of the capital were dominated by inter-colonial rivalries, although a broad consensus was reached on the requirement for an inland location (to obviate the perceived security risk presented by a coastal location). It was eventually decided that the decision on the location of the future capital would be taken by the new Parliament following Federation.[21]

The Australian Constitution of 1900 included direction to hold land for the National Capital:

> (125) The seat of Government of the Commonwealth shall be determined by the Parliament, and shall be within territory which shall have been granted to or acquired by the Commonwealth, and shall be vested in and belong to the Commonwealth, and shall be in the State of New South Wales, and be distant not less than one hundred miles from Sydney.
>
> Such territory shall contain an area of not less than one hundred square miles, and such portion thereof as shall consist of Crown lands shall be granted to the Commonwealth without any payment therefore. The Parliament shall sit at Melbourne until it meets at the seat of Government.[22]

At least 40 districts were proposed for the National Capital, of which 23 were inspected by parliamentarians, a Commission and a Royal Commission. In 1904 a *Seat of Government Act* was introduced, nominating Dalgety in New South Wales. However, the New South Wales State Government objected and refused to release the land to the Federal Government.[23] Finally, on 8 October 1908 – following the repeal of the 1904 *Act* – it was determined that the site would be in the Yass-Canberra district. The New South Wales District Surveyor, C R Scrivener, was dispatched to Yass-Canberra to determine the precise location of the future city. His brief was as follows:

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20 Lovell Chen, *Nomination of Canberra to the National Heritage List: An examination of the merits*, prepared for the National Capital Authority, April 2008, pp. 42-43.

21 The National Capital Development Commission, *Tomorrow's Canberra: Planning for Growth and Change*, Australian National University Press, Canberra, 1970, pp. 3-7; and Lovell Chen, *Nomination of Canberra to the National Heritage List: An examination of the merits*, prepared for the National Capital Authority, April 2008, pp. 42-43.

22 Commonwealth of Australia Constitution Act, Chapter VII.

23 The National Capital Development Commission, *Tomorrow's Canberra*, p. 3.

> The Federal Capital should be a beautiful city, occupying a commanding position with extensive views, and embracing distinctive features ... consequently the potentialities of the site will demand careful consideration from a hygienic stand-point, with a view to securing picturesqueness, and also with the object of beautification and expansion.[24]

Scrivener's choice was an elevated site straddling the Molonglo River, with mountains and hills to the north-west, north-east, east and south. The 1909 *Seat of Government Surrender Act* (NSW) and 1909 *Seat of Government Acceptance Act* (Commonwealth) officially named Yass-Canberra as the site of the Federal capital. The site was formally handed over to the Commonwealth on 1 January 1911.

In April 1911, King O'Malley, Minister for Home Affairs for the standing Labor Government initiated an international competition for designs for the layout of the new city. The conditions of the competition stated that, 'The premiated [sic] Designs shall become the property of the Government for its unrestricted use ... Any claim for further remuneration by ... the authors ... will not ... be recognised ...'[25] In May 1912, a proposal by architect Walter Burley Griffin (1876-1937) with drawings by his architect wife Marion Mahony Griffin (1871-1961), of Chicago, was awarded first prize (see Figure 26). Second prize was awarded to Eliel Saarinen of Helsinki (Helsingfors), Finland and third prize to Alf Agache of Paris, France.[26] The emphasis of the Griffin's proposal, largely determined by topography, combined a number of specialised centres (for administration, government, the capitol etc) in circular, octagonal and hexagonal street systems. The centres were linked by the primary axes, which were aligned to the surrounding hills and mountains.

In November 1912, O'Malley established a Departmental Board to review the three winning schemes. The Board prepared a new plan incorporating aspects of all of them. The composite 'Departmental Plan' was accepted by O'Malley in January 1913, and the foundation stone of the city was laid on 12 March 1913. The city was formally named Canberra at the ceremony.[27]

A change of government stalled progress, and led to Walter Burley Griffin being invited to Australia to advise on the development of the city. The new Minister for Home Affairs, W H Kelly, subsequently disbanded the Departmental Board and appointed Griffin as Federal Director of Design and Construction for the National Capital, a position that he held from 1913 to 1920.[28]

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24 Quoted in David Headon, *The Symbolic Role of the National Capital: From colonial argument to 21st century ideals*, Commonwealth of Australia (National Capital Authority), ACT, p. 36.

25 *Preparation of Competitive Designs for the Federal Capital City,* National Archives of Australia, A1818/12, quoted in Alasdair McGregor, *Grand Obsessions: The Life and work of Walter Burley Griffin and Marion Mahony Griffin*, Lantern (Penguin), Australia, 2009, p. 121.

26 The National Capital Development Commission, *Tomorrow's Canberra*, p. 6.

27 The National Capital Development Commission, *Tomorrow's Canberra*, p. 6.

28 The National Capital Development Commission, *Tomorrow's Canberra*, p. 6; and Alasdair McGregor, *Grand Obsessions,* pp. 197-204 and 321-41.

In October 1913 Griffin submitted a revised version of his plan ('Preliminary Plan', see Figure 27), with a report expanding on his ideas for the development of the city ('Report Explanatory'). Parliamentary factions and funding cutbacks caused by World War I contributed to the slow progress in the development of the National Capital in the following years.

3.1.2 *Commonwealth Brickworks*

In 1910, King O'Malley announced Government plans for the construction of a brickworks to serve the Federal Capital.[29] Other industries considered essential for the inland city included a power station, and a dam and pumping station (respectively the Kingston Power House and Cotter Dam).

Various experiments on shale in the region were carried out in early 1911. Two potential sites were investigated, one at the Duntroon Station and the other on Frederick Campbell's Yarralumla property. Samples from both sites were sent for testing.[30] Reports concluded that samples from Yarralumla produced bricks of excellent quality, equal to the best commercially produced bricks for hardness and porosity, while those produced from the Duntroon sample produced bricks of a better colour, but the material was 'little in weight, its absorption is greater and it has not burnt too well'.[31] The Yarralumla site was selected on this basis. Frederick Campbell agreed to the acquisition of approximately 38 acres of his land holding (see Figure 28). The area was gazetted on 27 July 1912, and development of the site began in 1913.[32]

As originally proposed the permanent Commonwealth Brickworks was to include three Staffordshire kilns, one rock breaker, five American Ring Pulverisers, five Whittaker mixing pans and ten Whittaker presses (see Figure 29). The kilns were to have induced draft fans in place of high chimneys. It was proposed to convey the bricks by aerial ropeway to a city depot.[33]

At this time (c. 1911–12) no other kilns of the Staffordshire type had been constructed in Australia, although the New South Wales State Brick Works at Homebush, west of Sydney, had announced plans for the imminent construction of several.[34]

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29 Lester Firth Associates Pty Ltd, *Old Canberra Brickworks, Conservation Plan*, June 1986, Section 2.1.1, citing the *Queanbeyan Age*, 23 February 1910.

30 Lester Firth Associates (Section 2.1.1) state that 1,000 test bricks were fired at the Hoffman Brick Co., Melbourne.

31 National Archives of Australia, Series A110/FC 1913/1055, in Ian Carnell, 'Canberra's Cornerstone,' *Canberra Historical Journal*, no. 5, March 1990, cited by Lester Firth Associates, 1986, section 2.2.1.

32 Ann Gugler, *The builders of Canberra, 1909-1929. Part one, Temporary camps & settlements*, Canberra, CPN Publications, 1994, p. 77.

33 National Archives of Australia, Series A110/FC 1913/1985, cited in Lester Firth and Associates, 1986, Section 2.1.1.

34 Lester Firth and Associates, 1986, Section 2.1.1, source uncited. It has not been confirmed if Staffordshire kilns were constructed at the State Brick Works at Homebush, which was developed from 1911 (see Chapter 6). However, the Royal Commission on Federal

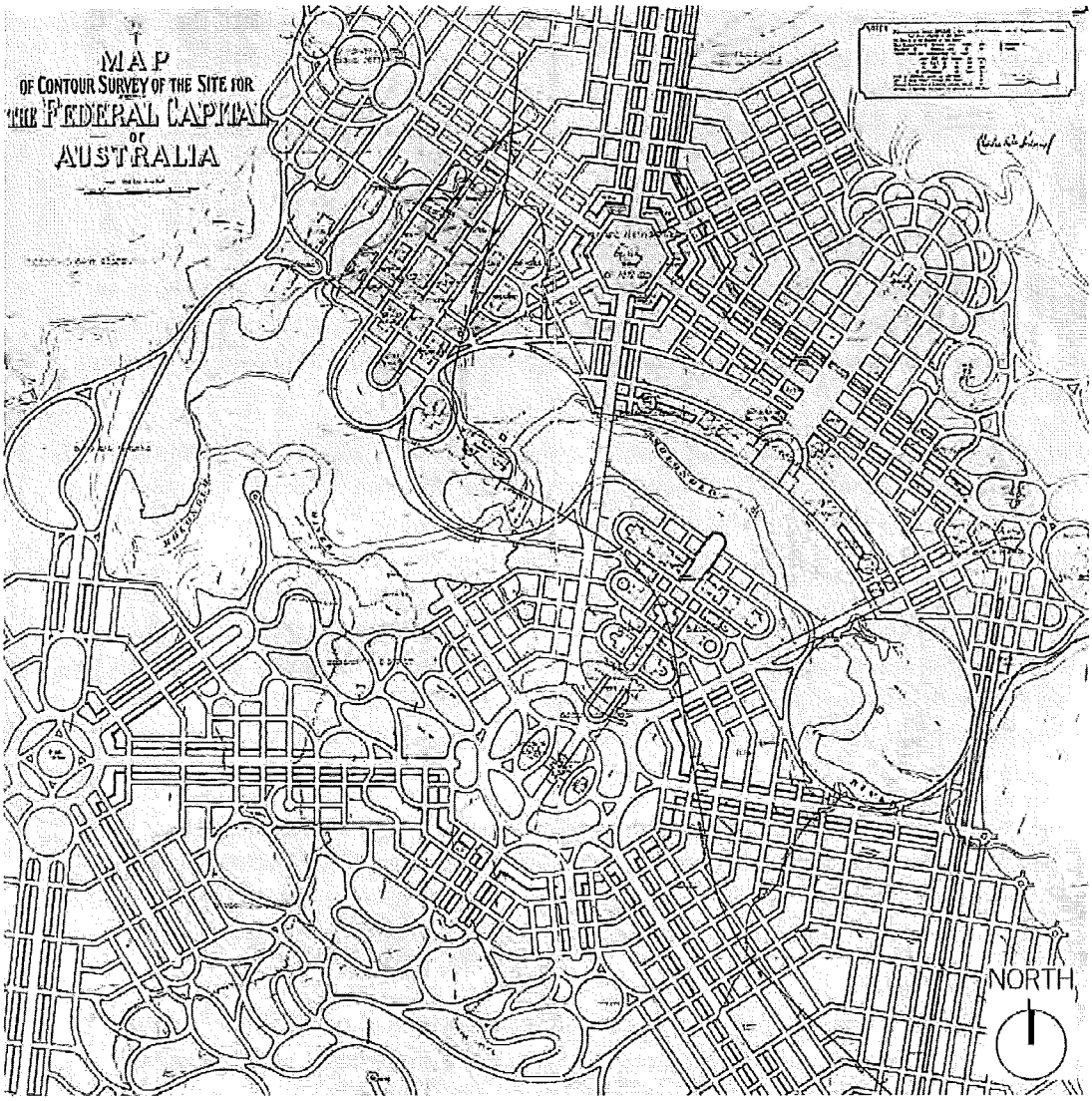

Figure 26 Walter Burley Griffin's winning competition entry (1912), overlaid on the contour map prepared by C R Scrivener.
Source: National Archives of Australia (A710, 36-37).

A temporary plant was established and operational by 19 June 1913.[35] This comprised a grinding pan, brick making machine and elevator made by Geo. Foster and Sons, Sydney, and a portable steam engine. By contrast the permanent plant was to be electrically driven, with power from the 'Central Generating Station' (Kingston Power House), then under construction. By August 1913, four open kilns were in use at the temporary plant (see

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Capital Administration (RC No. 378), which ran from June 1916 to 14 June 1917, found that the Staffordshire kiln at the Canberra brickworks was the first constructed in Australia.

35 National Archives of Australia, Series A119 Item 1914/723, cited in Lester Firth and Associates, 1986, Section 2.1.1. See also, Ann Gugler, *The builders of Canberra, 1909-1929. Part one, Temporary camps & settlements*, Canberra, CPN Publications, 1994, chapter 2. Copy viewed at ACT Heritage Library, Woden, ACT, Woden.

Figure 30), with plans for a fifth.[36] The temporary brickworks plant had an output of between 44,000 and 50,000 bricks per week.[37] Bricks were being produced for the construction of the kilns at the permanent brickworks,[38] and the Kingston Power House complex.[39]

The first stage of the construction of the permanent Brickworks, which comprised a single Staffordshire kiln, was approved on 1 December 1913 by P T Owen, the Director-General of Works.[40] It was proposed to use this kiln to produce bricks for the construction of a further two kilns.

The decision to build the Staffordshire kiln type at the site was based on the recommendations of Andrew Christie, a consulting engineer, who together with Owen had inspected 'the latest equipment' at the State Brickworks in Homebush. In correspondence dated 24 July 1911 Christie noted in relation to the Staffordshire that:

> ...all drying, burning and cooling temperatures are under perfect control and high class goods of perfect colouring is the result. The kiln can also be for fancy and facing bricks, finials, pipes, etc., as well as ordinary bricks, the use of downdraught kilns is dispensed with and the cost of fuel materially reduced'.[41]

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36 Four open kilns are indicated on the survey plan of 1916, but newspapers reports refer to only three open kilns. *Queanbeyan Observer,* 18 February 1913, cited in Lester Firth and Associates, 1986, Section 2.1.1.

37 National Archives of Australia, Series A119 Item 1914/723, cited in Lester Firth and Associates, 1986, Section 2.1.1.

38 By September 1913, some 250,000 bricks had been produced for construction of the main kilns. *Queanbeyan Observer,* 9 September 1913, cited in Lester Firth and Associates, 1986, Section 2.1.1.

39 The Kingston Power House is a steel framed structure with roughcast concrete walls. It was designed by John Smith Murdoch, Chief Architect of the Department of Works and Railways, and completed in 1915. As originally envisaged, the building was to be portable. As such the steel frame was to be clad in galvanized steel. When a permanent site was found for the power house it was decided to change the cladding to brick. A total of 1.5 million bricks were manufactured at the Canberra Brickworks for the task. However, the bricks produced at the temporary works disintegrated before they could be used on the Power House. As a cost-effective solution, the steel frame was clad in unreinforced in situ concrete made with river gravel. The Power House was adapted to the Canberra Glassworks visitor centre in 2005-07 by Tanner Architects. Pers comm., Jocelyn Jackson, Project Director/Architect for the adaptive reuse of the Kingston Power House, Tanner Architects, and Adam Mornement, Lovell Chen, 3 February 2010. See also, Peter Freeman Pty Ltd, *Kingston Power House Precinct, Kingston, ACT*, Conservation Management Plan Review, 2001, Volume 1 of 2, pp. 18-20.

40 National Archives of Australia, Series A119 Item 1914/723, cited in Lester Firth and Associates, 1986, Section 2.1.1.

41 National Archives of Australia, Series A110 FC 1913/1055, 24 July 1911, cited in Lester Firth and Associates, 1986, Section 2.1.1.

Figure 27 Plan prepared by Griffin to accompany his 'Report Explanatory' of 1913. Source: National Archives of Australia (A1, 1917/7242).

The decision to build the Staffordshire kiln type at the site was based on the recommendations of Andrew Christie, a consulting engineer, who together with Owen had inspected 'the latest equipment' at the State Brickworks in Homebush. In correspondence dated 24 July 1911 Christie noted in relation to the Staffordshire that:

...all drying, burning and cooling temperatures are under perfect control and high class goods of perfect colouring is the result. The kiln can also be for fancy and facing bricks, finials, pipes, etc., as well as ordinary bricks, the use of downdraught kilns is dispensed with and the cost of fuel materially reduced'.[42]

42 National Archives of Australia, Series A110 FC 1913/1055, 24 July 1911, cited in Lester Firth and Associates, 1986, Section 2.1.1.

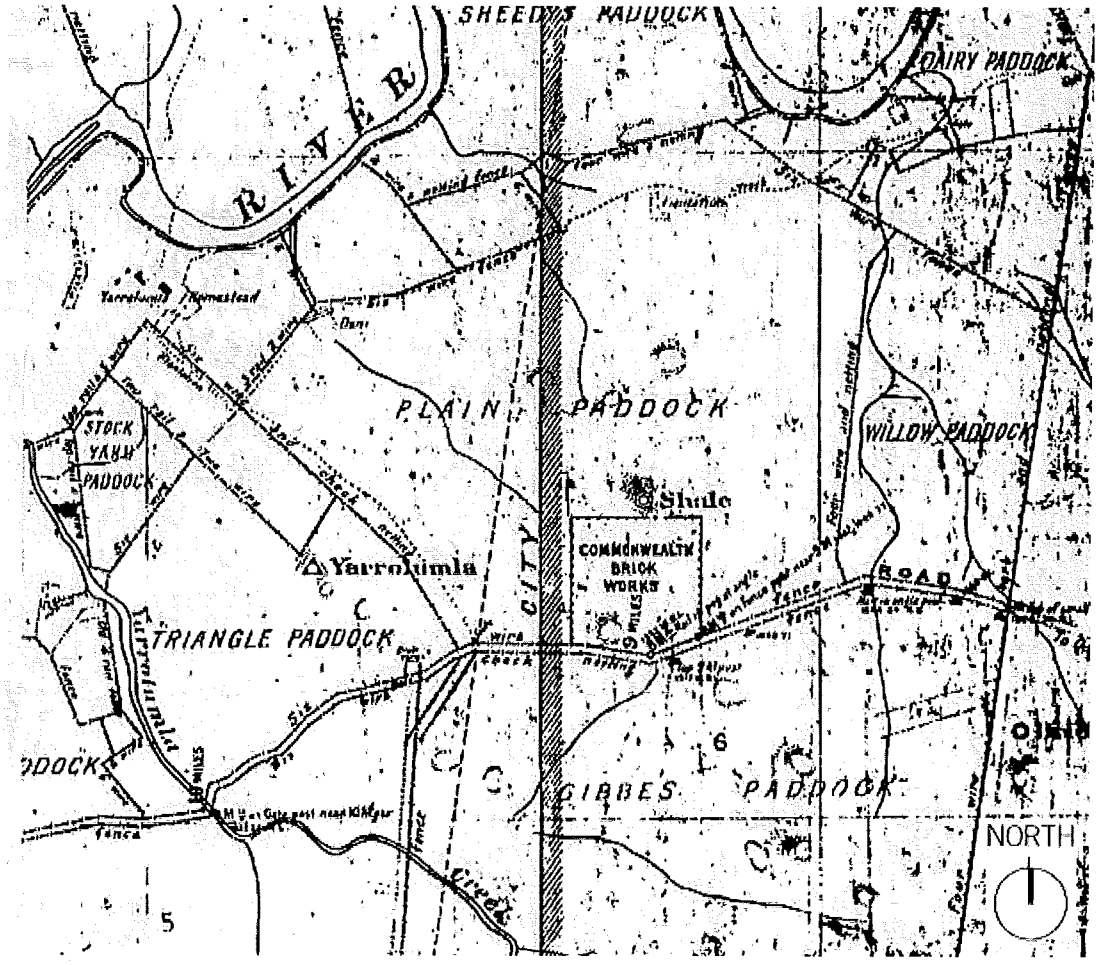

Figure 28 Site survey, c. 1911, showing the dimensions of the 38ha site acquired in 1912. Source: Lester Firth Associates, section 2.1.1. Original source not cited.

Plans for the Staffordshire kiln were purchased in early 1914 from the Australian agent of the patentees, R E Odd, and Christie prepared plans for machinery sheds to be constructed adjacent to the kiln. Tenders were accepted in March 1915 for major plant, equipment and materials for the permanent works. Messrs Jaques Bros of Richmond tendered for three rotary rockbreakers (cost £502); Messrs Timmings and Gardiner of Sydney for two grinding mills (£834); George Foster for ironwork for the Staffordshire kiln (£842); and George Weymouth of Melbourne for electric motors (£494).[43]

43 Lester Firth Associates 1986, section 2.1.1, sources uncited.

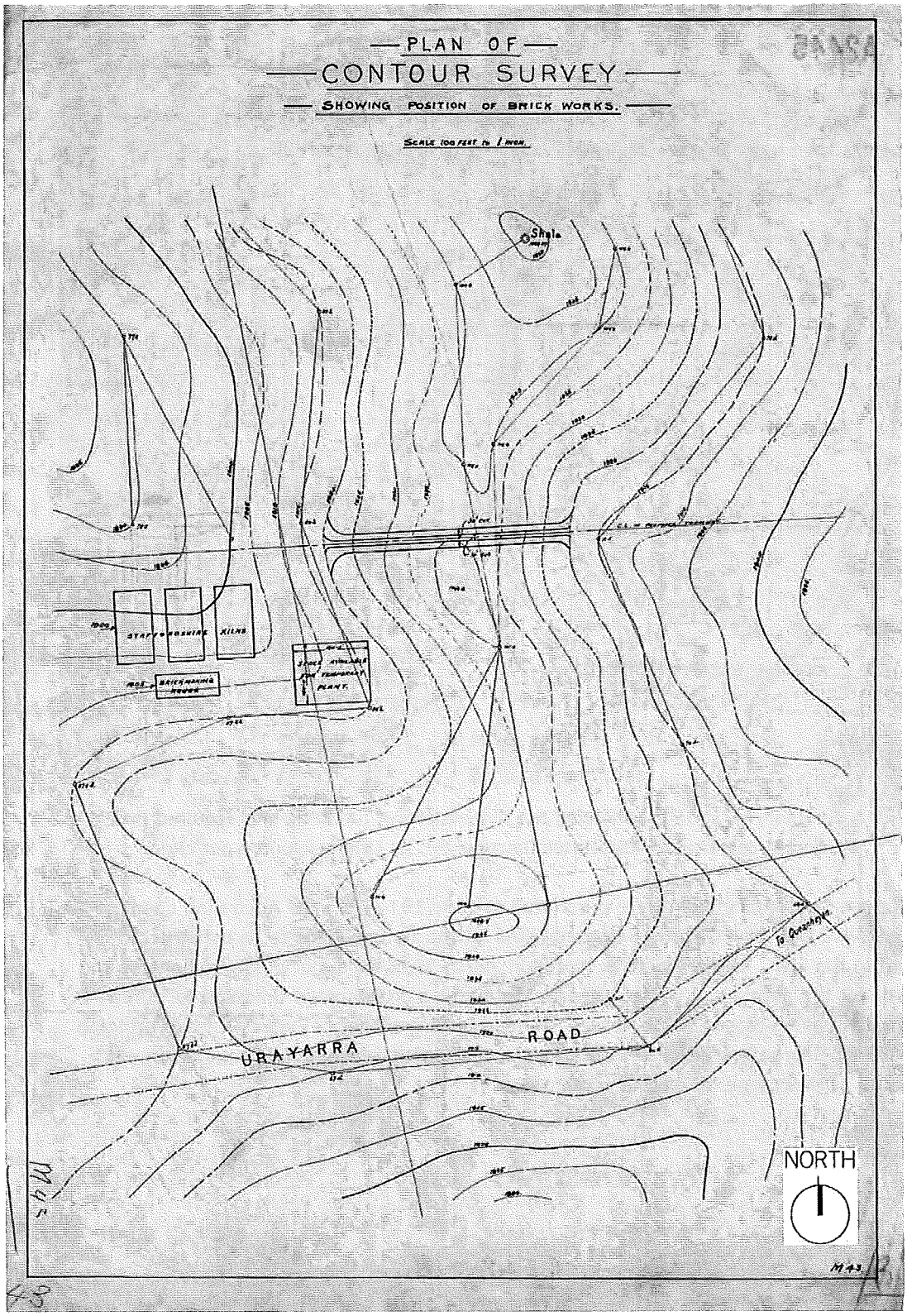

Figure 29 Contour plan with the layout of the brickworks as proposed in c. 1911, showing three Staffordshire kilns and the location of brick making plant.
Source: National Archives of Australia.

In September 1915 the brickwork for a 20 chamber Staffordshire kiln was nearing completion (see Figure 31, Figure 32 and Figure 33).[44] The internal chamber bricks, shaped to provide the arched form, were imported from England together with the steel work trusses in the kiln loft. Three burners are also believed to have been imported from England.[45]

A Survey Plan of the site, dated 20 December 1916 (see Figure 30), shows a small galvanised iron office building close to the 'Machine Shop', and a galvanised iron 'Cottage' with associated coal store and stable to the north-east of the site. Other features shown on the plan include the temporary 'Old Kiln' area with four kilns (shown in outline on the plan, with 'Dormitories' immediately to the north), a coal stage, a long concrete retaining wall separating the quarry zone and the working areas, water storage tanks on a high knoll, a remote powder depot, three detached WCs south of the kiln, an elevated gangway connecting the coal stage to the kiln and overhead electrical connections linking the 'Power Station' to the 'Fan Room,' and the 'Power Station' to the 'Machine Shop' and 'Cottage'. A tram line is indicated linking the quarry to the machine shop. The 2ft (610mm) gauge line was laid so that loaded trucks ran downhill to the works, and the empty trucks were pushed uphill by manpower. The tram lines could be relocated as the quarry face advanced.[46]

Elements shown on the 1916 plan and remaining on the site today are the 'Power Station,' the Staffordshire kiln (without verandahs to the north and south), the 'Fan Room' and 'Stack' and the long concrete retaining wall.

The Staffordshire kiln together with crushing, processing equipment and brick presses was ready for production in early 1916. However, the commitments of World War I, and consequent restrictions on the works program for Canberra, together with a coal strike, saw the brickworks close in December 1916.[47]

In 1917, the Royal Commission on Federal Capital Administration considered the Brickworks at Canberra.[48] Walter Burley Griffin had complained that the Brickworks were a 'nullification' of his plan and that they were 'established without any consultation with him'. It was found that this charge was not fairly made since the Brickworks were established while the Departmental Plan was in force, and before Griffin came to Australia.

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44 *Queanbeyan Age,* 14 September 1915, cited in Lester Firth and Associates, 1986, Section 2.1.1.

45 Lester Firth Associates 1986, section 2.1.1, sources uncited.

46 Walter M Shellshear, author of Chapter 2 (Railways) in W C Andrews, Alan Fitzgerald et al, *Canberra's Engineering Heritage*, Institution of Engineers, Australia, Canberra Division. 1983, viewed online (unpaginated) at, www.engineer.org.au, accessed 29 January 2010. The side-tipping trucks used at the brickworks were manufactured by Francis Theakston Ltd., Light Railway Engineers, Crewe Works, 66 Tufton Street, London.

47 Lester Firth Associates 1986, section 2.1.1, sources uncited.

48 The Royal Commission on Federal Capital Administration (RC No. 378) ran from 14 June 1916 until the Report was tabled on 14 June 1917. The Commissioner was W Blacket and matters examined included issues relating to Mr. Griffin; accounts and finance at Canberra; wasteful expenditure at Canberra; sewerage at Canberra; brickworks at Canberra and water supply, power. References to the Royal Commission are from the, *Report of the Royal Commission on Federal Capital Administration*, Victoria (1917), and Lester Firth Associates, 1986, section 2.1.1. The source is uncited.

The Royal Commission also established that the 250,000 bricks made at the temporary plant were of poor quality and not suitable for major building work. Instead they were used for filling and lining drains, and for the Staffordshire kiln. The Commission also found that construction of the Staffordshire kiln was begun in November 1914; that it was *the first Staffordshire kiln built in Australia* [emphasis added]; and that there was evidence of construction errors in estimating and design. (The findings of the Royal Commission are confusing when compared with the report in which Andrew Christie recommended the use of a Staffordshire kiln following an inspection of the works at Homebush, which suggests a Staffordshire in operation there. This anomaly in the historical record has not been resolved.)

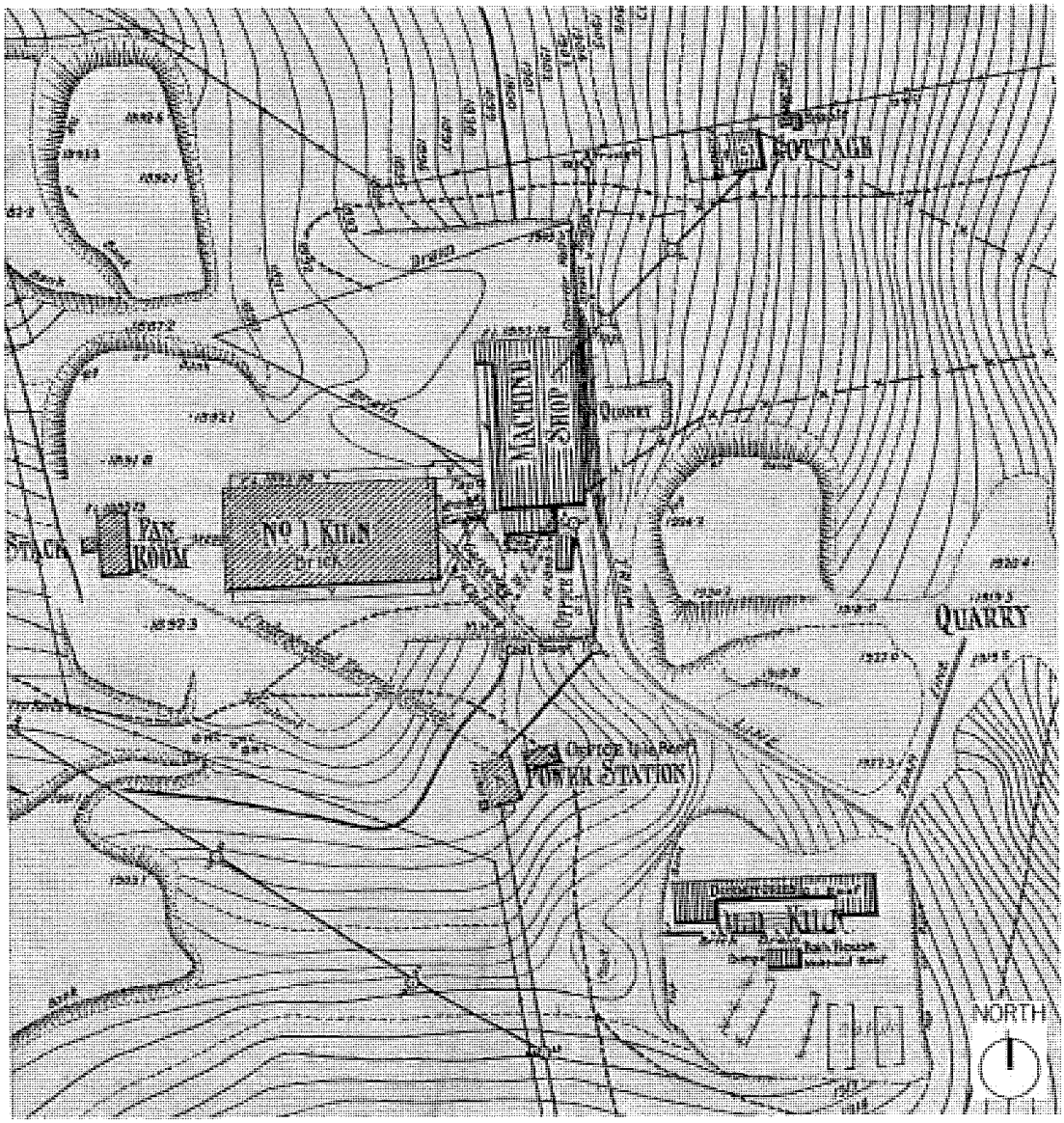

Figure 30 Detail of Contour and Detail Survey, Canberra Brick Yards, 20 December 1916. Note the locations of the clamp kilns below the 'Dormitories' to the south-east of the Power Station.
Source: National Archives of Australia.

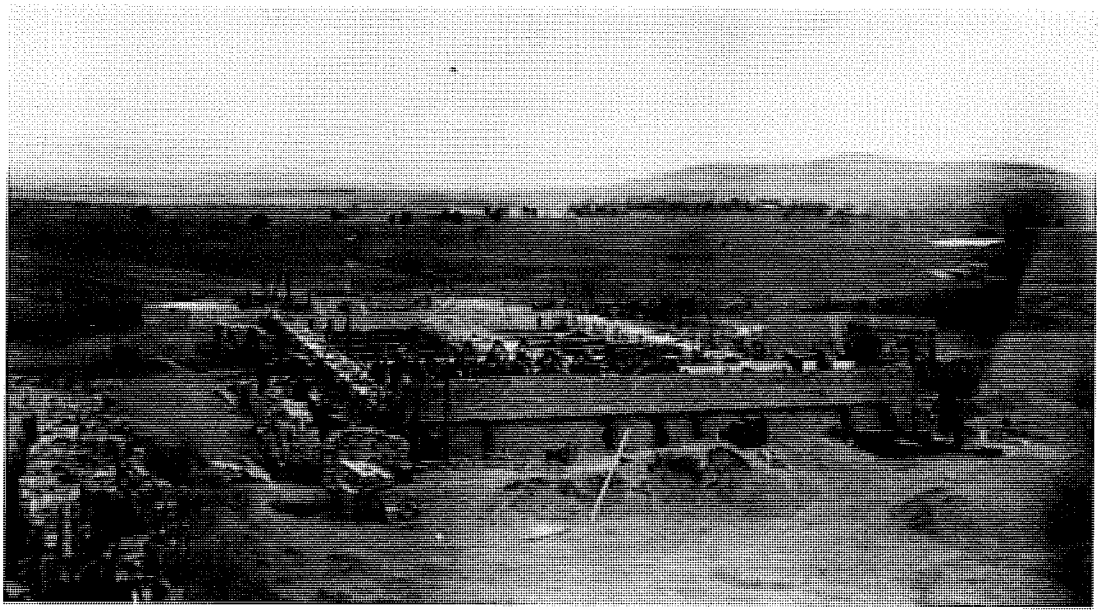

Figure 31 Staffordshire kiln under construction, c. 1915
Source: National Library of Australia.

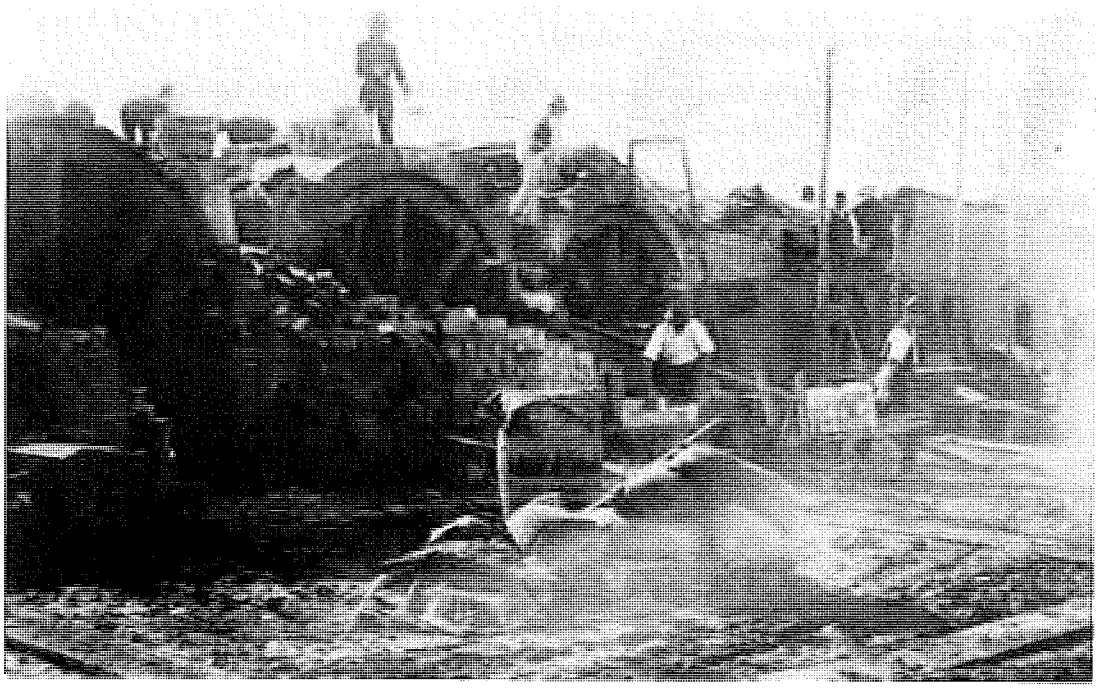

Figure 32 Constructing the transverse arches of the Staffordshire kiln, c. 1915.
Source: National Library of Australia.

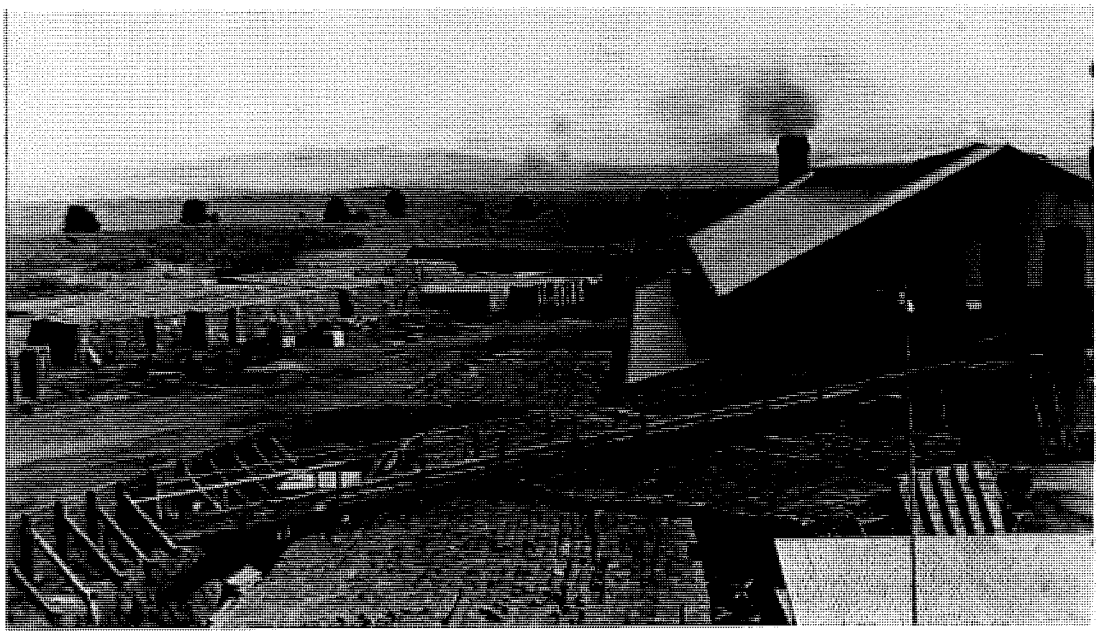

Figure 33 The Staffordshire kiln pictured in c. 1917.
Source: National Library of Australia.

3.1.3 *The development of 'Westridge' (Yarralumla)*

Walter Burley Griffin envisaged the area to the west of the 'Capitol Centre' as a lake front suburb. The *Plan (of City and Environs)* of 1918, which was the last plan signed by Griffin during his tenure as Federal Capital Director of Design and Construction,[49] shows a broadly triangular area extending from the 'Capitol Centre' in the west, and defined by 'Adelaide Avenue' to the south, 'Westlake Esplanade' to the north and 'Mountain Way' to the west (see Figure 34).

Some elements of this plan were developed, including Adelaide Avenue and the southern section of 'Mountain Way,' which is on the approximate alignment of the present Novar Street. 'West Lake,' which is the western element of the waterway now known as Lake Burley Griffin, was formed in 1963, following the construction of the Scrivener Dam. Griffin named the suburb 'West Lake'. The area to the west of this proposed suburb, now Yarralumla, was popularly known as 'Westridge'.

Two enterprises underpinned the development and identity of the area between the city boundary and the west of Griffin's proposed layout for 'Westlake'. The first, operational from June 1913, was the Canberra Brickworks. The second, established in 1914, was Westbourne Woods Arboretum (also known as Westbourne Woods), which was a proving ground for the suitability of native and exotic plants to the Canberra climate. The Arboretum is associated with Charles Weston, the first Superintendent of Park and Gardens for the National Capital.

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49 Paul Reid, *Canberra Following Griffin: A Design History of Australia's National Capital*, National Archives of Australia, Canberra, 2002, p. 16.

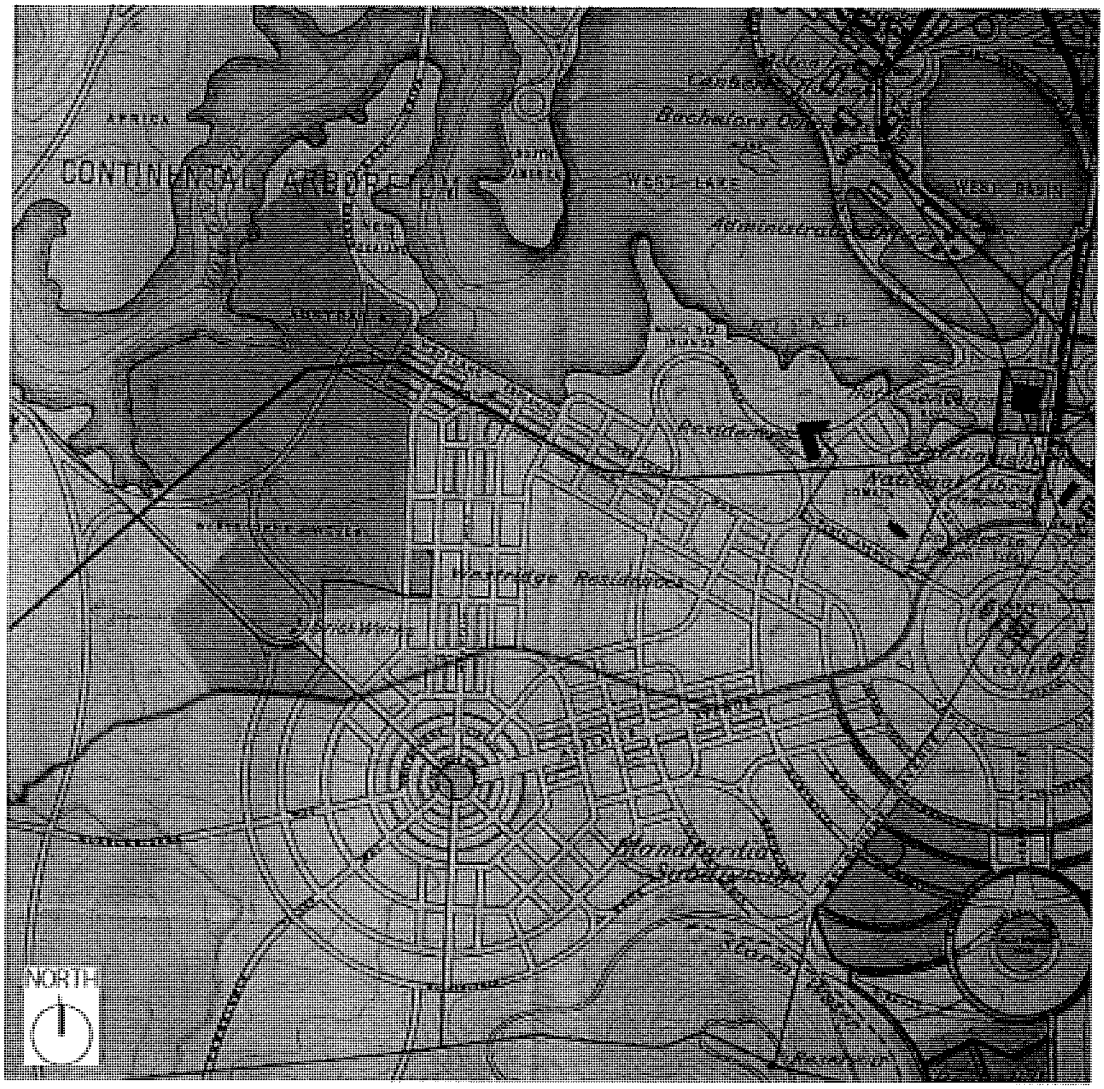

Figure 34 Detail of *Plan (of City and Environs)*, 1918. The 'Westridge Residences' may be the location of the Brickworks Camp.
Source: State Library of Victoria.

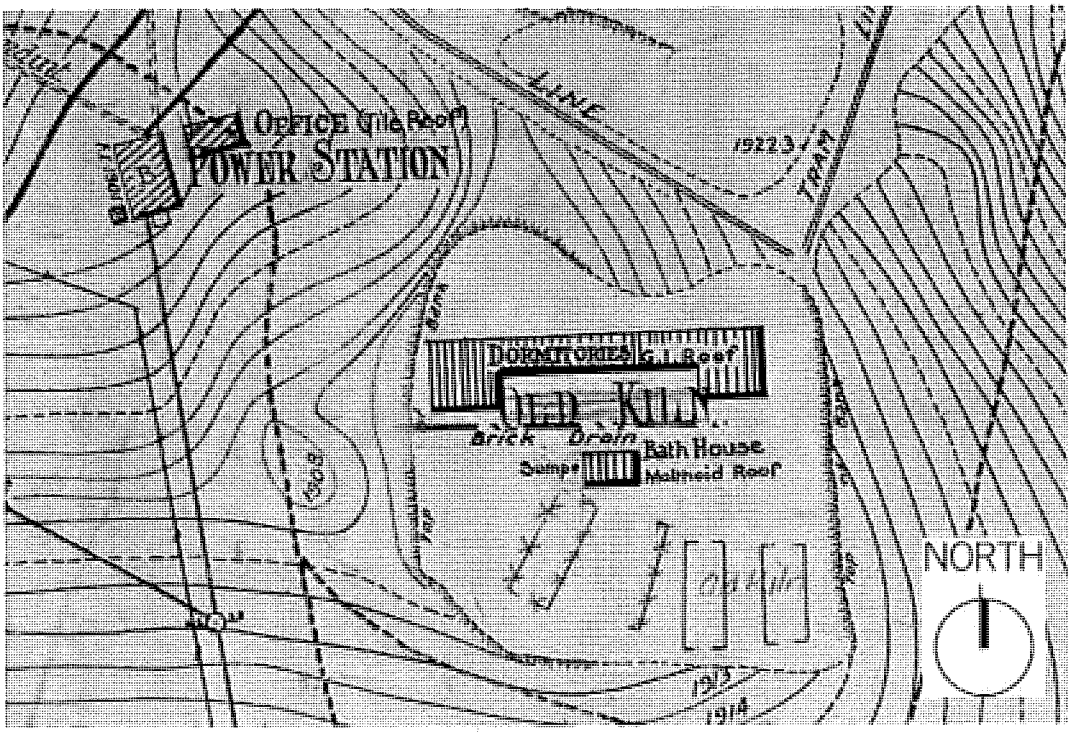

Figure 35 Excerpt from Detail Survey, 20 December 1916: it has not been established whether the 'Dormitories' on the site of the 'Old Kiln' was built.
Source: National Archives of Australia.

Since 1960, much of the site has been incorporated into the grounds of the Royal Canberra Golf Course.[50]

During the Establishment Phase of the Canberra Brickworks, prior to its closure from late-1916 until 1920, workers were accommodated in two camps of tents; one for married couples, the other for single men. The camps were located on Banks Street, near the present Forestry School (see Figure 34).[51] The census of 31 December 1913 recorded a total of 62 residents of Westridge (Yarralumla), comprising 37 men and 25 women, the majority of whom were employed at the Brickworks.[52]

A dormitory block is shown on the site of the 'Old Kilns' on later versions of the 1916 Survey Plan (see Figure 35). It has not been established whether this was built. The first recorded permanent dwellings for workers at the Yarralumla works were constructed in the 1920s, at the top of Denman Street (single men's camp), and to the south-west of the Brickworks (married quarters).[53] (See also Chapter 4.)

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50 Register of the National Estate, Westbourne Woods Area, Place ID 13337.

51 Ann Gugler, *The builders of Canberra, 1909-1929, Part one,* chapters 2 and 3.

52 Ann Gugler, *The builders of Canberra, 1909-1929. Part one,* p. 77.

53 The single men's camp had been abandoned by 1928. Ann Gugler, *The builders of Canberra, 1909-1929. Part one, Temporary camps & settlements*, Canberra, CPN Publications, 1994, chapter 2.

3.2 Datasheets for Establishment Phase elements

No	Name/Description	Date of construction
01	Quarry	Shale extraction from 1913 until c. 1940
02	Concrete retaining wall	c. 1913-16
03	Power House	1915-16
04	Staffordshire kiln	1914-15
05	Fan house for Staffordshire kiln	1914-15
06	Stack for Staffordshire kiln	1914-15

Figure 36 Location of elements surviving from the Establishment Phase. Refer to the larger scale site plan in Chapter 1 for more detail.

Name	Quarry	**Reference No**	01
Historical Phase	Establishment and Expansion phases (1911 – c. 1940)	**Survey Date**	3 December 2009
		Date	Shale extraction from 1913

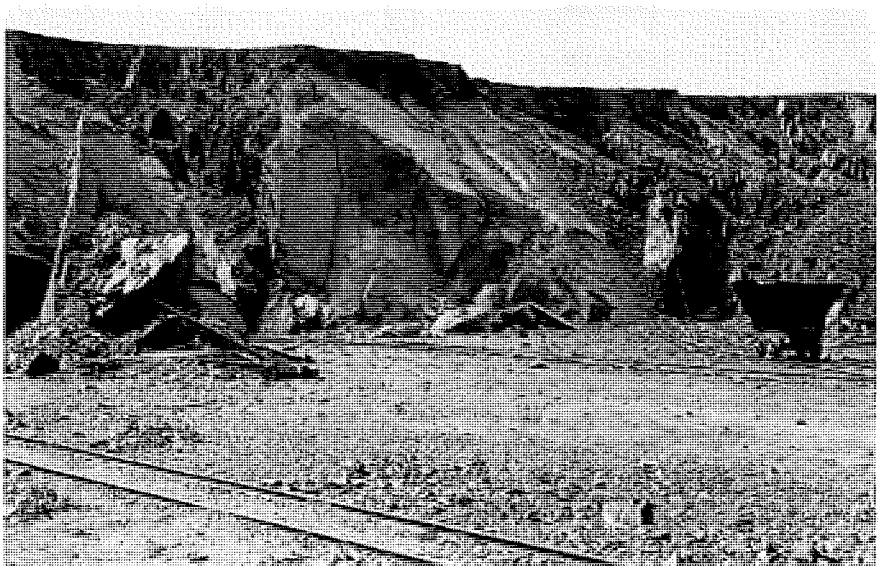

Figure 37 View of the quarry showing the narrow gauge tramway used to transport shale to the crusher, 1921.
Source: National Archives of Australia.

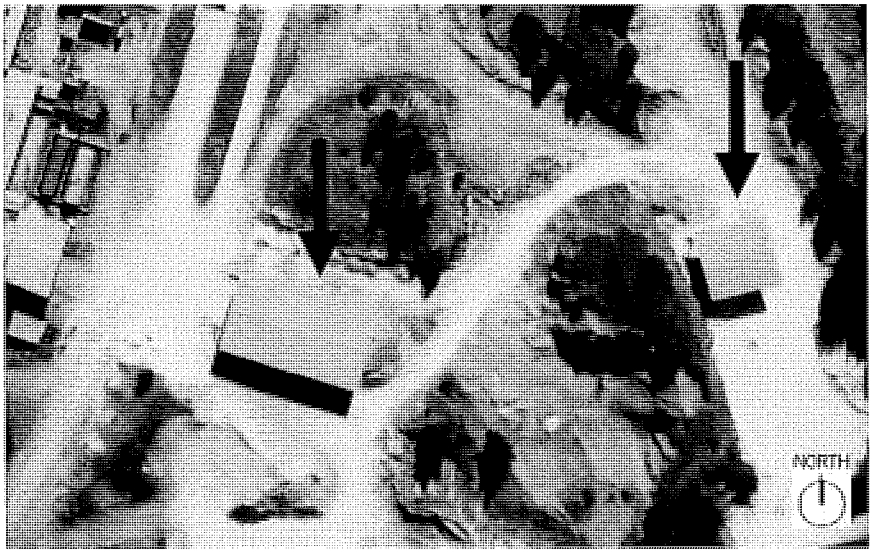

Figure 38 Detail of a 1976 aerial photograph showing the clay storage shed and an unknown smaller structure to the right (both demolished).

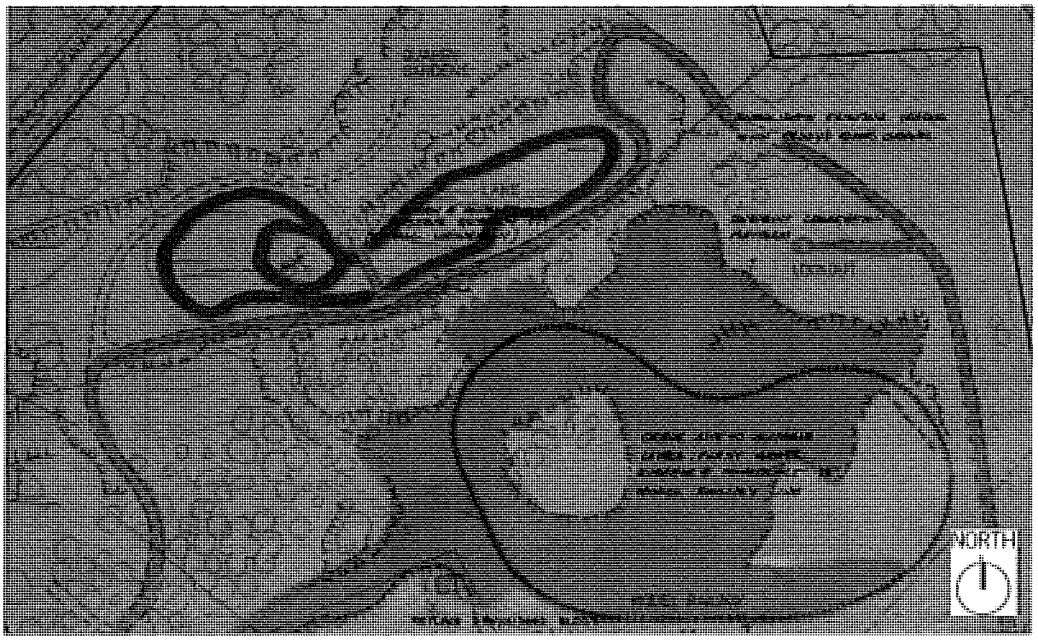

Figure 39 Detail of site landscaping plan prepared by A R Marr Pty Ltd showing the reflection pond and the location of the model railway, c. 1977.
Source: ACT Heritage Library, Woden, ACT.

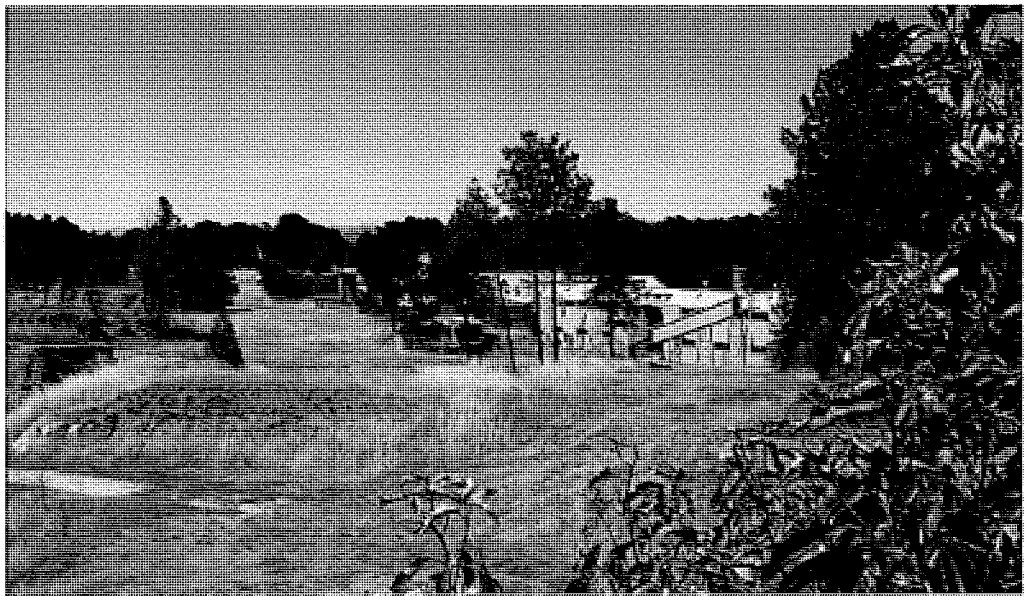

Figure 40 View of the Quarry looking south-west from adjacent to the site boundary to Bentham Street.

Figure 41 Looking north across the quarry floor, the site of the reflection pool, developed as part of the A R Marr Pty Ltd proposal. The dividing wall in the centre of the image marks the location of a walkway which traversed the pool.

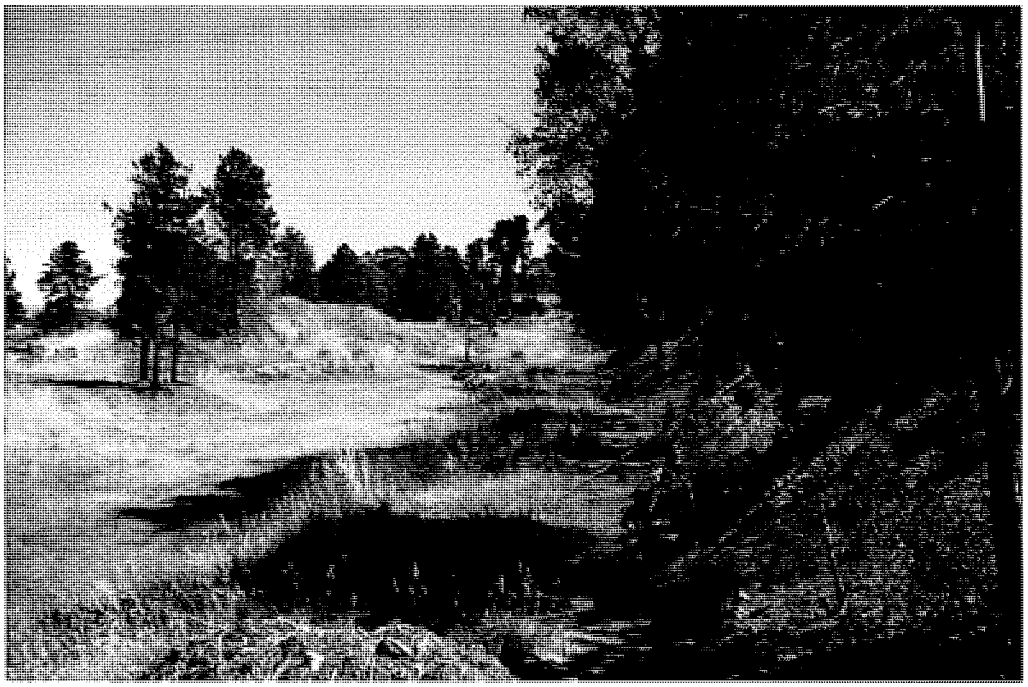

Figure 42 Quarry looking north towards Bentham Street.

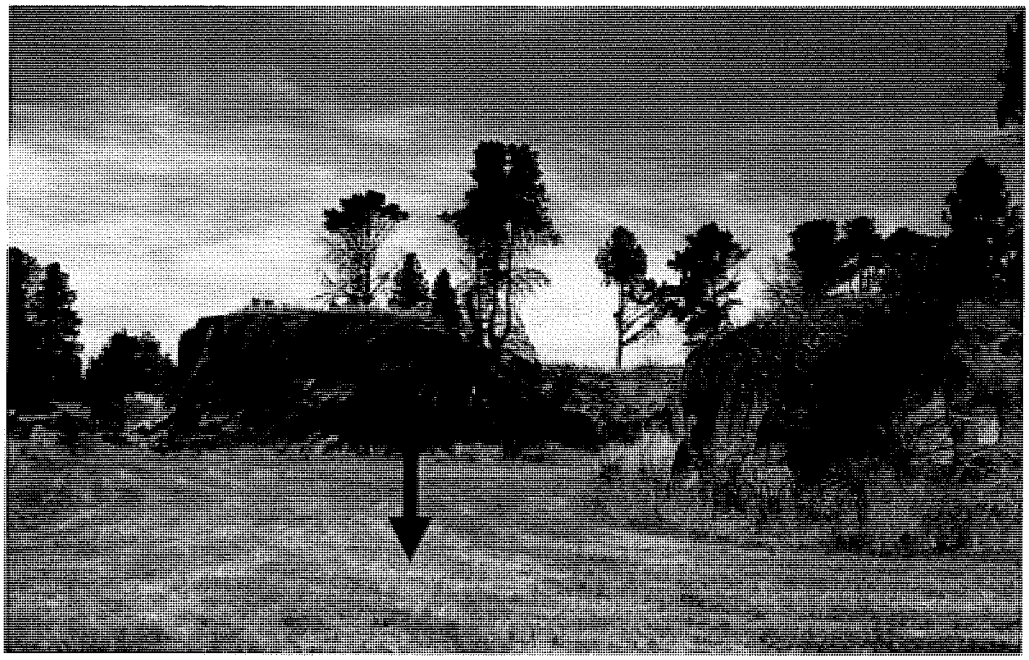

Figure 43 The approximate site of the clay storage shed, demolished after the closure of the works, is indicated by the arrow.

Historical background

The geology of Canberra consists of a range of both sedimentary and volcanic rock types which are relatively common in south-east New South Wales. The main rock types are:

- Deep water sediments of late Ordovician and early Silurian age
- Shallow water sediments of middle to late Silurian age
- Volcanic rocks of middle Silurian to early Devonian age

There are also minor outcrops of recent river gravels and stream deposits.

The deep water sediments (mudstone and siltstone) of the early Silurian age (424-423 million years ago) are present as what is known as the Yarralumla Formation. The Yarralumla Formation comprises shale - a very fine-grained sedimentary rock – which is fossiliferous in places.

The selection of the site for the 'Commonwealth Brickworks' on Frederick Campbell's Yarralumla property followed tests on shale samples which produced bricks of good hardness and porosity (though the quality proved not to hold over time).

The raw material quarried for the 'temporary' works from 1913 was a hard yellow shale which was obtained by levelling a knoll to the east of the works. The shale varied greatly in quality and material from the various seams had to be mixed thoroughly to secure uniform colour in the bricks, increasing production costs.[54] As noted at Section 3.1.2, the raw materials were transported to the brickworks by a narrow gauge tramway, which was constructed so that trucks ran downhill to the works and empty trucks were returned to the

54 Lester Firth Associates (Quarry datasheet, Appendix 2). The sources for the information in this paragraph are not cited.

quarry area using manpower. The tram lines could be relocated as the quarry face advanced (see Figure 37).

From the mid-1930s, raw materials were brought in from outside the works. Quarrying at the site was reported to be a complex process, and more costly than the average brickworks due to seams of unusable material such as limestone and sandstone.

Levelled areas of the quarry floor were subsequently used to house brickworks-related facilities, including an open-sided roofed enclosure for clay storage (since removed). It is shown in an aerial photograph of the site taken in 1976 (see Figure 38, see also Figure 43). Another smaller structure, located further east is also shown, although its purpose is not known.

After the closure of the Brickworks, the site development proposal prepared by A R Marr Pty Ltd proposed the construction of a narrow gauge railway and a 'reflection pool' in the former quarry (see Figure 39, and Figure 41). However, the pool failed to retain water and was frequently dry.

Description & Integrity

Other than for the works undertaken by Marr, the quarry appears to be little altered since the closure of the brickworks in the 1970s. It retains a series of rock outcrops which presumably contained unsuitable material, with quarrying continuing around them. It is not clear the extent to which sections of the quarry floor may have been modified and filled since the 1970s.

A concrete dividing wall, capped with stone paving at the quarry floor is a remnant of the A R Marr 'reflection pool', being a walkway across the pool. The railway has been dismantled.

There are areas of grass and the quarry and its edges are lightly treed, predominantly by self-seeded conifers.

The quarry is secured by a cyclone wire fence, due to safety concerns regarding the eroding quarry face, though access is available to residents whose properties back onto it.

Name	Concrete retaining wall	**Reference No**	02
Construction	Off-form concrete cast in situ	**Survey Date**	17 February 2010
Historical Phase	Establishment phase 1911-1920	**Date**	c.1913-16;

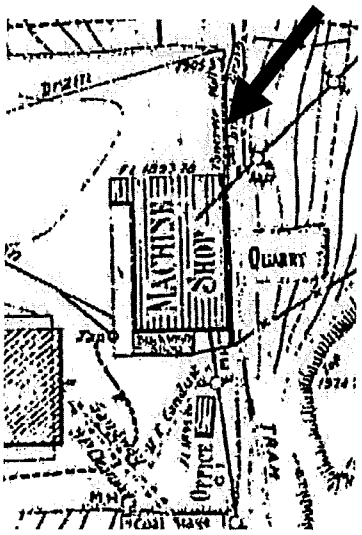

Figure 44 Detail from 1916 Survey Plan, with the concrete retaining wall highlighted.

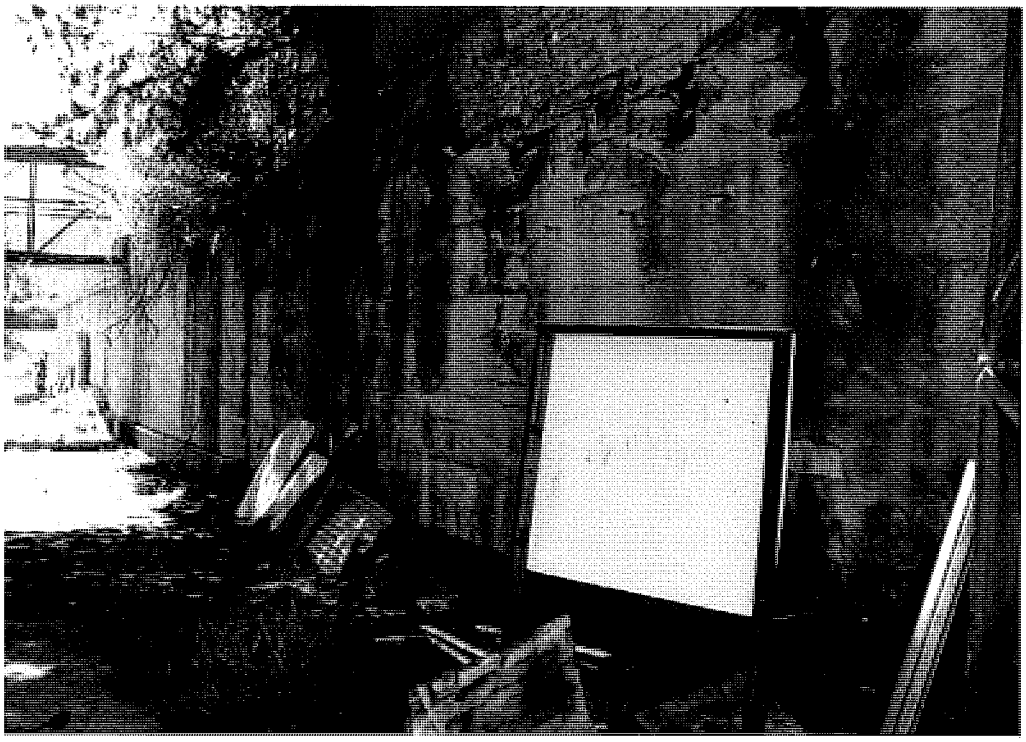

Figure 45 Retaining wall to the rear of the Workshop (Building 17).

Figure 46 The north end of the concrete wall.

Historical background

A concrete retaining wall separating the quarry and the working area is shown on the 1916 Survey Plan. It is probable that it was constructed as part of the permanent works, during 1915-16. At its southern end, the wall returned to form the 'Coal Stage,' also shown on the 1916 Survey Plan. The wall extended to the north, approximately to the concrete base of the demolished Pan Room, where is returned to the east (see Figure 46). The rear of the original 'Machine Shop' abutted the retaining wall (see Figure 44).

Description & Integrity

The cast in-situ off-form concrete wall is approximately three metres high. Its depth has not been established. The original extent of the wall remains legible, although the former Coal Stage has been demolished. The crusher houses (Buildings 18 and 19) and the east and north brick walls of the model railway workshop (Building 33) are built on top of the wall. It also carries the pedestrian bridge that provides access to the firing floor of the first Hardy patent kiln (Building 8), see Figure 46.

Notwithstanding some deterioration at the top, and the impacts of buildings 18, 19 and 33, the wall is generally in sound condition.

Name	Power House	**Reference No**	03
Construction	Brick with terracotta tiled roof	**Survey Date**	3 December 2009
Historical Phase	Establishment phase 1911-1920	**Date**	c.1915-16;

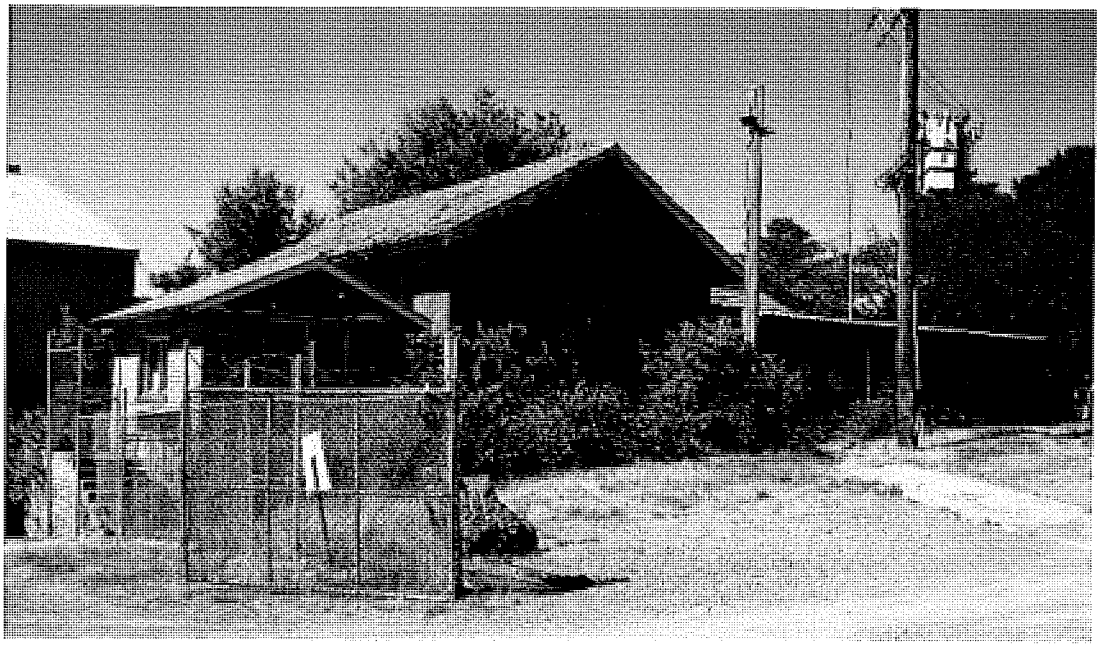

Figure 47 The Power House is the tile roofed building in the centre of the image. The office building (Building 7) adjoins it to the right and the small cream brick structure is the Downdraught kiln control room (Building 23).

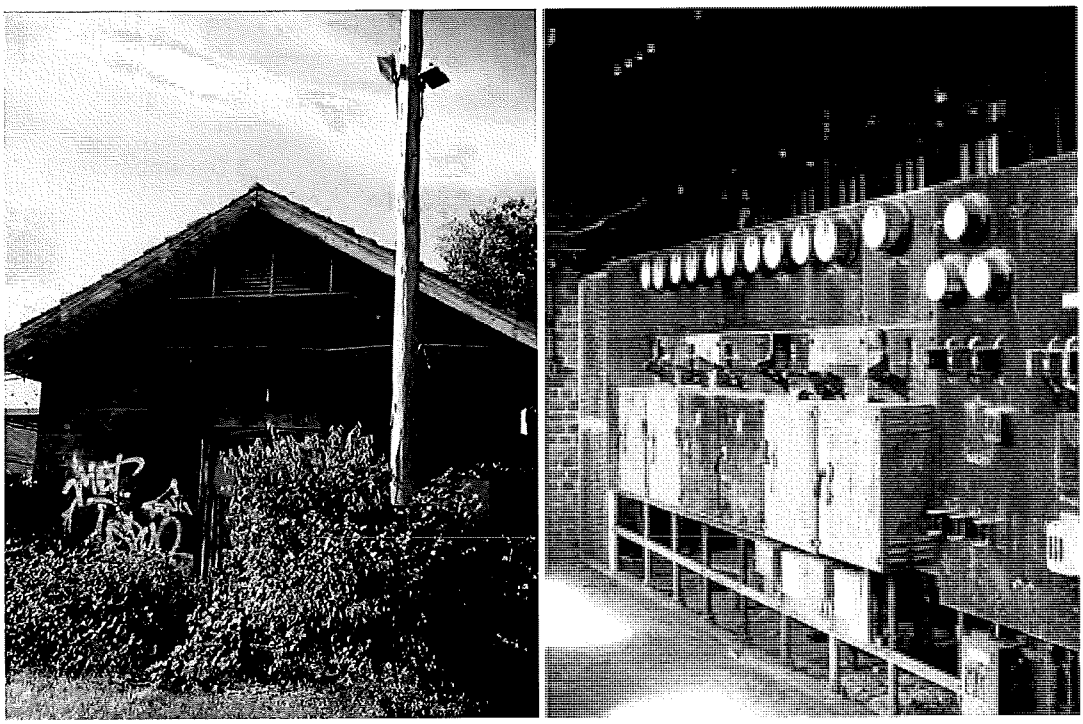

Figure 48 From left: South elevation and entry; interior showing retained plant.

Historical background

Prior to the commissioning of the Central Generating Station (Kingston Power House) in 1915, the Canberra Brickworks was powered by a steam driven donkey engine. When the Kingston Power House came on line in July 1915, the high voltage supply was broken down by transformers to lower voltages and distributed across the site. This was achieved by three overhead cables connected to the purpose-built Power House, described as the 'Power Station' on the Survey plan of December 1916 (see Figure 30). The locations of the original entry points for the cables are visible on the south elevation.

It is possible that the openings in the south elevation have undergone alteration.[55]

Description & Integrity

The Power House is built of face red brick, has a gable roof clad in terracotta tiles with timber vents within the gable to both the south and north end. Access is via paired ledged and braced timber doors to the south and north ends of the building. At present, the paired doors to the south elevation are in use and those to the north are secured internally by timber battens nailed across the doors. Highlight windows to the east wall and three access

55 A drawing dated 17 December 1953, (ref. Canberra Brickworks Proposed extension to Office Building Sketch-plans, National Archives of Australia) detailing additions to the adjoining office refers to the north elevation of the Power House as the 'front' and the south elevation as the 'rear'. The drawing details the doors to the north elevation but does not detail any openings to the south, possibly implying that the openings to the south are not original. No original drawings of the Power House have been located to confirm or refute this evidence, but a visual inspection of the fabric suggests that the door opening and the cable access points are original details or alterations of long standing, predating the 1953 drawing.

points for transmission cables in the south wall are bricked up and there are two non-original multi-paned metal-framed windows in the west wall.

Internally, the Power House has a concrete floor and the ceiling is lined with a narrow profile painted corrugated iron. Some early electrical equipment is still *in situ* within the building, including circuit breakers, ammeters, watt meters and distribution boards and some is in still in use, providing power for tenants. Other early high voltage switchgear and transformers are thought to have been removed. The original connection high up in the south wall has been discontinued and power is now relayed underground from a power pole in close proximity to the structure.

The building is in fair condition. Efforts to secure the building against illegal entry and vandalism have had a detrimental impact on its physical condition and presentation. The terracotta roof tiling and the soffit are both in poor condition. The entry doors are damaged with some of the boards removed and the highlight windows above are broken and sheeted over. Graffiti is also evident.

Openings to the east and south walls are bricked up.

The extension of the adjoining office block to the east and the siting of the small service building to the immediate west have had an adverse impact on the presentation of the building.

Name	Staffordshire Kiln	**Reference No**	04
Construction	Brick with corrugated steel roof	**Survey Date**	3 December 2009
Historical Phase	Establishment phase 1911-1920	**Date**	c. 1916

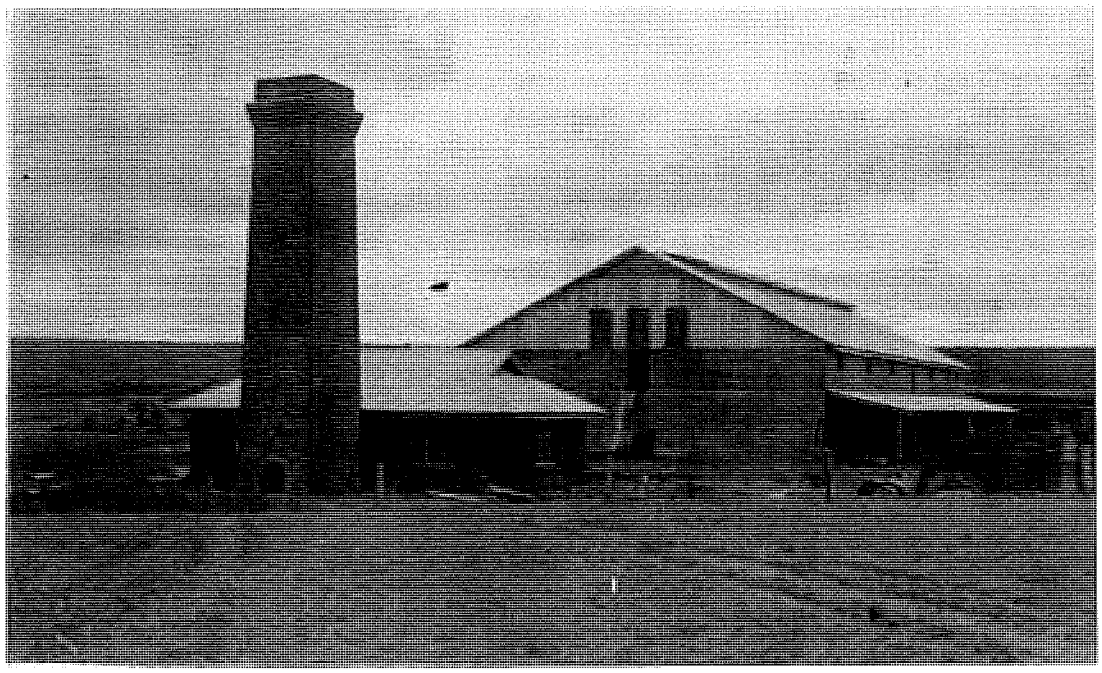

Figure 49 The Staffordshire kiln, fan house and stack, photographed in 1917 by Harry Connell. Note that in this view the kiln verandah does not extend to the west elevation.
Source: National Library of Australia.

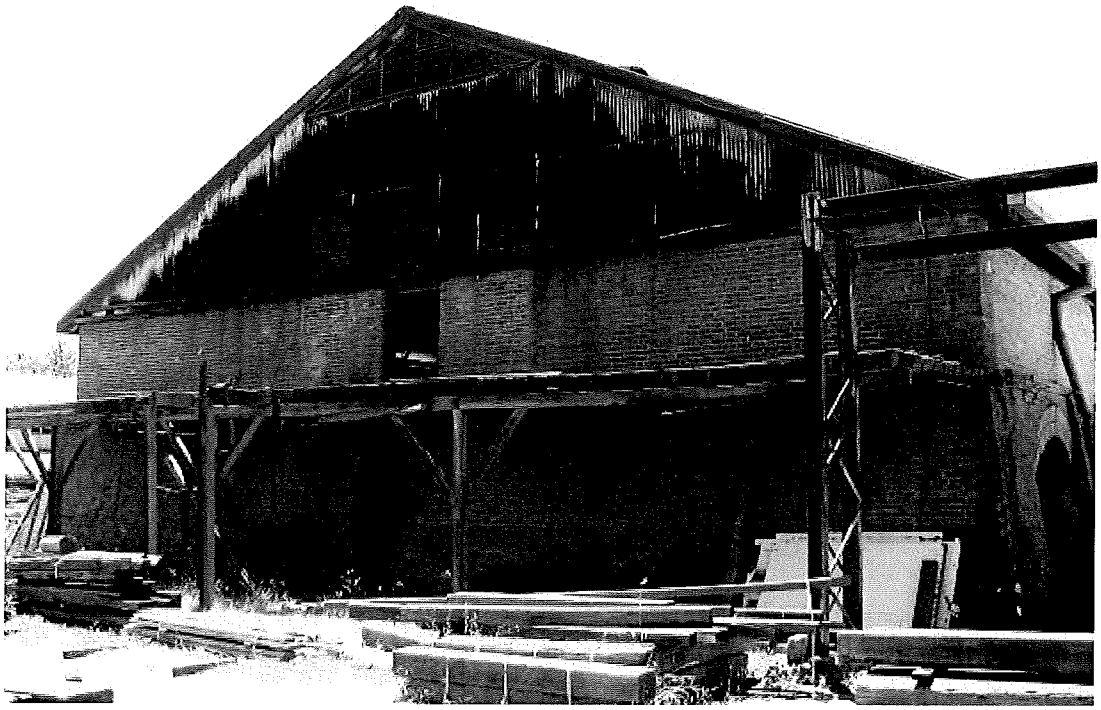

Figure 50 The west elevation today.

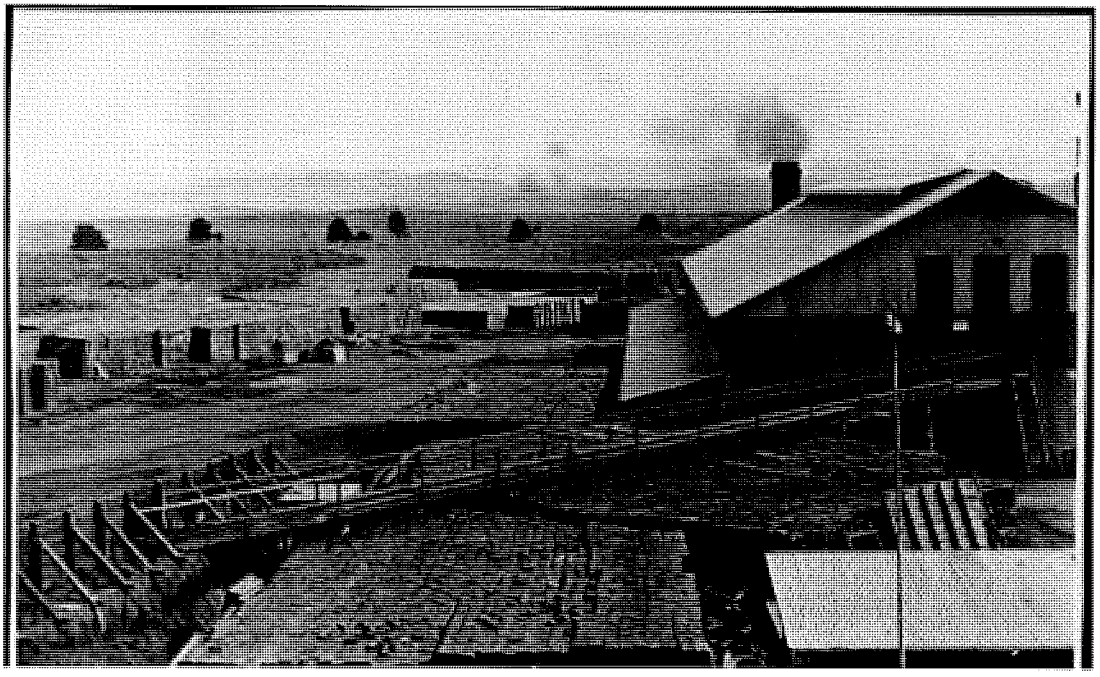

Figure 51 The east elevation, photographed by Harry Connell in 1917.
Source: National Library of Australia.

Figure 52 The north elevation, photographed prior to the rebuilding of the verandah to support a first floor enclosed verandah structure.
Source: National Archives of Australia.

Figure 53 View of the west elevation from the 1920s showing the later two-level verandah structure.
Source: National Archives of Australia.

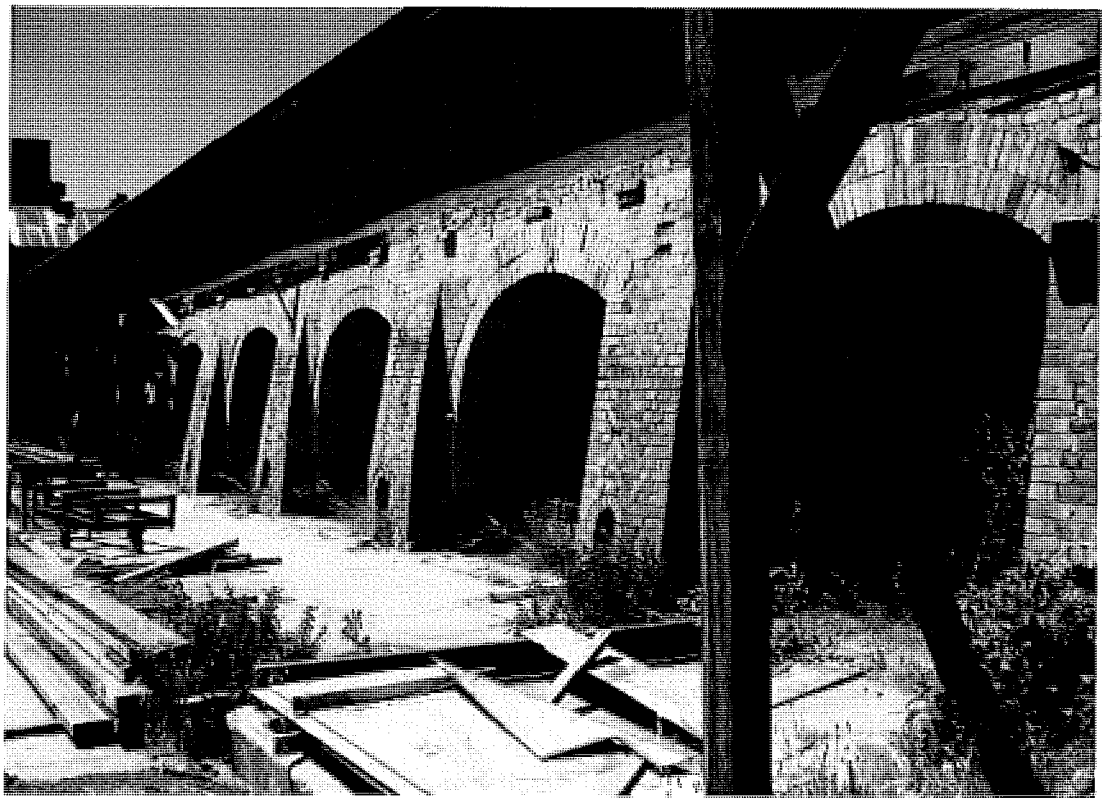

Figure 54 North elevation showing modified kiln entrances.

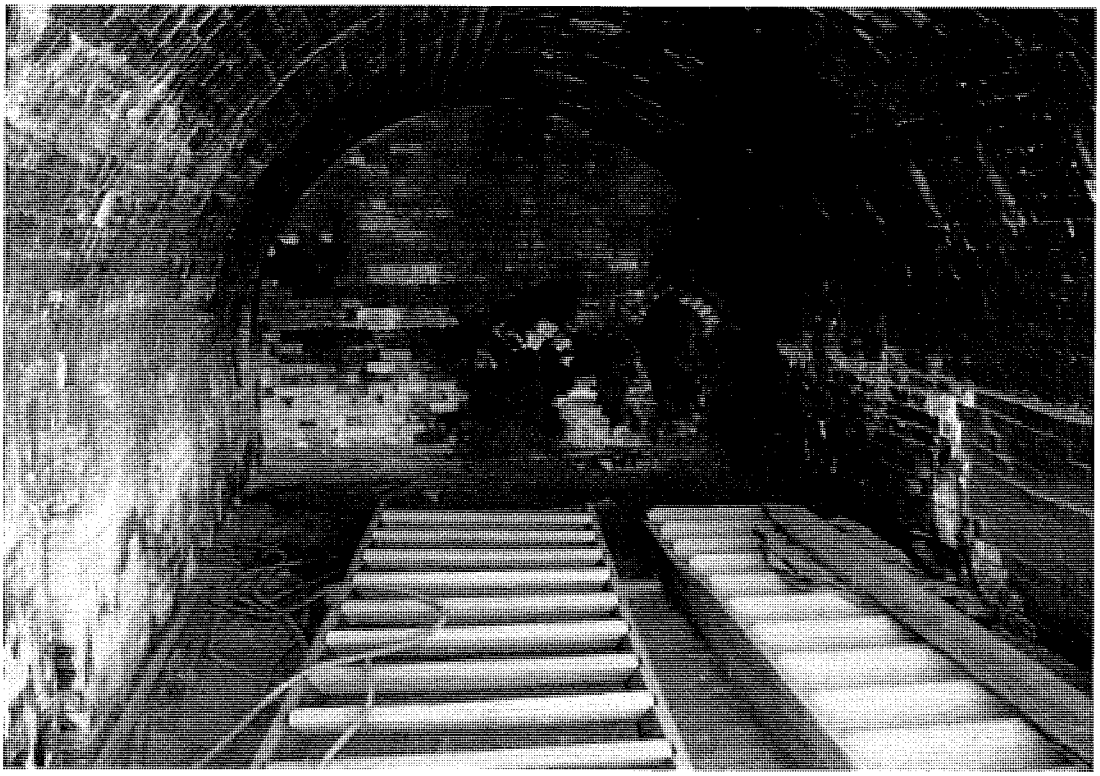

Figure 55 Kiln interior.

Figure 56 Interior of the upper floor of the kiln looking west across the firing floor.

Historical background

An overview of the history, planning and construction of the Staffordshire kiln is included in Chapter 2.

Plans for the Staffordshire kiln were purchased in early 1914 from Robert E Odd, the Australian holder of the patent for the 'Staffordshire' and 'Manchester' continuous brick kilns. The Staffordshire kiln, a variation on the Hoffman model, had been patented by Dean and Hetherington of Accrington, Lancashire (England) in 1904. The continuous tunnel of the Hoffman kiln was replaced by a series of separate side by side chambers, in this case 20 chambers. This allowed a single chamber to give special treatment to its contents; such as terracotta tiles or pipes which could therefore be produced alongside brick firing. Previously, separate kilns were required.

Fans accommodated in a separate fan house are used to draw the heat through the kiln tunnel to be dispersed through a short brick stack, rather than a high chimney. The Lester Firth Conservation Plan notes this aspect of the design of this particular Staffordshire kiln was pursued to avoid the visual impact of a higher stack in the Canberra area. No documentary evidence has been located to substantiate this claim, though there is some evidence that Staffordshire kilns constructed elsewhere may have had taller stacks. [56]

56 See, for example, the online views of a Staffordshire kiln at the Dunaskin Brickworks in the UK, http://www.scran.ac.uk/database/record.php?usi=000-000-481-395-C.

Construction of the kiln began in November 1914, and it was operational from early 1916. However, the brickworks closed within a year, a reflection of a reduced works program in Canberra during World War I, and the coal strike of November-December 1916.

The Staffordshire Kiln was the first permanent kiln structure to be constructed at Canberra and the only example of its type to survive in Australia today.[57]

Description & Integrity

As originally constructed, the Staffordshire kiln was a two-storey structure with a brick base, brick upper walls and a galvanised steel roof. It contained 20 chambers. The internal fire bricks were imported from England, and some were apparently numbered to show construction sequence. Truss work in the loft was also imported with steel beams stamped 'Frodingham England', indicating their manufacture by the Appleby-Frodingham Steel Co. A single level verandah, supported on timber posts enclosed the north and south elevations (see Figure 51 and Figure 52). By the mid 1920s, this structure had been removed and a more robust structure enclosed the north, south and west walls at first floor level with a timber enclosed verandah structure, thought to have been open to the firing floor internally (ie the brick walls having been demolished, see Figure 53). There is some evidence that this expanded upper level to the Staffordshire kiln may have been used for the drying of tiles, presumably those produced in the tile-making plant which is understood to have been added to the site in this period (at the south end of the Machine Shed)[58]. A 1925 plan showing proposed alterations at the site indicates two 'tile lifts' located adjacent to the Staffordshire kiln.[59] According to Lester Firth Associates, the first floor level to the verandah was demolished in the A E Marr period and the brick walls at first floor level were rebuilt in their original position at this time, but without the openings as in the original (refer to Figure 52).[60]

Today the Staffordshire kiln comprises the 20 kiln chambers to the ground floor with a firing floor above, enclosed by non-original brick side walls and original brick end walls, with a gable roof form, clad in corrugated steel. The gable to the west end is infilled with corrugated steel and timber louvres, which are thought to be the original treatment. A 1917 photograph shows that the same scheme was in place at the east end, now obscured by the skillion roof structure that later enclosed the yard area between the machine bays and the kiln (see Figure 51).

Significant rebuilding works took place in the mid 1950s, when the 1927 Hardy Patent kiln (Building 8) was also upgraded and extended, and a further Hardy patent kiln (Building 12) was constructed. At this time the kiln chamber entrances were enlarged to permit forklift access. The individual kiln numbers, originally painted above the centre of each of the arched entrances are today incised in a rendered 'pad' to the right side of each of the

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57 Up to three Staffordshire kilns were constructed at the State Brickworks, Homebush Bay Strathfield NSW in 1911-12, but since demolished.

58 Lester Firth Associates 1986, Section 2.1.2

59 Commonwealth of Australia, Department of Works and Railways: Proposed Additions to Brickworks, 18 November 1925, M3495B, National Archives of Australia, cited in Lester Firth Associates 1986, Section 2.1.2.

60 Lester Firth Associates, 1986, Datasheet appendix.

openings. To the south elevation, one of the kilns at the eastern end has been infilled with brickwork and a single door opening installed, enabling the space to be secured for storage. The first floor level of the verandah has been demolished and the supporting verandah is only extant in areas to the north, east and west ends, and is in an advanced state of deterioration.

Internally, between the kiln chambers, there are a number of 'trace-holes' which could be closed by dampers, which were raised and lowered from the firing floor above. Within the kiln arches the feedholes and hot air off-takes are still apparent. A number of the kilns have been paved internally with cement tiles, a modification which occurred after the closure of the plant, and for the accommodation of antiques stalls, part of the tourism concept for the site developed by A R Marr Pty Ltd in the late 1970s.

The upper floor and verandah of the Staffordshire Kiln has also been modified a number of times including the enclosing of the verandah with corrugated iron, bringing the line of the upper floor out to the edge of the original verandah. This modification was later reversed by A R Marr Pty Ltd when new brick walls were constructed on the line of the original building wall, with the intention of refitting the space as a commercial facility in line with a proposal to establish a tourist park. The roofing was also replaced at this time.

Several of the kiln linings are bulging and brickwork is loose in places. The first floor remnant verandah structure is in very poor condition and the former firing floor space is in poor condition.

Name	Fan house for Staffordshire kiln	**Reference No**	05
Construction	Brick with corrugated steel roof	**Survey Date**	3 December 2009
Historical Phase	Establishment phase 1911-1920	**Date**	c. 1916

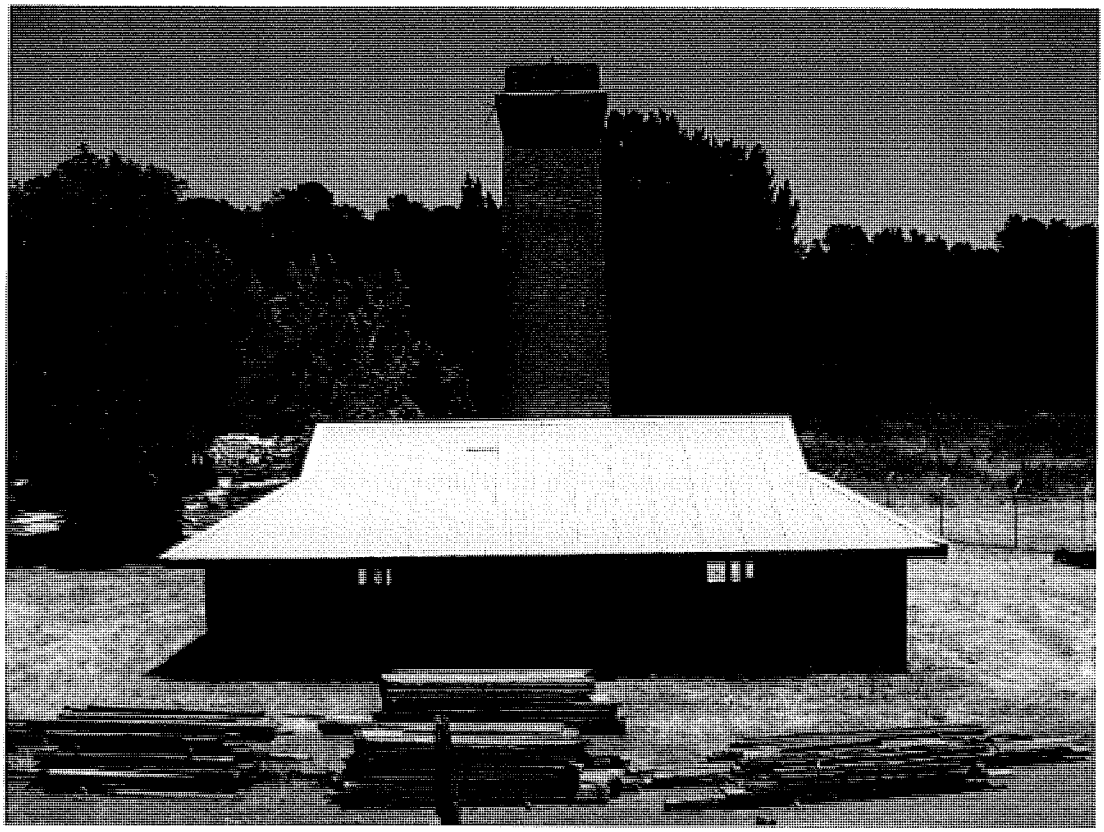

Figure 57 Fan house with stack behind.

Figure 58 Interior of fan house. The tangential fan is mounted on the rear wall.

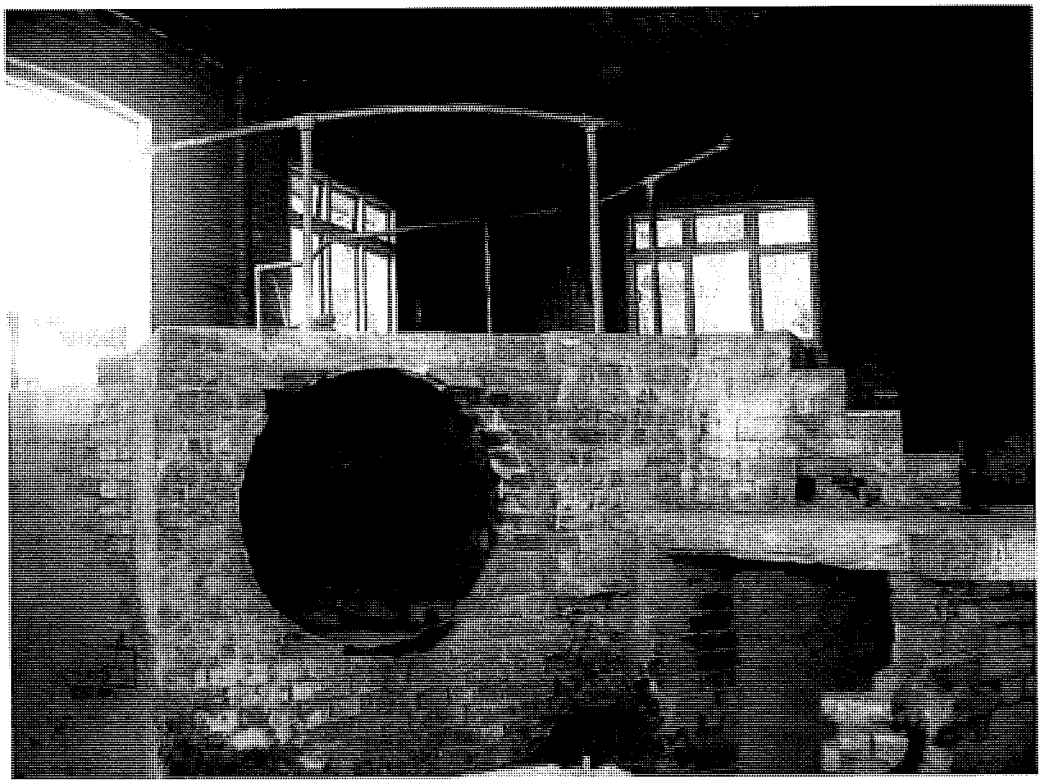

Figure 59 Another view showing the entry to the tunnel / flue connecting the fan house with the Staffordshire kiln.

Historical background

An unusual feature of the design of the Staffordshire kiln was the use of fans to help dissipate heat and burnt fuel. The use of fans compensated for the greater draw or suction a taller chimney would have provided, and allowing for the use of a lower brick stack.

The fan house, constructed of brick and roofed in corrugated steel, is located approximately 20 metres west of the Staffordshire kiln. It was constructed in conjunction with the kiln in c. 1915-16, and housed the machinery to induce the drafts required to disperse heat and burnt fuel through the stack.

Description & Integrity

The fan house is constructed of face red brick, laid in English bond with a Dutch gabled roof clad in of corrugated steel, recently renewed. The fan house presents as a single-storey building, but has a lower floor level internally. There is a central double door entrance in the east (front) elevation (door leaves removed), flanked by tripartite timber-framed casement windows with awning toplights, set on sloping sills of bullnose bricks. The windows are broken and some of the glazing bars to the toplights have been knocked out. Additional windows are centrally placed in the north and south end walls. The west wall has windows placed directly opposite the windows that flank the entrance. The rainwater goods, soffits and fascias to the roof have all been removed.

Internally the ceiling is lined in beaded painted timber boards, some of which are damaged. The walls are of brickwork, heavily stained by soot. Within the building there is a diamond-shaped concrete apron to the entry with metal ladder from stairs to a lower floor level to either side of the apron. There is a metal guardrail around the apron. The apron sits over the entry to the kiln draught tunnel and the tunnel to the stack. One of two fan motors remains (albeit in a dilapidated state) within the basement area and the concrete engine mounts are also intact. The fan housings are partly intact with the dampers in-situ and one of the tangential fans hanging on the rear wall. The ductwork which carries the exhaust to the stack is carried below ground.

The building is unsecured and in poor condition with evidence of the effects of vandalism including broken windows, missing entry doors and graffiti to the exterior brickwork. The replacement of the roof cladding is a positive action which is preventing further deterioration of the interior ceiling lining.

The bulk of the plant appears to have been removed, and what remains is in a dilapidated state. Remnants remain of the tangential fans, partially dismantled motor housing and components of one of the electric motors remain. The dampers to the kiln tunnel are also extant.

Name	Chimney stack for Staffordshire Kiln	**Reference No**	06
Construction	Brick	**Survey Date**	3 December 2009
Historical Phase	Establishment phase 1911-1920	**Date**	c. 1916

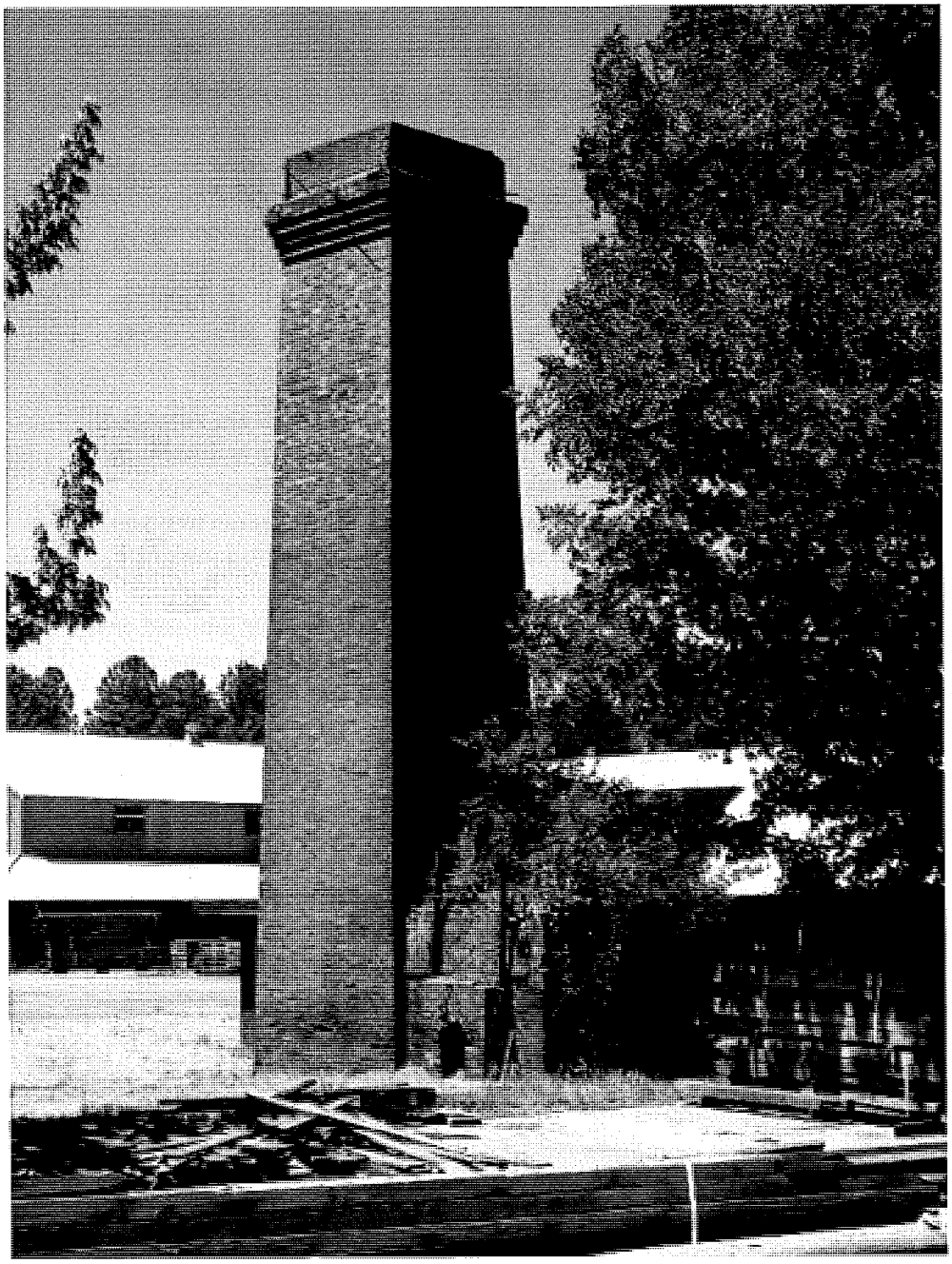

Figure 60 The full extent of the stack, with a smaller near-contemporary kiln adjoining to the right.

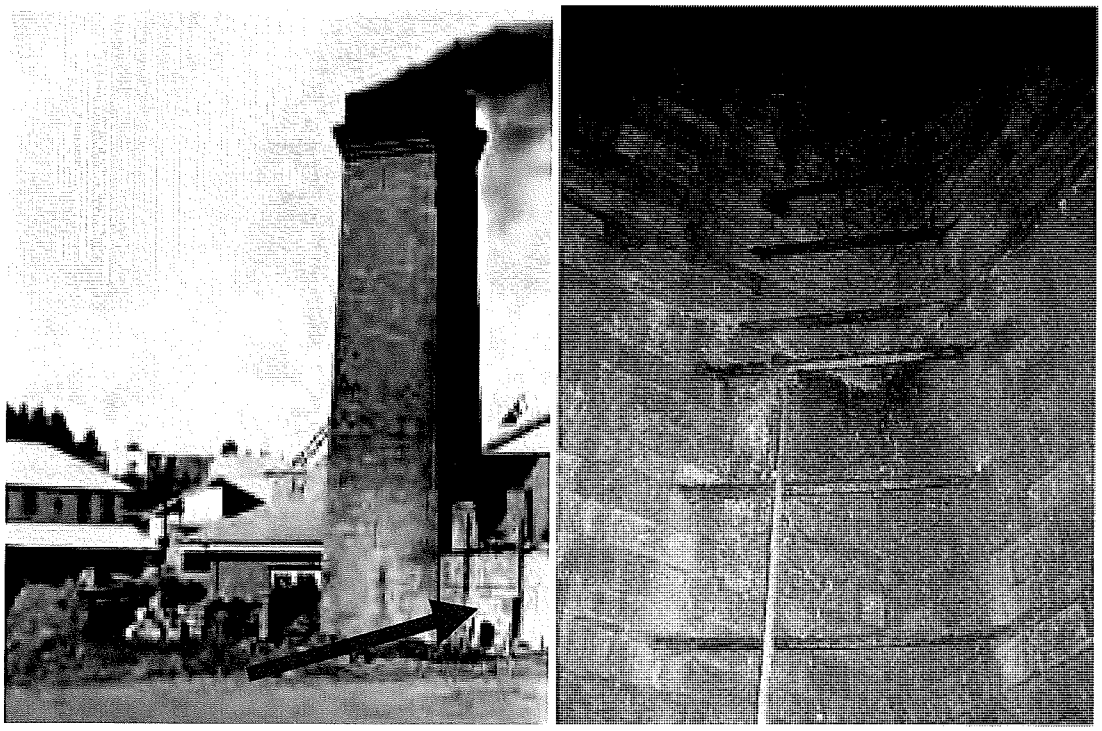

Figure 61 Left: Detail of a photograph of c.1926. The kiln abutting the stack is indicated by the arrow (Source: National Archives of Australia). Right: Interior of the chimney stack.

Historical background

In the case of the Staffordshire kiln, fans were used help dissipate heat, allowing for the use of a lower brick stack. The heat and burnt fuel was pushed by the fans through a subterranean duct to the stack, from which it was dissipated.

To its south, the stack abuts a small brick kiln, referred to in the 1986 *Conservation Plan* as an experimental kiln. While this element is not shown in a 1917 photograph of the works, it is clearly visible in a photograph taken in c. 1926 indicating it is an early site element (Figure 61).

Description & Integrity

The chimney stack, constructed of face red brick is adjacent to the Staffordshire kiln fan house and located approximately 30 metres west of the kiln building. A gravelled roadway separates the kiln from the stack and fan house. The stack is capped with several courses of corbelled brickwork and then surmounted by nine rows of brickwork. Metal bracing to the corners of the section above the stepped brickwork is partly intact. There is evidence of rebuilding of some of the upper courses and a lightning conductor has also been installed since the 1986 *Conservation Plan* was completed. An arched opening in the west face of the stack has been infilled with brickwork. Within the stack iron rungs have been installed on a diagonal to provide internal access.

To the right, a small brick kiln abuts the stack. It has an arched opening in both its west and south faces. The kiln is in a partially ruinous state and vegetation is impacting on the structure.

3.3 Demolished structures

The 1986 *Conservation Plan* provides background information, with varying degrees of detail, on a number of now demolished structures associated with the development of the Canberra Brickworks. Several of these relate to the establishment phase of the site and are addressed below. It is noted that there are structures relating to the post-war phase of development, including a clay storage shed, carpenter's workshop, oil and coal bunkers, weighbridge and a forklift shed, demolished since the 1986 *Conservation Plan*, are discussed in brief in Chapter 6.

3.3.1 *'Temporary' kilns*

The precise location of the temporary kilns (possibly clamps), delineated as four structures on the 1916 Survey Plan (see Figure 30), is unclear. While it is would appear that little discernible evidence of the structures were visible at the date of the compilation of the 1986 *Conservation Plan*, the site of the kilns and associated works would be of archaeological potential and this should be assessed prior to any proposed major disturbance to the site (refer to Chapter 8).

3.3.2 *Brickworks Hostel / Accommodation Village*

Initially workers were housed in tents along the ridge to the east of the works. Permanent dwellings for workers at the Yarralumla works were constructed in the 1920s, at the top of Denman Street (single men's camp), and to the south-west of the Brickworks (married quarters). The single men's camp was disused by 1928 (see also Chapter 4). The buildings that comprised the married quarters are shown in a detail of a 1929 photograph of the works, as well as in an image of the kiln 'road', running north-south between the kilns and fan houses, also of 1929 (see Figure 62, Figure 63). The married quarters were removed during World War II, and replaced by a new Brickworks Hostel (1945, demolished in the early 1970s). Little evidence of the former residential accommodation is visible, with revegetation resuming much of the area (Figure 64). Again, the site of the accommodation village, as well as its earlier temporary site would be of archaeological potential and this should be assessed prior to any proposed major disturbance of the site.

3.3.3 *Cottage complex*

This complex of buildings – refer to 1986 *Conservation Plan* datasheet NE4, Appendix 2 – apparently comprised a cottage with outbuildings located to the north of the second Hardy patent kiln and stack (Buildings 8 and 10). Set above the complex, the site today has been redeveloped as part of Lane Poole Place and is outside the study area. The archaeological potential of this site is considered to be very limited.

3.3.4 *Explosives store*

The explosives store was relocated from a site c. 180 metres south of the Power House to the opposite side of the brickworks, behind the brick extrusion plant – refer to 1986 *Conservation Plan* datasheet NE-3. Both locations should be examined to determine their archaeological potential prior to any proposed major disturbance of the site.

3.3.5 *Weatherboard cottage*

A cottage and stable building are delineated on the 1916 Survey Plan, sited to the north-east of the quarry – refer to 1986 *Conservation Plan* datasheet NE6 – with its approximate site within the present day bounds of the quarry.

3.3.6 *Carpenters shed*

This structure was located approximately 50 metres south-east of the Power House –refer to 1986 *Conservation Plan* datasheet NE8. Its date of construction is not known and it was removed during the 1960s with the site later used as a car parking area – refer to detail of the 1976 aerial photograph at Figure 65. Prior to any redevelopment of the site of the former carpenters shed, the potential for archaeological significance should be assessed.

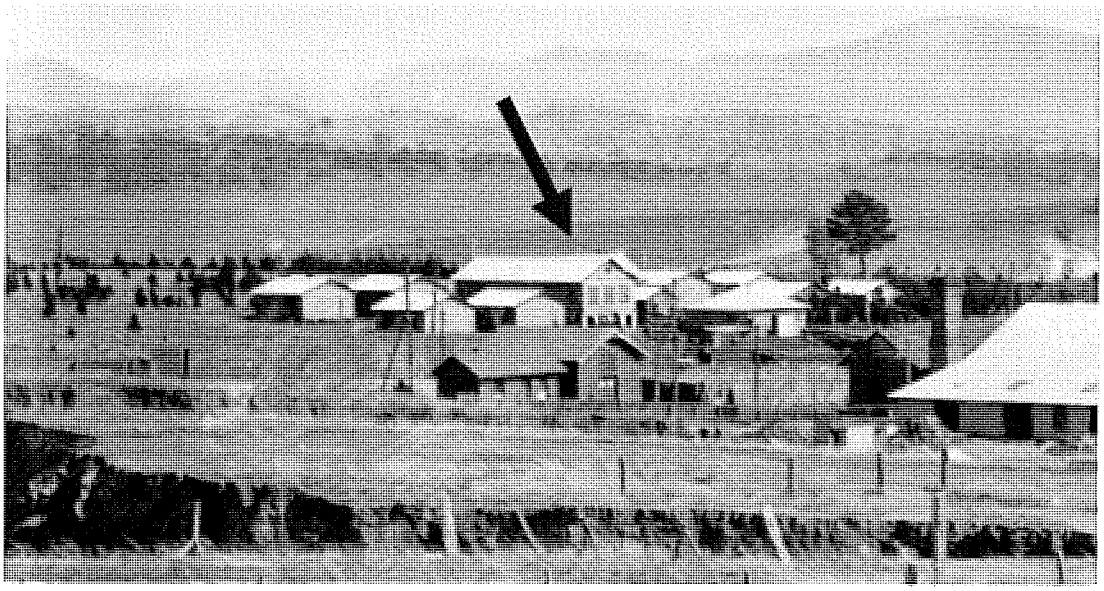

Figure 62 Detail of a 1929 photograph of the brickworks looking south-west showing the accommodation village buildings (indicated).
Source: National Archives of Australia.

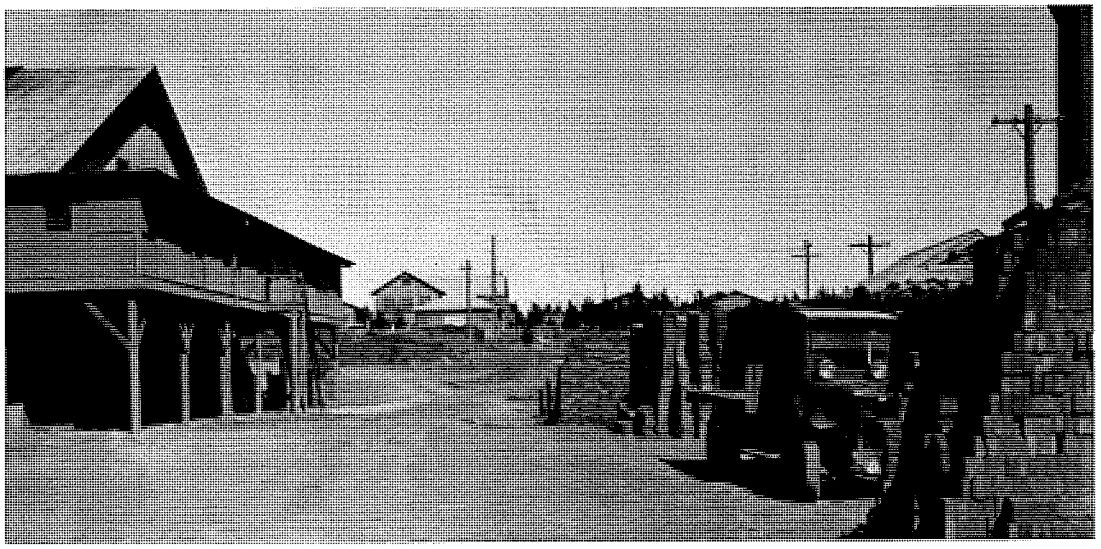

Figure 63 Looking south along the kiln 'road', the Staffordshire kiln at left, 1929. The mess hall building and the roofs of several of the sleeping quarters are visible in the background.
Source: National Archives of Australia.

Figure 64 The remains of the accommodation village today, looking north-east.

Figure 65 Detail of a 1976 aerial photograph with the then car park, thought to be the site of the former carpenter's shed indicated.
Source: ACT Heritage Library, Woden, ACT.

4.0 HISTORY & PHYSICAL ANALYSIS: EXPANSION PHASE 1921-1940

4.1 Historical background

4.1.1 *Interwar Canberra*

At the end of 1920, following the end of World War I, the Hughes Government decided to proceed with the construction of Canberra. Major works completed in the 1920s included the Provisional Parliament House, Sydney and Melbourne Buildings, Albert Hall, Forestry School, Hotel Canberra, Hotel Ainslie and the Capital Theatre, as well as housing at Ainslie, Reid, Forest and elsewhere. Residential construction peaked in 1927, the year that Parliament first sat at Canberra, and just prior to the transfer of public servants to the National Capital in May 1928.

During the 1920s, the population of Canberra was approximately 3,000, the majority being construction workers (the influx of public servants effectively doubled the population of the city).[1] The construction workers were housed in 'barrack-like camps'[2] located around the edges of the evolving city. One of these camps was built on Stirling Ridge, elevated ground to the east of the Brickworks. 'Westridge' (as Yarralumla was then known) was also the location of Canberra's night soil depot, located on Adelaide Avenue, close to the present-day Kent Street-Novar Street overpass.[3]

When the Canberra Brickworks was reactivated (see Section 4.1.2), accommodation was required to attract workers to Canberra. In 1921/22, seven timber tenements and a number of brick cottages were constructed adjacent to the Brickworks Camp, near the present Forestry School on Banks Street. These were among the first permanent dwellings at Westridge. At around this time, a recreation ground and tennis courts were also constructed for the benefit of the workers at the Brickworks Camp. Further development in Westridge followed during the 1920s, including the construction of 62 timber cottages for workers on the Provisional Parliament House.

The next phase of residential development at the Brickworks began in February 1927, when a new single men's camp was constructed on the south side of Denman Street, close to the entrance to the site. New married quarters were located to the south of the Brickworks in the same year (see Figure 66).[4]

In 1925, Yarralumla was selected as the site of the Australian Forestry School (see Figure 67). A new building, designed in the Interwar Stripped Classical style by J H Kirkpatrick of the Federal Capital Commission (FCC), was completed in 1927. This was followed in 1928 by Westridge House, a house designed by Melbourne architect Harold Desbrowe Annear in collaboration with the noted interior designer, Ruth Lane Poole, as the premises of the

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1 Paul Reid, *Canberra Following Griffin: A Design History of Australia's National Capital*, National Archives of Australia, Canberra, 2002, p. 193.

2 Paul Reid, *Canberra Following Griffin*, p. 193.

3 Ann Gugler, *The builders of Canberra, 1909-1929. Part one, Temporary camps & settlements*, Canberra, CPN Publications, 1994, chapter 3.

4 Dates and details in this paragraph are from, Ann Gugler, *The builders of Canberra, 1909-1929. Part one*, chapters 2 and 3.

Figure 66 The married quarters camp (background), built to the south-west of the Brickworks in 1927.
Source: National Archives of Australia.

Figure 67 Forestry School, Banks Street, Yarralumla, built 1927.
Source: National Archives of Australia.

Figure 68 Westridge House, Yarralumla, built 1927/28.
Source: National Archives of Australia.

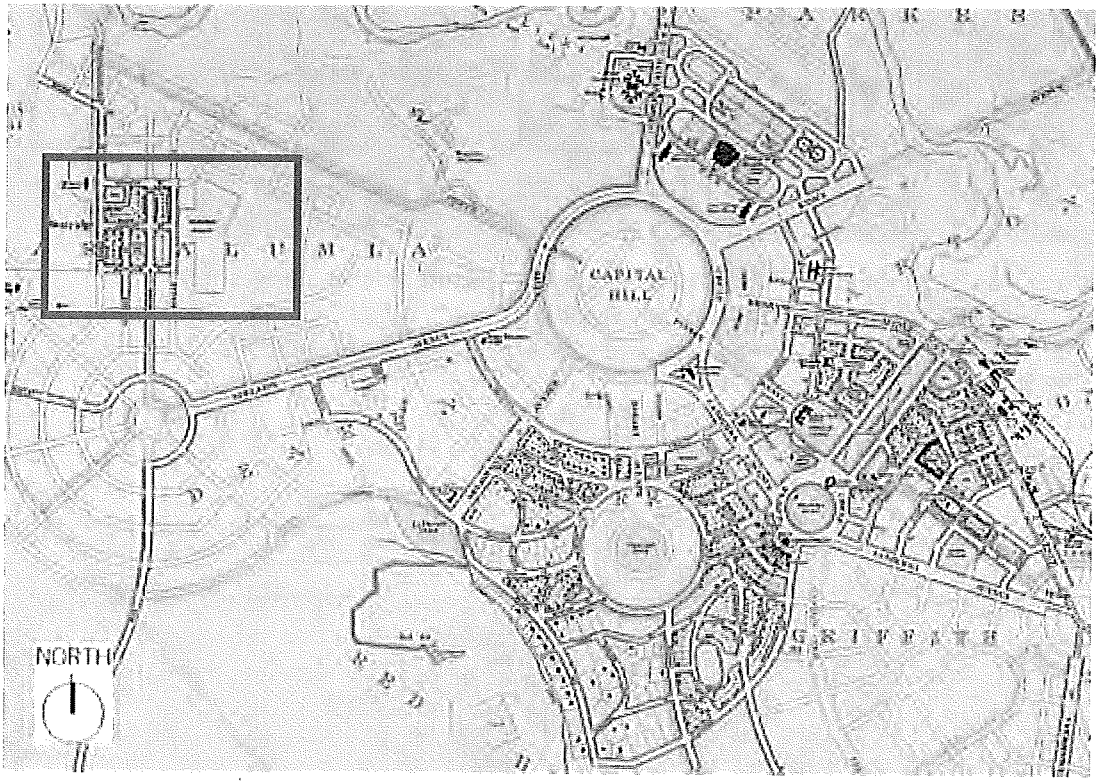

Figure 69 Plan of Canberra, 1933, showing the Brickworks to the west of the camp at 'Westridge' (Yarralumla).
Source: National Library of Australia, G8984 C3 G45 1933 NLA.

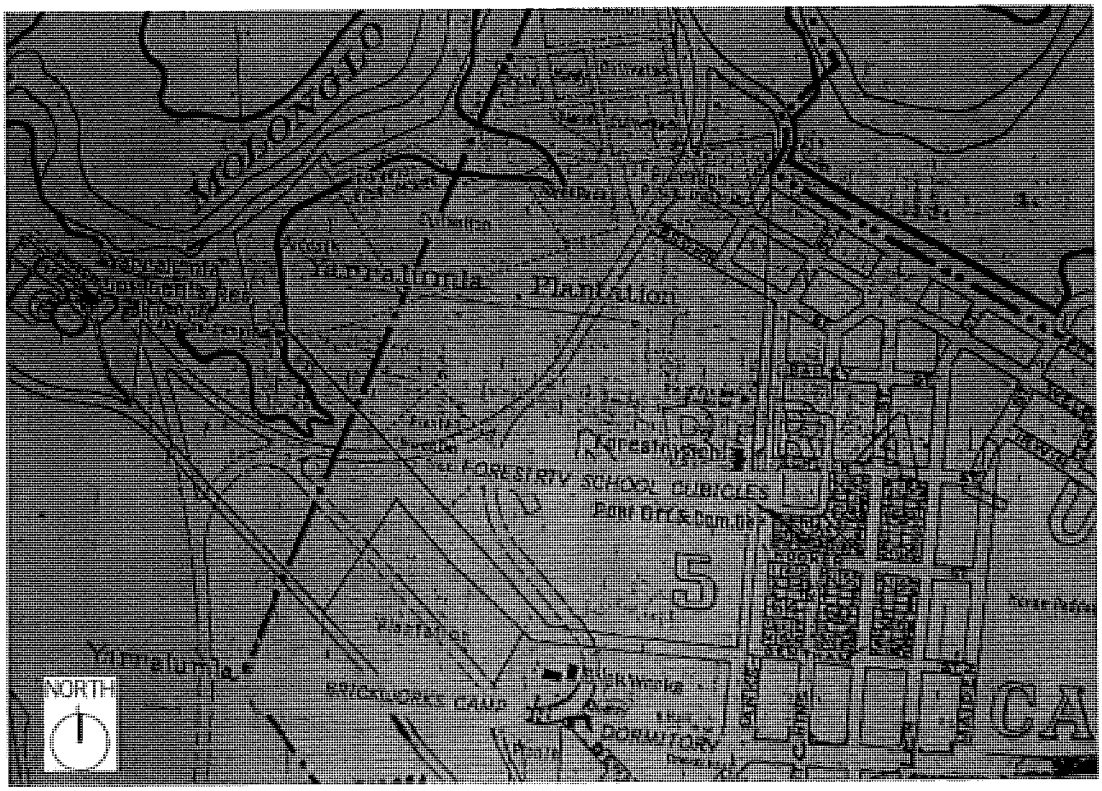

Figure 70 Plan of Yarralumla, 1927. The street layout (pictured right), derives from Griffin's scheme and was not fully realised.
Source: Ann Gugler, *The builders of Canberra, 1909-1929*, chapter 3.

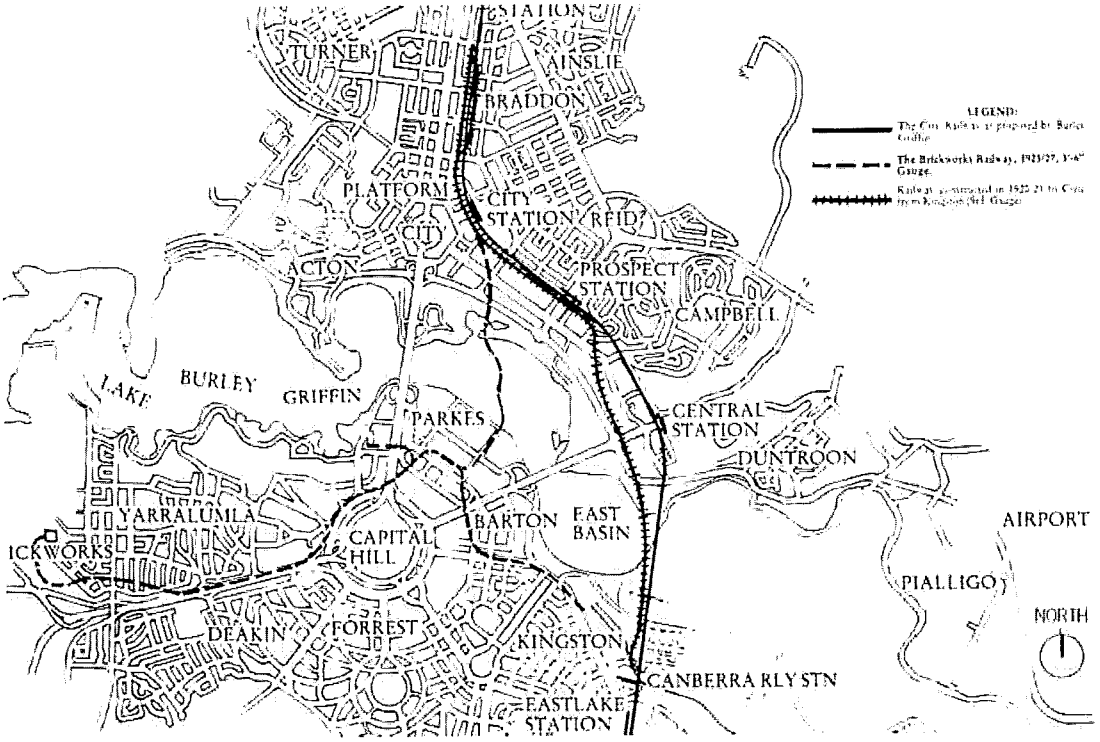

Figure 71 Plan of Canberra with the Brickworks Railway (broken lines) superimposed.
Source: Canberra's Engineering Heritage (www.engineer.org.au)

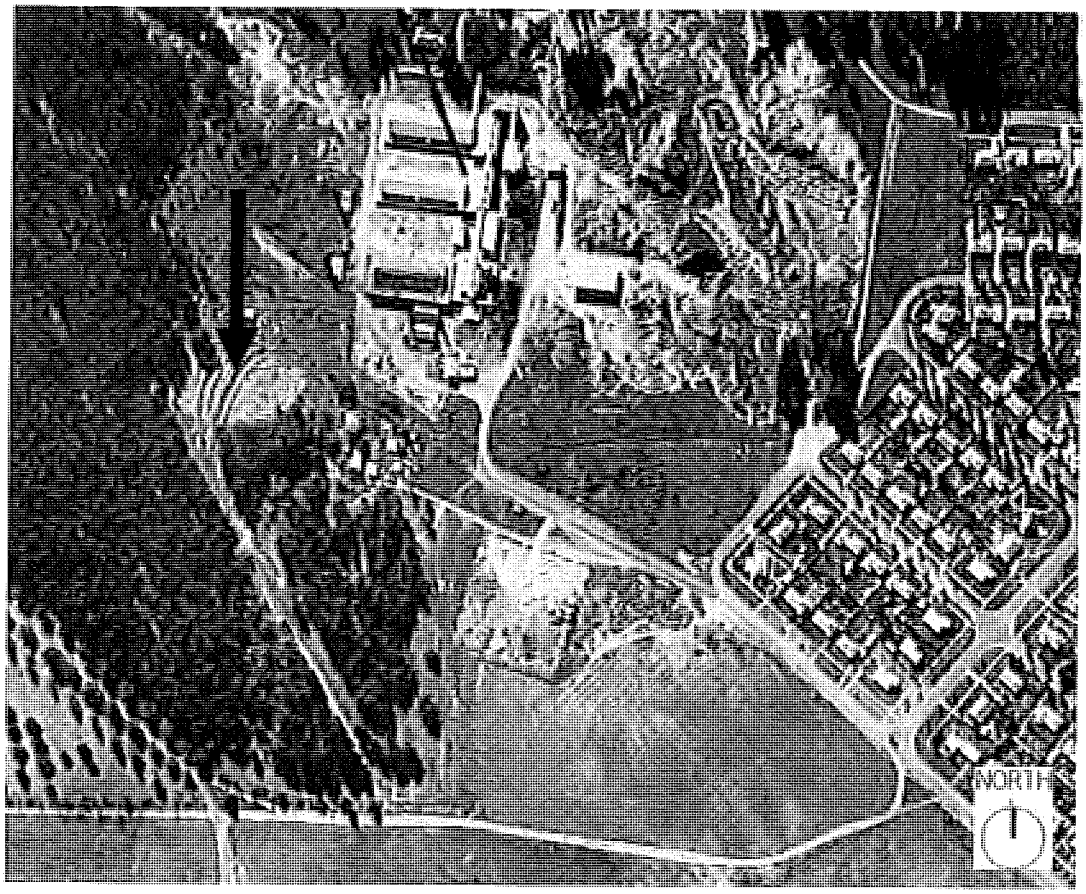

Figure 72 Aerial view of Canberra Brickworks, 1961. Note the railway cutting to the west of the site. The route of the railway east towards the city is also evident. Source: ACT Planning and Land Authority.

Principal of the Forestry School, Charles Lane Poole (see Figure 68).[5] The property survives, and the Lane Pooles are remembered in the name of the residential street to the north of the Brickworks.[6] Also in 1927/28, 27 'lined cubicles' and 'mess, recreation and ablution areas' for students were constructed in the grounds of the Forestry School.[7]

In the late 1920s, Westridge was an isolated outpost of the emerging National Capital. The area was not recognised as a suburb until October 1935, following complaints from local residents that they had been overlooked by the authorities (see Figure 69 and Figure 70).[8]

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5 'Westridge House,' viewed at uncommonlives.naa.gov.au, accessed 31 January 2010.

6 Lane Poole Place was developed during the 1980s, following the decommissioning of the Brickworks (1976), and subsequent re-zoning of the site (1979). See Chapter 6.

7 Ann Gugler, *The builders of Canberra, 1909-1929. Part one*, chapter 3.

8 Ann Gugler, *The builders of Canberra, 1909-1929. Part one*, p. 77.

4.1.2 *Canberra Brickworks revived*

Repairs to machinery at the Canberra Brickworks were made in 1920, and the complex was re-opened early in 1921, with Mr W K Newbold as manager and a staff of only 35.[9]

A tile making plant was installed in 1922, located to the south of the 'Machine Shed'. In 1925, Dr Wunderlich of the Wunderlich Tile Company, Sydney reported to the Government that £5,000 had been expended on a small tile making plant, and that tiles were of poor quality. He recommended a £15,000 upgrade, however the Government decided to spend £2,000 on improving the product.[10]

By the end of 1923, five million bricks and 50,000 tiles had been produced at the plant by a workforce of 53.[11] The bricks produced at Yarralumla in this period were generally regarded as being of high quality. In 1925, Dr Wunderlich reported that, 'the Canberra Brickworks has been turning out a brick of remarkably fine quality; in fact a quality unnecessary for ordinary construction work'.[12]

Initially, bricks were transported from the Brickworks to the construction sites in the emerging city centre by traction engine. However, the machines were able to make only two daily round trips. To speed the process a light railway was constructed, leading from the south-west of the brickworks site, before aligning with the present Denman Street and heading east to the construction sites (see Figure 71). A bridge was constructed to carry the trains over the Molonglo River to the Civic Centre (now known as Civic). The 3' 6" (1,067mm) gauge steam powered railway was operational by the end of 1923.[13]

The 'branch lines' of the light railway were removed prior to the opening of the Provisional Parliament Building in May 1927 and the remaining sections of the railway were removed in 1929. From the late 1920s, bricks were transported by truck. The route of the railway is shown on a 1961 aerial view of the site (see Figure 72). It is believed that the only remaining evidence of the light rail network is the formation between Denman Street and the west side of the Brickworks.[14]

To cope with increased demand during the 1920s, two 'temporary' downdraught kilns and an associated stack were constructed in October 1925. These were oriented east-west and located close to the site of the three 1960s Downdraught kilns that remain today (see Figure

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9 Lester Firth and Associates, 1986, Section 2.1.2. Sources are not cited.

10 National Archives of Australia, File no. 25/15958, cited in Lester Firth and Associates, 1986, Section 2.1.2.

11 Dates and figures in this paragraph are taken from Lester Firth and Associates, 1986, Section 2.1.2. Sources are not cited.

12 *Queanbeyan Age,* 16 July 1925, cited in Lester Firth and Associates, 1986, Section 2.1.2.

13 Walter M Shellshear, author of Chapter 2 (Railways) in W C Andrews & Alan Fitzgerald, *Canberra's Engineering Heritage*, Institution of Engineers, Australia, Canberra Division, 1983, viewed online (unpaginated) at, www.engineer.org.au, accessed 29 January 2010.

14 Walter M Shellshear, author of Chapter 2 (Railways) in W C Andrews & Alan Fitzgerald, *Canberra's Engineering Heritage*, viewed online at, www.engineer.org.au, accessed 29 January 2010.

73). However, the additional output was insufficient to cope with the demands of the National Capital construction program; during this period at least five million bricks were purchased from outside the Australian Capital Territory. In 1926, the *Canberra Times* reported that by October of that year additional plant capable of doubling the output of the Brickworks, was to be operational.[15]

In 1926 the existing 'Machine Shed' (see Figure 74), was expanded by two bays for two new New Era 'Whittaker' brick machines and grinding pans. A Hardy patent kiln (a modified Hoffman-type kiln with a detached stack) was built and in use by early 1927, located to the north of and parallel to the Staffordshire kiln (see Figure 75 and Figure 76).[16] This kiln remains today, albeit in extensively modified form. Also during this period, a 'Scotch' kiln was in operation to the north of the Staffordshire kiln (see Figure 75), and the original section of the present office building was constructed (see Figure 78). In January 1927, the *Canberra Times* commented on the expanded capacity of the works, noting that in addition to the new Hardy patent kiln of 18 chambers (with a potential annual output of six million bricks), a new down draft tile kiln was operating with an annual output of 420,000 tiles and a new Roman tile machine had a daily output of 2,000 tiles. It also noted that three hand presses had been installed (presumably in the Machine Shed) 'for all classes of special work'.[17]

Ironically, considering the scale of the expansion works, with the end of major building operations in the ACT, the demands on the Brickworks were greatly reduced. The 1927/28 Federal Capital Commission *Annual Report* noted that the plant at Westridge, which comprised one 'Hoffman' (the Hardy patent kiln), one Staffordshire and two Downdraught kilns, was capable of producing 12,000,000 bricks and 500,000 tiles per annum. The report also noted that extra crushing plant and equipment was installed at the quarry, and large supplies of material for road construction and use in building works had been obtained. The Joinery Shop, Mechanical and Electrical Workshops had operated during the year although the Joiner's Shop was to be closed due to lack of demand.[18]

Due to instability, quarrying was reportedly more difficult and costly at Yarralumla as compared to other Brickworks. A comparison of prices in 1929 showed that 1,000 common Canberra Bricks cost £6.11s while the State Brickworks in Sydney could supply 1,000 commons for £2.18s 6d. But freighting 1,000 bricks to Canberra cost £5.1s, almost as much as it cost to manufacture them at Yarralumla. In addition the Brickworks was operating at a loss, because of Commission policies to sell bricks to private enterprise at little above cost price to make building as cheap as possible. Bricks for public servant homes were sold below cost price to give further incentive for them relocate to Canberra.[19]

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15 Cited in Lester Firth and Associates, 1986, Section 2.1.2. The date of the *Canberra Times* article is not included.

16 Lester Firth and Associates, 1986, Section 2.1.2, source uncited.

17 *Canberra Times*, 6 January 1927, p. 1.

18 Lester Firth and Associates, 1986, Section 2.1.2, citing the *Annual Report of the Federal Capital Commission*, 1927 and 1928.

19 Lester Firth and Associates, 1986, Section 2.1.2, citing the *Annual Report of the Federal Capital Commission*, 1929.

The 1929 Depression saw production severely curtailed. To minimise costs, timber was used for firing kilns instead of coal. Production eventually ceased altogether and the works closed in February 1931. Stockpiled bricks were used for essential construction purposes only. As the economy revived, Government funds were again available for office accommodation for public servant transfers to Canberra. Restricted production at the Canberra Brickworks began again in 1935. From this period problems with shale quality (limestone intrusion) meant that most material for brick production had to be brought to the site from elsewhere. Evidence of this limestone problem is evident in the rock outcrops in the quarry area.[20]

The late-1930s was a boom time for the construction of Canberra, and the Canberra Brickworks was unable to meet demand. On 19 October 1939 the *Canberra Times* reported that daily production at the brickworks was 45,800 bricks, and the average consumption in building operations was 50,280, a situation that required the purchase of 631,500 bricks from the Bowral works in New South Wales.[21] For the 12 months ending December 1940, the output of 7.25 million bricks was the highest since the boom days of the 1920s.[22]

World War II diverted peace time activity to works associated with the war effort, and saw the closure of the Brickworks once again. In April 1942 staff were laid off and a caretaker manager retained to issue bricks for essential works. At the time, three million bricks were in stock, some of which were used in the construction of the US Legation in Canberra.[23]

The range of products for building purposes produced at the Brickworks in the 1930s was enormous. A 1936 Stock Sheet of the Department of Interior lists all products and includes: 3" common bricks, 3" Face bricks (red), 3" Black bricks common, 2" Paving bricks, 2" Face bricks (red), 3" semi-glazed Face Bricks, 3" Chocolate Face bricks, 3" Pavers, 2" Common bricks, Squints, Ovolo Double return bricks, Special Mould bricks, Ovolo Type 8, Ovolo Type 17, Splay on End 3", 3" Splay on End Flat double, Angle Bricks, Scotia, Cornice, 3" Bull Nose Bricks, Plinth single Return, Double Return, Bull nose stops – single and double, Vents, Louvres, Air Bricks, kerbs, Tiles – Marseilles, Roman, with apex, ridge, starters and stops, paving tiles, chimney pots, fluted bricks and facing tiles.[24]

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20 Lester Firth and Associates, 1986, Section 2.1.2, source uncited.

21 'Canberra Bricks – Local Production Inadequate, Imports From Bowral,' *Canberra Times*, 19 October 1939, reproduced in Ann Gugler, *Canberra 1930-1943 & 1949, articles from the* Canberra Times *& other sources*, Mawson, ACT, 2002, p. 19

22 *Canberra Times,* 17 January 1941, cited in Lester Firth and Associates, 1986, Section 2.1.2.

23 Department of the Interior memo no. C480 16 April 1942, cited in Lester Firth and Associates, 1986, Section 2.1.2.

24 Department of Interior, Stock Sheet, 1936, referenced in Lester Firth and Associates, 1986, Section 2.1.2.

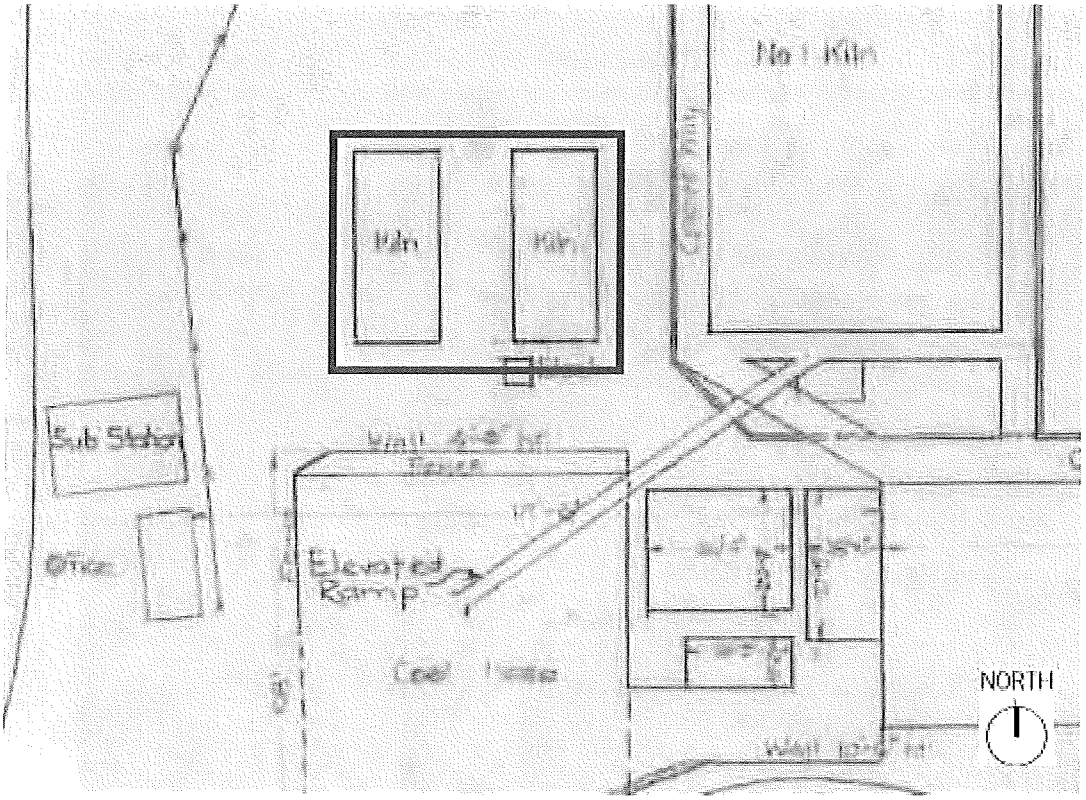

Figure 73 Detail of 1947 site plan, indicating the location of the two 'temporary' Downdraught kilns, to the south of the Staffordshire kiln ('No. 1 Kiln'). .
Source: National Archives of Australia.

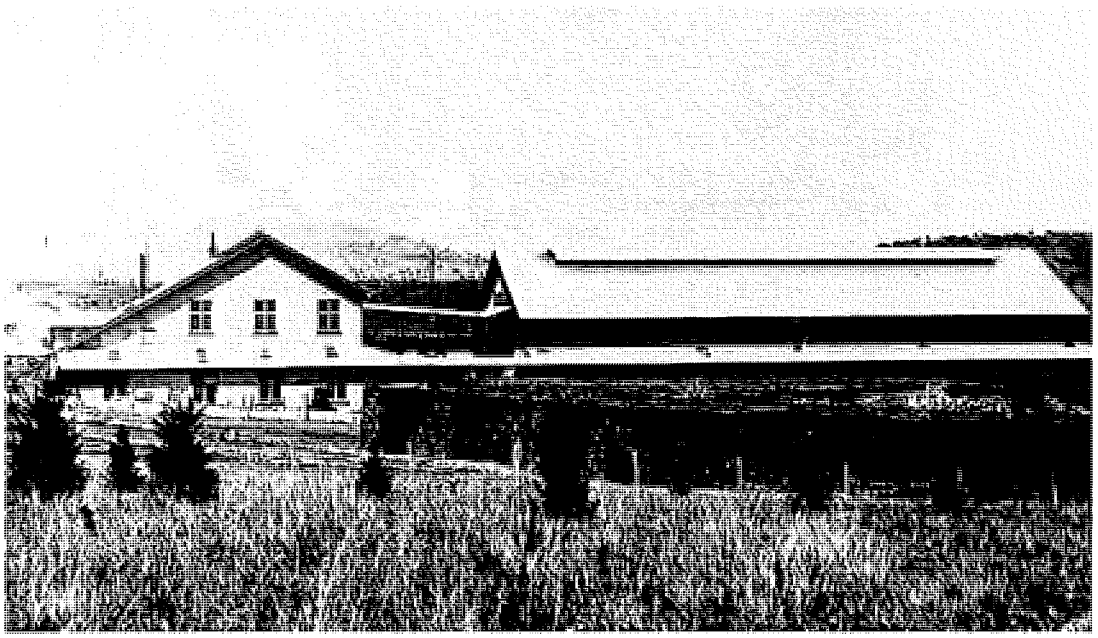

Figure 74 The Machine Shop (left), pictured mid-1920s.
Source: National Library of Australia.

Figure 75 Hardy patent kiln under construction, 1926. Note Scotch kiln to right of picture.
Source: National Archives of Australia.

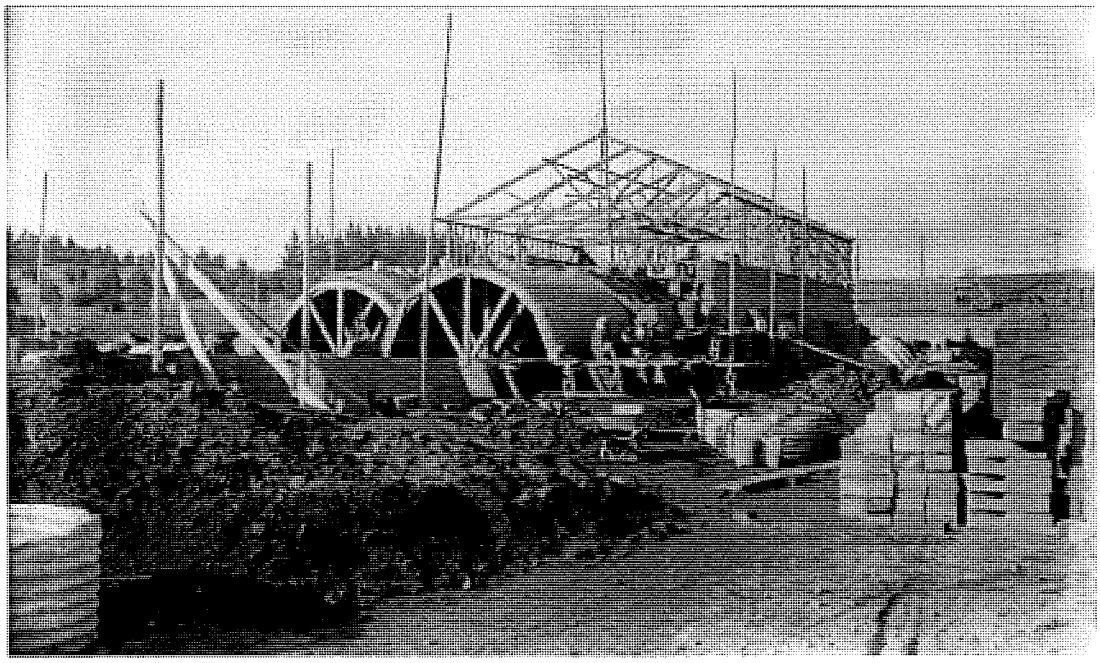

Figure 76 Hardy patent kiln under construction, c. 1926.
Source: National Archives of Australia.

4.2 Datasheets for Expansion Phase elements

No	Name/Description	Date of construction
07	Offices	c. 1925
08	Hardy patent kiln	c. 1926-27 (rebuilt 1955)
09	Fan house for Hardy patent kiln	c. 1927 (second phase c. 1955)
10	Chimney stack for Hardy patent kiln	c. 1926-27

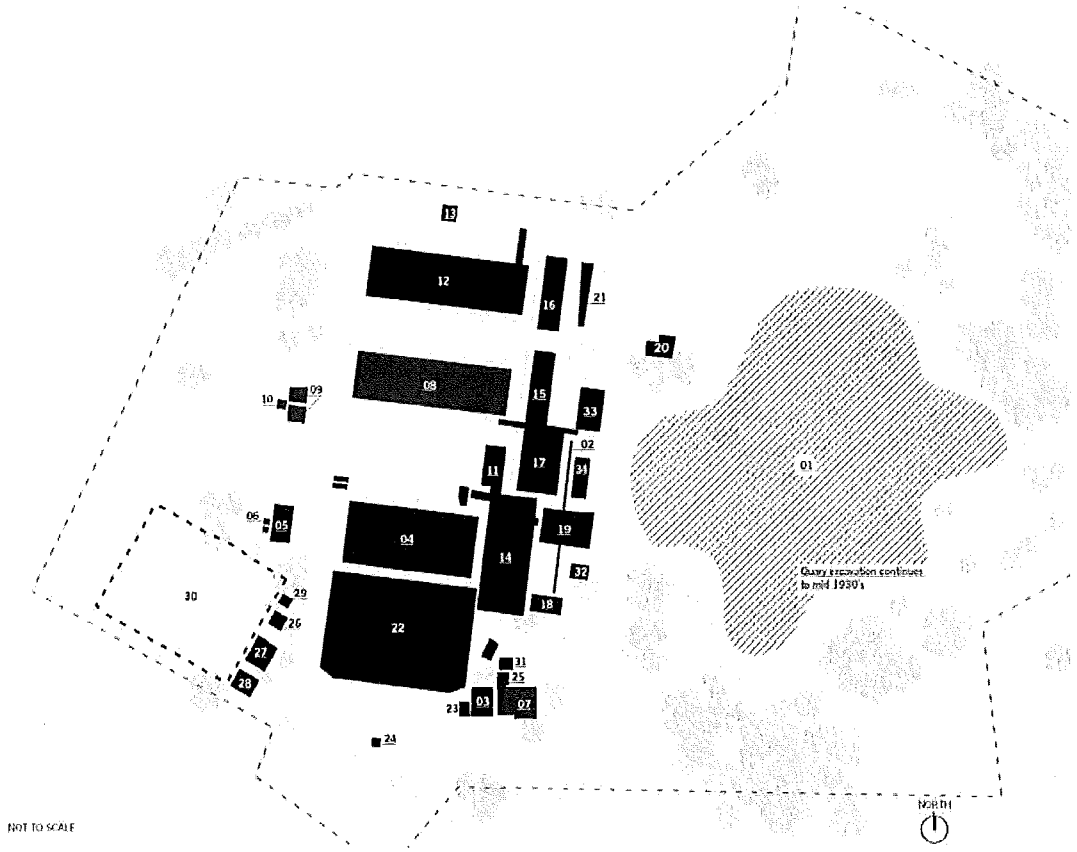

Figure 77 Location of elements surviving from the Expansion Phase. Refer to the larger scale site plan in Chapter 1 for more detail.

Name	Offices	**Building No**	07
Construction	Brick with terracotta tiled roof, brick additions roofed with steel sheet	**Survey Date**	3 December 2009
Historical Phase	Expansion phase 1921-1942	**Date**	c. mid 1920s, extended c. 1953 and 1970s

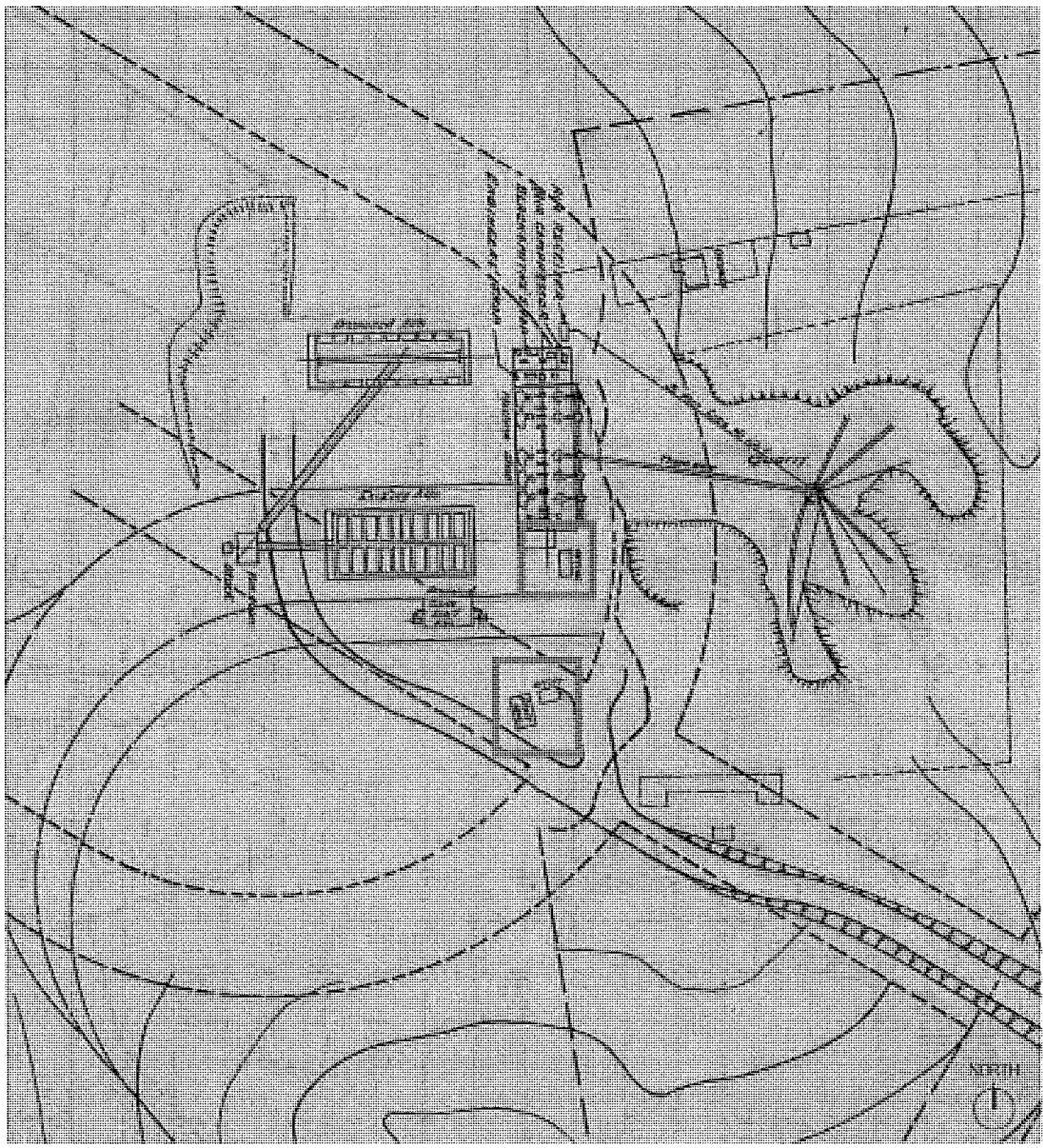

Figure 78 Detail from the Canberra Brickworks site plan, April 1926. The present office building (right), subsequently extended, and the original office (left), later demolished, are highlighted.
Source: National Archives of Australia.

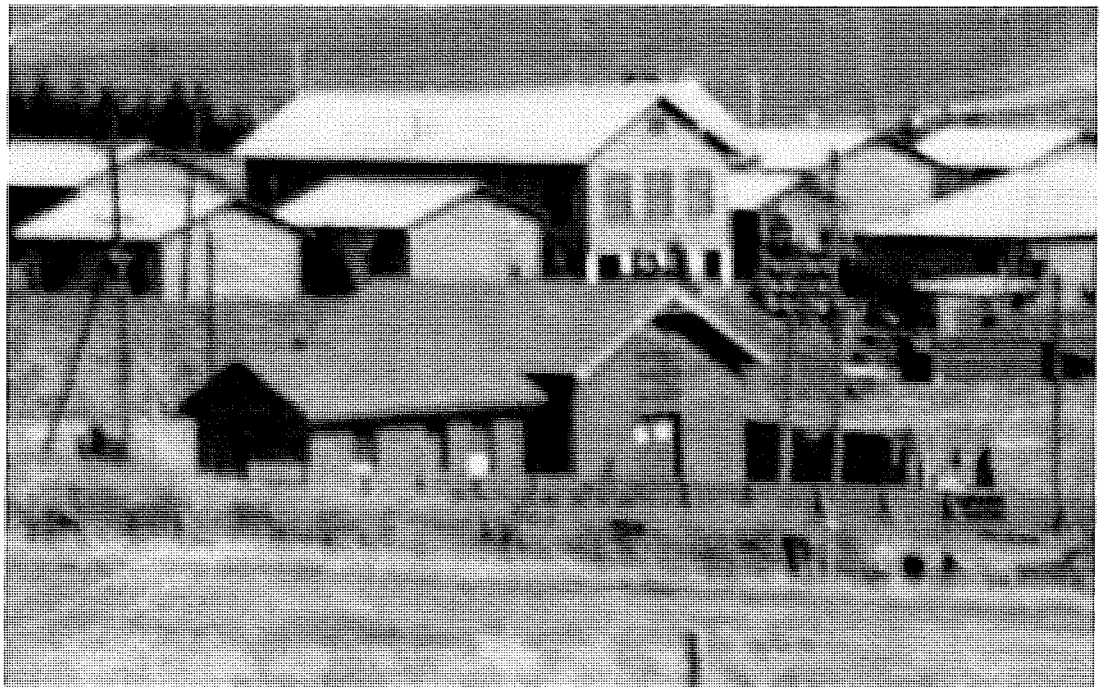

Figure 79 Detail of a photograph of the Brickworks site in 1929 taken from the quarry area, showing the original form of the office building to the east of the Power House (foreground). Note that at this date, the main entrance to the Power House is from the north. The married quarters camp is in the background. Source: National Archives of Australia.

Figure 80 South elevation. Part of the Power House (Building 3) is visible at left.

Figure 81 East and north elevations, showing the extent of the additions. The only portion of the original two-roomed structure, not enclosed by additions is indicated by the arrow.

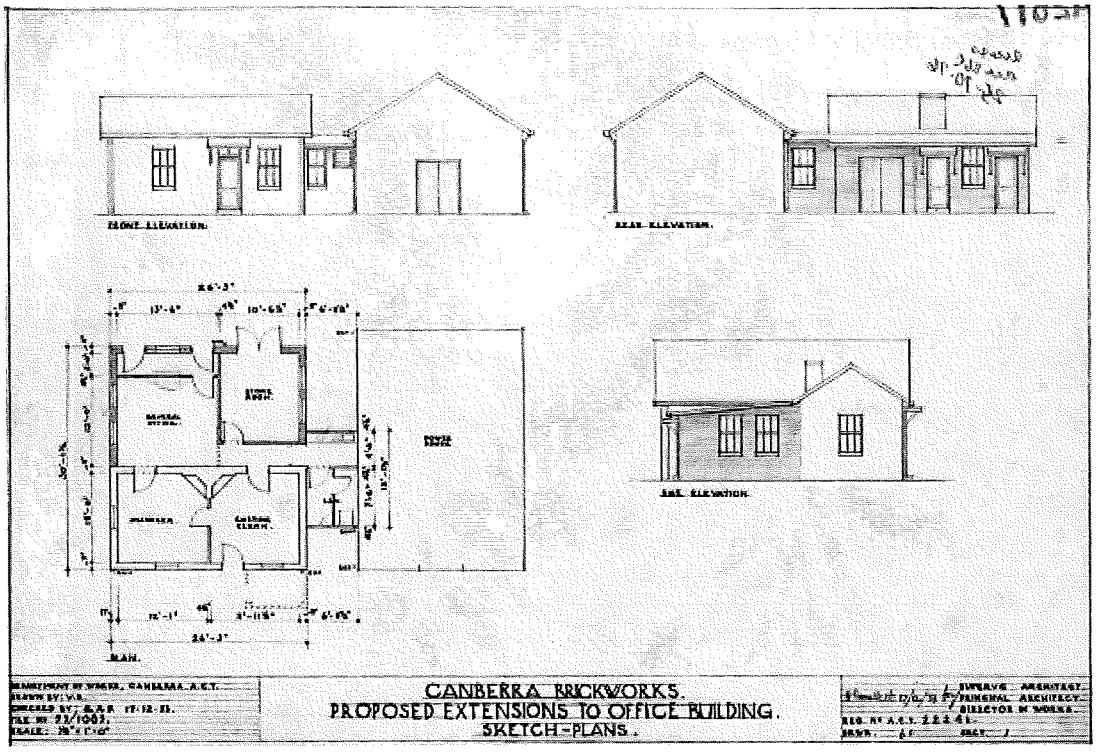

Figure 82 Office extension, consisting of a two roomed addition to the south and a lavatory/washroom infilling the space between the original structure and the Power House, 1953.
Source: National Archives of Australia.

Historical background

The Survey Plan of 1916 (see Figure 30) indicates a galvanised iron 'Office' located approximately 40 metres north of the present office building. This was subsequently removed and the site developed for the original Machine Shed. The date of construction for the original portion of the present offices – consisting of two rooms – has not been established. It is not indicated on a site plan dated September 1921, but is represented in outline on a site plan of April 1926 (see Figure 78).[25] It appears in a 1929 photograph, shown at Figure 79.

The offices have been extended in at least two phases, in 1953 and during the 1970s. The 1953 works doubled the size of the original building, extending the structure to the south to provide a General Office, office for the Manager and for a Costing Clerk, as well as a store room. A lavatory and washroom were located between the office and the Power House (Building 3) (Figure 82). The extension had a skillion roof of corrugated iron. A later extension, thought to have been built during the 1970s, extended the building to the east, and further altered the south elevation.

Description & Integrity

As constructed in the mid-1920s, the office building was a small brick and tiled roofed gable ended building, sited immediately to the east of the Power House. A number of extensions have been made to the original building, with extant drawings prepared in both 1953 and 1958 for alterations and extensions to the original two-roomed structure. The 1958 works appear not to have gone ahead.[26] During the 1970s a brick addition to the east and a new verandah partially enclosed the remainder of the south elevation, abutting the Power House. In addition, a small brick extension was added to the rear (north) of the building, and small skillion roofed outbuildings were constructed to the east and north.

The subsequent alterations have diminished the integrity and obscured the presentation of the building.

It was not possible to inspect the interior of the building during the site visit. The building - including the interior, it is understood - has been extensively vandalised.

25 Commonwealth of Australia. Dept. of Works and Railways. Canberra, Brickworks Layout. 14 September 1921, M1970C, National Archives of Australia; Federal Capital Commission. Commonwealth of Australia. Dept. of Works & Railways. Canberra Brickworks. Site Plan. 6 April 1926, National Archives of Australia respectively.

26 Lester Firth and Associates, 1986, 'O Office complex' data sheet, Appendix 2, source uncited.

Name	Hardy patent kiln I	**Building No**	08
Construction	Brick, upper floor and roof of corrugated galvanised steel	**Survey Date**	3 December 2009
Historical Phase	Expansion phase 1921-1942	**Date**	1926-27; substantially rebuilt in c. 1955

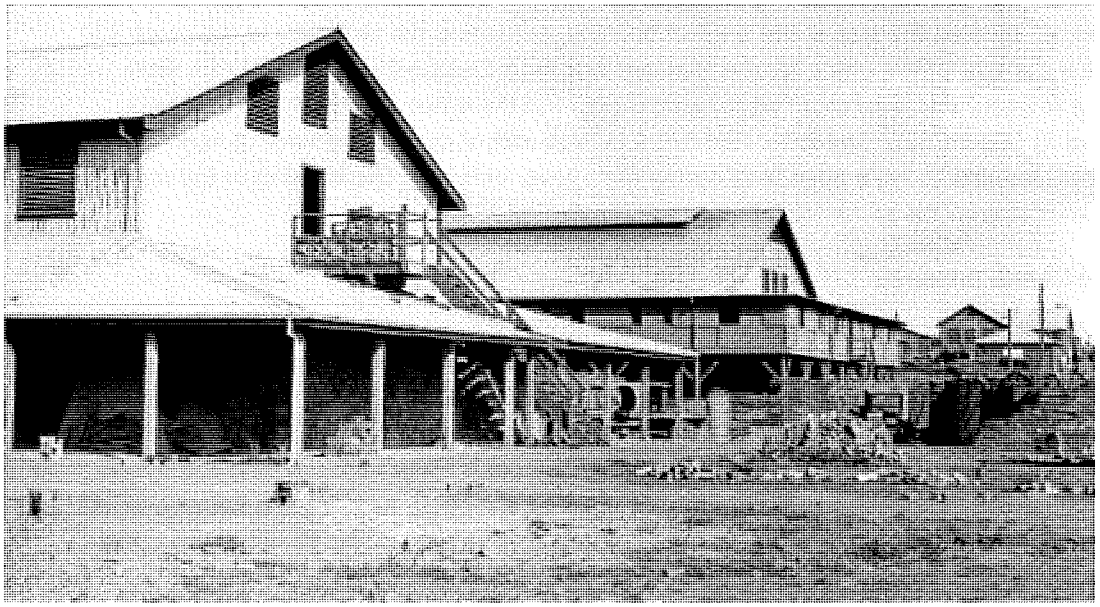

Figure 83 The first Hardy patent kiln (left) and the Staffordshire kiln in1928.
Source: National Archives of Australia.

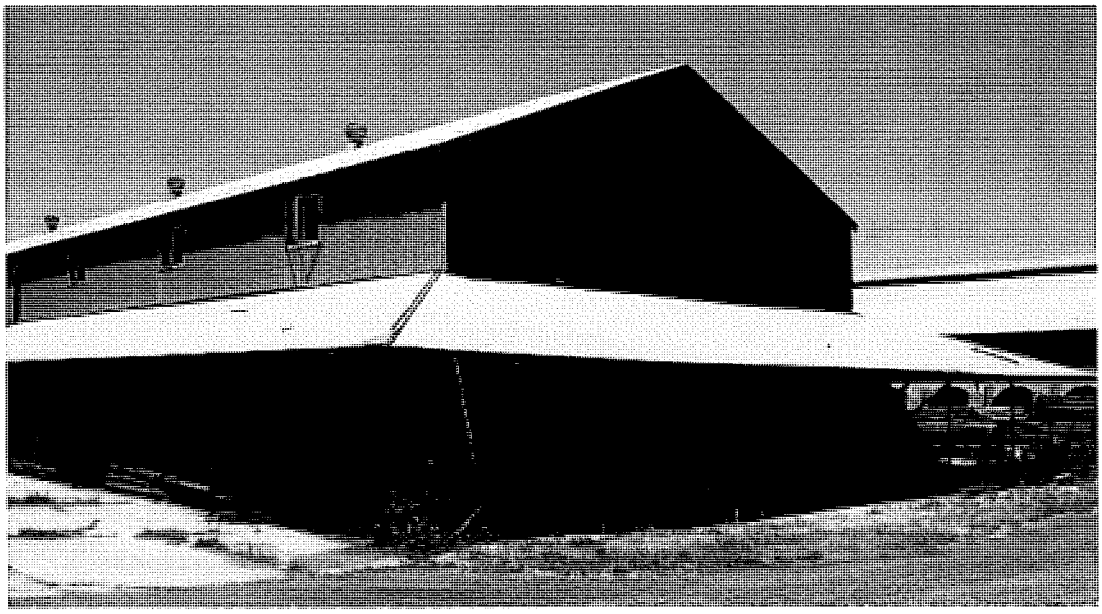

Figure 84 The Hardy patent kiln showing the west and part of the north elevation.

Figure 85 Interior of the Hardy patent kiln. The kiln is divided in two by a non-original brick wall.

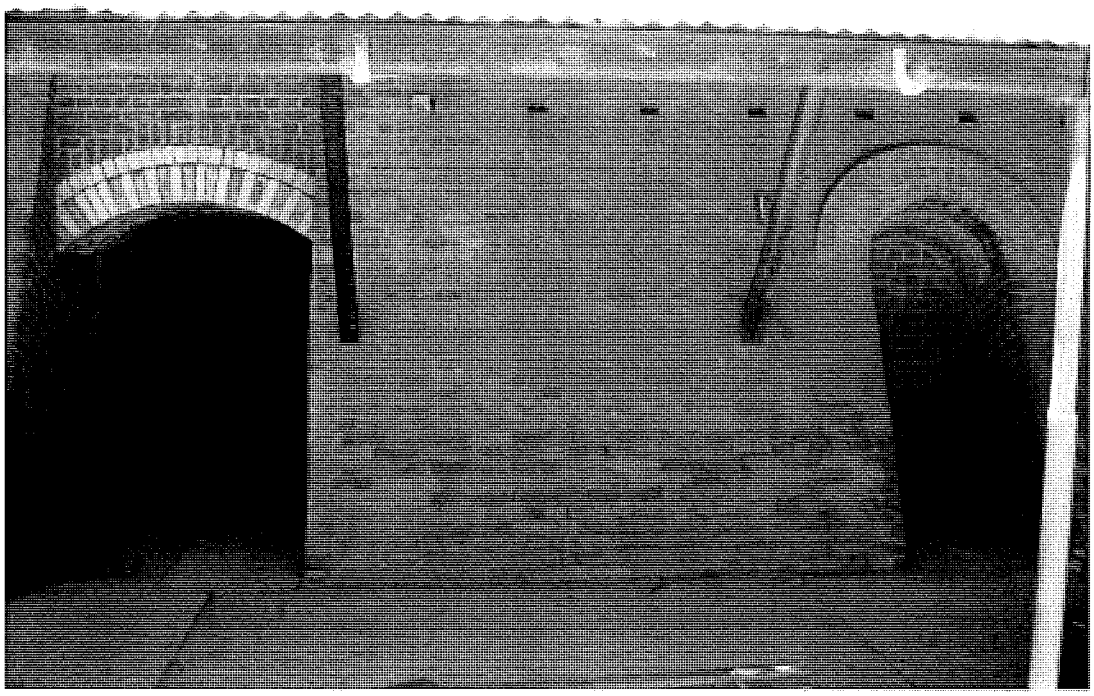

Figure 86 Kiln wickets – the opening at left has been altered to enable forklift access and the bricked-up the opening at right is as originally built.

Figure 87 Interior of the firing floor, showing remnants of a commercial fitout dating from the late 1970s.

Historical background

The Hardy patent kiln (Building 8) was built in 1926, and became operational in 1927. It was a critical component of the drive to double the output of the Brickworks in the build up to the relocation of the Parliament to Canberra (1927) and the transfer of public servants the following year.[27] Other components of the expansion of the Brickworks during the mid-1920s were two 'temporary' downdraught kilns (built in 1925, and demolished in the early 1960s), which were located close to the site of the present downdraught kilns, and a Scotch kiln (undated and demolished) located to the north of the Staffordshire kiln. The Hardy patent kiln fired continually in a clockwise cycle, and was able to produce up to 150,000 bricks per week (though in January 1927 the *Canberra Times* estimated annual output for the kiln as up to 6 million bricks). [28] A firing cycle lasted for 14 days.[29]

In the mid-1950s the partially collapsed kiln was extensively rebuilt. It was also extended at that time from 18 to 20 bays, though details of these works have not been located. Further works are understood to have been undertaken in the 1970s.[30]

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27 Cited in Lester Firth and Associates, 1986, Section 2.1.2. The date of the *Canberra Times* article is not included.

28 *Canberra Times*, 6 January 1927, p. 1.

29 Lester Firth and Associates, 1986, 'K2 Hardy patent' data sheet, Appendix 2, source uncited.

30 Lester Firth and Associates, 1986, 'K2 Hardy patent' data sheet, Appendix 2, source uncited.

Description & Integrity

The Hardy patent kiln is a two-storey structure of brick construction with a lighter-weight upper level clad in corrugated galvanised steel. The ground floor comprises 20 arched brick openings or 'wickets', which provide access to the two kiln chambers, which are oriented east-west. In the late 1960s each alternate wicket was widened to permit egress of forklifts. Other wickets have been infilled with brickwork. The outer walls of the kiln are battered at approximately 60 degrees. Wicket numbers are painted onto the brickwork next to each opening. A single-storey timber verandah roofed in corrugated galvanised steel extends around all sides of the building. The verandah is supported on timber props which extend at 45 degrees from the brickwork, as well as by a series of painted steel posts. To the east the verandah abuts the skillion roofed section of the corrugated steel machine bay to its east (Machine Bay 2, Building 15).

The first floor area (the firing floor), is of steel-framed construction, clad and roofed in corrugated sheet steel. As built, the walls to the north and south were interrupted at regular intervals by openings infilled with timber louvres, providing ventilation to the space.

Today the first floor retains part of a commercial fitout related to the development of the Brickworks by A R Marr from the late 1970s to the early 1980s, including the remains of insulation and lining boards to the ceiling and part-removed wall linings. There are a number of metal framed casement windows to the north and south walls. The position of these is unrelated to the original configuration of louvred openings and is thought to date from the rebuilding of much of the kiln structure in the 1950s. The floor retains a number of the firing holes and handles for opening and closing the flues. A portion of the floor area has been excavated and the form of the firing holes can be seen.

Originally, access to the west end of the firing floor was via a timber stair, which rose through the verandah to this elevation (see Figure 83). Today the re-cladding of the end wall and the present verandah form has removed any evidence of this access point. The east end has been modified with a walkway at first floor level extending from the south elevation and connecting the firing floor with the adjoining machine bay behind (the latter dating to the mid-1950s). Access to the firing floor is now through a single leaf ledged and braced timber door in the east wall.

The existing roof, first floor cladding and verandah roofing are thought to date from the early 1970s, when fire damaged the structure.[31]

The interiors of the kilns have been part floored in cement pavers, and divided by a non-original brick wall. These works were undertaken as part of the A R Marr post-closure development proposal.

31 Lester Firth and Associates, 1986, 'K2 Hardy patent' data sheet, Appendix 2, source uncited.

Name	Fan houses for Hardy patent kiln I	**Building No**	09
Construction	Timber frame, corrugated steel cladding	**Survey Date**	3 December 2009
Historical Phase	Expansion phase 1921-1942	**Date**	c. 1926, 1955

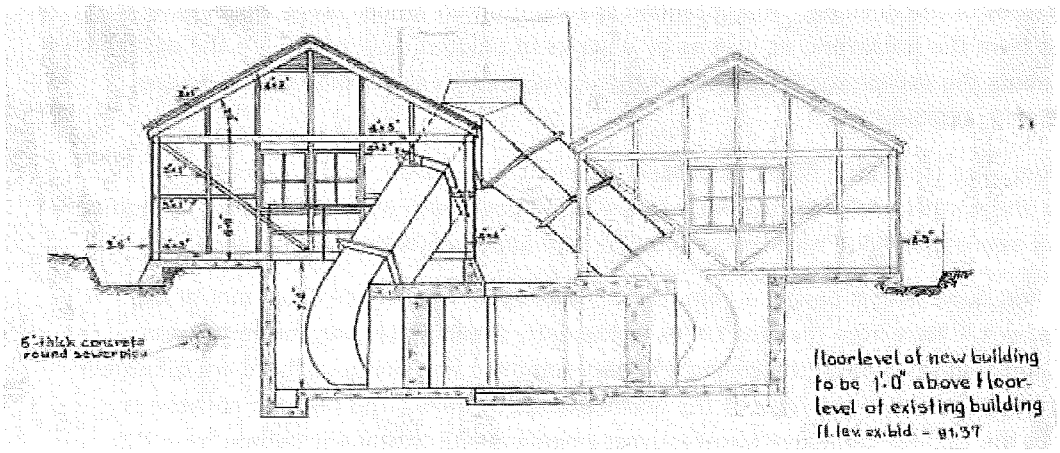

Figure 88 Section through the fan house for the Hardy patent kiln constructed in 1955. Source: National Archives of Australia.

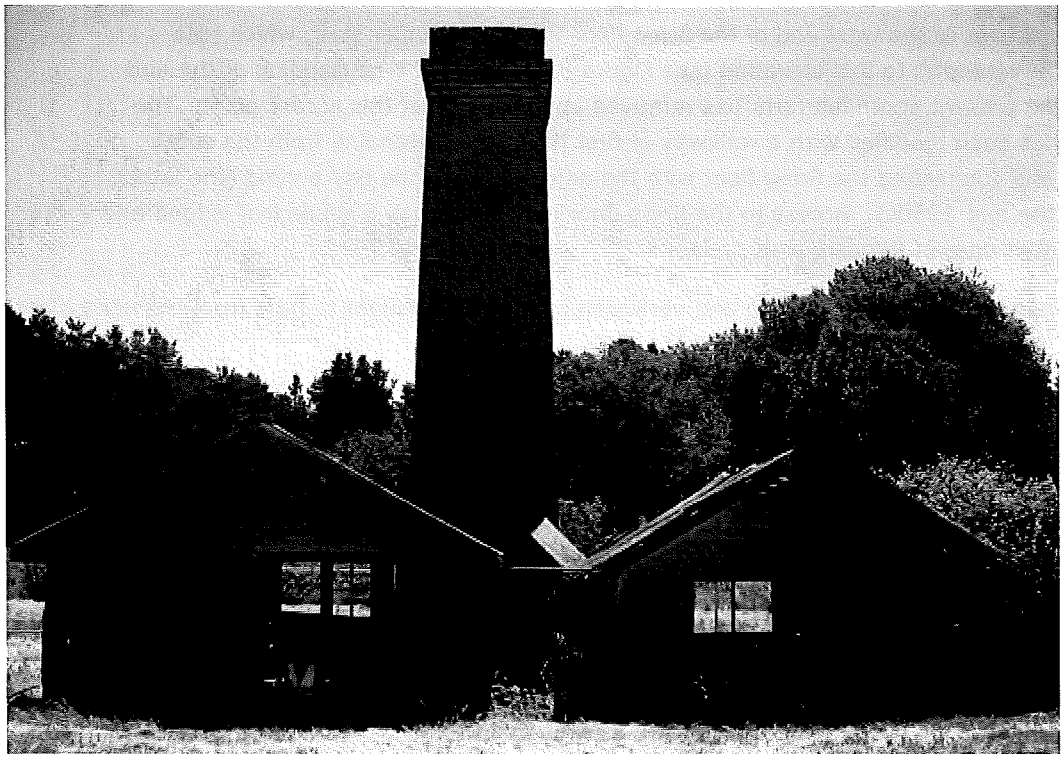

Figure 89 The fan house at right is the earlier of the two (1927). The fan house on the left was added in 1955.

Figure 90 Interior of the 1927 fan house.

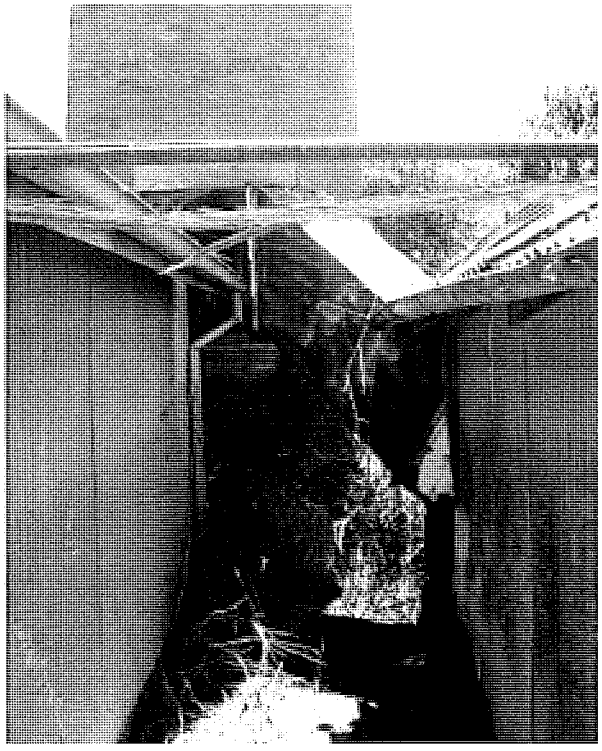

Figure 91 Ducts connect through to the chimney stack.

Historical background

The first stage of the Hardy patent kiln fan house was constructed in c. 1926 and was a considerably more modest structure than that constructed to support the Staffordshire kiln. It is located approximately 20 metres west of the Hardy patent kiln.

In 1955, plans were prepared to provide additional exhaust capacity and the fan house was augmented by a near identical structure was constructed immediately to its south. This structure was set approximately 30 centimetres above the floor level of the earlier building. The need for additional capacity may have related to the rebuilding and extension works to the Hardy patent kiln which was expanded from 18 to 20 chambers in c. 1955.

Description & Integrity

The fan house comprises two timber-framed sheds, with gabled roofs, clad and roofed in corrugated steel. There is an entry to the east elevation and windows in the rear and outer walls. Part of the wall cladding has been removed, and the glazing has also been broken and many of the glazing bars are missing. The entry doors have also been removed.

Internally, similar to the Staffordshire kiln fan house, the floor is below ground level and there is an, entry apron with metal handrail. Evidence remains of the now removed fan machinery, the location of which is discernible by the pedestal mount of the fan machinery. The ducts connecting the fan house with the stack are *in-situ*, and unlike the Staffordshire kiln fan house, these are visible rising out of the rear wall of the fan houses and connecting to the east elevation of the stack at a height of approximately two metres (Figure 91).

The fan house is in an advanced state of disrepair and the c. 1926 structure is severely impacted upon by unchecked growth of blackberries.

Name	Chimney Stack for Hardy patent kiln I	**Building No**	10
Construction	Brick	**Survey Date**	3 December 2009
Historical Phase	Expansion phase 1921-1942	**Date**	c. 1926-27

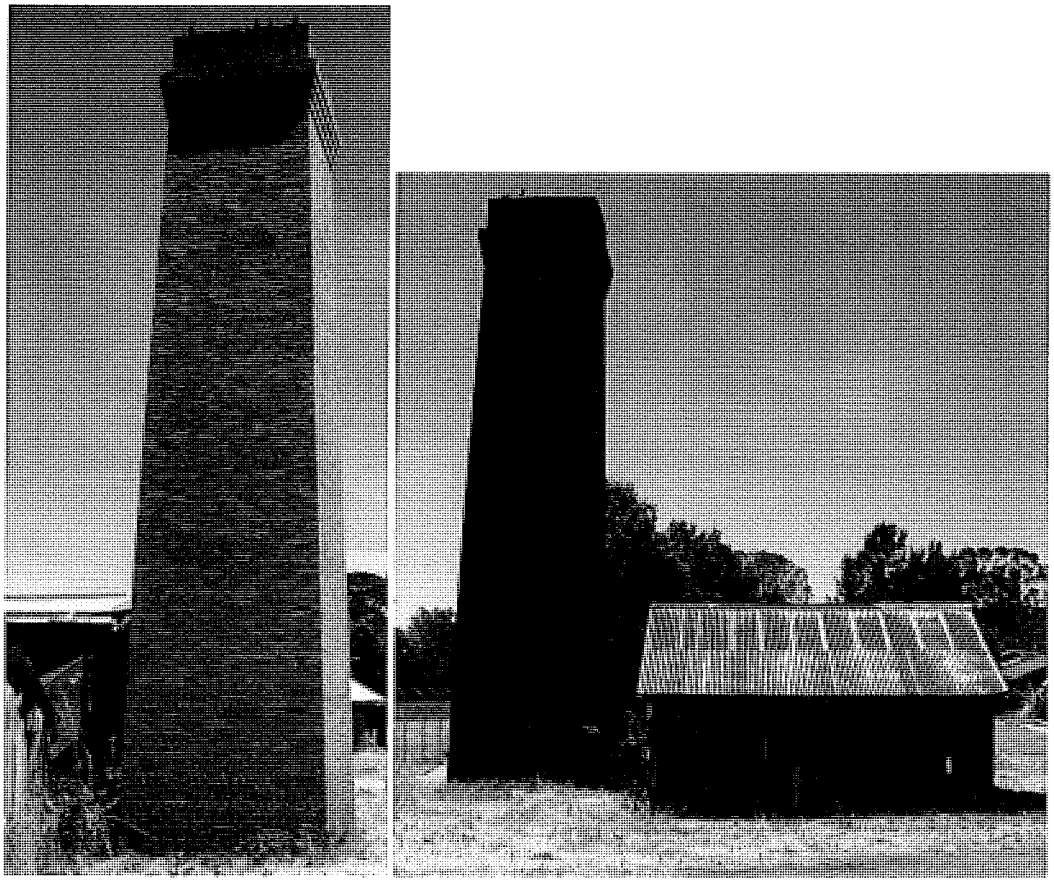

Figure 92 Left: North elevation. Right: South elevation with the 1955 fan house adjoining.

Historical background

The brick stack was built to service the 1927 Hardy patent kiln. While the stack is virtually identical to the Staffordshire kiln stack, in this case ductwork linking the fan house to the stack is not placed below ground and adjoins the stack through an opening in the east elevation approximately two metres above the ground.

Description & Integrity

The chimney stack, constructed of face red brick, is adjacent to the fan house and located approximately 30 metres west of the kiln building. A gravelled roadway separates the kiln from the stack and fan house. The stack is capped with several courses of corbelled brickwork and surmounted by nine rows of brickwork. There is a significant crack in the north elevation of the brickwork above the stepped courses. There is an arched opening in the south face of the stack, infilled with brickwork.

5.0 HISTORY & PHYSICAL ANALYSIS: POST-WW II PHASE 1944-1976

5.1 Historical background

5.1.1 *Post-war Growth (1944-1963)*

With the end of World War II in sight, the Canberra Brickworks reopened in September 1944, with production on a limited scale. From the late-1940s and into the 1950s output was stepped up to provide material to address the post-war housing shortage, resulting in a major expansion and redevelopment of the Brickworks (see Figure 93 and Figure 94).

Among the first post-war construction projects was the replacement of the Brickworks Camp (the married quarters, built during the 1920s), which had been removed by the Army during World War II. In the immediate post-War period a request for new quarters was made to attract more workers – recruitment of qualified and experienced workers was a problem during this period. The new 'Brickworks Hostel' was ready for occupation in 1945[92] and was located on the site of, or in close proximity, to the former married quarters (see Figure 95). Demolished in c. 1970, sections of the foundations of this structure survive. The Amenities Block (Building 11) also dates to the early post-War period of investment in staff facilities.

In 1952, plans for a new 'Tunnel' kiln were prepared, equipment was purchased and foundations were laid. However, the project was abandoned amid spiralling costs. The aborted Tunnel kiln project resulted in expenditure of £141,014. Department of Works records show that items of equipment purchased for the project were transferred to other sections of the Department (these items were valued at £39,193), and that redundant equipment to a value of £44,000 was still on site in 1956. A further £28,351 was lost on account of sales of redundant equipment, expenditure on site and compensation for equipment not received. Department records also note that a large prefabricated Marsden shed, which had been acquired to cover the kiln, was to be re-erected at Duntroon as a store for the Australian War Memorial.[93]

In July 1952, following the losses related to the Tunnel kiln project, responsibility for the Canberra Brickworks was transferred from the Department of Works to the Department of the Interior's Administration Branch.[94] Also in 1952, with demand for construction materials increasing, a C G D Butler of Melbourne advised the Department to build a 20-chamber 'Hoffman' kiln with a capacity of 20,000 bricks per chamber, to be located on the foundations of the Tunnel kiln (see Figure 96).[95] On 16 June 1954, the contract for the construction of a second Hardy patent kiln with loft, awning and tall stack was awarded to McDonald Bros & Co, of Lidcombe, Sydney.[96] This new kiln was to be lined with firebricks, equipped with the

92 National Archives of Australia, Series A431, cited in Lester Firth and Associates, 1986, Section 2.1.4.

93 National Archives of Australia, Series A431, cited in Lester Firth and Associates, 1986, Section 2.1.4.

94 National Archives of Australia, File no. 171/8, cited in Lester Firth and Associates, 1986, Section 2.1.4.

95 National Archives of Australia, Series A431, cited in Lester Firth and Associates, 1986, Section 2.1.4.

96 National Archives of Australia, Series A431, cited in Lester Firth and Associates, 1986, Section 2.1.4.

latest system of hot air flues and wickets and large enough to permit free movement of fork lift trucks.[97] Its price was a relatively modest £43,455.

Unlike both of the existing continuous kilns at the Brickworks, the new Hardy patent type kiln was constructed utilising natural draught for firing, as opposed to being fan-induced. As a consequence a tall chimney stack was required (see Figure 96). Ironically, the natural draught process did not work efficiently and a fan was installed within about a year.

The expansion of the Brickworks in the 1950s saw a change in the process of brick making and in the machinery required for production at the Yarralumla works. The early machine shop, adjacent to the Staffordshire kiln, was replaced with a series of brick press buildings and a workshop. The Brickworks was also equipped with a series of new crushers and hoppers, an elevator and a 'Pan Building'; and a sequence of conveyor belts (see Figure 97 and Figure 98).[98] (The operation of the site during the 1950s is described in Chapter 2). In 1955 the existing Hardy patent kiln (Building 8) was also substantially rebuilt and enlarged by two bays.

By 1956, it was reported that progress had been made in re-organising the layout of the brickworks; that a large new kiln was in operation with other kilns being substantially reconstructed; and that all brick machines were of recent installation.[99]

In 1959, a report on the operations, management, equipment and economics of the Canberra Brickworks was prepared by an H H Macey (April1959), to address concerns about the low productivity of the plant.[100] Macey found that the works were generally well planned and maintained; that the grinding was 'a little on the coarse side' resulting in bricks of moderate quality; and that a reliable supply of high quality clay at reasonable costs was a notable problem. He also expressed concerns about heat 'leakage' to the Staffordshire kiln, which he suggested could be addressed with minimal difficulty.[101]

Macey's conclusion with regard to the low productivity of the plant was:

> The works is basically a good one and capable of a much greater output than at present. The essential cause of the low output is an ill-advised bonus payment [scheme] which not only provides no incentive towards greater output, but actually encourage a lack of production ... Provided that the men can be made to work steadily and regularly at reasonable

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97 The recommendation for wide wickets was not carried through. As built, the wickets of the Hardy patent kiln were only a metre wide. See drawing, 'Canberra Brickworks layout of firing holes for No. 3 Kiln for Dept. of the Interior, n.d. M8759B,' National Archives of Australia.

98 Department of Works, Canberra Brickworks – Works Programme, 31 May 1955, drawing M8866D, National Archives of Australia.

99 Lester Firth and Associates, 1986, Section 2.1.4. Original sources for the content of this paragraph are not cited.

100 H H Macey, *Report on Canberra Brickworks*, April 1959. Copy supplied by the LDA.

101 H H Macey, *Report on Canberra Brickworks*, pp. 1-18.

rate common elsewhere, the works is capable of making a considerable profit.[102]

The development of Canberra received renewed attention with the creation of the National Capital Development Commission (NCDC) in 1958, following the *National Capital Development Commission Act, 1957*. To meet construction needs the two 'temporary' downdraught kilns (built c. 1925) were demolished to make way for three new downdraught kilns, which were reputed to be the longest in Australia.[103] These were constructed on the site of the former 'temporary' kilns in 1960-63 (Building 22), although oriented north-south rather than east-west. Each held 120,000 bricks; the process of loading, firing and unloading took seven days. With the completion of the downdraught kilns the Brickworks had a capacity of 800,000 bricks per week.[104]

During the 1960s, oil replaced coal as the fuel for firing the kilns, and modifications were made to the entrances of the three continuous kilns (the Staffordshire and two Hardy-patents) for the use of forklift trucks to set and remove bricks.[105]

5.1.2 *Decline*

In 1967, the ACT Health Services Branch inspected the Brickworks Hostel and reported that the buildings were in a state of disrepair. Late in 1970 it was reported that the hostel was to be demolished.[106]

In 1971, a large building to the west of the 1960s downdraught kilns was constructed to house drying kilns and machinery for making extruded bricks was installed ($500,000.00 plant)[107] (Building 30). This operated until the closure of the works in 1976.

By 1973, the brickworks at Yarralumla were considered to be in need of extensive modernisation and proposals were prepared by Commonwealth Brickworks Pty Ltd for upgrading. These proposals were rejected by the NCDC on environmental grounds and a new site for a brickworks was released at Mitchell, north of Canberra. The *Canberra Times* cited the reasons for moving the brickworks as: the land being required for residential purposes; excessive use of neighbourhood roads by heavy traffic; and levels of air pollution incompatible with the amenity of residential development nearby.[108] The kilns at Yarralumla

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102 H H Macey, *Report on Canberra Brickworks*, p. 19.

103 Lester Firth and Associates, 1986, Section 2.1.4. Source uncited.

104 Lester Firth and Associates, 1986, Section 2.1.4. Source uncited.

105 Lester Firth and Associates, 1986, Section 2.1.4. Dates and precise details relating to these modifications are not included, and sources are not cited.

106 Lester Firth and Associates, 1986, Section 2.1.4. Original sources uncited.

107 Lester Firth and Associates, 1986, Section 2.1.4. Source uncited.

108 *Canberra Times*, 18 June 1974, cited in Lester Firth and Associates, 1986, Section 2.1.4.

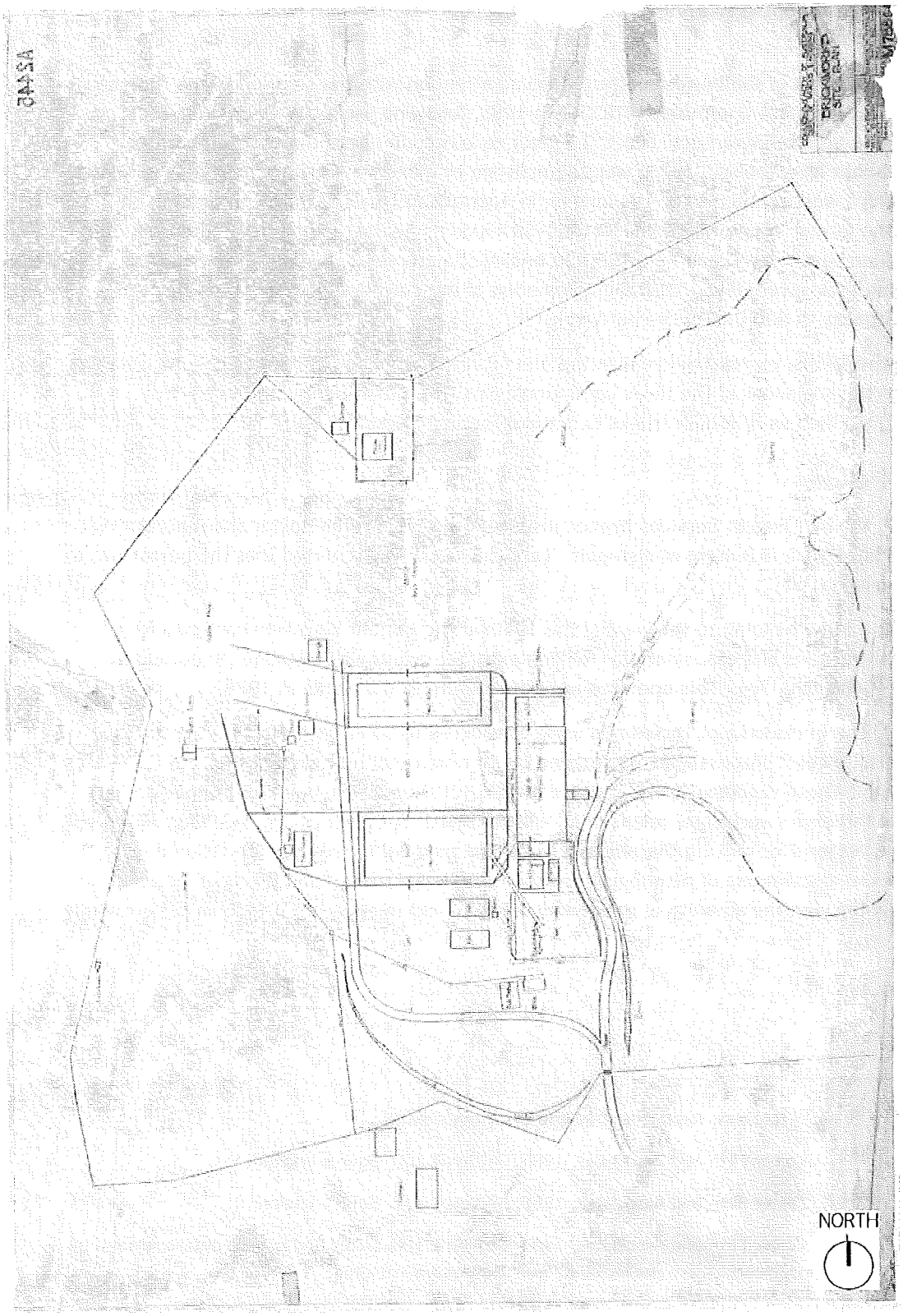

Figure 93 Site plan, 1947.
Source: National Archives of Australia.

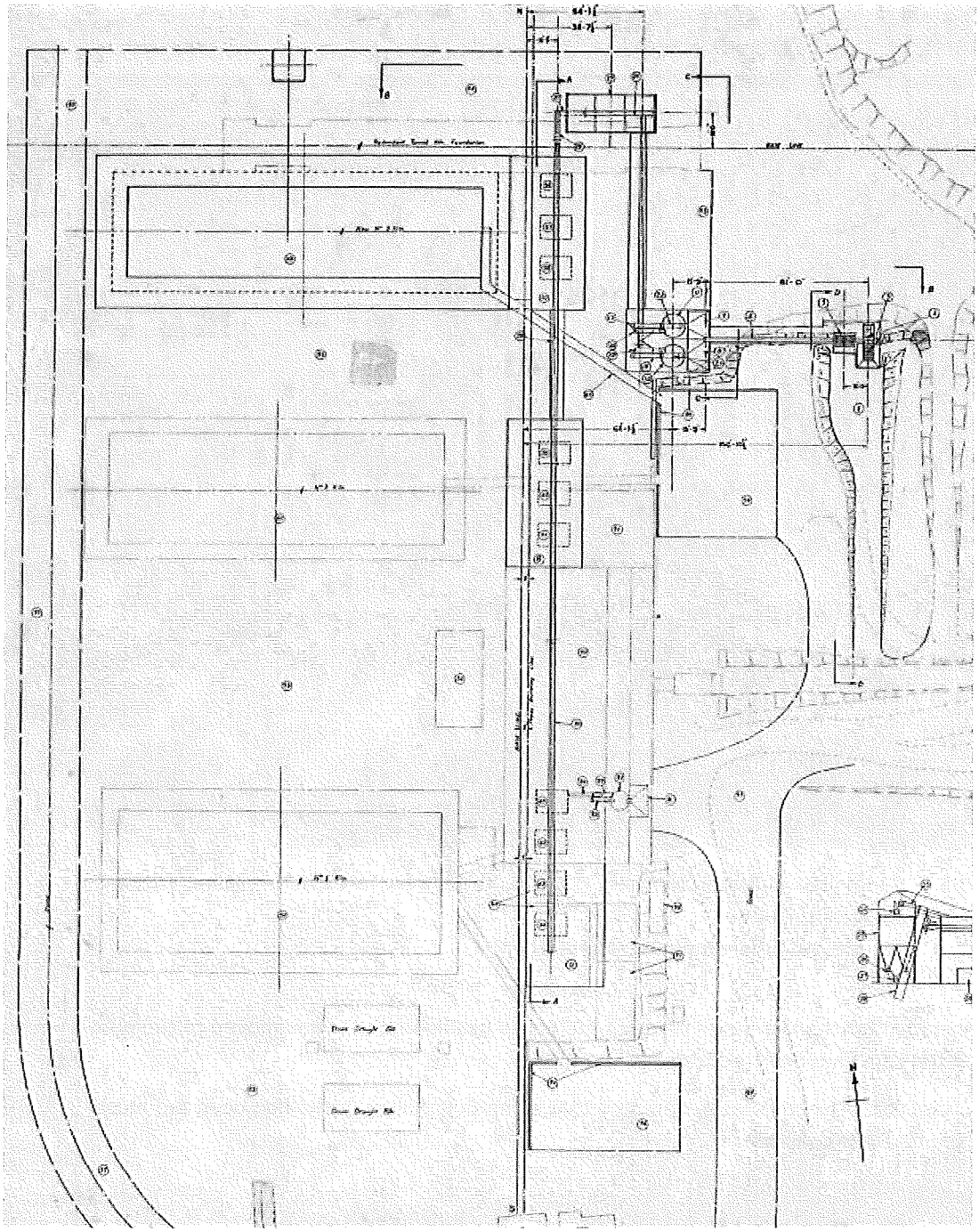

Figure 94 Layout of the site, 1954.
Source: National Archives of Australia.

Figure 95 Aerial view of the brickworks, 1950. Note the new 'Brickworks Hostel' to the south of the site.
Source: ACT Planning and Land Authority.

were unloaded for the last time in August 1976. All usable material was moved to the new site and the remainder offered for sale.

By the time of its closure it was estimated that some 600 million bricks had been produced at the Canberra Brickworks.[109]

109 Lester Firth and Associates, 1986, Section 2.1.4. Source uncited.

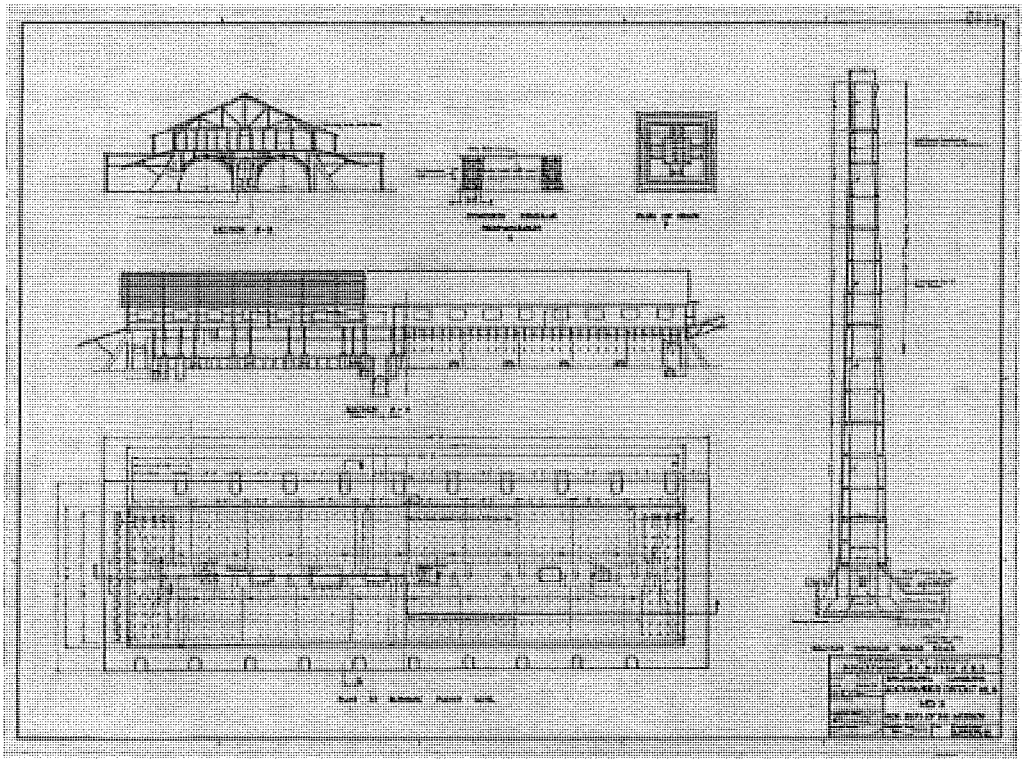

Figure 96 Plans for the Hardy patent kiln (Building 12) and stack (13), built 1954-55.
Source: National Archives of Australia.

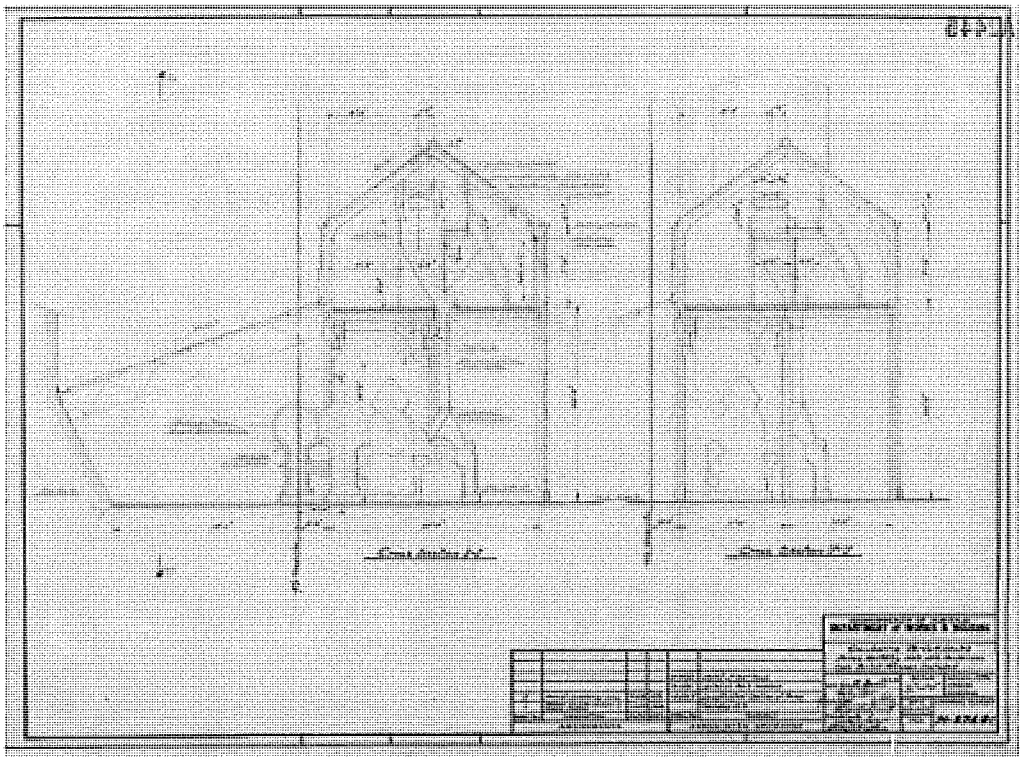

Figure 97 Cross section through machine bay for Hardy patent kiln (Building 12) showing brick press below, and conveyor in the gable.
Source: National Archives of Australia.

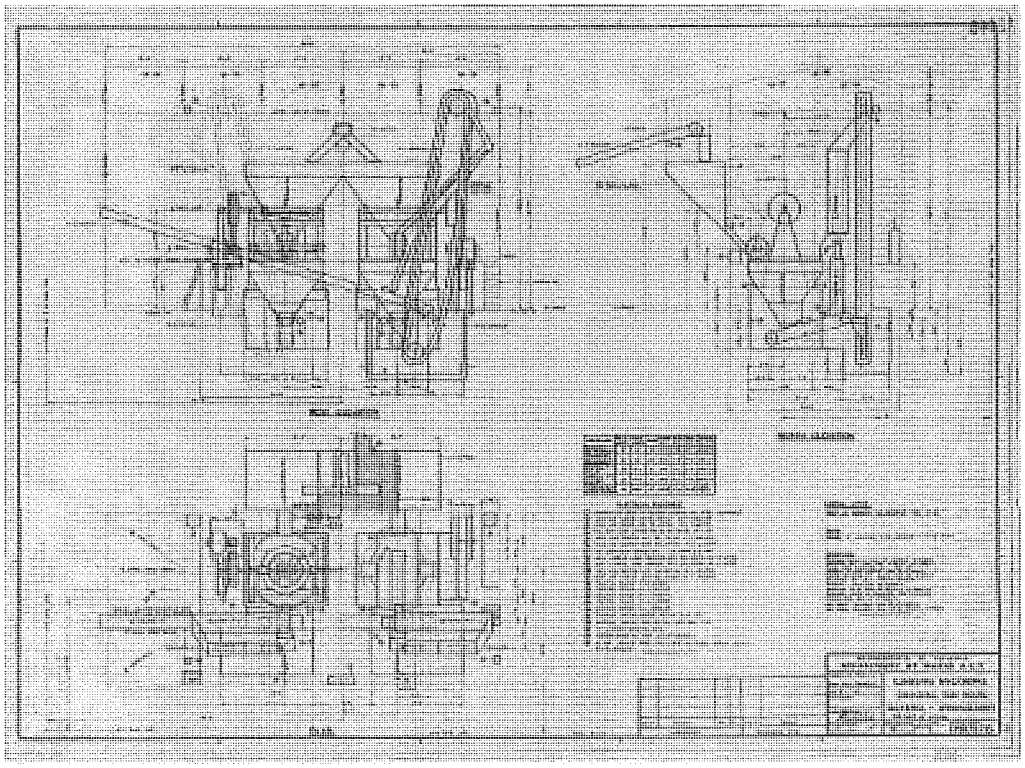

Figure 98 Grinding Pan House General Arrangement 1956 (Red Pan Room, demolished). Source: National Archives of Australia.

The Sixteenth *Annual Report* (1975-1976) of the Commonwealth Brickworks (Canberra) Limited recorded that the company received $2.25 million from the Department of the Capital Territory as compensation upon having to vacate the Yarralumla site. This report also indicates that between 1972 and the closure of the works in 1976 the workforce had halved, from 106 to 53, and total brick sales reduced from $22.25 million to $12.76 million. Substantial operational losses made during this period were attributed to the imminent relocation of the plant and the depressed state of the economy.[110]

Bricks were first produced in the Mitchell plant in October 1976.

110 The Sixteenth *Annual Report* (1975-1976) of the Commonwealth Brickworks. cited in Lester Firth and Associates, 1986, Section 2.1.4.

5.2 Datasheets for Post-WWII phase elements

No.	Name/Description	Date of construction
11	Amenities block	c. 1950, c. 1977
12	Hardy patent kiln	c. 1953
13	Chimney stack for Hardy patent kiln (Building 11)	c. 1953, c. 2005
14	Machine Bay I for Staffordshire kiln (Building 3)	c. 1955
15	Machine Bay II for Hardy patent kiln (Building 7)	c. 1955
16	Machine Bay III for Hardy patent kiln (Building 11)	c. 1955
17	Workshop	1955
18	Small Crusher House (Crusher House I)	c. 1958
19	Large Crusher House (White Pan Room/ Crusher House II)	c. 1955
20	Primary Crusher House (Crusher House III)	c. 1955
21	Elevator / Conveyor	c. 1955
22	Downdraught kilns (x3)	c. 1960-3
23	Downdraught kiln control room	c. 1963
24	Chimney stack for downdraught kilns	c. 1950s
25	Toilet block	c. 1960s
26	Amenities block	c. 1960s
27	Substation/control room	c. 1971
28	Boiler house	c. 1971
29	Ancillary storage building	c. 1971
30	Extrusion plant	c. 1971
31	Ancillary storage building	c. 1960s
32	Storage shed	c. 1960s

Figure 99 Location of elements surviving from the Post-WWII Phase. Refer to the larger scale site plan in Chapter 1 for more detail.

Name	Amenities Block	**Reference No**	11
Construction	Brick, reinforced concrete, galvanised steel	**Survey Date**	3 December 2009
Historical Phase	Post-war phase 1944-1976	**Date**	c. 1950, c. 1977

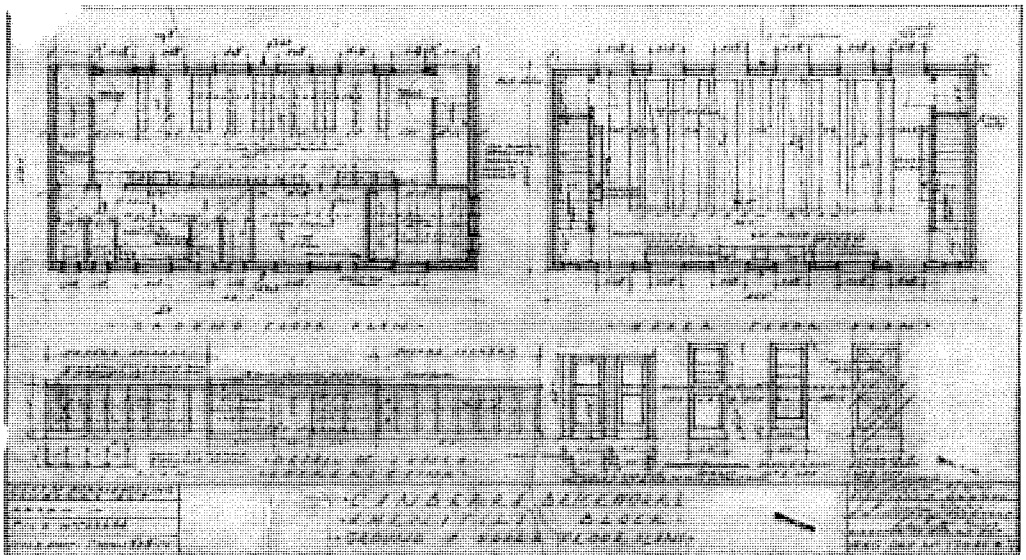

Figure 100 Amenities Block floor plans, 1947.
Source: National Archives of Australia.

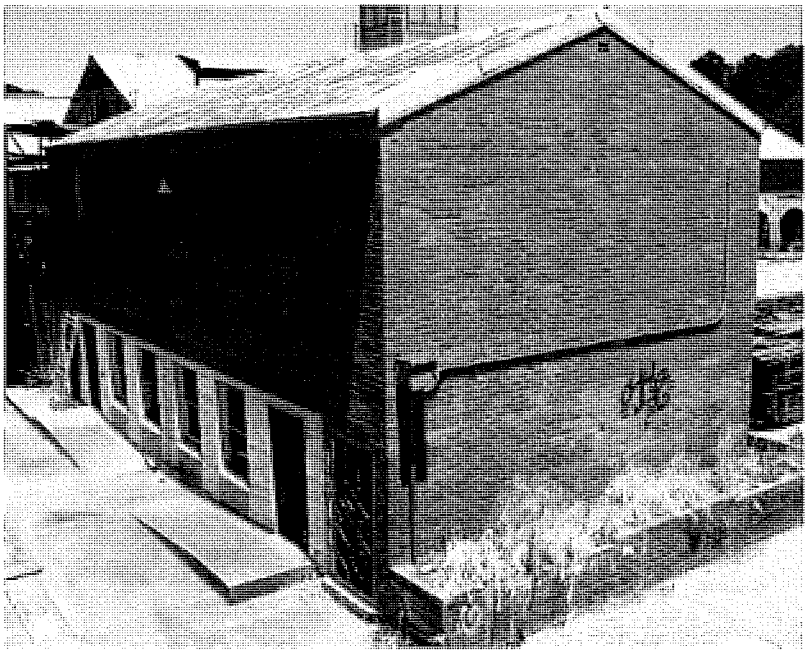

Figure 101 The Amenities Block viewed from the west.

Historical background

The provision of a purpose-built amenities building, consolidating toilet, changing and lunch room facilities, was one of the first actions of the Brickworks administration in the years following World War II. It heralded an era of significant expansion and modernization and saw the provision of a modern up-to-date facility which centralized worker's amenities at the centre of the site.

Description & Integrity

The amenities block is a two-storey building of face red brick, with a gable roof clad in corrugated galvanised steel. The first floor originally accommodated a lunch room with access from a concrete staircase to both the north and south ends of the east (front) elevation with toilet and changing facilities including showers, a drying room and a locker room located on the ground floor. The present entrances to the ground floor toilets were originally windows. The ground floor spaces were originally accessed from the stairwells. The date of these works has not been established. The building previously had a covered breezeway protecting the entry and there is a ramp access to both toilets. The white painted area to the ground floor façade indicates the scale of the breezeway enclosure, since removed.

Internally the former locker room, showers and drying room have been reconfigured. A wall has been constructed, dividing the ground floor in half, on an east-west axis to provide male and female washrooms and toilet facilities. These alterations were undertaken by A R Marr Pty Ltd as part of the conversion of the site to a tourist precinct in the later 1970s. The finishes are typical of the period – ceramic tile, modular basins, laminate partitions and mosaic tiled floors.

A single-storey first aid room was appended to the south end of the building at a later date. Access to this room is from the east.

The building is in a badly vandalized state with only a few toilets and basins intact and operable. Most of the glazing has been broken and the exterior of the building spray-painted with graffiti. Access to the first floor space was not obtained with one of the stairs secured by a metal grille and the door off the stair landing to the south end nailed shut internally.

Name	Hardy Patent Kiln II	**Building No**	12
Construction	Brick, corrugated steel and corrugated fibro cement sheet	**Survey Date**	3 December 2009
Historical Phase	Post-war phase, 1944-1976	**Date**	c. 1953

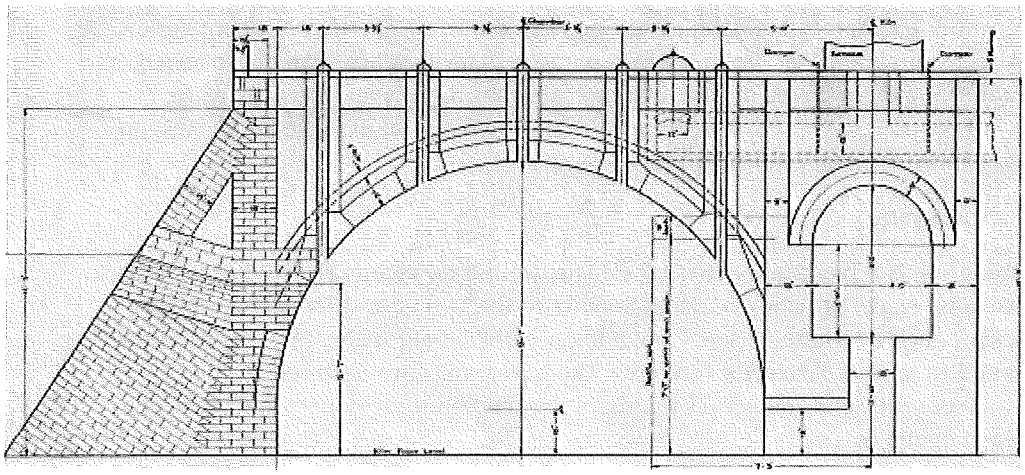

Figure 102 Section through wicket chamber and flue of the second Hardy patent kiln, 1953. Source: National Archives of Australia.

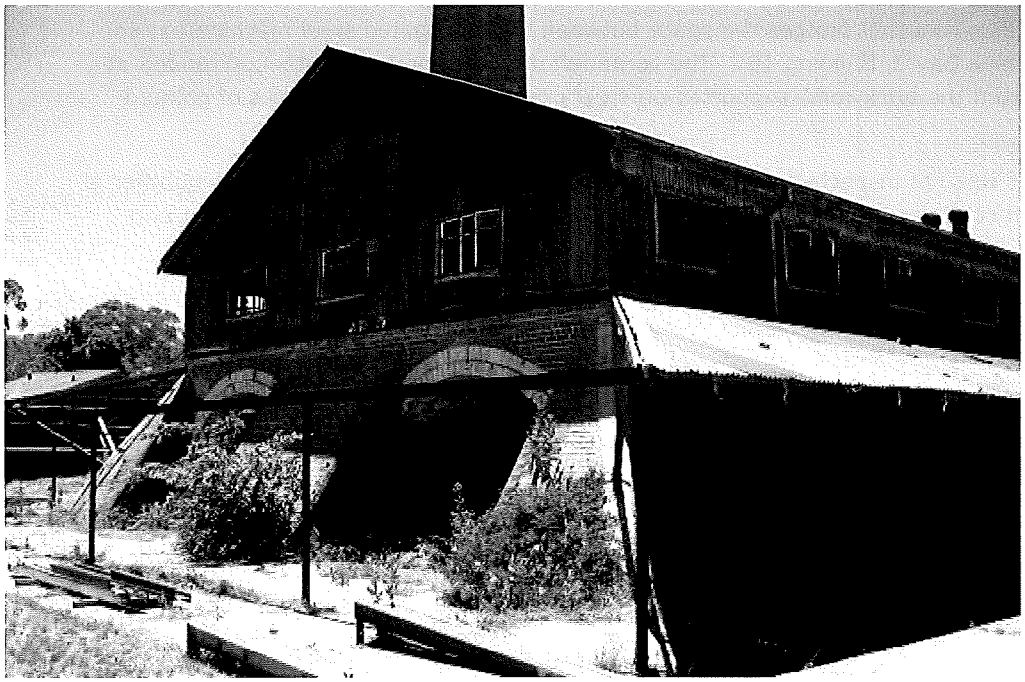

Figure 103 The Hardy patent kiln, showing the west end and part of the south elevation. Note the verandah cladding has been removed and the kiln wall part removed, presumably for improved access to the kiln interior.

Historical background

After the decision to abort construction of the Tunnel kiln was taken in 1952, plans were prepared and tenders called to authorize the construction of a new 20-chamber Hardy patent kiln, 50 metre stack, kiln loft and awning to meet Canberra's post World War II needs (see also Section 5.1.1). The new Hardy patent kiln was constructed on the foundations of the Tunnel kiln.

The decision to not adopt the fan-induced model of the Staffordshire kiln and the first Hardy patent kiln and instead build a taller chimney stack did not result in the expected superior drawing power, and fans had to be installed to augment the draw shortly after completion. A recommendation to provide wider wickets to enable access for forklifts, was not followed. Plans held in the National Archives of Australia indicate that the wicket openings were originally only a metre in width.[111] A number of these openings were widened for fork lift use during the 1960s, including the west kiln end.

Description & Integrity

The Hardy patent kiln is a two-storey structure. The ground floor comprises 20 arched brick openings or wickets, which provide the access points to the two east-west kiln chambers. Several of these – each alternate wicket – have been modified since construction, with the openings widened to permit access for forklifts. The outer walls are battered at approximately 60 degrees and the wicket numbers are painted directly onto the brickwork surrounding each opening.

A verandah roofed in corrugated steel extends around the all sides of the building, apart from the west where only the metal posts and support framing are intact. The removal of the verandah cladding may have occurred prior to the part removal of the brick end wall, where the two kilns are revealed in cross section –see Figure 103. To the east the verandah abuts the skillion roof that bridges the space between the corrugated steel machine bay to its east (Machine Bay 3, Building 16). The verandah structure here is of steel, extended at 45 degrees from the brickwork, supported on steel props as well as by a series of painted steel posts.

The first floor was not inspected internally due to OH&S concerns.[112] There are a number of metal-framed casement windows to the two long north and south walls and the west end wall.

The removal of the verandah flashing to the north elevation and the verandah to the west elevation have exposed the wall studs.

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111 *Canberra Brickworks layout of firing holes for No. 3 Kiln for Dept. of the Interior, n.d. M8759B*, National Archives of Australia.

112 Refer Robson Laboratories Pty Ltd, *Survey to determine the extent and condition of hazardous building materials at Yarralumla Brickworks,* March 2006 and *Specification for the removal of asbestos materials from Yarralumla Brickworks,* October 2006.

Name	Chimney Stack for Hardy Patent Kiln II	**Building No**	13
Construction	Brick, steel cladding	**Survey Date**	3 December 2009
Historical Phase	Post-war phase, 1944-1976	**Date**	c. 1953; c. 2005

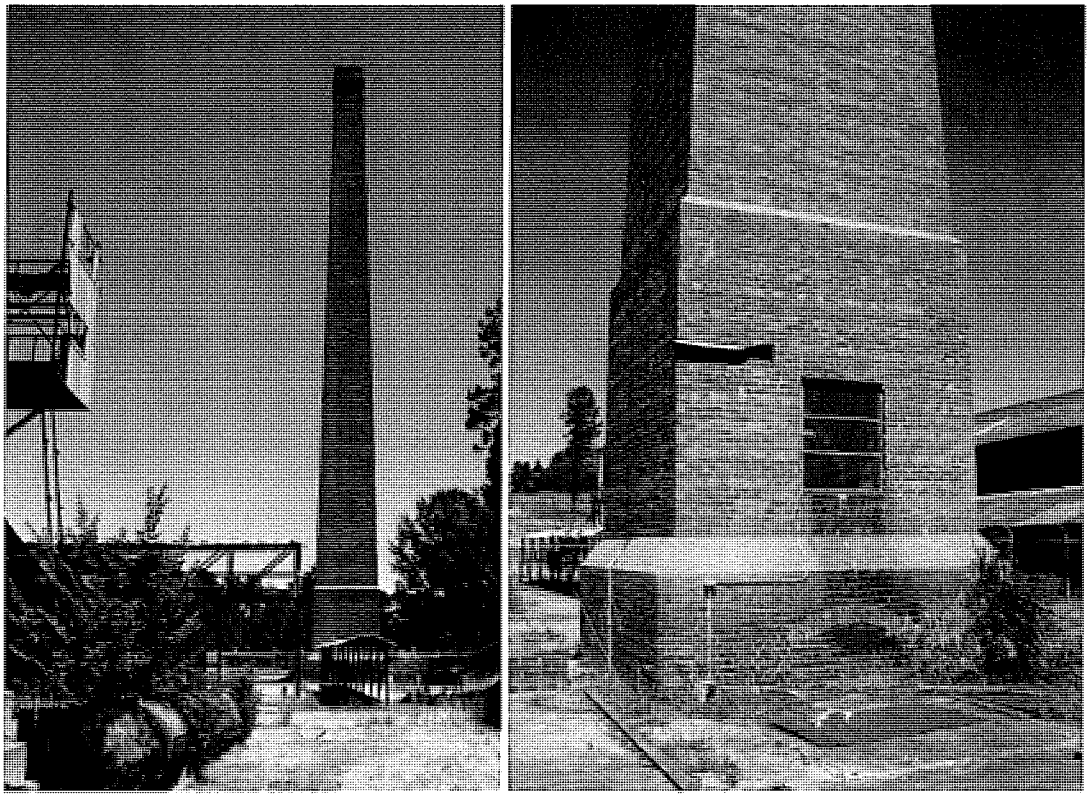

Figure 104 Left: view from east. Right: West elevation, base of stack.

Figure 105 The Chimney stack viewed from across Yarramundi Reach, Lady Denman Drive.

Historical background

The tall stack for superior drawing power was specified as part of the new Hardy patent kiln (Building 12) in 1952. This represented a break with tradition at the Canberra Brickworks; the two existing continuous kilns at the site were fan induced, and required only low stacks. However, the tall stack was not a success, and fans were installed to augment the draw shortly after completion.

The suggestion has been made that the stack was designed by architect Eric Nicholls (1902-1966) however this has not been confirmed. Nicholls had designed the much earlier and architecturally distinctive Canberra Incinerator (for the Reverberatory Incinerator and Engineering Company) in 1938-9.[113]

Description & Integrity

The chimney stack comprises a brick plinth, a shaft and a 'crown' or capital of corbelled brickwork. It is constructed of face red brick laid in Colonial bond courses, and is approximately 150ft (45 metres) high. It is sited to the north of the second Hardy patent kiln (Building 12), and is surrounded by a large concrete slab. There is an arched brick entry hatch at ground level to all four elevations with the entry to the east elevation fitted with a secured wire mesh gate. To the west and north the openings are bricked up and to the south a concrete tunnel rises from underground indicating the location of the kiln tunnel. To the west elevation there is a large rectangular opening approximately 3.5 metres above the ground, secured by a metal grille. This may have been the location of ducts which linked the stack to a now demolished fan house facility, although this has not been confirmed. The chimney steps inwards, rising from a brick plinth, capped with brickwork laid on a 45 degree angle. A lightning conductor has been fixed to its south elevation. Sections of the upper courses of brickwork have been re-laid with new mortar visible. The opening has been part-capped with steel roofing as a part of a series of works undertaken c. 2005.

Internally the tunnel connection to the kiln is visible and there is a steel frame and timber work platforms installed within the stack. These were installed as part of the c. 2005 building works, which stabilized the structure, and repaired significant cracking and damage to the top of the structure.

113 Ian Wood-Bradley, LDA, pers. com. Nicholls, Eric M, 1938, Exterior perspective view of incinerator, Canberra Incinerator, Westbourne Woods, Australian Capital Territory (picture), Eric Milton Nicholls, http://nla.gov.au/nla.pic-vn3603884-s428

Name	Machine Bay I for Staffordshire Kiln and Downdraught Kilns	**Building No**	14
Construction	Corrugated galvanised steel over steel frame	**Survey Date**	3 December 2009
Historical Phase	Post-war phase, 1944-1976	**Date**	c. 1955

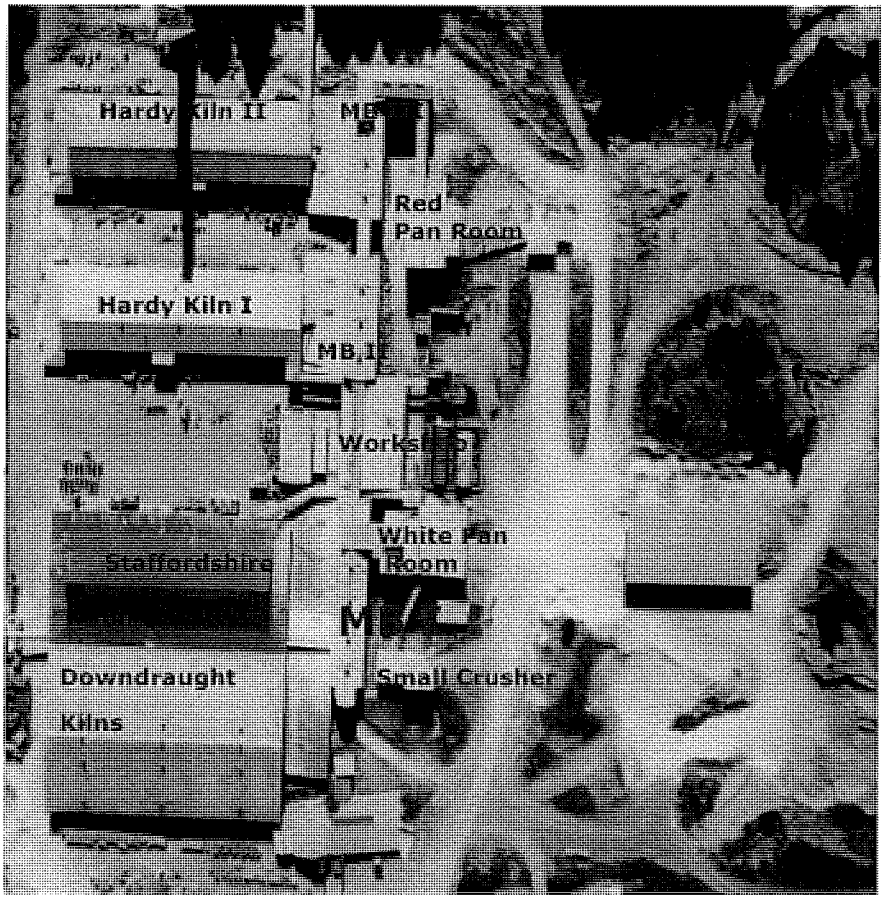

Figure 106 1976 aerial photograph with major site elements in the vicinity of the machine bays labelled. Machine Bay I is indicated by a larger font.
Source: ACT Heritage Library, Woden ACT.

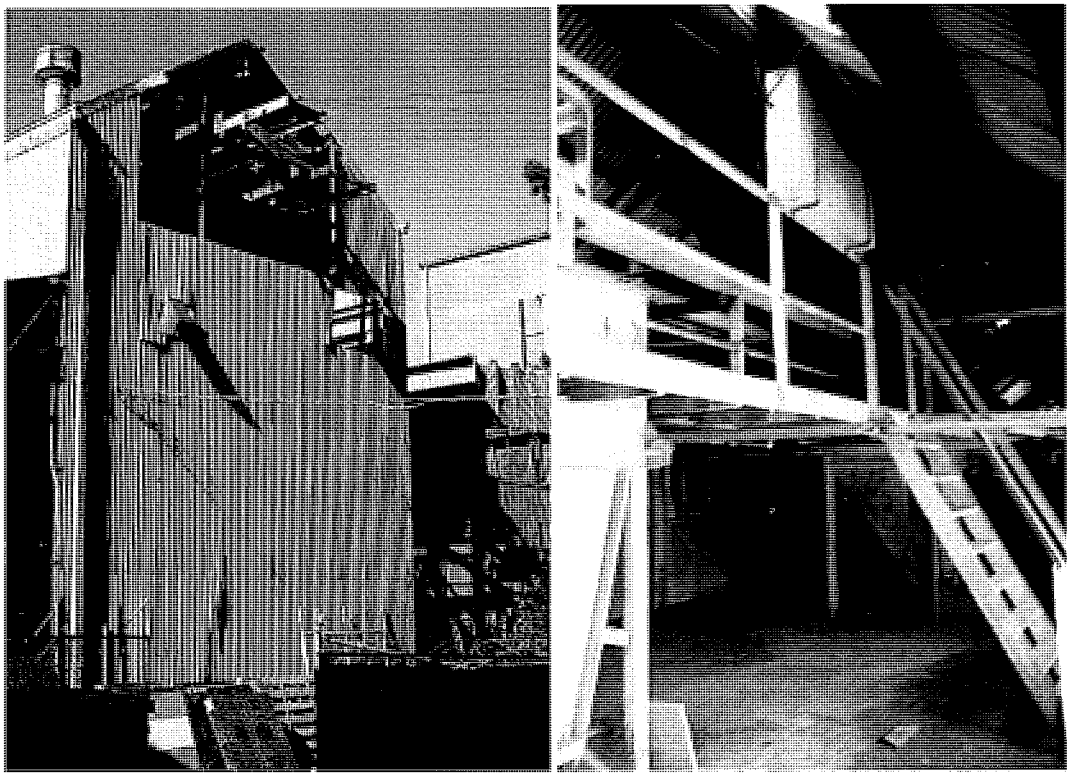

Figure 107 From left: the truncated south end of Machine Bay 1, showing location of former headgear housing; interior of the loft space.

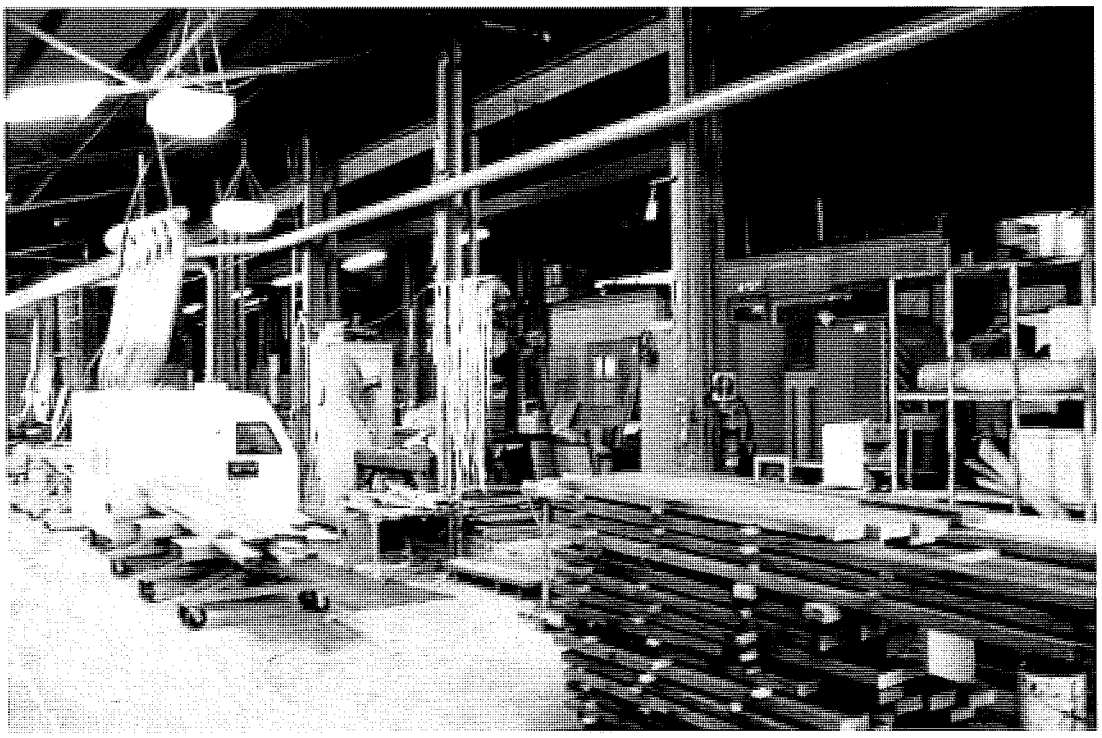

Figure 108 Interior of the Machine Bay shop floor, presently used by a timber recycling business.

Historical background

Known also as Brick Press No. 1, Machine Bay I is partly located on the site of the earlier by 1915 Machine Bay and tile making plant (demolished). The present machine bay was constructed in 1955 as part of the upgrading of the Brickworks to meet post World War II production requirements. After grinding and processing through the crusher houses and pan rooms, raw materials were fed along the top level conveyor system, housed within the upper (loft) areas of the three machine bays, and passed through the upper roof area of the Workshop (Building 17) to hoppers and gravity fed via chutes to the brick presses below. After pressing, the bricks were transported by forklift to the adjoining kiln for firing. Machine Bay 1, which serviced the Staffordshire Kiln (Building 4) also received white clay material refined in the adjoining White Pan Room (also known as the Large Crusher House, Building 19), immediately to the east. The machine bay was extended by two additional bays to service the early 1960s downdraught kilns (Building 22). This addition was subsequently demolished and the present tenant has an office on the site.

The former brickmaking floor is utilised by the present tenant as the main workshop space for the sanding and treatment of recycled timber.

Description & Integrity

Machine Bay I is a three level steel-framed and corrugated galvanised steel-clad structure. It comprises the loft gallery, containing the overhead conveyor, which extends through the loft space of all three machine bays and the workshop, and hoppers which fed the brick presses housed on the 'shop floor' below. The loft space has a concrete floor and the conveyor, housed within the roof space is accessed by steel ladder-form stairs from this level. The conveyor level walkway is of timber, some sections of which are in poor condition. There are a number of holes in the concrete floor where machinery and stairs have been removed. There is a row of windows, previously fitted with glass louvres to the east and west sides of the loft space, and a row of windows to the east (rear) wall of the shop floor below. The shop floor is raised on a concrete slab, and the space between the end (west) wall of the kiln and the machine bay is roofed by a skillion roof, clad in corrugated steel over a series of warren trusses. A number of skylights have been let into the roof. This roof form is thought to be original – refer to the section drawing for Machine Bay III (Building 16), at Figure 113.

The brick making machinery (brick presses and the like) has been removed, and the southern extension to service the downdraught kilns has been demolished.

Name	Machine Bay II for Hardy Patent Kiln I	**Building No**	15
Construction	Corrugated galvanised steel over steel frame	**Survey Date**	3 December 2009
Historical Phase	Post-war phase, 1944-1976	**Date**	c. 1955

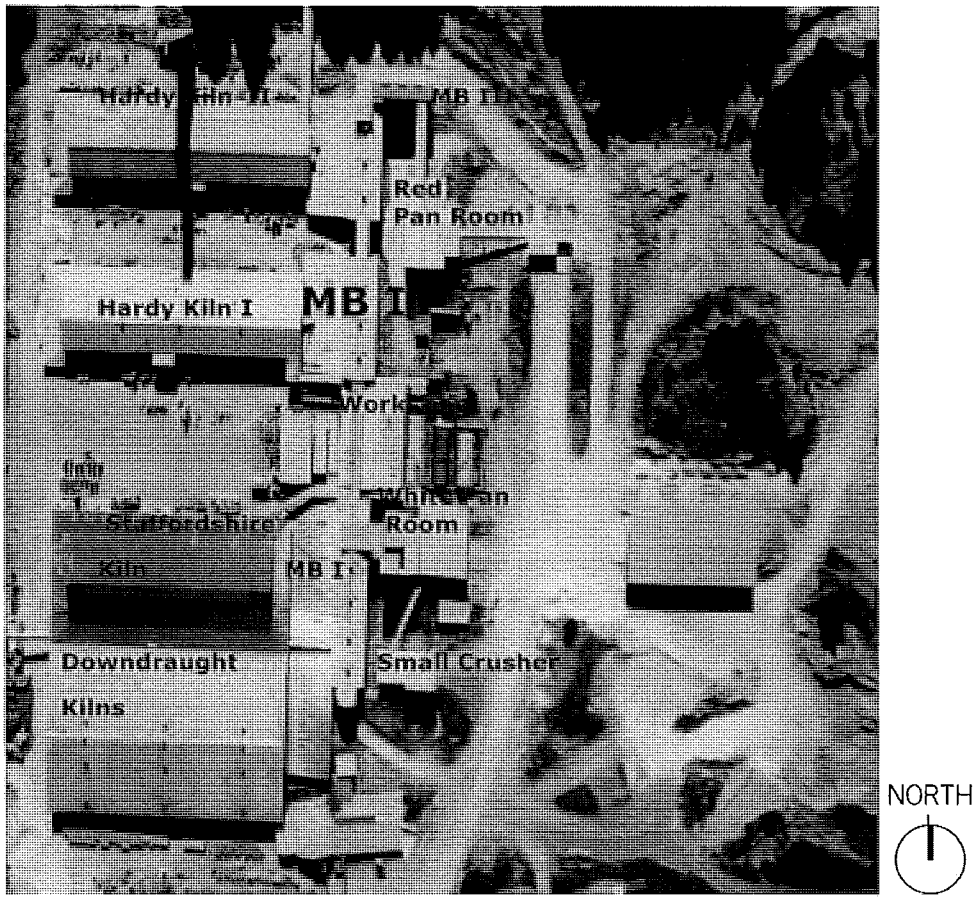

Figure 109 1976 aerial photograph with major site elements in the vicinity of the machine bays labelled. Machine Bay II is indicated by a larger font.
Source: ACT Heritage Library, Woden ACT.

Figure 110 The rear (east) wall of Machine Bay II. The adjoining building (to the north) is Machine Bay III.

Figure 111 Interior of the Machine Bay II shop floor, looking north.

Historical background

Machine Bay II was built in 1955 as part of the upgrade of the Brickworks to meet post World War II production increases. It is interlinked with Machine Bays I and III as well as the workshop (Building 17).

After grinding and processing through the crusher houses and pan rooms, raw materials were fed along the top level conveyor system, housed within the lofts of the three machine bays and passed through the upper roof area of the Workshop (Building 17) to hoppers and gravity fed via chutes to the brick presses below. After pressing, the bricks were transported by forklift to the adjoining kiln- in this case the Hardy patent kiln I - for firing. Machine Bay II received raw materials transported via conveyor from Machine Bay III, which was fed from the 400 ton hopper (now demolished) which adjoined the west end of Machine Bay III.

The former brick making floor is utilised by the present tenant as a storage area for recycled timber.

Description & Integrity

Machine Bay II is a three level steel-framed and corrugated galvanised steel-clad structure. The structure comprises the loft gallery containing the overhead conveyor which extends through the loft space of all three machine bays and the workshop, and hoppers which fed the brick presses housed on the 'shop floor' below. The loft space has a concrete floor and the conveyor, housed within the peak of the roof space is accessed by steel ladder-form stairs from this level. The conveyor level walkway is of timber, some sections of which are in poor condition. There is an open walkway at the height of the concrete floor level which interconnects this building with Machine Bay III, to the north. There is a row of windows, previously fitted with glass louvres to the east and west sides of the loft space, and a row of windows to the east (rear) wall of the shop floor below. The shop floor is raised on a concrete slab, and the space between the end (west) wall of the kiln and the machine bay is roofed by a skillion roof, clad in corrugated steel over a series of warren trusses. The shop floor is raised on a concrete slab, and the space between the end (west) wall of the kiln and the machine bay is roofed by a skillion roof, clad in corrugated steel over a series of warren trusses. A number of skylights have been let into the roof. This roof form is thought to be original – refer to the section drawing for Machine Bay III (Building 16), at Figure 113.

The brick making machinery itself has been removed.

Name	Machine Bay III for Hardy Patent Kiln II (Brick Press Building)	**Reference No**	16
Construction	Corrugated galvanised steel over steel frame	**Survey Date**	3 December 2009
Historical Phase	Post-war phase, 1944-1976	**Date**	c. 1955

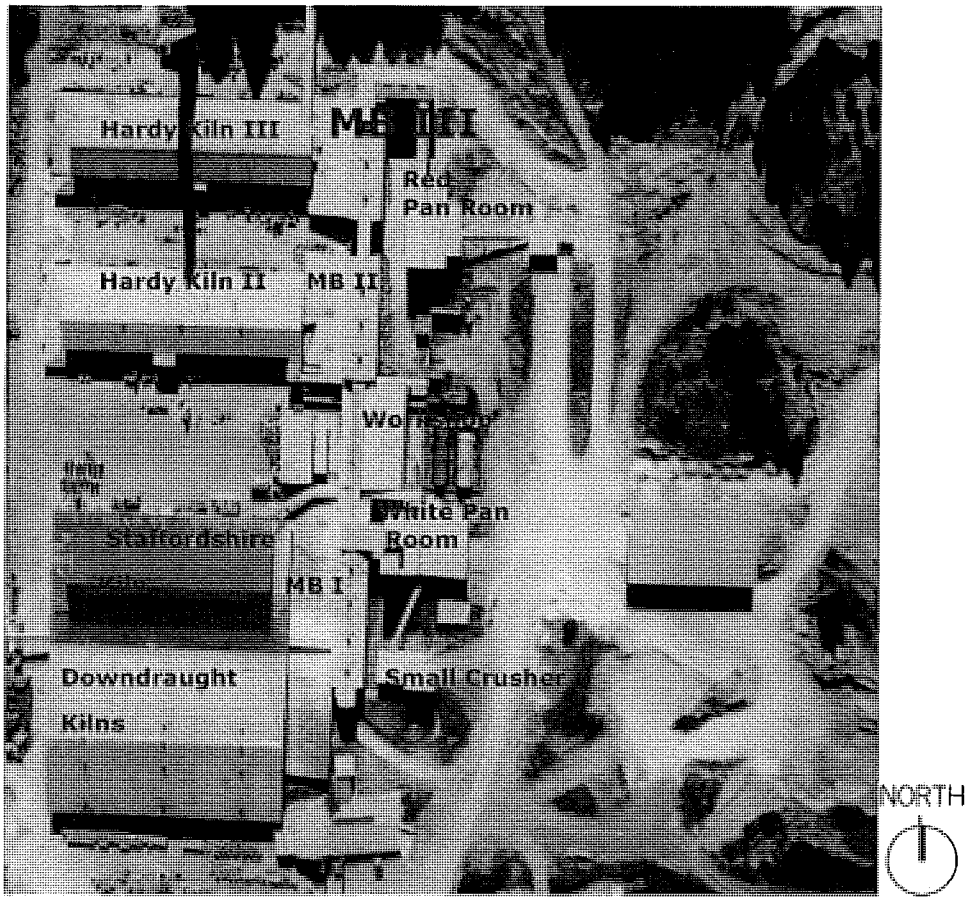

Figure 112 1976 aerial photograph with major site elements in the vicinity of the machine bays labelled. Machine Bay III is indicated by a larger font.
Source: ACT Heritage Library, Woden ACT.

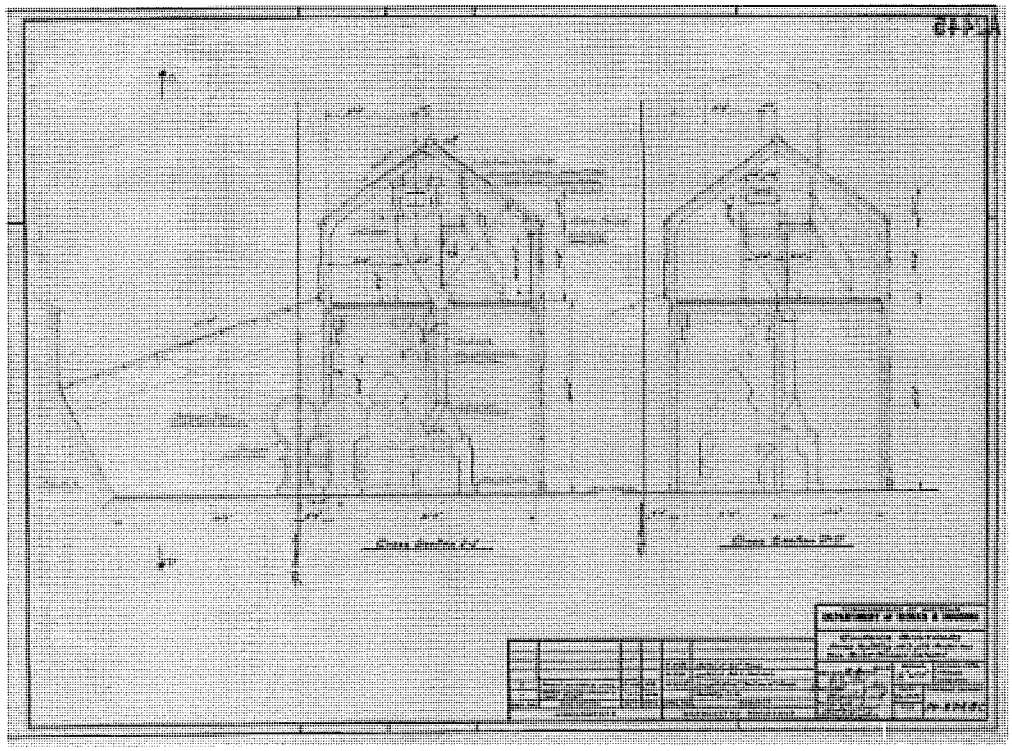

Figure 113 Canberra Brickworks Press Building III, 23 November 1954. Cross-sections showing internal structure and machinery installation, Machine Bay III. Source: National Archives of Australia.

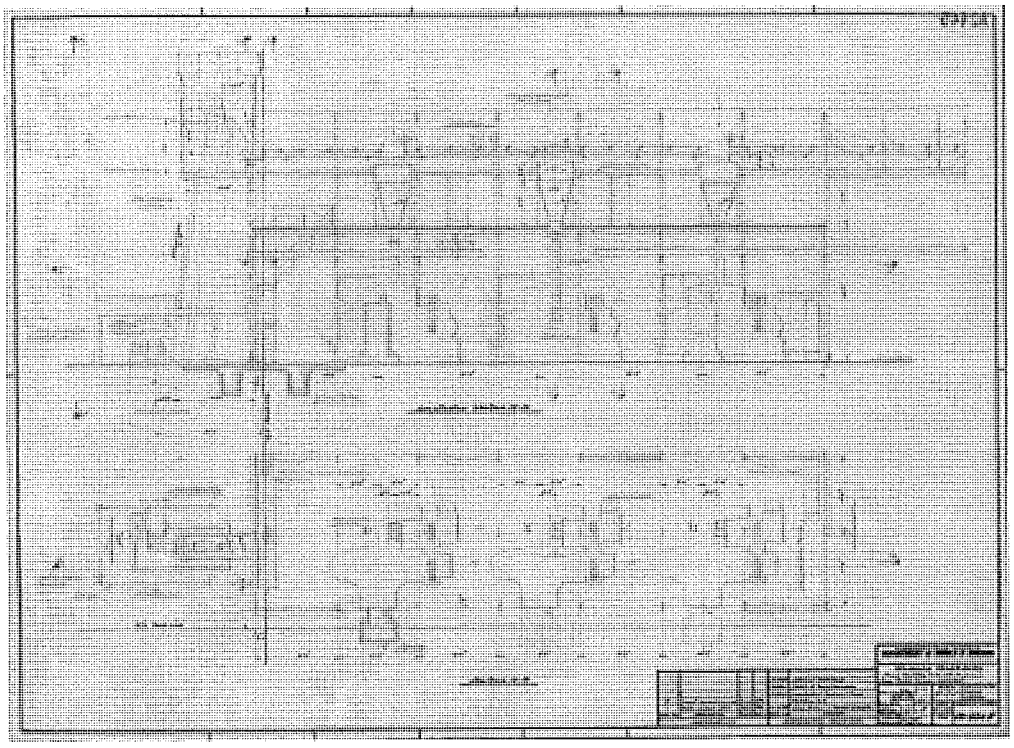

Figure 114 Canberra Brickworks Press Building III, 23 November 1954. Longitudinal sections showing internal structure and machinery installation, Machine Bay III. Source: National Archives of Australia.

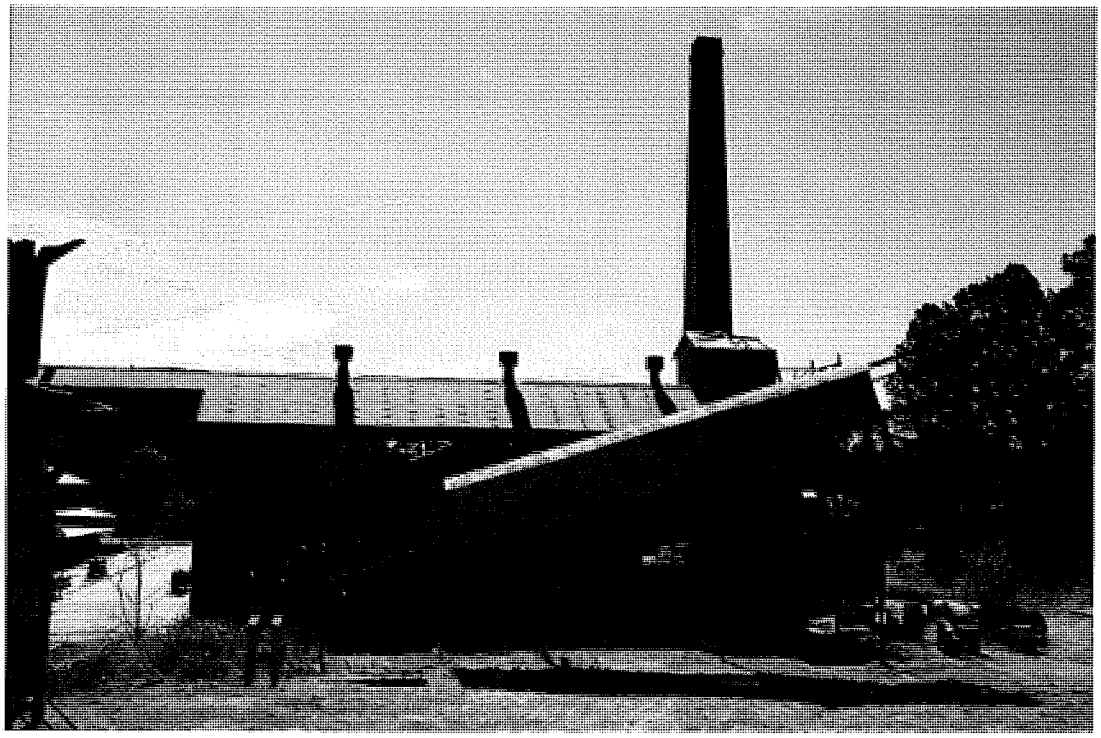

Figure 115 Machine Bay III, east elevation, with the remains of the conveyor in the foreground.

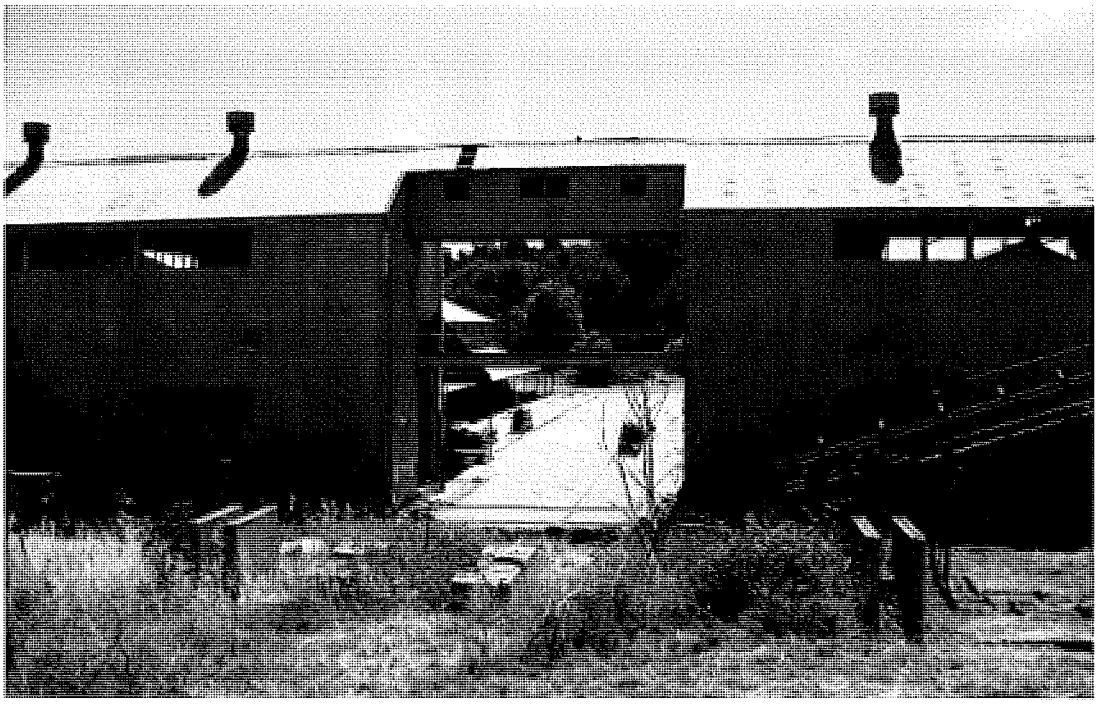

Figure 116 Machine Bays II (left) and III (right), looking west, showing the conveyor 'bridge' and open walkway between the two structures.

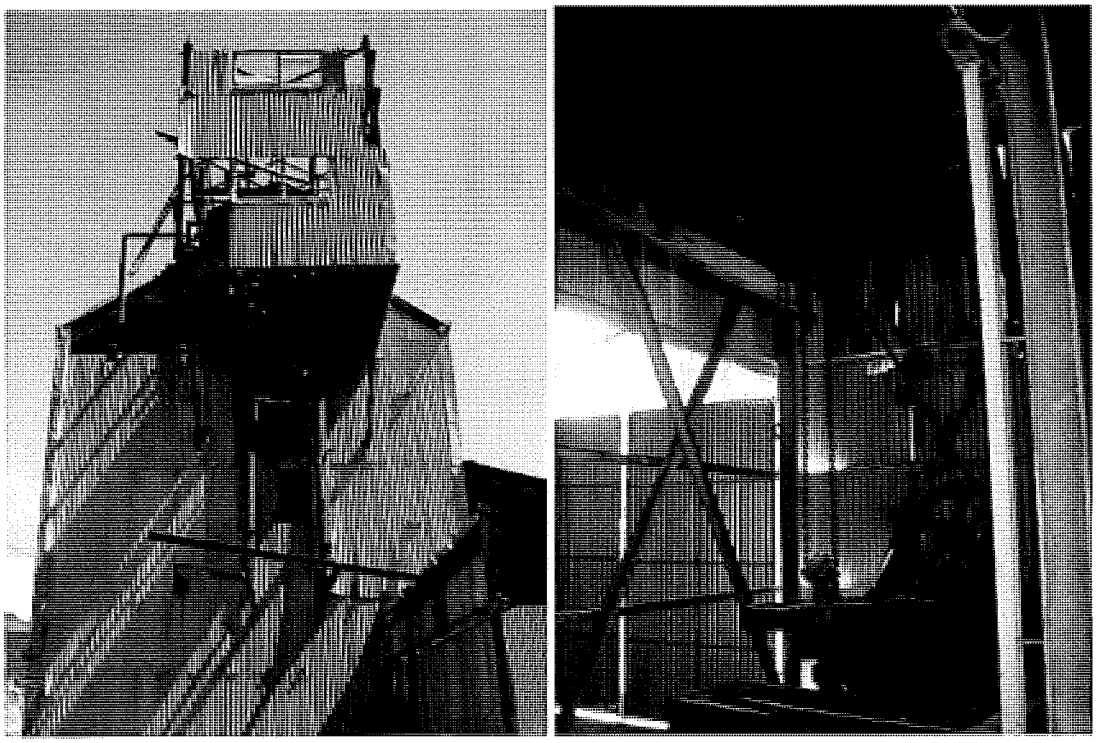

Figure 117 From left: north end Machine Bay III showing remains of headgear housing for the loft conveyor; interior with remnants of the Anderson brick machinery at north end.

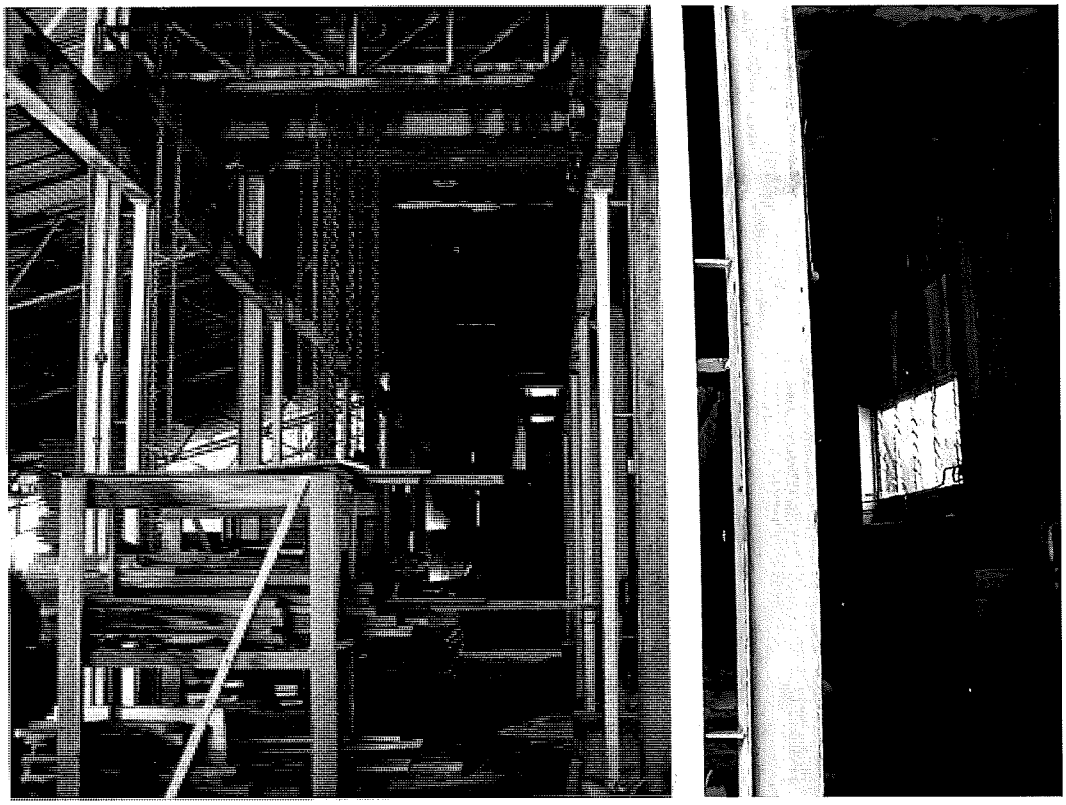

Figure 118 Interior of the Machine Bay III shop floor, looking north.

Historical background

Machine Bay III was built in 1955 as part of the upgrade of the Brickworks to meet post World War II production increases. It is interlinked with Machine Bays I and II as well as the workshop (Building 17). After grinding and processing through the crusher houses and pan rooms, raw materials were fed along the top level conveyor system, housed within the lofts of the three machine bays and passing through the upper roof area of the Workshop (Building 17) to hoppers and gravity fed via chutes to the brick presses below. After pressing, the bricks were transported by forklift to the adjoining kiln – in this case the Hardy patent kiln II – for firing. Machine Bay III received raw materials directly from the 400 ton hopper (now demolished) which adjoined the north end of the structure.

The former brick-making floor is utilised by the present timber-working tenant as a storage area for recycled timber.

Description & Integrity

Machine Bay III is a three level steel-framed and corrugated galvanised steel-clad structure. The structure comprises the loft gallery containing the overhead conveyor which extends through the loft space of all three machine bays and the workshop, and hoppers which fed the brick presses housed on the 'shop floor' below. The loft space has a concrete floor and the conveyor, housed within the peak of the roof space is accessed by steel ladder-form stairs from this level. The conveyor level walkway is of timber, some sections of which are in poor condition. The northernmost section is blocked off as it approaches the site of the part-demolished headgear housing and site of the removed hopper. There is an open walkway at the height of the concrete floor level which interconnects this building with Machine Bay II, to the south. There is a row of windows, previously fitted with glass louvers to the east and west sides of the loft space, and a row of windows to the east (rear) wall of the shop floor below. The shop floor is raised on a concrete slab, and the space between the end (west) wall of the kiln and the machine bay is roofed by a skillion roof, clad in corrugated steel over a series of warren trusses. A number of skylights have been let into the roof. This roof form is thought to be original – refer to the section drawing at Figure 113.

Some elements of the dismantled brick making machinery have been relocated to this building, and are sited in its north-east corner. The removal of the hopper and part of the headgear for the loft conveyors has also occurred.

Name	Workshop	**Reference No**	17
Construction	Corrugated galvanised steel over steel frame	**Survey Date**	3 December 2009
Historical Phase	Post-war phase, 1944-1976	**Date**	1955

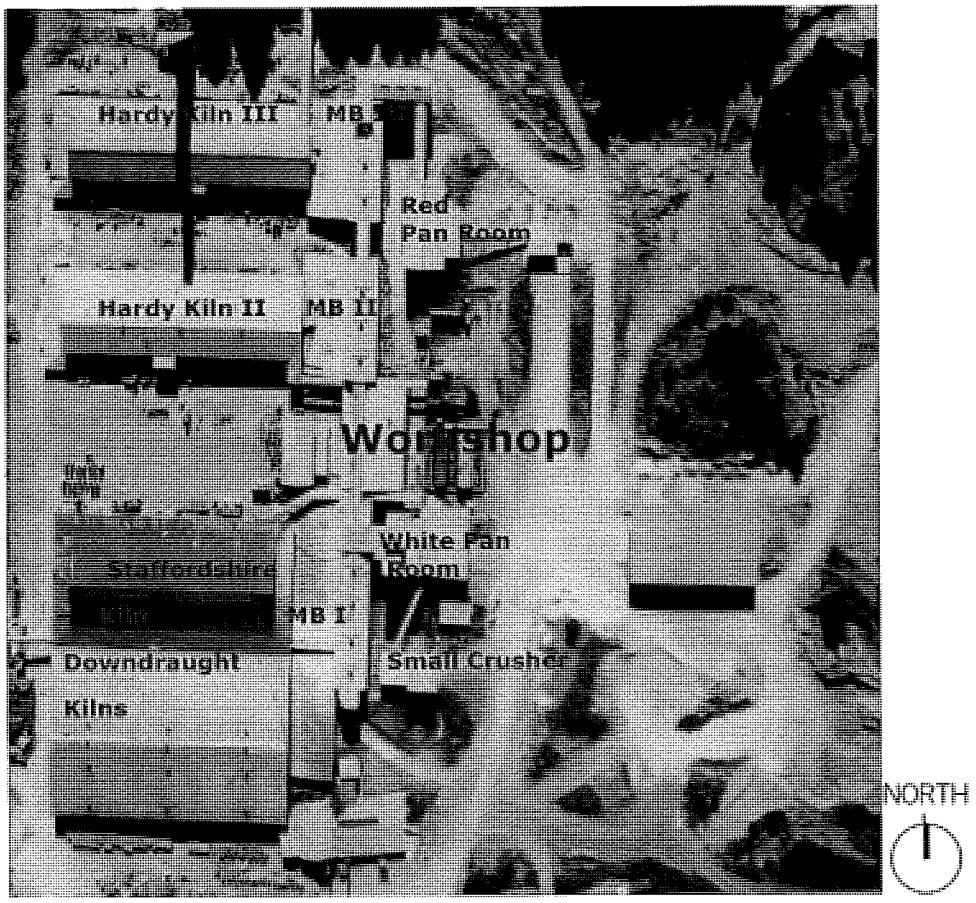

Figure 119 1976 aerial photograph with major site elements in the vicinity of the machine bays labelled. The Workshop is indicated by a larger font.
Source: ACT Heritage Library, Woden ACT.

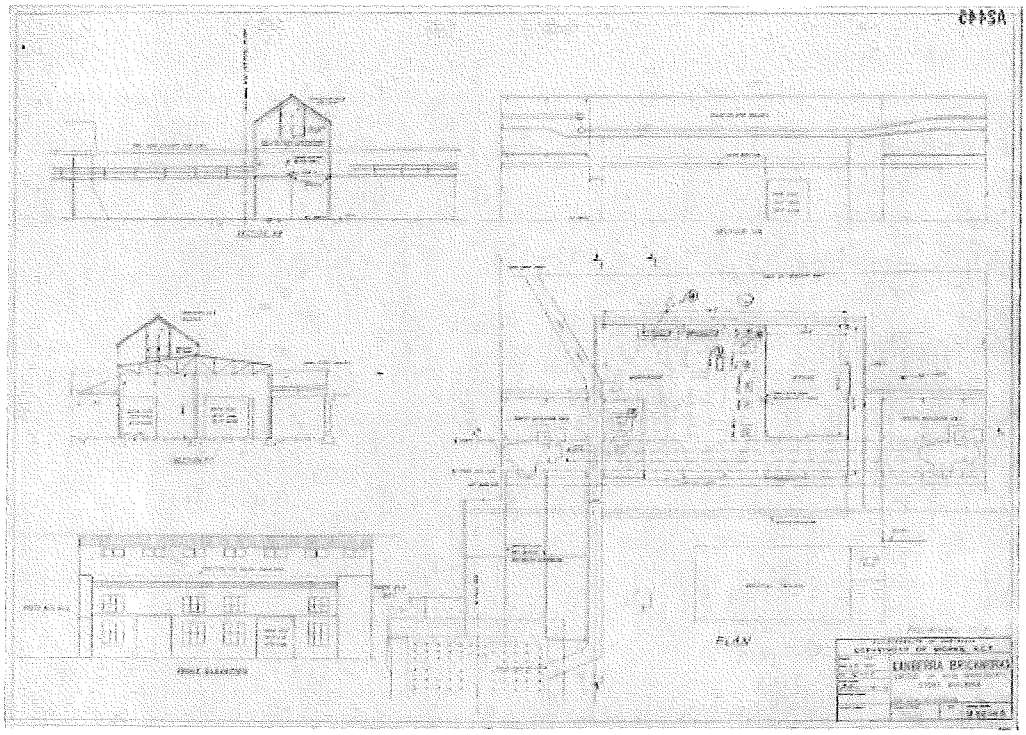

Figure 120 Canberra Brickworks Layout of new Workshop – Store Building, 1955. Source: National Archives of Australia.

Figure 121 Interior of Workshop

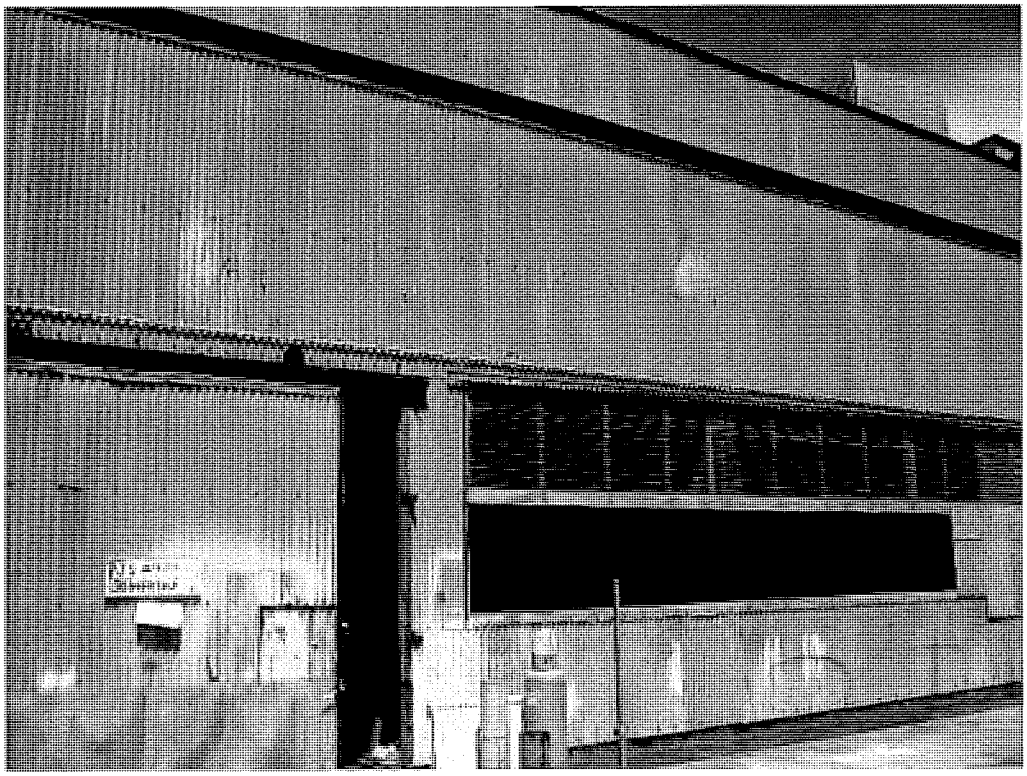

Figure 122 West elevation showing entry.

Historical background

The Workshop was constructed in 1955. It was used for general workshop repairs and the maintenance of machinery. It runs north-south across the site in the main built area, and was built on the approximate site of the original Machine Shop, which was constructed in 1915, and demolished in the 1950s.

The conveyor which connects the three machine bays also travels through the gabled roof space within the north side of the building. Within the space the overhead gantry crane remains in situ and operational.

Description & Integrity

The Workshop is a two-storey steel framed building, clad in corrugated steel over a brick base. There is a sliding corrugated steel door in the west elevation and another entry to the north elevation. The original louvred glazing to both the west and east elevation have partly been replaced by corrugated fibreglass sheeting, due to vandalism. The window openings as shown on the original plan differ from those shown today. To the north and south the building is part enclosed at the upper level by walkways with connect the conveyor gallery with the higher ground to the east, where the later model railway sheds (Buildings 33 and 34).

Internally the building has a concrete floor and the walls are unlined. Since 1991, the former workshop has been used as an artist's studio. The tenant has installed some internal partitioning and has also been responsible for the maintenance of the building – at the time of inspection the building appeared to be in reasonable condition.

Name	Small Crusher House (Crusher House I)	**Building No**	18
Construction	Corrugated galvanised steel over steel frame	**Survey Date**	3 December 2009
Historical Phase	Post-war phase, 1944-1976	**Date**	Unknown, c. mid to late 1950s

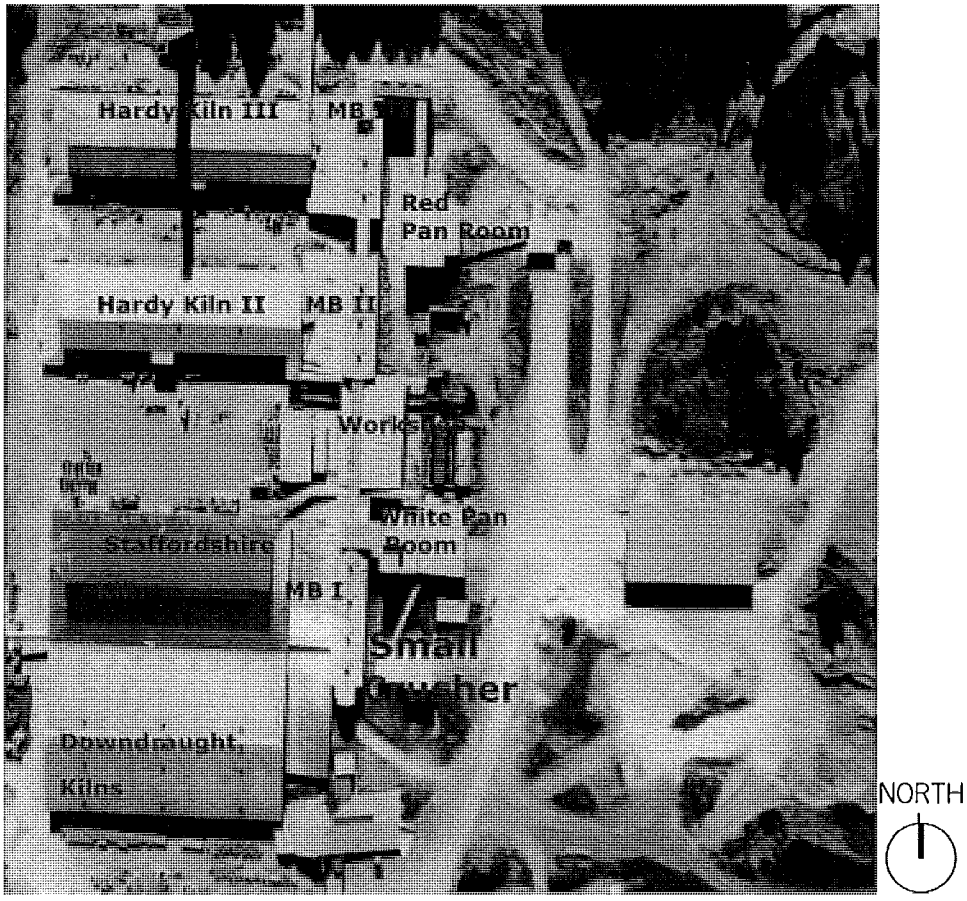

Figure 123 1976 aerial photograph with major site elements in the vicinity of the machine bays labelled. The Small Crusher House is indicated by a larger font. Source: ACT Heritage Library, Woden ACT.

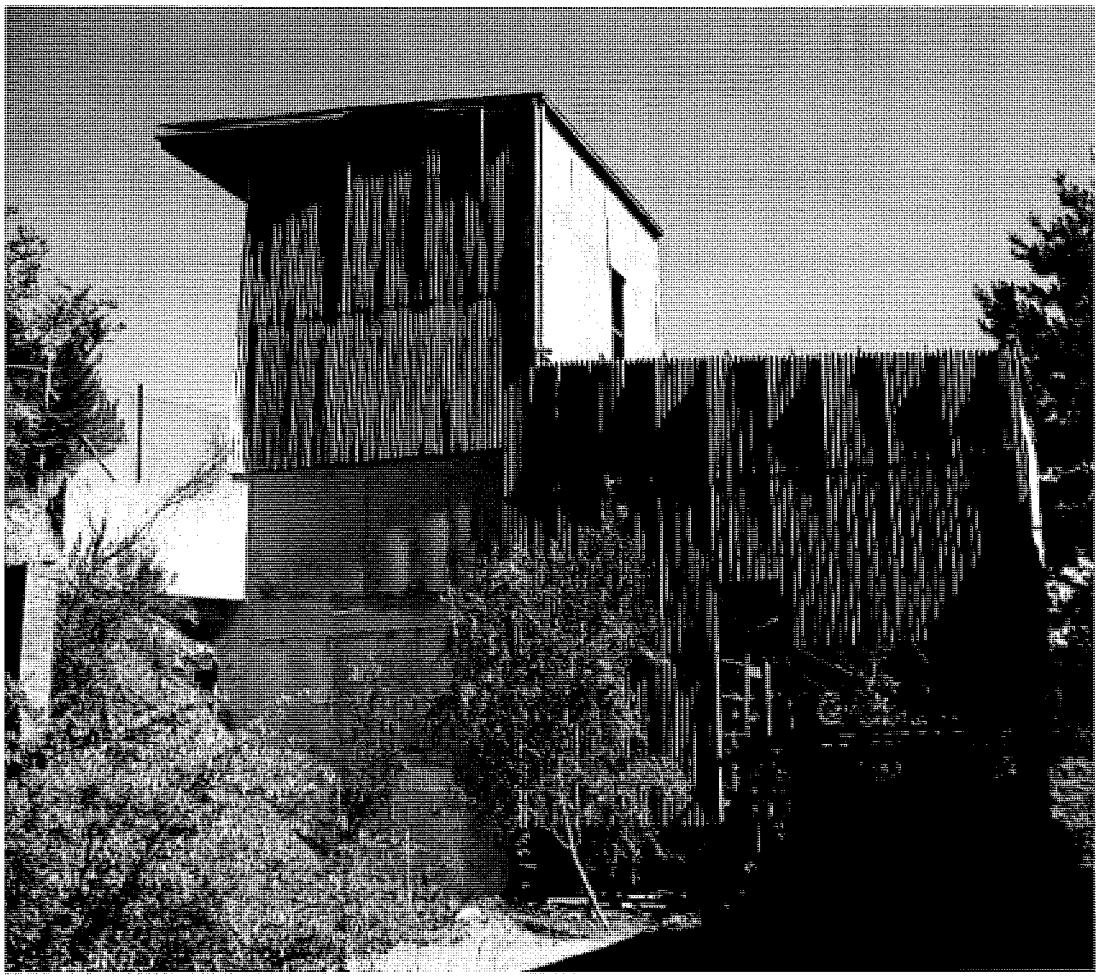

Figure 124 Small Crusher House viewed from the north.

Historical background

Though its construction date has not been confirmed, the Small Crusher House appears to have been constructed as part of the 1950s expansion works.[114] Its later construction date may suggest the requirement to augment the operations of the newly completed crushers (Buildings 19 and 20) at comparatively short notice.

The Small Crusher house was fitted with a 'Hazemag' brand crusher and a single hopper. Raw materials could be unloaded directly from the truck bay at the higher level, into the hopper and thence into the crusher. The 'Hazemag' crusher was a rotary crusher which ground and screened the raw material through a perforated plate. Material was then transported by conveyor to the Large Crusher House or White Pan Room, (Building 19) so named because it solely processed white clay for further refining. Here materials would be further ground and screened. Crushed clay would then be conveyed by elevator to the three machine bays which immediately adjoin the crusher houses to the west.

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114 The building is not shown on a site layout plan prepared in 1955 which comprehensively documented site elements relating to this significant phase of works: *Canberra Brickworks re-arrangement of Plant Layout of Site Works for Dept of the Interior 11 July 1955* ,ref. no. M8788K, National Archives of Australia.

Description & Integrity

The Small Crusher House is a steel-framed, corrugated galvanised steel-clad machinery house. The building at the upper (driveway) level is flanked by low sloping walls of off-form concrete, which frame the unloading bay. At the lower level the structure presents as a two-storey building, with some of the machinery platforms and framing including the hopper in place. The conveyor connecting the crusher to Building 19 has been removed. Part of the roof cladding and lower sections of the wall cladding and the internal flooring have been removed.

The Small Crusher House is in poor condition and its connection to the White Pan Room removed.

Name	White Pan Room (Large Crusher House II)	**Building No**	20
Construction	Corrugated galvanised steel over steel frame	**Survey Date**	3 December 2009
Historical Phase	Post-war phase, 1944-1976	**Date**	c. 1955

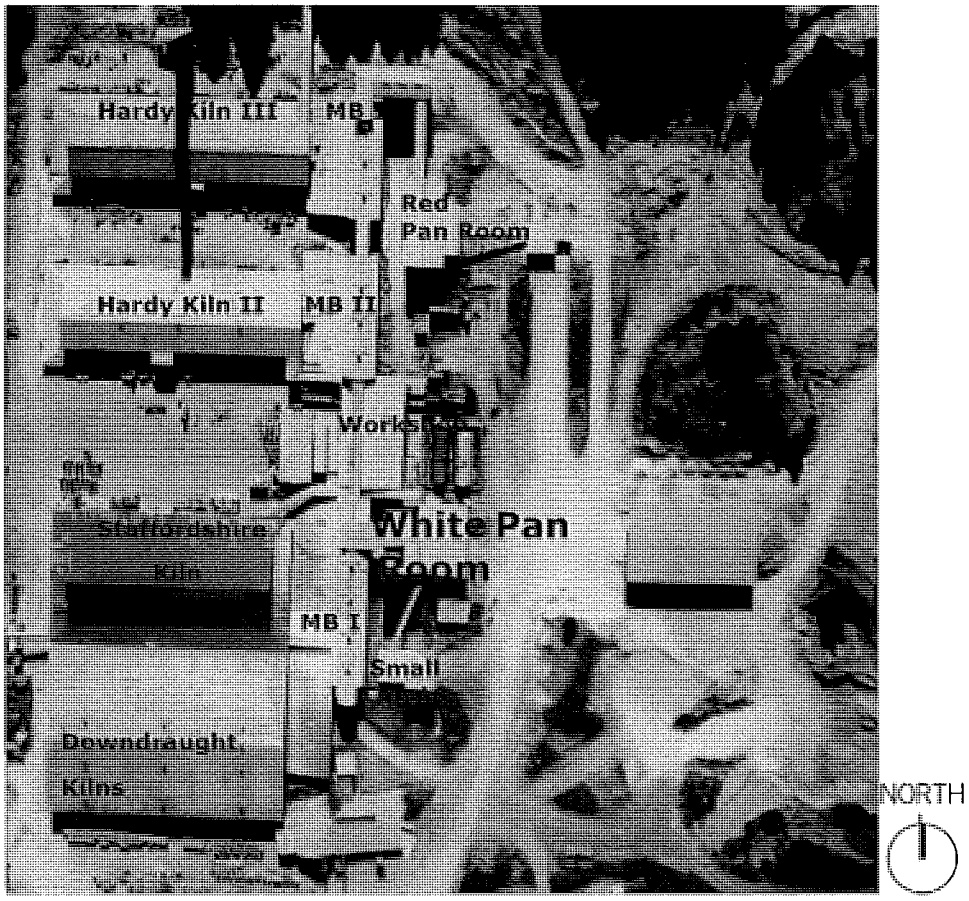

Figure 125 1976 aerial photograph with major site elements in the vicinity of the machine bays labelled. The White Pan Room is indicated by a larger font.
Source: ACT Heritage Library, Woden ACT.

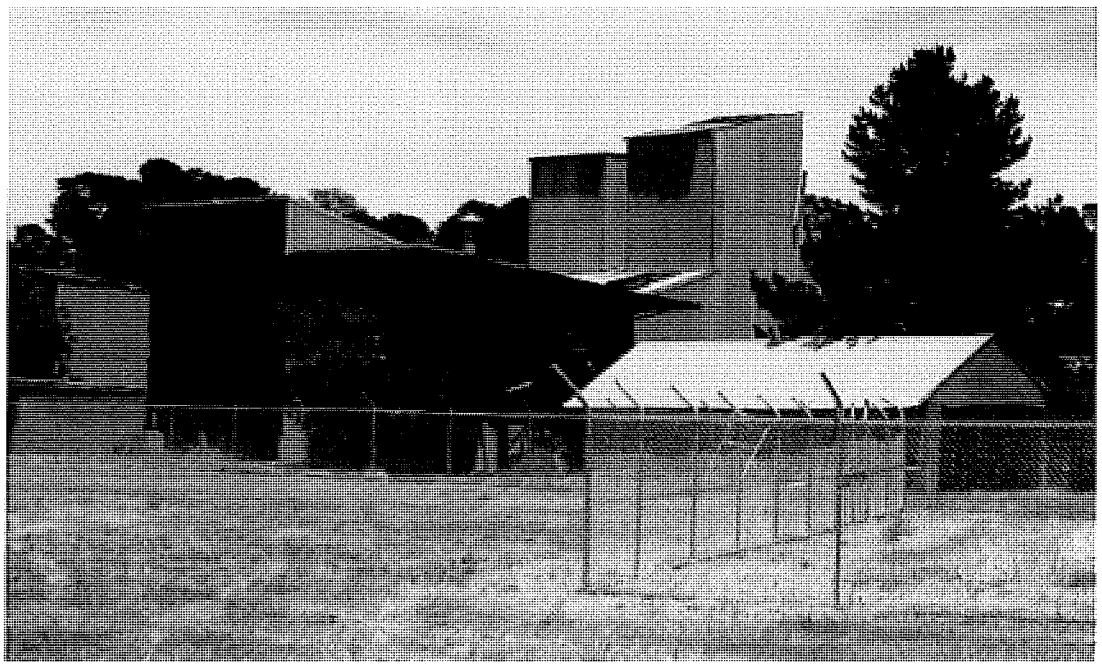

Figure 126 The White Pan Room viewed from the east. The shed in the foreground is Building 34.

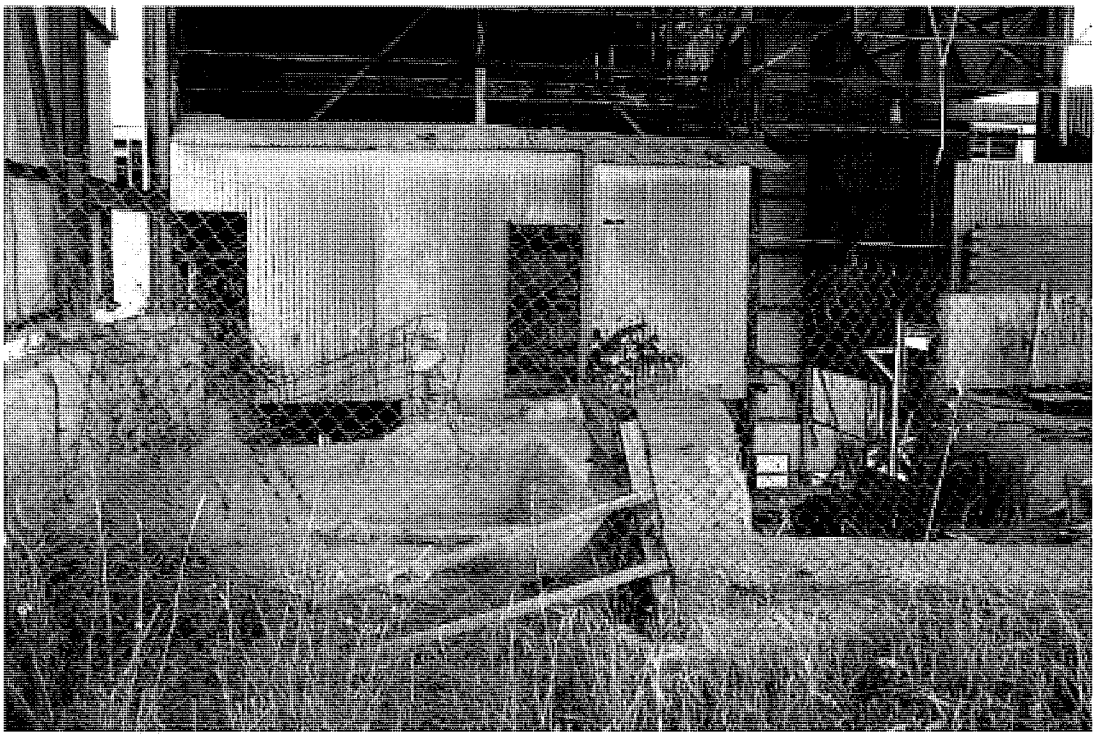

Figure 127 Interior of the White Pan Room looking west. The site of the now-removed hoppers is in the foreground.