Attachment AL

Archaeological Excavation Report and

Statement of Heritage Effects

Volume 1

Canberra Brickworks Precinct

Archaeological Excavation Report and Statement of Heritage Effects

Volume 1—Report

Prepared for
Doma Group
April 2022

GML HERITAGE

Acknowledgement of Country

We respect and acknowledge the Ngunnawal and Ngambri people of the lands and waterways on which we live and work, their rich cultural heritage and their deep connection to Country, and we acknowledge their Elders past and present. We are committed to truth-telling and to engaging with Ngunawal and Ngambri people to support the protection of their culture and heritage. We strongly advocate social, cultural and political justice and support the Uluru Statement from the Heart.

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Report register

The following report register documents the development of this report, in accordance with GML's Quality Management System.

Job No.	Issue No.	Notes/Description	Issue Date
19-0443E	1	Draft Report	22 December 2021
19-0443E	2	Revised Draft Report	5 April 2022

Quality assurance

The report has been reviewed and approved for issue in accordance with the GML quality assurance policy and procedures.

Cover image

Open Area 2, Kiln D. (Source: © GML 2021)

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Executive summary

GML Heritage Pty Ltd (GML) was engaged by Doma Group (Doma) to undertake historical archaeological test excavations at the Canberra Brickworks Precinct (the Precinct or the Brickworks) in accordance with Excavation Permit Yarralumla-S102-B1, issued under Section 61F of the *Heritage Act 2004* (ACT).

The Precinct is a significant historic site with a distinctive industrial character. It has recognised heritage significance through its listing on the ACT Heritage Register as the 'Yarralumla Brickworks' and the associated 'Yarralumla Brickworks Railway Remnants'

A 2016 Archaeological Assessment (AA) identified 12 areas of archaeological potential across the Precinct. Eight of these areas were selected to be subject to archaeological test excavation based on: observable remnant surface features; degree of archaeological potential; and likely significance of any surviving archaeological deposits.

A total of 32 test trenches (TTs) were excavated during 2–19 March 2021. Five of these were then fully or partially reopened as part of two open area (OA) trenches excavated during 19 July–12 August 2021. A total of 225 contexts were recorded, 38 of which yielded artefacts.

The archaeological remnants identified in this investigation are only partially reflective of several distinct phases of operations. Widespread demolition often took place between these phases, and subsequent reinvigoration of the site often obscured the earlier activities.

Most notably, the archaeological investigations identified evidence for the 1913–c1916 'experimental plant'. This evidence comprised the remains of five early kilns, including the modification of two downdraught kilns into Scotch kilns. Although previously considered to be a temporary part of the Brickworks, the modification of these two kilns to continue operations show an active investment in the longevity of the experimental plant—this demonstrates the value the experimental kilns held, and the efforts expended to continue their operation.

The investigations also mapped the subsurface flues for the Staffordshire and Downdraught Kilns. Whilst the subsurface flues for the Hardy Patent Kilns 1 and 2 could not be accessed, the documenting of the Staffordshire and Downdraught Kilns flues provided valuable insight into the layout and conditions of these previously unexplored structures.

The Canberra Brickworks Precinct is significant as the first industrial manufacturing facility commissioned for and constructed in the ACT, developed specifically to facilitate the construction of the new capital city. It has a diverse range of heritage values, such as the role it has played in the course of the ACT's history, its aesthetic qualities, and the

connection it holds with both the local Yarralumla community and the wider Canberran population. These values are manifested in the intact industrial landscape and its archaeological remains.

Contents

1 Introduction

1 Introduction

The Canberra Brickworks Precinct (the Precinct or the Brickworks) is a significant historic site with a distinctive industrial character. It has recognised heritage significance through its listing on the ACT Heritage Register as the 'Yarralumla Brickworks' and the associated 'Yarralumla Brickworks Railway Remnants' (Section 1.1.3).

Doma Group (Doma) engaged GML Heritage Pty Ltd (GML) to undertake historical archaeological test excavations at the Precinct across a number of identified areas of archaeological potential. The archaeological investigation of these areas is proposed to inform the design and management of the Precinct during the proposed redevelopment.

The archaeological works were undertaken in accordance with Excavation Permit Yarralumla-S102-B1, issued under Section 61F of the *Heritage Act 2004* (ACT) (see Section 3.1).

This report has been prepared to meet the post-excavation reporting requirements of the ACT Heritage Council (2015) *Cultural Heritage Reporting Policy*.

1.1 Site identification

1.1.1 Terminology

The Precinct is subject to two separate ACT Heritage Register listings (Section 1.1.3) and has been referred to historically by many names (eg the Old Canberra Brickworks, Yarralumla Brickworks, Westridge Brickworks, the Commonwealth Brickworks, and the Government Brickworks). For consistency, this assessment utilises the terminology outlined in the 2021 Conservation Management Plan (CMP) prepared by GML:

- **Canberra Brickworks Precinct**—The area comprising Blocks 1, 7, and 20, which is inclusive of the 'Yarralumla Brickworks' and 'Yarralumla Brickworks Railway Remnants' heritage citations.
- **Canberra Brickworks**—Referred to as the 'Yarralumla Brickworks' in the ACT Heritage Register citation.
- **Railway Remnants**—Referred to as the 'Yarralumla Brickworks Railway Remnants' in the ACT Heritage Register citation.

1.1.2 Location

The Precinct is in the suburb of Yarralumla, to the west of central Canberra (Figure 1.1). It occupies Blocks 1, 7, and 20, Section 102. The site is bordered to the north and east by

low-density residential development, to the west by the Royal Canberra Golf Course and Westbourne Woods, and to the south by open space. It comprises the heritage-listed sites and additional unlisted lands that were part of the ancillary operation of the Brickworks.

Figure 1.1 Location of the Canberra Brickworks Precinct (inclusive of the 'Yarralumla Brickworks' and 'Yarralumla Brickworks Railway Remnants'), in the broader context of Canberra. (Source: Google Earth with GML overlay, 2017)

1.1.3 Heritage status

ACT Heritage Register

The Heritage Act aims to represent and protect the rich natural and cultural heritage of the ACT. The legislation establishes a system for the recognition, registration and conservation of natural and cultural heritage places and objects, including Aboriginal places and objects.

As described previously, the 'Yarralumla Brickworks' and the 'Yarralumla Brickworks Railway Remnants' are included on the ACT Heritage Register (Appendix A).

Non-statutory listings

- Yarralumla Brickworks' is listed on the Australian Institute of Architects (AIA) ACT Chapter Register of Significant Twentieth Century Architecture (RSTCA), Item No. R063.

- 'Canberra Brickworks' was identified as a 'Classified' place by the National Trust of Australia (ACT) on 20 July 1981.

1.2 Authorship and acknowledgements

This report was prepared by Elise Jakeman (GML Consultant and Archaeologist) with input and review by Martin Rowney (GML Principal and Archaeologist). The excavations were undertaken by Martin Rowney, Elise Jakeman, Caitlin Harvey (GML Graduate Consultant), Lara Tooby (GML Subcontractor), and Georgia Reed (GML Subcontractor). Post-excavation analysis and processing was undertaken by Elise Jakeman, Caitlin Harvey, Anna Leeson (GML Consultant), and Therese McCarthy (GML Senior Consultant).

We gratefully acknowledge the assistance of the following individuals for their contribution to the preparation of this report:

- Rod and Joe, D Group Pty Ltd;
- Peter Fogarty, Soil and Land Conservation Consulting Pty Ltd, and Cath Fogarty, ceramicist;
- Guy Hazell, Archaeological Surveying, Photogrammetry, and Illustration;
- John O'Brien, Agon Environmental Pty Ltd;
- Steve Barnsley, MMB Consulting Surveyors Pty Ltd;
- Jeff Wullaert, Commence Communications Pty Ltd;
- Ann Gugler, local historian; and
- archivists at the National Archives of Australia (NAA), ACT Heritage Library and ACT Archives, and Canberra District Historical Society (CDHS).

1.3 Limitations

The Brickworks has previously been assessed as having no Aboriginal cultural values. As a result, this archaeological investigation has not addressed Aboriginal archaeological potential.

1.4 Relevant documentation

Several previous reports considering the archaeological potential and heritage significance of the Canberra Brickworks Precinct have been consulted in the preparation of this post-excavation report:

- GML Heritage, Canberra Brickworks Precinct—Conservation Management Plan, prepared for Doma, September 2021;

- Navin Officer Heritage Consultants, Archaeological Assessment Canberra Brickworks and Environs, draft report prepared for the Land Development Agency, September 2016;
- GML Heritage, Canberra Brickworks Quarry—Statement of Heritage Effects, draft report prepared for Doma, September 2021;
- Lovell Chen, Canberra Brickworks—Conservation Management Plan, prepared for the Land Development Agency, April 2010; and
- Lester Firth Associates, Old Canberra Brickworks—Conservation Plan, June 1986.

2 Historical context

2 Historical context

This section provides a summary of the historical development of the Canberra Brickworks Precinct, with particular emphasis on events and features that have been identified as having archaeological potential (see Section 3.2). It has been drawn largely from the history provided in the CMP, but supplemented where necessary.

A comprehensive history of the development of the site, its operations, and its contextual place within the historical landscape of Canberra is presented in the CMP.

2.1 Establishment of the Brickworks, 1911–1920

In 1910, King O'Malley announced Government plans for the construction of a brickworks to serve the Federal Capital.[1] Other industries considered essential for the inland city included a power station, a dam and a pumping station, which became the Kingston Powerhouse and the Cotter Dam.

The establishment of the Brickworks is outlined in meticulous detail in a number of letters between Andrew Christie, an engineer, and PT Owen, the Director General of Works over the course of 1911 to 1913. Dubbed the 'experimental plant', in July 1911, Christie intended that:

> The first portion of the works will consist of two Hoffman kilns and two open kilns for burning face bricks.[2]

Before construction could commence, the best source of raw materials for the production of bricks had to be located. 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 at the Hoffman Brick Company in Melbourne, where batches of bricks were burnt and compared for colour and composition.[3] 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'.[4] The Yarralumla site was selected on this basis and development of the began in 1913.[5]

The Queanbeyan Observer reported in February 1913 that:

> … an Australian-made brick-making machine … will be delivered on the site of the brick-works of the Federal Capital within three weeks. There will then be no delay in the

> manufacture of the first bricks, and it is anticipated that bricks for the making of the three open kilns will be turned out within a month … These kilns in turn will be used for the making of large quantities of bricks required in the construction of the new city.[6]

However, a letter from a Thomas Hill to the Director General of Works on 19 June 1913 indicated that the construction of the experimental plant had been delayed:

> … commencement was made on the 12th [instant] in the manufacture of green bricks for the first kiln, and fair progress is being maintained. The first kiln of bricks about 20,000 should be burnt in a few days.[7]

Once these first bricks had been fired and the second kiln constructed, the experimental plant grew rapidly. On 25 August 1913, Christie wrote:

> I beg to report that I visited the Brickworks at Federal Capital in 20th [instant] for the purpose of inspecting the bricks made in No 2 Kiln …
>
> I waited until next day to see No 3 Kiln opened. The bricks exposed appeared to be of good quality but were lighter in colour than No 2 Kiln …
>
> I had [a] test sample of shale bagged in my presence, of the same stuff as the bricks now being made for No 6 Kiln.[8]

Within the span of two months, the Brickworks had grown from a single kiln to at least six structures.

Beyond Christie's first suggestion that an equal number of Hoffman and open kilns would be constructed, it is unknown exactly what types of kilns were constructed or how many of each there were. The only known configuration of the experimental plant is shown on a 1916 contour survey of the Brickworks (Figure 2.5). Contemporary reports of the kilns were generally concerned with the quantity of brick being produced, with descriptions limited to 'open brick kilns'.[9] An article in *The Queanbeyan Observer* in September 1913 described these kilns as 'immense'[10], whilst a June 1917 Federal Capital Administration *Report of the Royal Commission* stated 'the bricks were burned in a Hoffman kiln'.[11]

Regardless, the experimental kilns were considered a success. In August 1913, Christie wrote:

> I found a considerable portion of the bricks were good quality common bricks and of good colour … I am perfectly satisfied that the rubbish stage has been passed and that the material now being quarried will make first class bricks and of good colour.[12]

As a result, further experiments could be undertaken. A memorandum from Owen to the Administrator of the Federal Territory in October 1913 reported:

> … the original proposal was to manufacture with the semi-dry process … The results from the semi-dry process have been satisfactory, but Mr Andrew Christie has, in the meantime, arranged for experimental brick making by the stiff plastic process, and that process has, on a small scale, produced bricks superior to the semi-dry …

Mr Christie has also arranged for experiments to be made in the moulding of special and fancy bricks with satisfactory results, but this factor enters into the considerations in respect to types of kilns …

I am glad to say that the work carried on up to the present in the … open kilns has proved satisfactory. There is now a stack of over a quarter of a million of good bricks which can be used in the permanent [Kingston] Power House now being erected, or elsewhere where demands may arise.[13]

Figure 2.1 A line of railway trucks carrying bricks from the Brickworks at the Kingston Powerhouse, c1927. (Source: NAA, A3560 7674)

Figure 2.2 The Kingston Powerhouse, c1926. (Source: NAA, A3560 150)

On 1 December 1913, Owen approved the construction of a single Staffordshire kiln, which was to form part of the next stage of the Brickworks. The selection of the Staffordshire design had been a rigorous process, with numerous other designs considered. Following the inspection of the Staffordshire kilns at the State Brickworks in Homebush, in July 1911 Christie wrote that the kiln design had:

… 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'.[14]

Figure 2.3 Staffordshire Kiln construction at the Brickworks, c1915. (Source: Canberra District Historical Society, ID15652)

Figure 2.4 View west over the Staffordshire Kiln, c1926. (Source: NAA, A3560 188)

Prior to the closure of the Brickworks from late 1916 until 1920, workers were predominantly accommodated in two camps of tents—one for married couples the other for single men—located on Banks Street, near the present Forestry School.[15] Table 2.1 lists the inhabitants of the 'Brickworks Campsite' for married men in 1915 and 1916. An additional dormitory block is shown on the site of the 'Old Kilns' on the 1916 survey plan (Figure 2.5).

Table 2.1 Occupants of the 'Brickworks Campsite' for married men. (Source: NAA A207, G1916/299)

Name	Block	Occupied from	Occupation
R Boag	1	27 August 1915	Main Sewer
Edward Moore	2	21 June 1915	Main Sewer
Peter Nightingale	4	29 March 2915	Brickworks, carpenter
Michael John Ware	5	24 August 1915	Brickworks, labourer
W Denley	6	22 April 1915	Unknown
W J McDermott	7	26 August 1915	Unknown
Lewis Pola	9	25 August 1915	Brickworks, labourer
Samuel Coad	10	31 March 1915	Brickworks, labourer
John Robert Lake		8 July 1915	Unknown
Thomas Ernest Enver		21 October 1915	Main Sewer, labourer
James Pearce	12	24 February 1916	Brickworks, labourer
Edward Skerry Snr	13	8 July 1915	Maintenance, Uriarra Road, labourer with horse and dray

Name	Block	Occupied from	Occupation
James 'Jas' Skerry	15	24 February 1916	Brickworks, carter
S Oldfield	16	16/4/15	Unknown
Joseph Lea	17	21 June 1915	Brickworks, engine driver
Everett P Eggleston	18	2 May 1915	Brickworks, bricklayer
William Handcock	20	13 April 1915	Brickworks, caretaker
M O'Malley	22	24 June 1915	Unknown
William C Boyd	23	20 October 1915	Main Sewer
Mitchell Curtin George Murrin	24	27 August 1915 24 February 1916	Unknown Main Sewer, miner
Arthur Henry Ingram Edward Quigg	25	8 July 1915 21 June 1915	Unknown Unknown
J C Cotterill	34	25 August 1915	Unknown
Williams Fields Percy William Stephenson	36	5 July 1915 24 February 1916	Brickworks, bricklayer Brickworks, labourer
Isaac Beveridge	37	24 February 1916	Main Sewer, miner
William Jacobs	41	24 August 1915	Main Sewer, labourer

The arrival of World War I led to a shift in government priorities and commitments and resulted in restrictions on the works program for Canberra. This shift, together with a coal strike, caused the first closure of the Canberra Brickworks in December 1916.

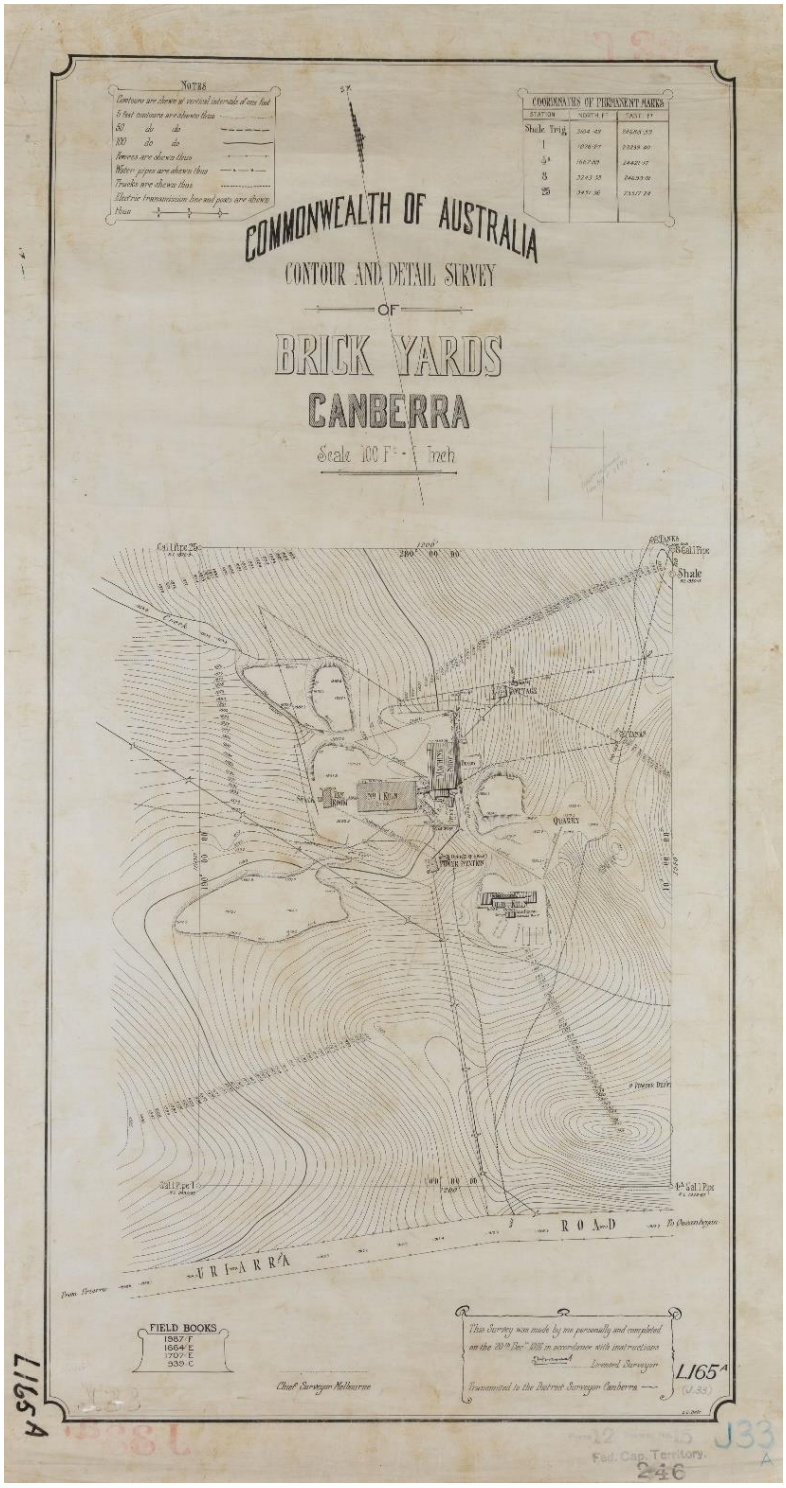


Figure 2.5 The 'Contour and Detail Survey, Canberra Brick Yards, 20 December 1916'. The 'Dormitories' and 'Bath House' are shown to the southeast of the site. Note that the 'Old Kilns' to the bottom right illustrates the footprints of four kilns—presumably two wholly or partially demolished kilns (indicated by the crossed lines) and two other kilns that may still have been standing. The two other kilns mentioned by Christie (totalling six kilns) are not depicted. (Source: NAA A6664, L165A)

2.2 Expansion phase, 1921–1942

With the end of World War I, the government proceeded with the construction of Canberra and formally reopened the Brickworks in 1921, which had undergone machinery repairs the previous year. In 1922, a tile-making plant was installed. By the end of 1923, five million bricks and 50,000 tiles had been produced at the plant by a workforce of 53.[16] The bricks produced at the Precinct in this period were generally regarded as being of a high quality.

Initially bricks were transported from the Brickworks to the construction sites in the emerging city centre by traction engine. However, the machines were only able to make two daily round trips. To accelerate the process, a light railway was constructed, leading from the southwest of the brickworks site, before aligning with the present Denman Street and heading east to the construction sites (Figure 2.1). 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 once again transported by road.

Figure 2.6 The quarry face and adjacent narrow gauge railway track, c1920 to 1930. (Source: NAA, A3560 3314)

The output of the Precinct in the mid 1920s was insufficient to cope with the demands of the national capital construction program. By 1927 a new Hardy Patent kiln (a variation of a Hoffman kiln) was completed and operational.[17] To aid in its construction, several clamp and Scotch kilns were in operation to the north of the Staffordshire Kiln (Figure 2.8).

Figure 2.7 The Hardy Patent Kiln 1 under construction, c1926. (Source: NAA, A3560 2111)

Figure 2.8 Scotch kilns (left) and a clamp kiln (right) were used to assist in making bricks for the Hardy Patent Kiln 1, c1926. (Sources: left, NAA, A3560 1968; right, NAA, A3560 1854)

The output of the two kilns was considered to be excellent, with approximately 2 per cent of green bricks and 15 per cent of tiles lost during the firing process.[18] The misfired bricks

were not allowed to go to waste. The clinker (over-burnt) and callow (under-burnt) bricks were often sold as suboptimal goods. Where the quality was too poor for sale, these bricks were kept aside. In 1929, a large proportion of this dump was collected and used as crushed material for road construction.[19]

The Depression curtailed production at the Brickworks and timber was used instead of the more expensive coal to operate the kilns. With significant reduction in demand, the Precinct closed for a second time in 1931 before reopening once again in 1935.

The range of products for building purposes manufactured at the Brickworks in the 1930s was enormous. A 1936 Stock Sheet of the Department of Interior lists all products and includes: 3 inch (76 millimetre) common bricks, 3 inch face bricks (red), 3 inch black bricks common, 2 inch (51 millimetre) paving bricks, 2 inch face bricks (red), 3 inch semi-glazed face bricks, 3 inch chocolate face bricks, 3 inch pavers, 2 inch common bricks, squints, ovolo double return bricks, special mould bricks, ovolo type 8, ovolo type 17, splay on end 3 inch, 3 inch splay on end flat double, angle bricks, Scotia, cornice, 3 inch 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.[20]

The reactivation of the Brickworks required accommodation to support the additional workers. In c1921–1922, seven timber tenements and a number of brick cottages were constructed adjacent to the Brickworks Camp. 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 (Figure 2.10 and Figure 2.11).[21]

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 was retained to issue bricks for essential works.

Figure 2.9 Workers at the Brickworks, c1924. (Source: The Canberra Page)

Figure 2.10 The married quarters camp (background), built to the southwest of the Brickworks in 1927. (Source: NAA)

Figure 2.11 Looking south past the Staffordshire Kiln (left), 1929. The mess hall building and the roofs of several of the sleeping quarters are visible in the background. (Source: NAA, A3560 5837)

2.3 Post World War II phase, 1944–1976

With the end of World War II in sight, the Canberra Brickworks reopened in September 1944, with limited production. From the late 1940s and into the 1950s, output was stepped up to provide material to address the postwar housing shortage, resulting in a major expansion and redevelopment of the Brickworks.

Among the first postwar construction projects was the replacement of the married quarters of the Brickworks Camp built during the 1920s, which had been removed by the army during World War II. The new 'Brickworks Hostel' was ready for occupation in 1945.[22] and was located on the site of the former married quarters.

In 1945 it was noted that the condition of the two 'dome kilns' had deteriorated. W J Lind, the Acting Secretary, wrote to the Director Works reporting that 'the main flues are collapsing and one has fully collapsed, whilst the floors are very bad'.[23] In 1955, Hardy Patent Kiln 1 was also substantially rebuilt and enlarged by two bays.

The development of Canberra received renewed attention with the creation of the National Capital Development Commission (NCDC) in 1958. The three existing kilns not producing enough bricks to meet the construction needs of Canberra, three new Downdraught Kilns were completed in c1960. In a continuation of the widespread upgrades, oil replaced coal as the fuel for firing the kilns, and modifications were made to the arched side openings (known as 'wickets') of the three continuous kilns (the Staffordshire and two Hardy patents) for the use of forklift trucks to set and remove bricks.[24]

From the late 1960s, however, the Precinct began to 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.[25]

By 1973 the Canberra Brickworks were considered to be in need of extensive modernisation and proposals were prepared by Commonwealth Brickworks Pty Ltd for upgrade works. These proposals were rejected by the NCDC on environmental grounds and a new brickworks site 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.[26] The kilns were unloaded for the last time in August 1976. All usable material was moved to the new site and the remainder offered for sale. Bricks were first produced in the Mitchell plant in October 1976.

By the time of its closure it was estimated that some 600 million bricks had been produced at the Canberra Brickworks.[27]

Figure 2.12 An aerial photograph of the Brickworks in 1976, the year of its closure. The photograph shows the six extant kilns, the extrusion plant to the west, a number of sheds within the quarry, and a carpark at the entrance of the complex. (Source: ACT Heritage Library)

2.4 Post-closure phase, 1976–2017

In 1976 a local developer and businessman, Alan Marr (A R Marr Pty Ltd), put forward a proposal to develop the Brickworks as an integrated tourist, recreation, and retail centre with medium-density housing to the east and north of the site. Marr succeeded in having the land rezoned to accommodate his vision, and carried out maintenance and reconstruction works to the kilns. Landscaping of the quarry, involving land fill and the creation of the reflection lake, proceeded in 1978. The redeveloped Brickworks was opened to the public as a tourist attraction in July 1979. However, limited income opportunities and high capital costs forced Marr's business into provisional liquidation. In the early 1980s Marr was seriously injured in a fall at the site and later died of complications. The Commonwealth accepted the surrender of Marr's company's lease in 1984 and management of the site was transferred to caretaker Bruce McDonald. While many of Marr's tenants remained at the Brickworks, concerns about the safety of some of the buildings and potential redevelopment of the site led to the tenants being asked to leave and the caretaker role being abolished. A timber recycling business, Thor's Hammer, was granted an extended period to relocate due to the considerable amount of its timber stock.

The 1988 *Canberra Brickworks South Canberra Policy Plan* suggested a range of potential uses for the site, such as housing, commercial accommodation, and office and retail space. The government adopted the plan despite it being poorly received by the community. Hooker Projects submitted the preferred 'Expression Of Interest', which proposed a development that adapted the kilns and machine bays, and contained a sports precinct, museum, restaurant, hotel, and visitor attractions. A depressed economy led to Hookers being placed in provisional liquidation, and by 1992 their proposal was defunct. It was around this that time the Commonwealth handed the Brickworks site over to the ACT Government.

Further development proposals were investigated but none proceeded, and during this phase the Brickworks continued to accommodate a range of tenants, including artists, designers, and manufacturers. In 2001 the Brickworks was included on the ACT Heritage Register as the 'Yarralumla Brickworks'. In 2013 the remnants of the former 1920s narrow-gauge railway were individually listed as the 'Yarralumla Brickworks Railway Remnants'.

In September 2013 the ACT Government's Land Development Agency (LDA) (now the Suburban Land Agency) released the *Canberra Brickworks and Environs Planning and Development Strategy*, which sought to promote the adaptive re-use of the site and its surrounds with respect to its heritage significance. Following a revision of the strategy in 2015 the LDA called for development proposals, and in 2017 it was announced that the preferred tenderer was local Canberra developer Doma, which had submitted a proposal for a mixed-use residential, commercial, and retail development that utilised much of the historic Brickworks infrastructure.

2.5 Endnotes

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

2 National Archives of Australia, A110, FC 1913/1055.

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

4 National Archives of Australia, A110, FC1913/1055, in Ian Carnell, 'Canberra's Cornerstone', *Canberra Historical Journal*, No. 5, March 1990, cited by Lester Firth Associates, 1986, Section 2.2.1.

5 Gugler, A 1994, The builders of Canberra, 1909–1929. Part one, Temporary camps & settlements, CPN Publications, Canberra, p 77.

6 *The Queanbeyan Observer*, 'Local and General News', 18 February 1913, p 2, Trove, National Library of Australia <https://trove.nla.gov.au/newspaper/page/25410953>

7 National Archives of Australia, A6269, E1/30/92.

8 National Archives of Australia, A6269, E1/30/92.

[9] *Queanbeyan Age*, 'The Federal Capital', 16 June 1914, p 4, Trove, National Library of Australia <https://trove.nla.gov.au/newspaper/page/4324941>; *The Queanbeyan Observer*, 'Local and General News', 18 February 1913, p 2, Trove, National Library of Australia <https://trove.nla.gov.au/newspaper/page/25410953>

[10] *The Queanbeyan Observer*, 'Electrical Brick-making Plant', 23 September 1913, p 3, Trove, National Library of Australia <https://trove.nla.gov.au/newspaper/page/25411094>

[11] The Parliament of the Commonwealth of Australia, Federal Capital Commission, *Report of the Royal Commission, Part 5, Brick-works at Canberra*, 3 April 1917, No. 15—F.7954, p 3.

[12] National Archives of Australia, A6269, E1/30/92.

[13] National Archives of Australia, A199, FCW1914/723.

[15] Gugler, A 1994, The builders of Canberra, 1909–1929. Part one, Temporary camps & settlements, CPN Publications, Canberra, Chapters 2 and 3.

[16] Dates and figures in this paragraph are taken from Lester Firth and Associates, 1986, Section 2.1.2. Sources are not cited.

[17] Lester Firth and Associates, 1986, Section 2.1.2. Source uncited.

[18] National Archives of Australia, A6269, E1/30/92.

[19] National Archives of Australia, A6269, E1/30/92.

[20] Department of Interior, Stock Sheet, 1936, referenced in Lester Firth and Associates, 1986, Section 2.1.2.

[21] Dates and details in this paragraph are from Gugler, A 1994, *The builders of Canberra, 1909–1929. Part one, Temporary camps & settlements*, CPN Publications, Canberra, Chapters 2 and 3.

[22] National Archives of Australia, Series A431, cited in Lester Firth and Associates, 1986, Section 2.1.4.

[23] National Archives of Australia, Series A431, 1953/1328.

[24] 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.

[25] Lester Firth and Associates, 1986, Section 2.1.4. Original sources uncited.

[26] *Canberra Times*, 18 June 1974, cited in Lester Firth and Associates, 1986, Section 2.1.4.

[27] Lester Firth and Associates, 1986, Section 2.1.4. Source uncited.

3 Investigation methodology

3 Investigation methodology

The following section provides the statutory context for the archaeological investigations and outlines the methods used.

3.1 Statutory approval

An Archaeological Research Design (ARD) and Excavation Permit application was submitted to the ACT Heritage Council in May 2020 under Section 61E of the Heritage Act. Following amendments to the application in September 2020 it was approved under Section 61F of the Heritage Act. An Archaeological Excavation Permit (Yarralumla-S102-B1) was granted on 20 October 2020 with the following conditions (Appendix B):

- all excavation and related activities are to be undertaken in accordance with the September 2020 ARD;
- a long term artefact management strategy is to be submitted to the ACT Heritage Council.

Two variations to the Permit were submitted to the ACT Heritage Council on 1 March 2021 and 21 June 2021. These concerned, respectively:

- Reducing the number of test trenches proposed to be excavated in BRW7, based on evidence gathered during the contamination and geotechnical investigations undertaken by Agon Environmental Pty Ltd during 16–18 and 25 February 2021.
- Expanding the test trenches in BRW8 to encompass an open area excavation and allow for the full exposure of the early kiln complex.

3.2 Description of investigations

The 2016 Archaeological Assessment (AA) prepared by Navin Officer Heritage Consultants Pty Ltd (NOHC) identified 12 areas of archaeological potential across the Precinct (Appendix D). Eight of these areas were selected to be subject to archaeological test excavation based on: observable remnant surface features; degree of archaeological potential; and likely significance of any surviving archaeological deposits. These were (Figure 3.1):

- Brickworks (BRW) 1—Building platform and concrete features;
- BRW2—Married quarters and Brickworks Hostel;
- BRW3—Area of postholes and other remains
- BRW7—Quarry;
- BRW8—Old kiln and dormitories;
- BRW10—Railway remnants;
- BRW11—Railway siding extension; and

- BRW12—Flues and subsurface workings.

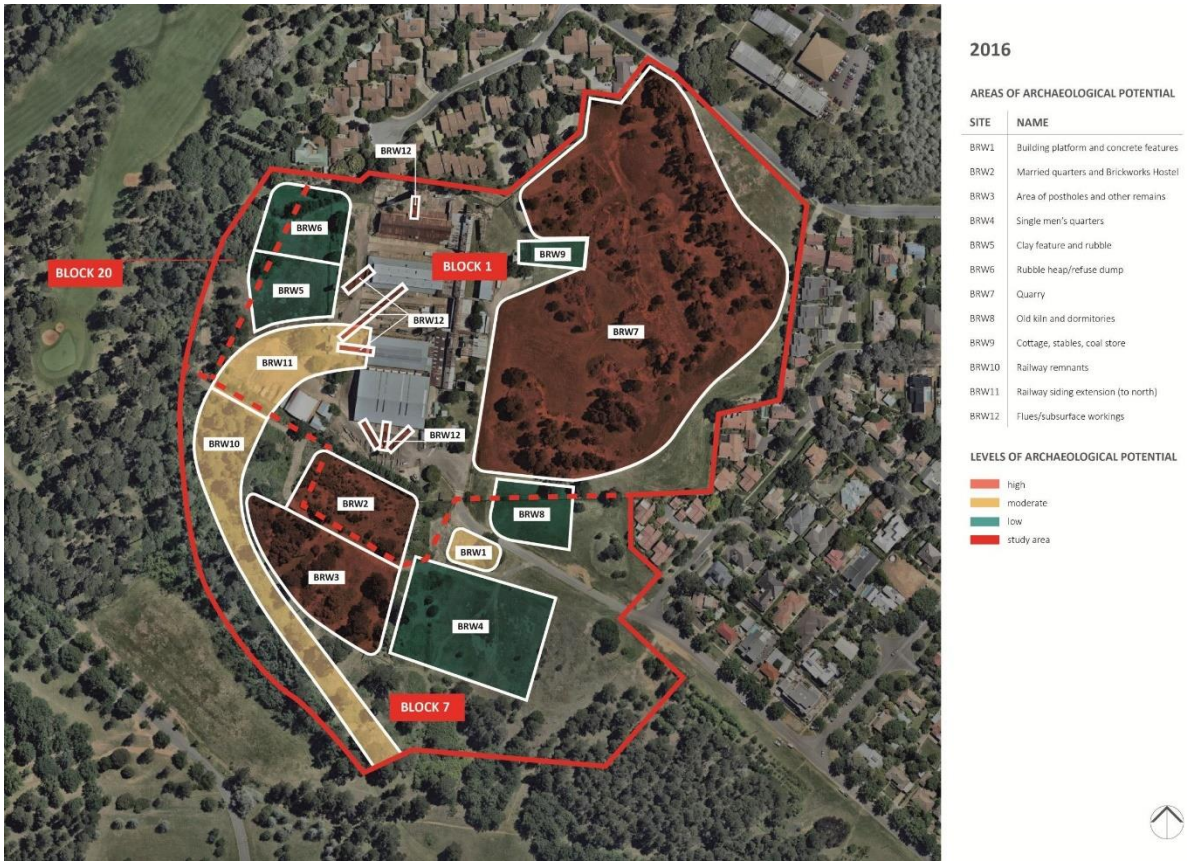


Figure 3.1 Areas of archaeological potential. (Source: NOHC, 2016)

Excavation and post-excavation tasks were undertaken in accordance with the detailed methodologies outlined in the approved ARD (Appendix C). These are summarised below.

- Excavation:
  - Archaeological material was recorded using the single context recording system and included context sheets, photographs, and measured drawings (included in Appendix).
  - Machine excavation (with a flat-edged bucket approximately 1.2 metres wide) was used to open all excavation areas, remove modern overburden, and reveal archaeological features and deposits. Once archaeological features and deposits were identified, manual excavation was employed to expose, investigate, and clean the in situ features.
  - Significant archaeology identified within the trenches was not removed during excavation. Where these features or deposits needed to be examined further, test pits and cross-sections were excavated to confirm the nature of the

archaeology, determine if any depositional phases were present, and verify archaeological significance. Where machine excavation was used to excavate sondages, a flat-edged bucket approximately 30 centimetres wide was used.
  - All artefacts recovered during the excavation were collected according to their context.
- Post-excavation:
  - All records made during the excavation were collated and digitised into a succinct database (Appendix F).
  - Artefacts were sorted into type—brick, glass, metal, ceramic, bone, organic, and other—for cataloguing, cleaning, and photographing. Emphasis was placed on cleaning and photographing diagnostic artefacts. The entire artefact assemblage was analysed to identify typologies and manufacture dates, and to provide context for the associated archaeological deposits.

4 Results

4 Results

The following section discusses the results from the archaeological investigations. It is split into two sections:

- The excavation, describing the archaeological features and deposits identified. This includes comparative analysis and synthesis for the structures identified in BRW2, 3, and 8.
- The artefacts recovered during the excavation, their provenance, and their interpretation.

4.1 Excavation and terminology

A total of 32 test trenches (TTs) were excavated during 2–19 March 2021. Five of these (all within BRW8) were then fully or partially reopened as part of two open area (OA) trenches excavated during 19 July–12 August 2021 (Figure 4.1). All context records, drawings, and photographs associated with the excavation units and contexts are provided in Appendix F. Context numbers referred to in the text below are signified in italics.

The following section uses the following terms to describe the orientation of laid brickwork in structures (Figure 4.1):

- Stretcher—The typical position for a laid brick. The brick is placed on its broadest surface with the long edge exposed on the wall face.
- Header—The opposite of the stretcher position. The brick is placed on its broadest surface with the short end exposed on the wall face.
- Shiner—The brick is placed on its long edge with its broadest surface exposed on the wall face.
- Rowlock—The opposite of the shiner position. The brick is placed on its long edge with the short end exposed on the wall face.
- Soldier—The brick is placed 'upright' on its short end with its long edge exposed on the wall face.
- Sailor—The opposite of the soldier position. The brick is placed 'upright' on its short end with its broadest surface exposed on the wall face.

A wall brick usually has a depression (called a frog) on one of the broadest sides. This reduces the amount of clay needed to form the brick and helps it bind to its neighbour when cemented on that side. The frog often incorporates a maker's or producer's mark. Bricks without frogs might have a mark stamped into the surface. Alternatively, some bricks are manufactured with perforations through the centre of the brick. These

perforations reduce the weight of the brick, promote even firing during production, and assist with the distribution of mortar. These have been referred to as 'air' bricks. The marks observed during the excavation are noted below and discussed in further depth in Section 4.2.1.

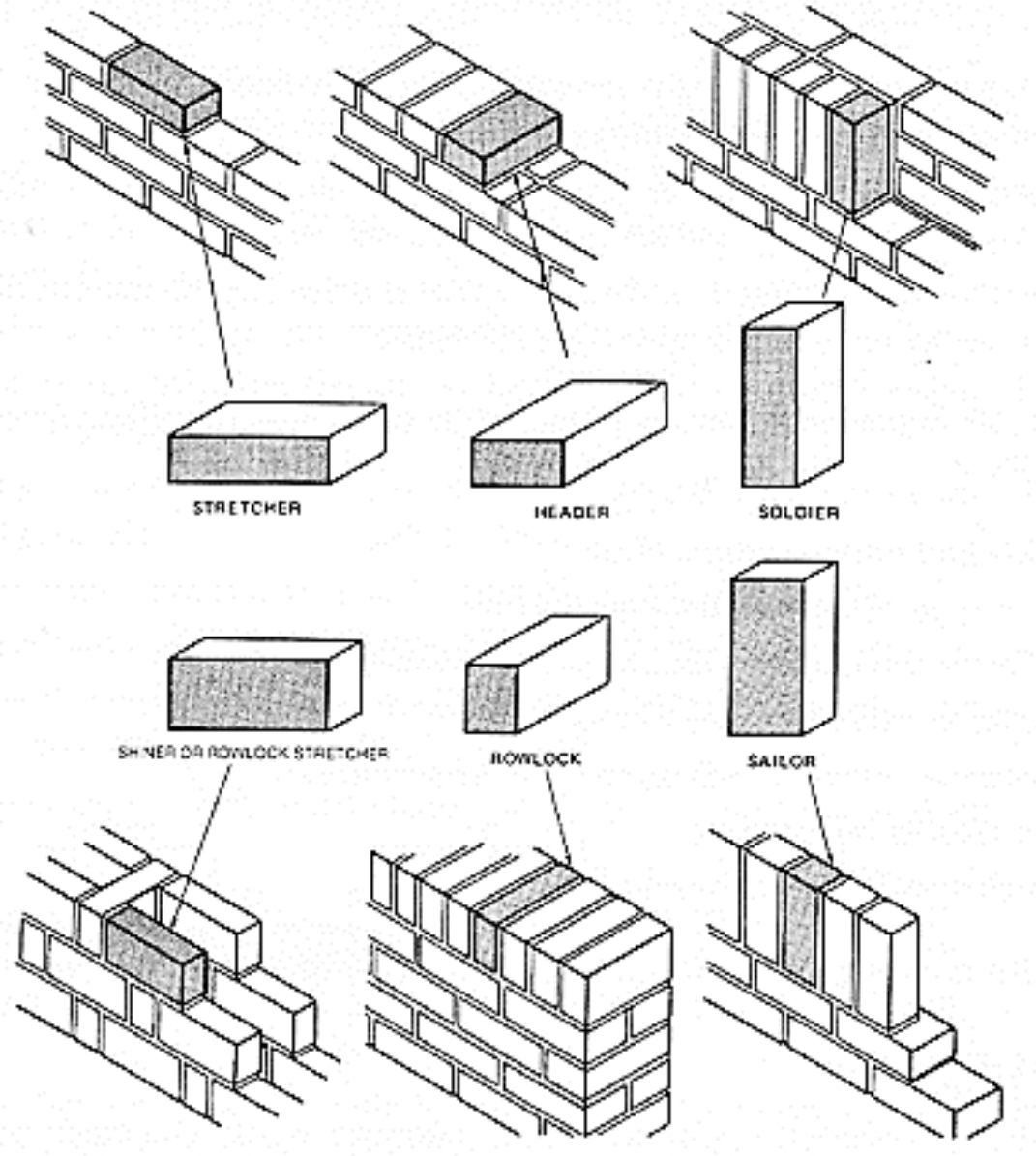


Figure 4.1 Typical orientations for laid bricks.

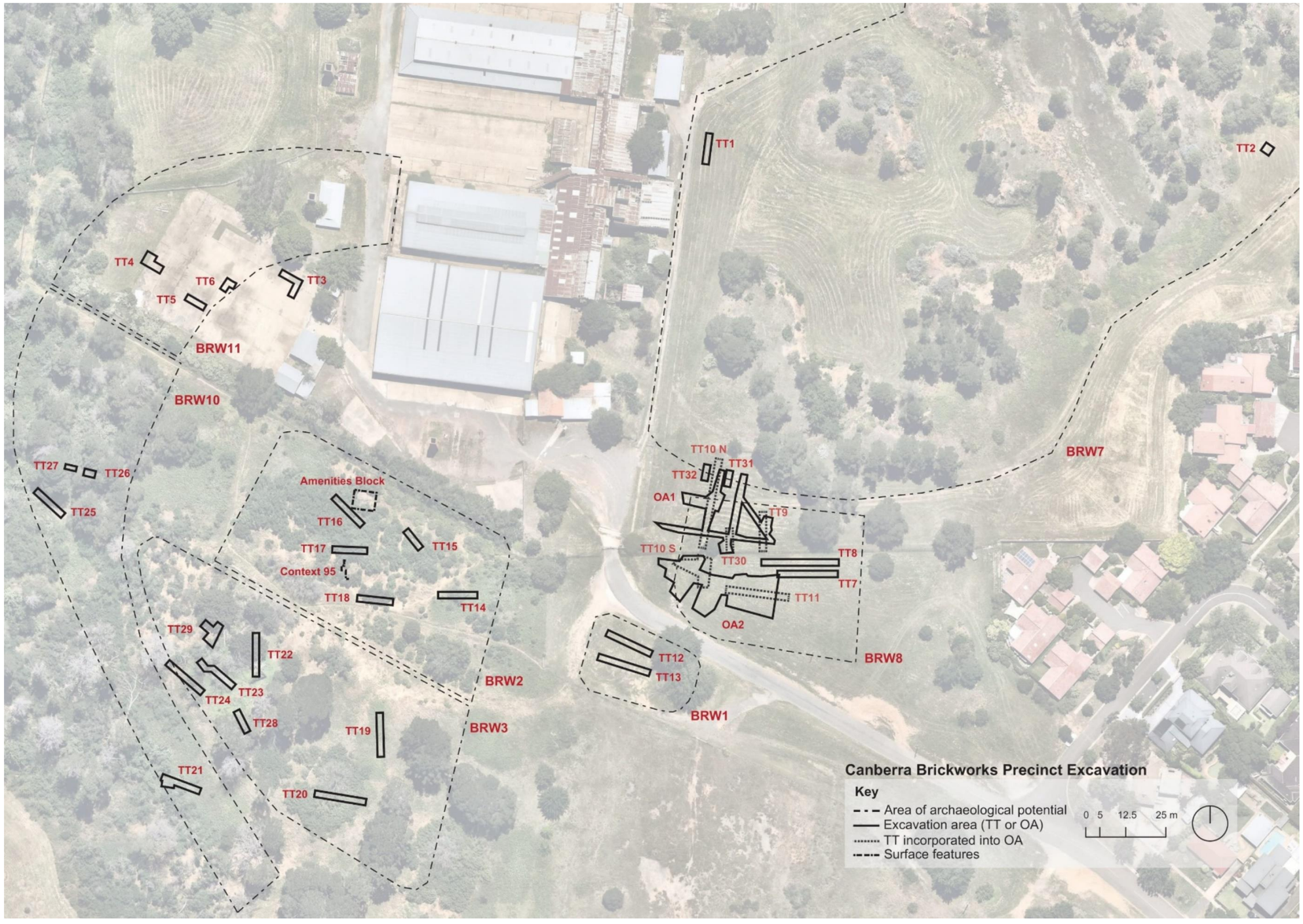


Figure 4.2 Layout of TTs and OAs excavated at the Canberra Brickworks Precinct. Note that BRW12 is not depicted; see Figure 4.3. (Source: Near Map 2020 with GML additions)

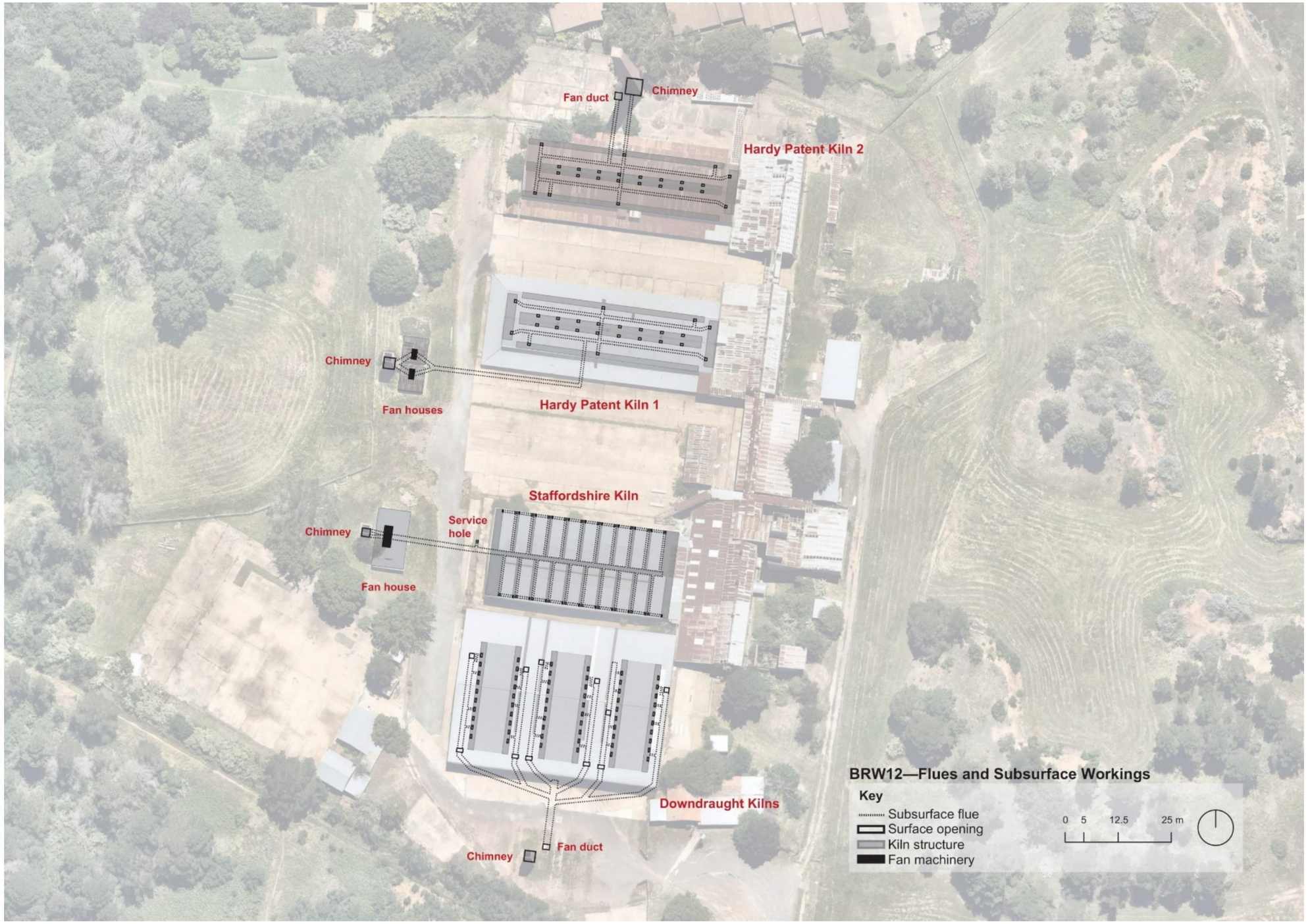


Figure 4.3 Layout of subsurface flues at the Canberra Brickworks Precinct. Note that the wickets in the long walls of both Hardy Patent Kilns have not been mapped due to successive alterations to the locations and use of the wickets. (Source: Near Map 2020 with GML additions)

4.1.1 BRW1—Building platform and concrete features

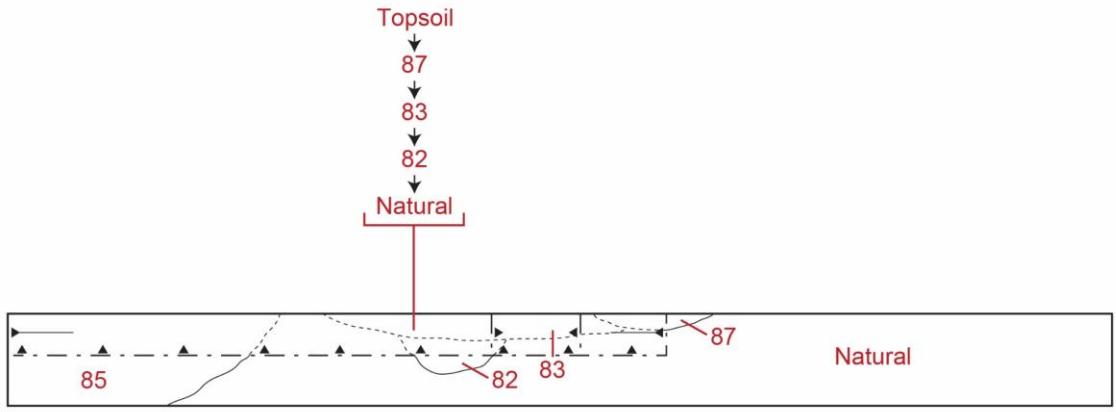
BRW1 consists of several surface features and potential subsurface features, including a square concrete feature and—at the time of recording—a visible line of grass dieback. The AA suggested that the feature had a function with water, either for storage or drainage. Aerial imagery showed that the area remained largely cleared without any structures, possibly with some intersection by roads during the twentieth century.[28]

Two TTs (12 and 13) were excavated in BRW1 (refer to Figure 4.6 and Figure 4.7). Both were oriented southeast–northwest and located adjacent to Denman Street opposite the main entrance to the Brickworks. Little ground cover was present at the time of excavation and the concrete feature was clearly visible.

The identified surface features were ephemeral pre-cast concrete remnants and were not associated with any further subsurface features, such as water storage or drainage infrastructure, or other structural purposes. Removal of the topsoil in TT12 identified a very compact crushed yellow granite gravel layer (*83*, similar to *35* and *41*), which is consistent with materials used in 1960s–1970s carparks in Canberra. Beneath the crushed gravel were several deposits (*82*, *85*, and *87*) containing ash, mixed shale, and brick rubble representative of background demolition and levelling events. These had been compacted into the natural soil surface. TT13 contained comparable deposits (*84*, *85*, and *86*). No artefacts were associated with any of these deposits.

Figure 4.4 TT12, ash (*82*) and crushed brick rubble (*87*) deposits, facing north.

Figure 4.5 TT13, crushed brick rubble (*85*) and clay (*86*) deposits, facing north.



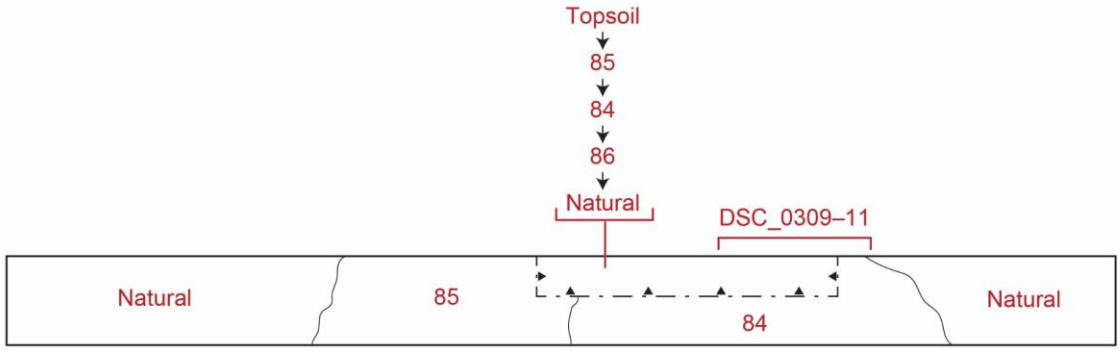
BRW1—Test Trench 12

Key

Trench edge
Sondage
Edge of context (remaining)
Edge of context (excavated)
Slope

0 1 2 m

Figure 4.6 TT12.



BRW1—Test Trench 13

Key

Trench edge
Sondage
Edge of context (remaining)
Edge of context (excavated)
Slope

0 1 2 m

Figure 4.7 TT13.

4.1.2 BRW2—Married quarters and Brickworks Hostel and BRW3—Area of postholes and other remains

BRW2

BRW2 consists of the Brickworks accommodation village, which contained a complex of structural features, including several remnant coursed brick footings and brick mounds, a metal spoil heap, and a concrete slab.[29]

Five TTs (14, 15, 16, 17, and 18) were excavated in BRW2.

TT16 was adjacent to the pre-cast concrete slab for an amenities block. The area was covered by dense shrubbery. TT16 contained no identifiable deposits or features, only natural soil profiles. The pre-cast concrete slab for the amenities block contained plumbing apertures for toilet and shower facilities.

TT14 and 15 were on the eastern and northeastern extent of BRW2 within an area of dense shrubbery (refer to Figure 4.10 and Figure 4.11). Following the removal of the topsoil, ferrous waterpipes were identified in each TT. The pipe (*88*) in TT14 was aligned north–south, and was below a deposit of friable brownish grey sandy silt with brick rubble and charcoal inclusions (*90*) (Figure 4.8). This deposit was 0.25 metres deep and contained a considerable quantity of miscellaneous ferrous metal artefacts (Section 4.2). It had been deposited onto natural soil profiles. The water pipe (*92*) in TT15 was aligned northeast–southwest and was not associated with any further archaeological deposits, having been inserted through natural soil profiles (Figure 4.9).

Figure 4.8 The water pipe (*88*) and overlying rubble deposit (*90*) in TT14, looking north.

Figure 4.9 The water pipe (*92*) in TT15, looking northeast.

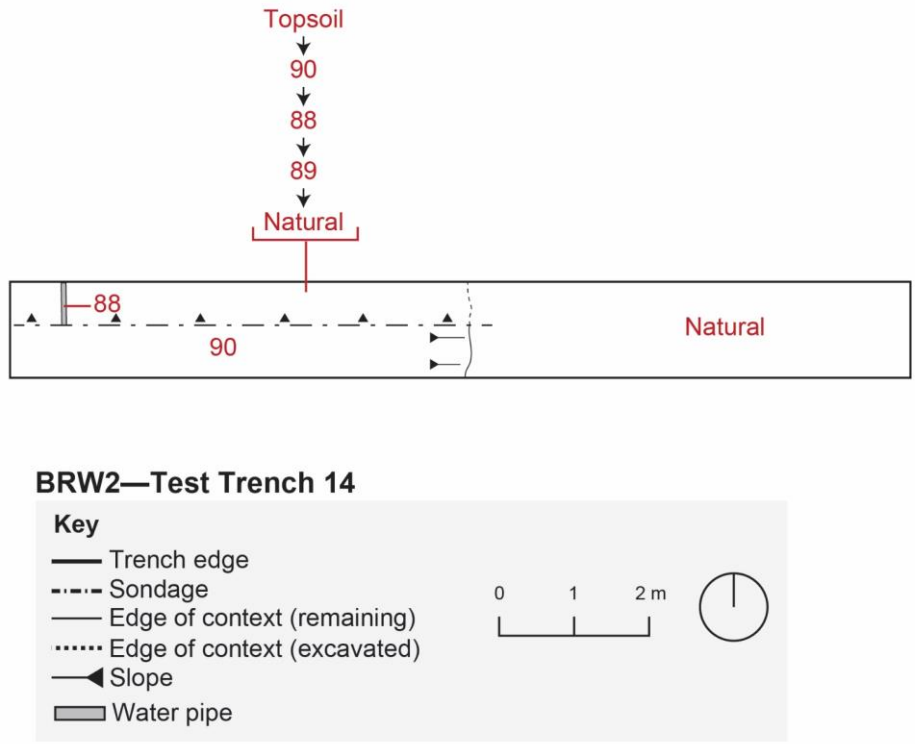


Figure 4.10 TT14.

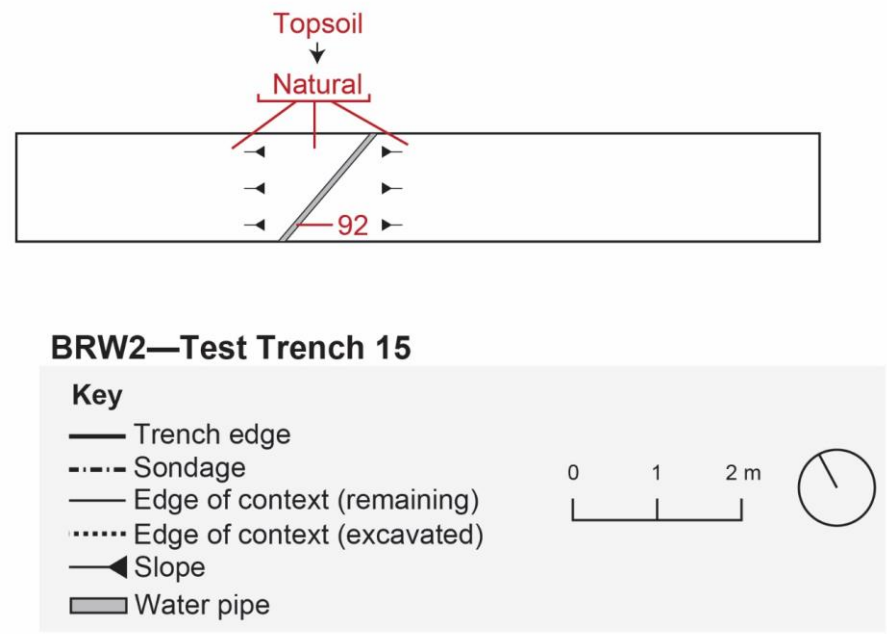


Figure 4.11 TT15.

TT17 was in the centre of BRW2 (refer to Figure 4.13). It was characterised by several drainage and plumbing features (*94*), including drains, a ferrous water pipe, and a possible grease or debris trap (Figure 4.12). Artefacts recovered from this area primarily comprised c1960s glass beer and soft-drink bottles (Section 4.2). The whole area had been extensively disturbed, and a considerable quantity of demolition debris and other waste materials was contained within the topsoil.

Figure 4.12 TT17, plumbing features (*94*), facing northwest.

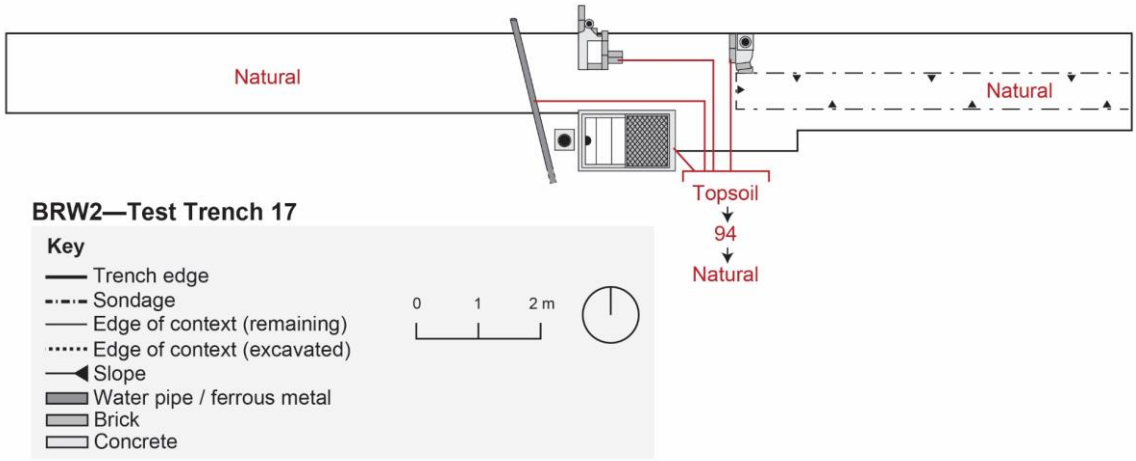


Figure 4.13 TT17.

TT18 was on the southern boundary of BRW2, adjacent to an informal vehicle track that provides external access around the Brickworks (refer to Figure 4.15). Due to the presence of the vehicle track, the immediate location of TT18 was largely clear of vegetation. Following the removal of the topsoil, several brick strip footings (*97* and *98*) and (originally) upright concrete stumps (*99*) were identified in TT18. These features were adjacent to an asphalt surface (*96*), all aligned east–west (Figure 4.14). The western-most footings (*97*) were constructed from bricks laid in stretcher bond—forming three sides of a rectangle—with amorphous cast-in-place concrete completing the fourth side. The concrete obscured the brick frogs (brick frogs are discussed in Section 4.2.1). A single line of brick strip footings (*98*) extended from the southeast corner of the western-most footings (*97*). This line of brick strip footings (*98*) had been constructed from bricks with frogs marked either 'CANBERRA C'WEALTH' or with no mark ('blank'), laid in shiner bond. The asphalt surface (*96*)—which had been significantly degraded—abutted both footings on the south. Five pre-cast concrete stumps with ferrous ant caps (*99*) were aligned linearly on the opposite side. Artefacts were predominantly collected from the topsoil in this area and reflected those found in TT17, with large quantities of glass beverage bottles, several tea cups and mugs, and animal (faunal) remains (Section 4.2).

Figure 4.14 TT18, brick strip footings (*97* [top left] and *98* [top right and bottom left]), asphalt surface (*96* [bottom left]), and (originally) upright concrete stumps (*99* [top right and bottom right]), facing various.

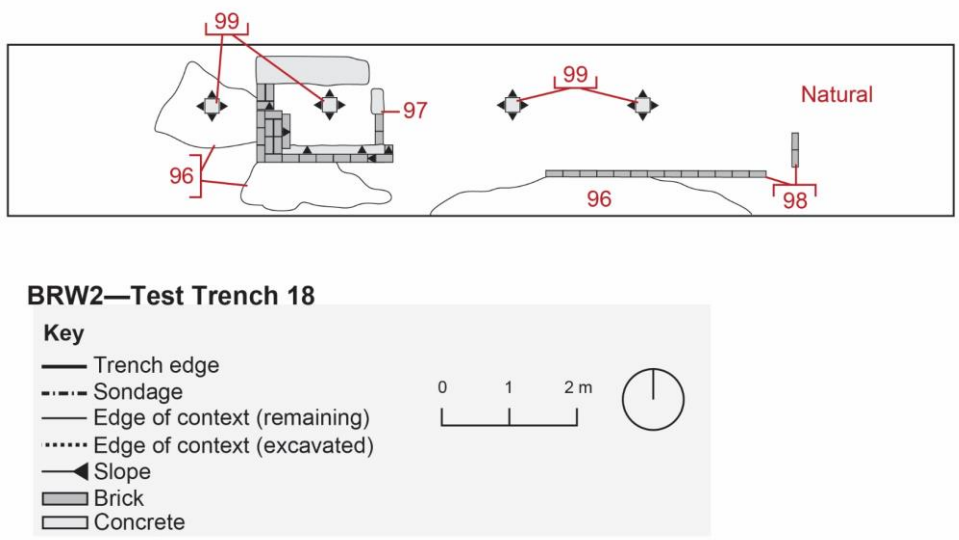


Figure 4.15 TT18.

Located between TT17 and 18 was a remnant coursed brick structure (*95*). Dislocated brick rubble was removed from the western face of the structure (Figure 4.16). The exposed structure comprised a number of strip footings ranging between a single course and 11 courses high. The entire feature had been constructed from a combination of bricks with 'simple', 'CANBERRA C'WEALTH', and 'CANBERRA' frogs laid in a mixture of stretcher and alternating header/stretcher bonds. The central part of the structure formed a rectangular enclosed space. Notable artefacts recovered from the rubble included a number of personnel and vehicle addressograph plates (Section 4.2.3).

Figure 4.16 Remnant coursed brick structure (*95*) between TT17 and TT18, facing northeast.

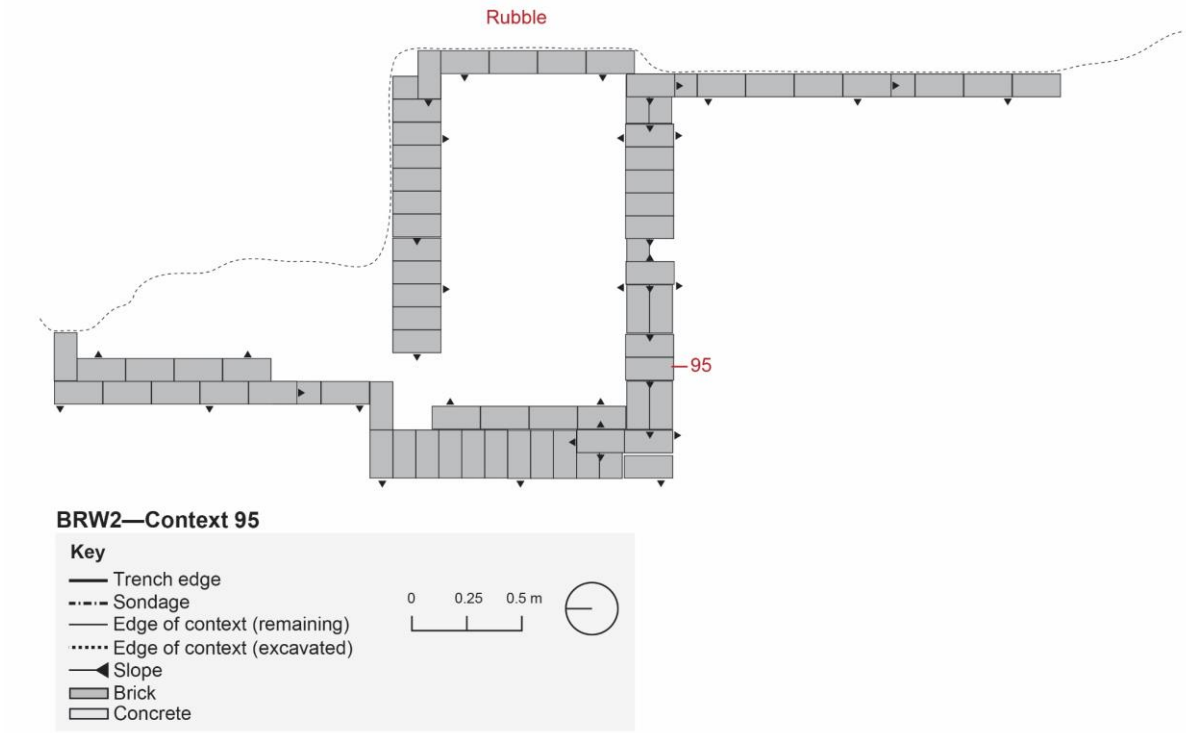


Figure 4.17 Remnant coursed brick structure (*95*) between TT17 and TT18.

BRW3

BRW3 consists of a complex of features relating to various structures. The AA describes this site as containing evidence of a modern fringe dweller's camp, including a hearth made of brick and concrete. Early plans indicate that this area was used as an ephemeral brickworks camp, and historical aerials from 1950 show two structures that were likely the 1940s Brickworks Hostel.[30]

Contamination and geotechnical investigations within BRW3 were undertaken by Agon Environmental on 18 February 2021. These works were monitored by GML for impact to any unidentified archaeological features. The results of the archaeological observations made during the works are included in Appendix E. No archaeological deposits or features were identified during the works.

Seven TTs (19, 20, 21, 22, 23, 28, and 29) were excavated in BRW3. The majority of these were located in areas of dense vegetation.

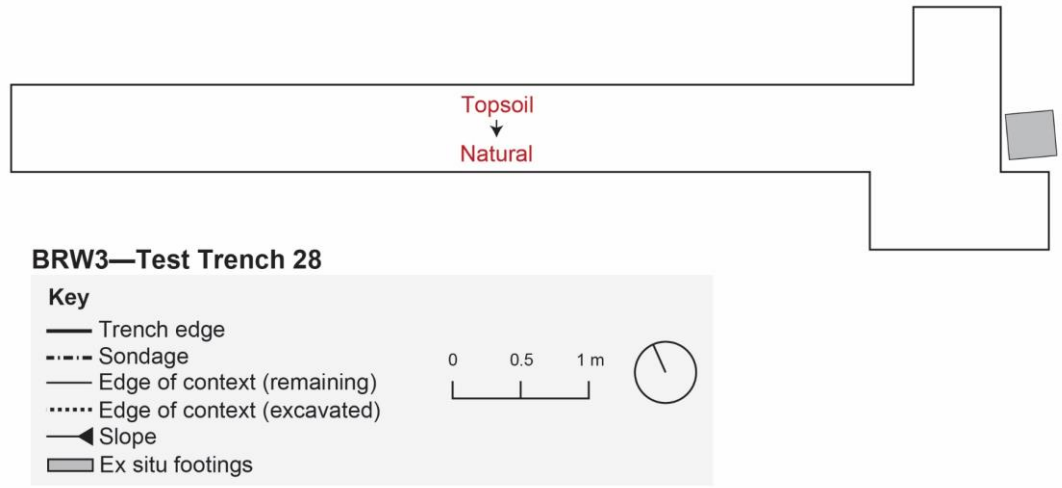
TT19, 20, 21, 22, and 23 contained no identifiable deposits or features, only natural soil profiles. TT28 contained a fragmented portion of a bonded brick footing (refer to Figure 4.21). This footing was resting on the topsoil and had no corresponding subsurface features; all other aspects of TT28 were consistent with natural soil profiles. Artefacts recovered from the topsoil generally comprised miscellaneous domestic items, such as window glass fragments, a stove filament, and a plastic doily (Section 4.2). Additional quantities of c late 1950s beer and condiment bottles were also identified.

TT29 contained a linear arrangement of five detached brick piers (*111*) aligned north–south, although the southernmost footing was askew (Figure 4.18 to Figure 4.20 and refer to Figure 4.22). The spacing between the piers was irregular and ranged from approximately 1.2 metres to 1.9 metres. Each pier comprised two courses of four bricks arranged in a faux basketweave-like bond, with the centre obscured by mortar. A corresponding set of footings was identified east of the piers (*111*) outside the excavated area in dense undergrowth. An asphalt surface (*109*)—which had been significantly degraded—abutted the piers (*111*) on their western edge (Figure 4.18). An ash deposit (*108*) was also present above the asphalt surface (*109*) (Figure 4.18). This deposit contained a number of recent beer cans and plastic rubbish.

Figure 4.18 TT29, brick piers (*111* [background]), asphalt surface (*109* [foreground]), and ash deposit (*108* [centre]), facing east.

Figure 4.19 TT29, two northernmost piers (*111*), facing west.

Figure 4.20 TT29, *111*, section, facing west.



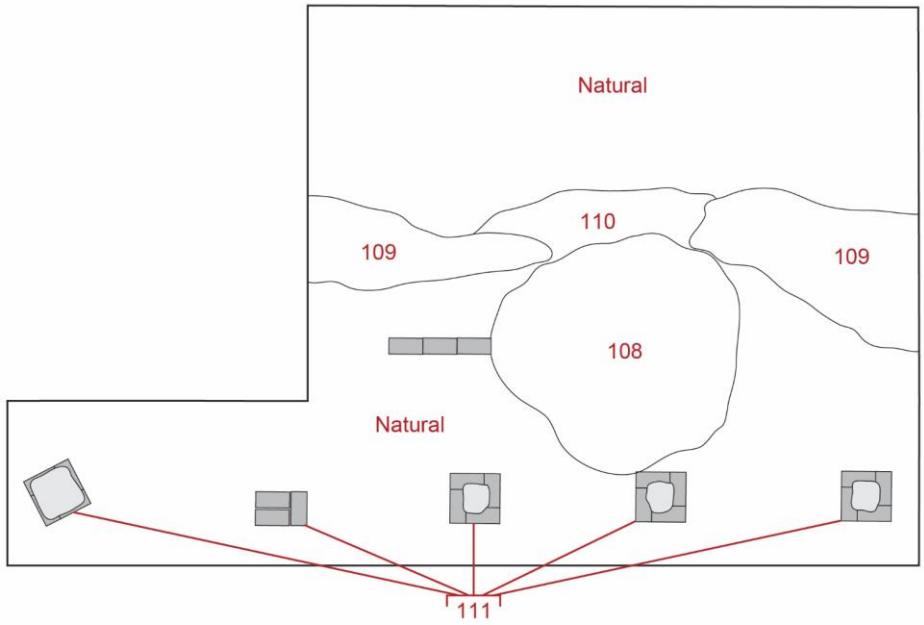
BRW3—Test Trench 28

Key

- Trench edge
- Sondage
- Edge of context (remaining)
- Edge of context (excavated)
- Slope
- Ex situ footings

0 0.5 1 m

Figure 4.21 TT28.



BRW3—Test Trench 29

Key

- Trench edge
- Sondage
- Edge of context (remaining)
- Edge of context (excavated)
- Slope
- Brick
- Concrete

0 0.5 1 m

Figure 4.22 TT29.

Interpretation of structures

Evidence for a minimum of three structures was identified in the BRW2 and BRW3 areas (Section 4.1.2, Figure 4.30):

- remnant brick structure (*95*) and adjacent plumbing features (*94*);
- brick footings (*97* and *98*), concrete stumps (*99*), and asphalt surface in TT18; and
- brick piers (*111*) and asphalt surface (*109*) in TT29.

Due to the fragmentary nature of the footings in TT18 and TT29 and the lack of artefactual material that was securely identified with the associated deposits, few inferences could be made regarding the total footprints or purpose of the structures. Similar issues are associated with the remnant brick structure (*95*), however, due to its more substantial nature and association with the adjacent plumbing features, it is probable that it held a wet area of some nature.

Plans of the early married quarters or fringe camp have not been found. Existing photographs (Figure 4.23 to Figure 4.28) suggest the layout comprised a number of individual dwellings clustered around a communal building.

Several engineering drawings and aerial photographs for the later Brickworks Hostel complex, however, provide insight into the buildings that occupied the area from the mid 1940s. Some of these engineering drawings include:

- 'Amenities Block' (c1947) (Figure 4.23)—A single storey building divided into two halves, one containing a locker room, water closet, shower room, and drying room, and the other a dining room. The footprint measures 48 feet (14.6 metres) long x 42 feet (12.8 metres) wide, with offset entry ways on both short sides of the building.
- 'Amenities Block (Scheme B)' (c1947) (Figure 4.24)—A two storey building containing a locker room, water closet, drying room, and showers on the ground floor and a dining room on the upper floor. The footprint measures 42 feet (12.8 metres) long x 25 feet (7.6 metres) wide.
- 'Amenities Block' (c1947) (Figure 4.25)—A two storey building containing a locker room, water closet, drying room, and showers on the ground floor and a dining room on the upper floor. The footprint measures 46 feet (14 metres) long x 22 feet (6.7 metres) wide.
- 'Brickyard Mess House' (undated) (Figure 4.26)—A single storey 'T'-shaped building containing a kitchen, mess room, and external meat safe. The footprint for the mess room measures 60 feet (18.3 metres) long x 20 feet (6.1 metres) wide. The kitchen is adjoined at the centre, but no measurements have been provided for its dimensions. The elevation suggests foundations along the external walls.

- ‘Workmen’s Sleeping Hut’ (8 August 1945) (Figure 4.27)—A single storey building accommodating 16 bedrooms. The footprint measures 83 feet (25.3 metres) long x 15 feet (4.6 metres) wide. It is elevated off the ground by 17 sets of four stumps.
- ‘Additional Sleeping Hut’ (1 March 1948) (Figure 4.28)—A single storey building accommodating 16 bedrooms. The footprint measures 80 feet (24.4 metres) long x 19 feet (5.8 metres) wide. It is elevated off the ground by 17 sets of five stumps. An indicative plan of where this hut was to be placed in included on the right hand side of the drawing, which was adjacent to two existing huts of similar dimensions.

The three ‘Amenities Block’ drawings presumably represent multiple phases of planning for the same building.

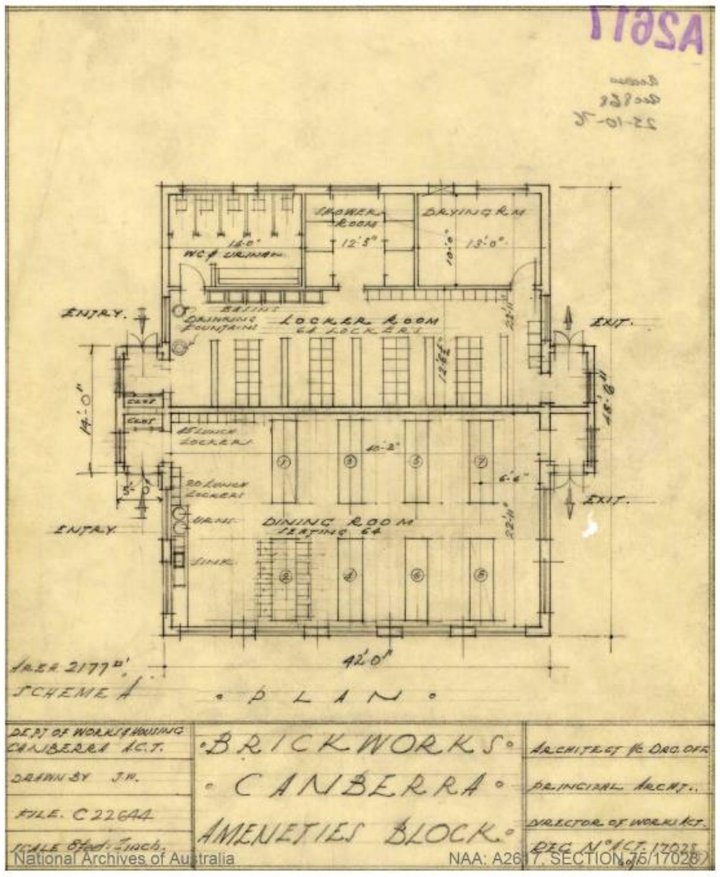


Figure 4.23 'Amenities Block'. (Source: NAA A2617, Section 75/17028)

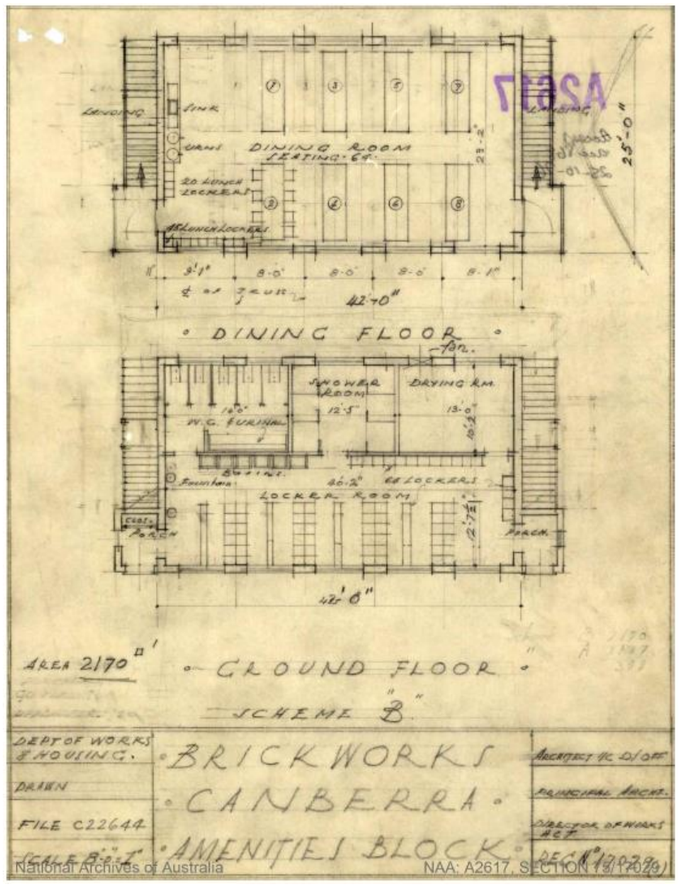


Figure 4.24 'Amenities Block'. (Source: NAA A2617, Section 75/17029)

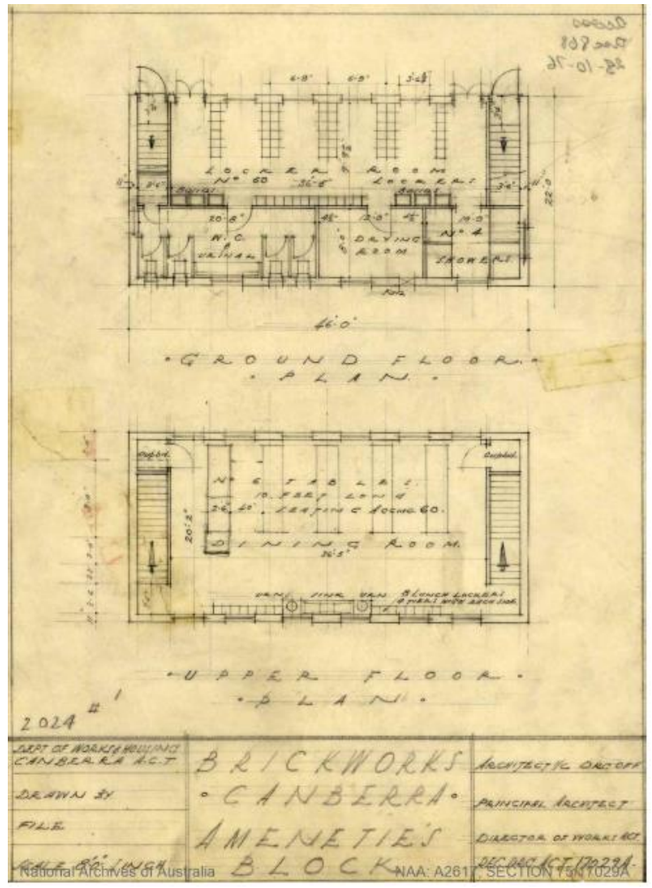


Figure 4.25 'Amenities Block'. (Source: NAA A2617, Section/17029A)

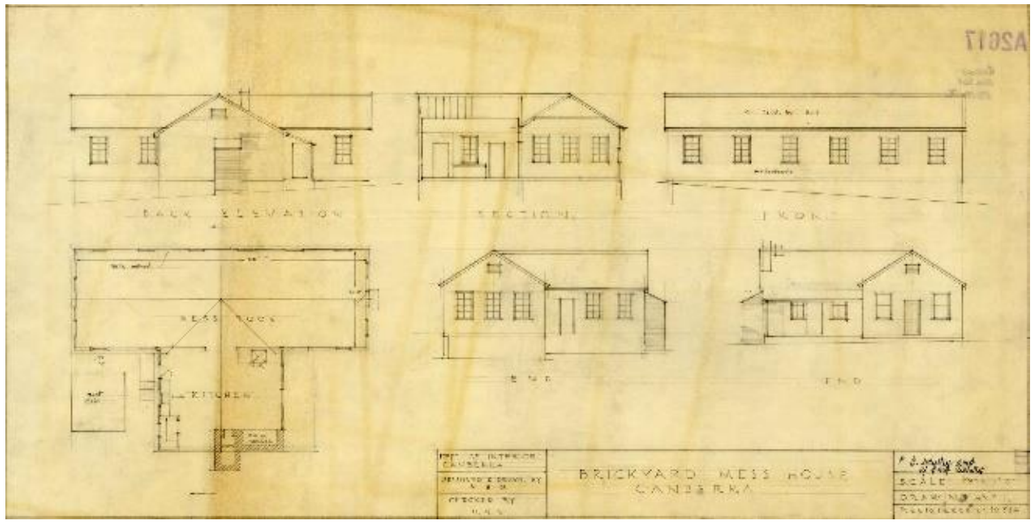


Figure 4.26 ‘Brickyard Mess House’. (Source: NAA A2617, Section75/17039)

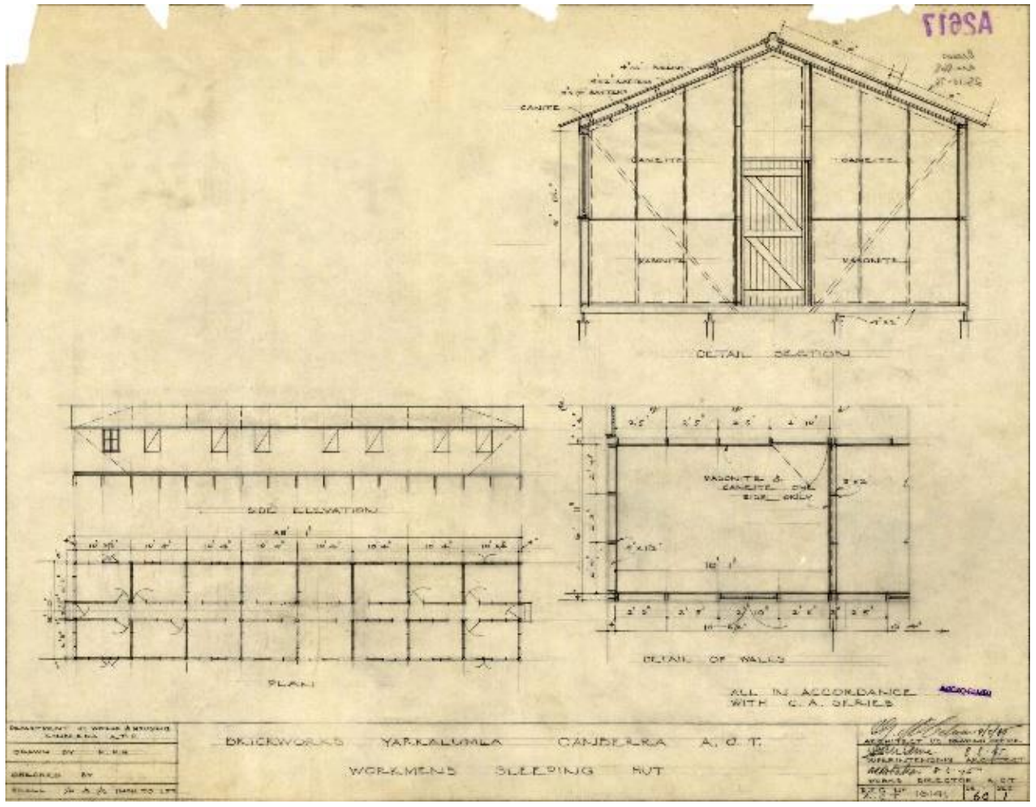


Figure 4.27 ‘Workmen’s Sleeping Hut’. (Source: NAA A2617, Section 75/16141)

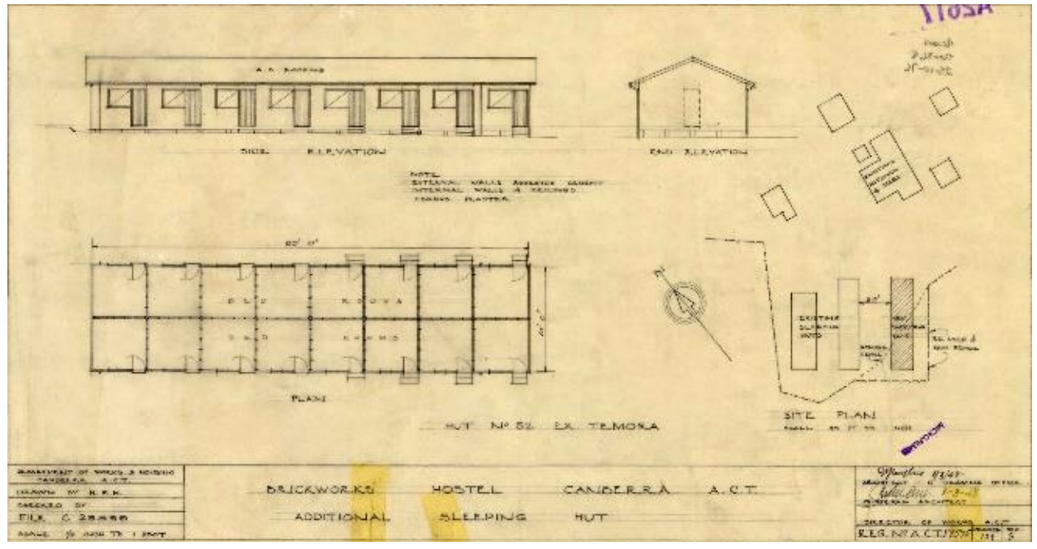


Figure 4.28 ‘Additional Sleeping Hut’. (Source: NAA A2617, Section 75/17575)

A 1950 aerial photograph shows how these buildings were laid out (Figure 4.29). Two buildings matching the approximate shapes of the 'Sleeping Huts' were located to the southwest of the site, at the end of the road and adjacent to the railway cuttings (BRW10). The 'T'-shaped building in the centre of the site is likely the 'Brickyards Mess House' (Figure 4.30), inclusive of a kitchen and messroom; adjacent to this building on its southeastern corner is a smaller structure, probably the meat safe. At least two more buildings to the north and east of the mess house are depicted in the photograph. The northernmost may be the 'Amenities Block'.

Figure 4.29 Detail from a 1950 aerial photograph showing the Brickworks Hostel area with overlaid engineering drawings. (Source: ACTPLA 29-11-1950 Run 2 Print 5101)

No archaeological evidence associated with the 1927 married quarters was securely identified. It is likely that all materials from this period of occupation were removed from site when it was demolished during World War II (Section 2.3).

The footprints of the structures identified in *95* and TT18 and 29 correlate with several of the buildings depicted in the engineering plans and 1950 aerial photograph.

The location of TT29 and the arrangement of the brick footings aligns with the 'Sleeping Huts' (Figure 4.22). The asphalt surface may have been located within the liminal space between the two huts and acted as a shared pathway. If this was the case, the footings likely belonged to the easternmost sleeping hut.

The irregular shape of the remnant brick structure (*95*) and its central location is indicative of the 'Brickyard Mess House'. The arrangement of the footings places them within the junction of the 'T'-shaped building, where the long wall of the mess room adjoins the smaller kitchen room (Figure 4.17). Given its proximity to a number of plumbing features, *95* was probably the kitchen.

The brick strip footings and concrete stumps in TT18 probably represent two structures. The more substantial brick and concrete footings in the western extent of the TT align with the remnant brick structure (*95*), indicating they probably supported the southeastern corner of the mess house (Figure 4.15). The brick strip footings adjacent to the asphalt surface, however, were too insubstantial to support a building the size of the mess house. Their location adjacent to this structure and the central road would suggest they formed part of the meat safe.

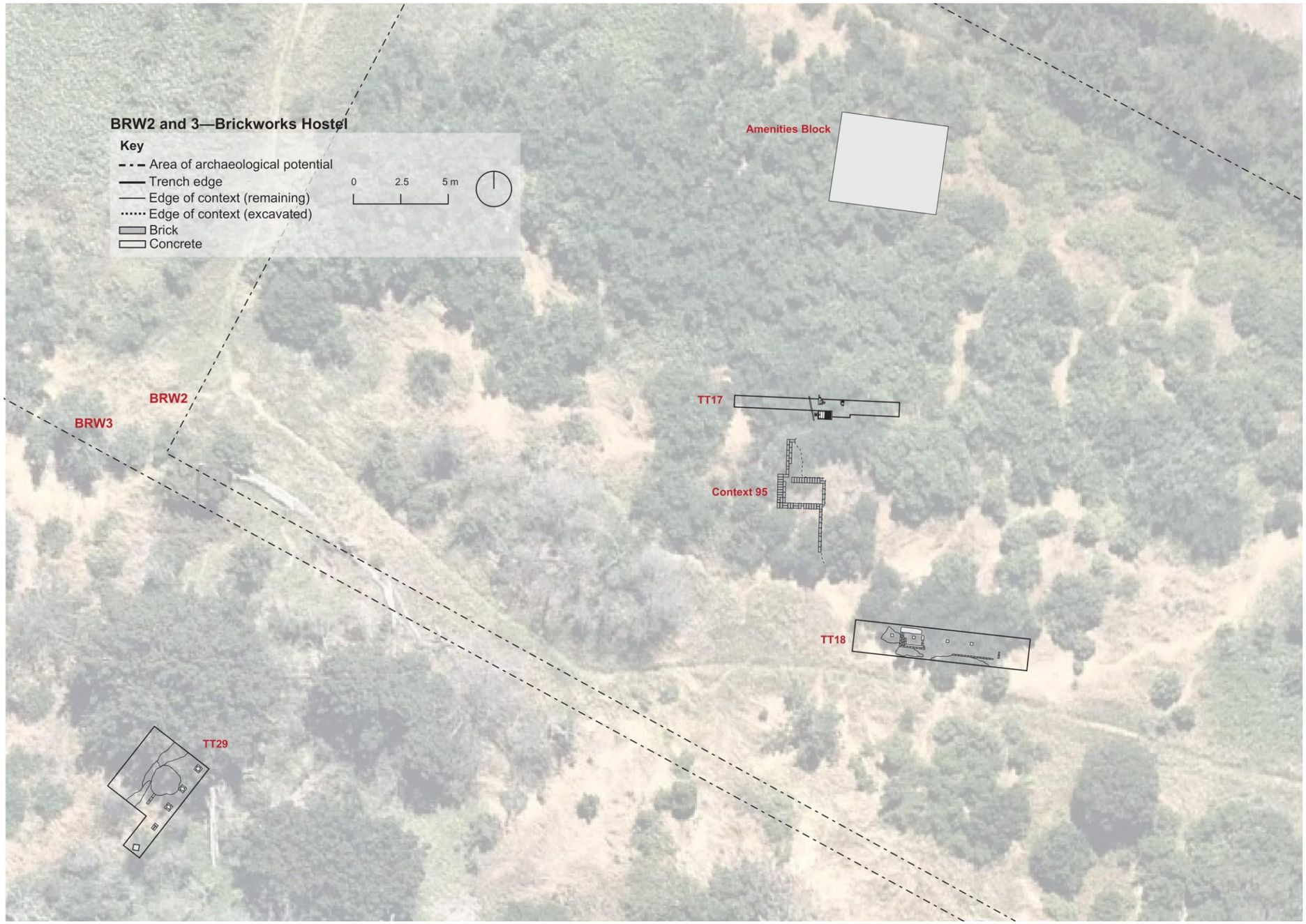


Figure 4.30 The layout of the remaining Brickworks Hostel structures. This includes the plumbing for the 'Brickyard Mess House' (TT17) and kitchen (*95* and TT18), the 'Meat Safe' (TT18), and a 'Sleeping Hut' (TT29). (Source: Near Map 2020 with GML additions)

4.1.3 BRW7—Quarry

BRW7 consists of the quarry, inclusive of the cutting and the eastern ridge. The AA identified several features:

- an in-ground circular, brick-lined tank (approximately 3 metres in diameter) that had been backfilled, located on the eastern ridge;
- a sequence of circular depressions in alignment with a row of mature pines on the southern boundary;
- two grassy mounds in the central extent, which may have been the remains of a demolished structure; and
- a raised earth embankment in the western extent of the quarry, which was likely the remnant of the c1977 model railway track.[31]

Additional inspections by GML also identified two distinct 'knoll'-like landforms located southeast of the quarry cutting on the eastern ridge, which were characteristic of spoil dumping.[32]

Contamination and geotechnical investigations within BRW7 were undertaken by Agon Environmental during 16–17 February 2021. These works were monitored by GML for impact to the identified archaeological features and the broader potential of the quarry itself. The results of the archaeological observations made during the works are included in Appendix E. Overall, the quarry was characterised by a consistent spread of brick rubble. The bricks were largely dominated by those with 'CB' frogs, followed by air bricks (bricks with holes through the centre—see Section 4.2.1), with isolated examples of bricks with frogs marked 'C'WEALTH CANBERRA', 'CANBERRA C'WEALTH', and 'CANBERRA'. The rubble varied between 3 metres to 7 metres deep. Miscellaneous discarded machinery pieces and other debris were included within the rubble. No evidence of demolished structures, model railway track embankment, or circular depressions were identified.

In addition to the 28 test units excavated by Agon Environmental, two TTs (1 and 2) were excavated in BRW7.

TT1 was oriented north–south and located adjacent to the western boundary fence of the quarry, opposite the model railway storage shed (refer to Figure 4.33). TT1 was predominantly characterised by waste deposits (*1*, *2*, *3*, and *4*) to a depth of 1.2 metres. One of these deposits—a varyingly compact crushed coal material (*2*)—had subtle stratigraphic differences within the overall matrix (Figure 4.31). This indicated that material from a single or multiple highly similar sources had been deposited in several sequential dumping events. A number of fragmented railway tracks were recovered within and below this material (Figure 4.32). Beneath this material was a varyingly compacted deposit of sandy clay containing shale and brick fragments (*3*). This in turn capped a

deposit with a 'slushy' composition that contained quantities of gravel and crushed brick inclusions (*4*).

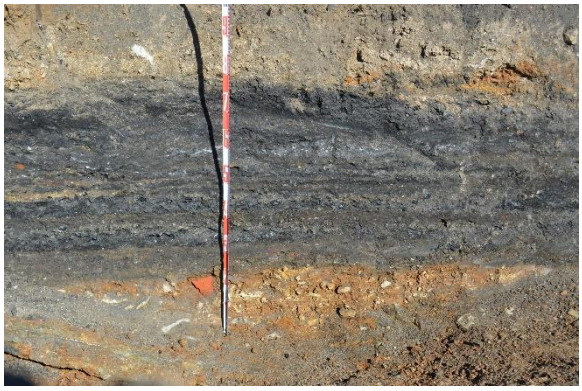


Figure 4.31 TT1, stratigraphic differences within *2*, facing west.

Figure 4.32 TT1, fragmented railway tracks within *2* and *3*, facing east.

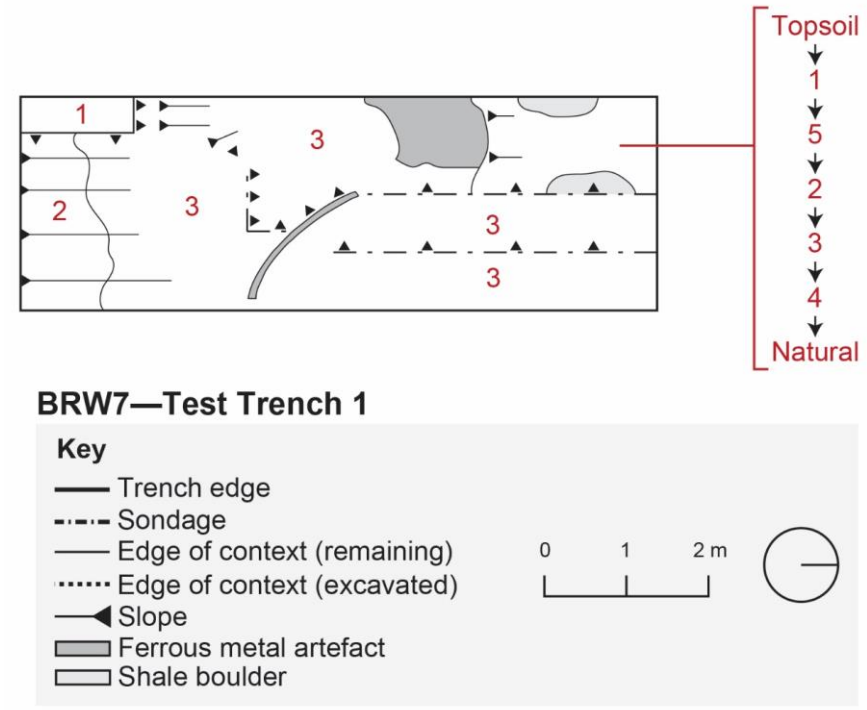
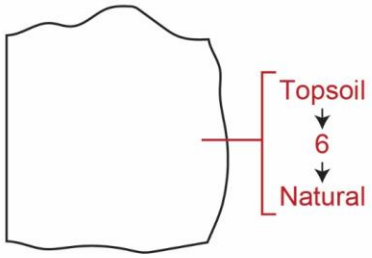


Figure 4.33 TT1.

TT2 targeted the backfilled brick-lined tank located on the eastern ridge overlooking the quarry face (refer to Figure 4.35). No evidence of a tank was identified. The circular surface expression was an incidental arrangement of brick rubble (*6*). The excavation revealed that the underlying soil matrix comprised only brick rubble to a depth of 1.7 metres, which was consistent with observations made during the geotechnical investigations (Figure 4.34).

Figure 4.34 TT2, brick rubble (*6*), facing west.



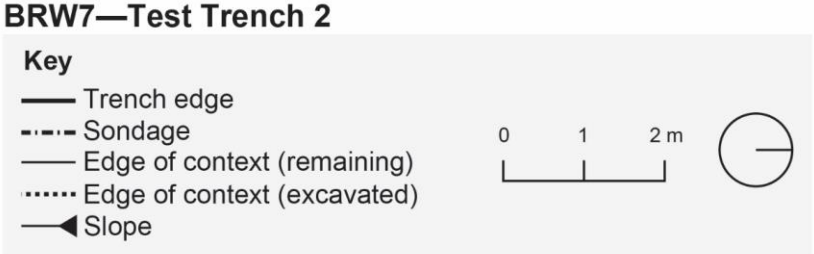


Figure 4.35 TT2.

4.1.4 BRW8—Old kiln and dormitories

BRW8 consists of the historical location of the 1913 kiln complex and 1916 dormitories and bathhouse area. The AA stated that these structures were likely demolished by the mid-1920s and replaced with a carpark in the 1960s–1970s.[33] None of these features were expressed on the ground surface.

Eight TTs were initially excavated in BRW7 (TTs 7, 8, 9, 10 North and South, 11, 30, 31, and 32). Five of these were incorporated into and re-excavated as part of OA1 (TTs 9, 10 North, and 30) and OA2 (TTs 10 South and 11). The results from TT9, 10 North, 10 South, 11, and 30 are discussed below as part of the relevant OA.

TT7 and 8 were located on a gently sloping east–west hill north of Denman Street, south of the southern quarry boundary fence (refer to Figure 4.37 and Figure 4.38). Both TTs were characterised by a widespread cut (*30*) that was filled with friable reddish brown clayey sand with a high proportion of brick rubble (predominantly 'CANBERRA' frog) (*29*). A large proportion of these bricks were misfired clinkers and callows. In TT7, this cut (*30*) had completely removed the cut (*33*) and fill (*31*) for a ferrous water pipe (*32*), leaving the pipe exposed at the base of the rubble (*29*) (Figure 4.36). The pipe was aligned southeast–northwest and was also identified in TT9, 10, and OA1.

Figure 4.36 TT17, the ferrous water pipe (*32*) at the base of a later cut (*30*) and rubble deposit (*29*), facing east.

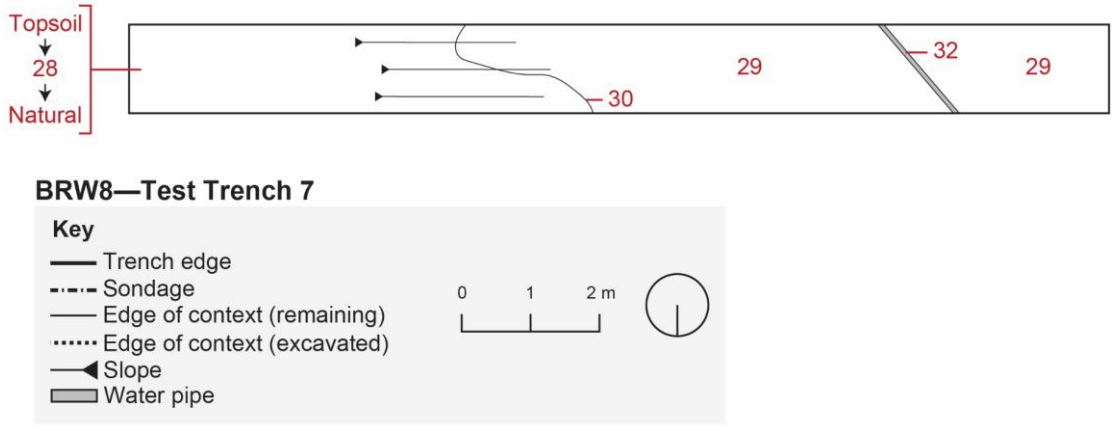


Figure 4.37 TT7.

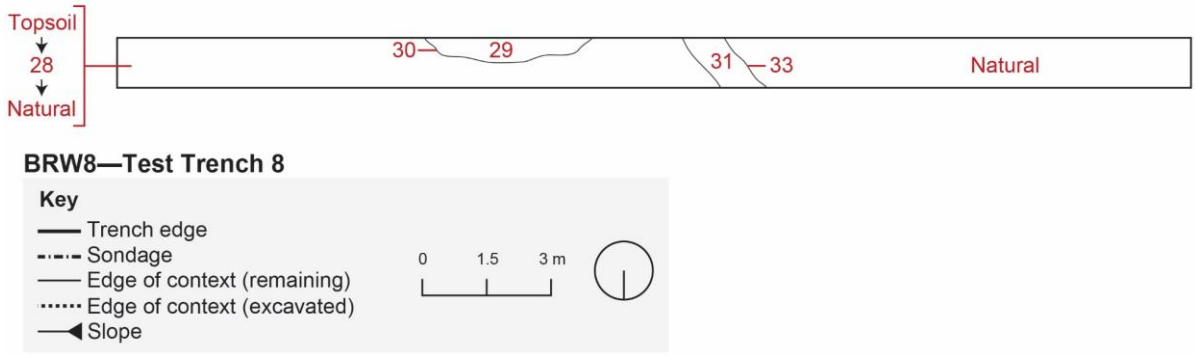


Figure 4.38 TT8.

The excavation of TT10 identified several areas of burnt and baked clay (discussed further below). At the northern extent of TT10 adjacent to one of these areas was a concentration of loosely compacted whiteish grey ash (*113*) and a loosely compacted mid reddish brown sandy clay containing crushed brick rubble (*114*) (Figure 4.39). TT31 and 32 were subsequently excavated either side of TT10 to investigate the extents of these deposits and whether they were associated with any in situ structures. They were found to be redeposited materials relocated from elsewhere on site.

Figure 4.39 Northern end of TT10, loosely compacted ash (*113*) and crushed brick rubble (*114*), facing southeast.

OA1

OA1 was located north of and adjacent to the southern boundary fence for the quarry. It comprised a predominantly level area and the termination of a slope to the east.

The upper stratigraphy of OA1 was largely homogenous across the entire excavation area. Removal of the topsoil revealed a number of discrete but associated deposits, including:

- a friable yellowish blue ashy clay with brick rubble and gravel in the eastern extent (*39*);
- a compact mid pinkish yellow mottled silty clay (*89*); and
- a loosely compacted mid reddish brown clayey sand containing brick rubble in the northeastern extent (*129*).

Underlying these deposits—and in some instances immediately below the topsoil—was a very compact crushed yellow granite gravel deposit (*41*, similar to *35* and *83*) (Figure 4.40). This gravel was consistent with materials used in 1960s–1970s carparks in Canberra. The deposit was level with a roughly consistent depth of 0.1 metres across almost the entire extent of OA1. All other archaeological features were identified in the stratigraphic matrix below the yellow gravel (*41*) (Figure 4.43 and Figure 4.51).

Figure 4.40 OA1, *41* (yellow gravel) beneath *129*, facing east.

A number of discrete features were identified in TT9, 10 North, and 30 that warranted further investigation. These included:

- a brick-lined spoon drain (*50*); and
- a sequence of brick features belonging to a kiln (*137*) embedded in an area of baked and heat-affected clay (*69* and *140*).

During the excavation of OA1, two additional structural features were identified:

- the partial remains of brick footings (*124*) and associated demolition rubble (*125*); and
- a brick box drain (*132*).

There was no clear association between any of these structural features (refer to Figure 4.41).

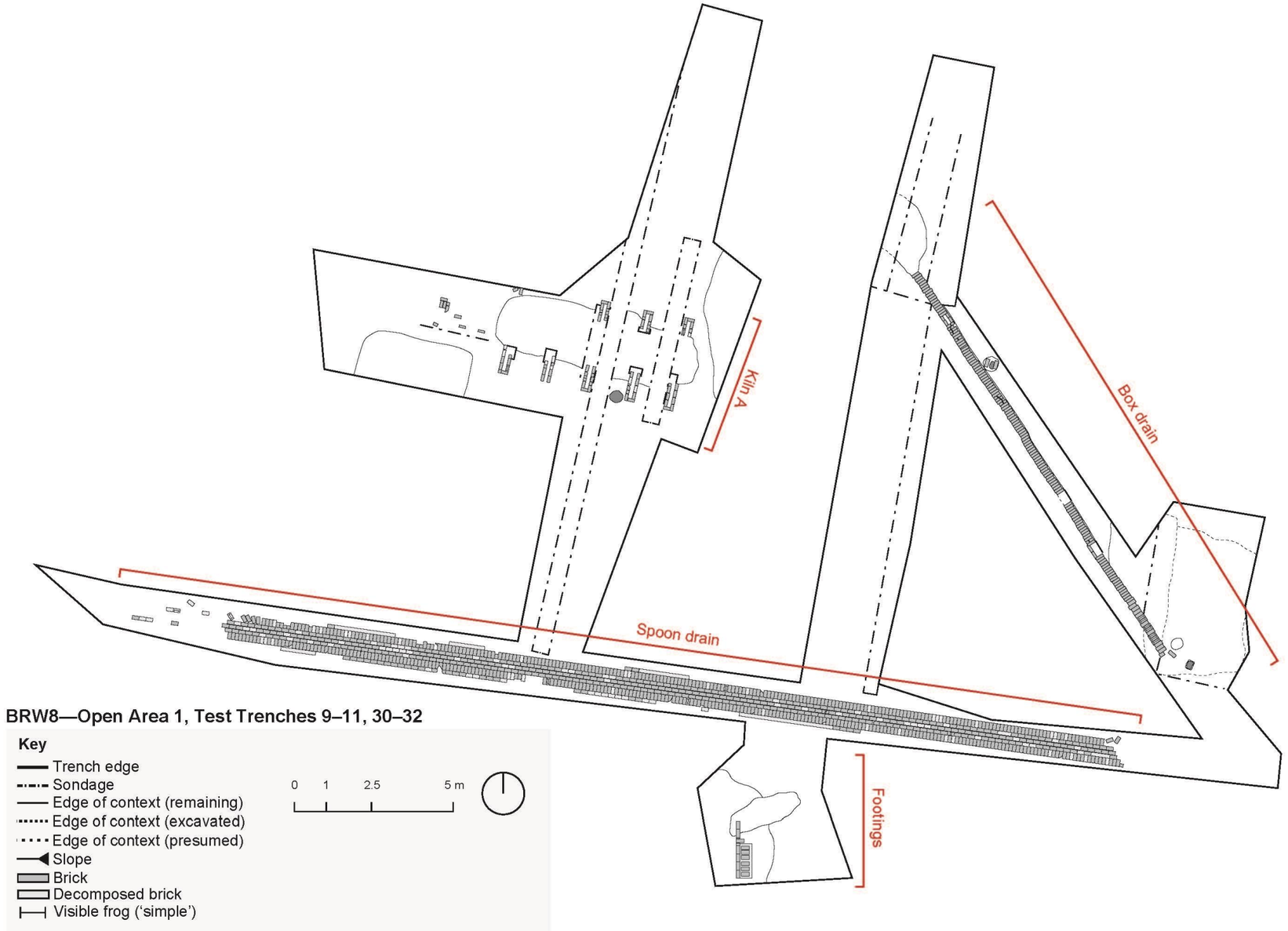


Figure 4.41 OA1 features.

Spoon drain (context *50* group)

The context *50* group comprised a brick-lined spoon drain aligned east–west through the centre of OA1 that measured approximately 32 metres long x 0.75 metres wide x 0.11 metres deep (Figure 4.47 and refer to Figure 4.48). The base of the drain (*50*) had been constructed from three rows of bricks set in a roughly regular stretcher bond pattern, with a gutter formed by a single row of perpendicular bricks at an angle of approximately 130 degrees (Figure 4.42). In some places, an additional stretcher bond row capped the perpendicular bricks. Where the brick frogs were visible, these were 'simple' (brick frogs are discussed in Section 4.2.1).

Figure 4.42 OA1, the spoon drain (*50*), facing east. The drain was constructed from three stretcher rows, guttered by a single row of soldiers. An additional stretcher row capped the soldiers in some places (right).

The drain (*50*) had been filled with a moderately compact mid greyish brown clayey silt (*49*), which contained a variety of artefacts, such as faunal remains, oyster shells, and a glass marble (Section 4.2). It is probable that this material accumulated during the use of the drain, rather than immediately prior to its decommissioning.

The surfaces that the drain (*50*) had been cut into was occasionally unclear. Often this comprised natural soils, however, south of feature *137* this included heat-affected clays (*46*, *52*, and *56*). It was unclear whether the baked clays had been heat-affected prior to the construction of the drain, or whether the heating event occurred after the installation of the drain.

The eastern extent of the drain (*50*) appeared to be its natural conclusion, although it had been partially disturbed on its northern margin. Embedded in natural clay, the bricks had been arranged in a staggered diagonal pattern (Figure 4.44). The western extent of the drain had, however, been removed by a later cut (*148*) (Figure 4.45). It is unknown how much of the drain had been removed by *148*. The drain had been cut in one other place by the installation of the subsurface electrical wires for an electrical services pole (*149*, *150*, and *151*) (Figure 4.46).

Figure 4.43 TT10 North, the spoon drain (*50*) and fill (*49*) were immediately overlaid by the yellow carpark gravel (*41*), facing east.

Figure 4.44 OA1, the spoon drain (*50*), the eastern extent, facing south.

Figure 4.45 OA1, the spoon drain (*50*), cut by *148*, facing east.

Figure 4.46 OA1, the spoon drain (*50*), cut by the subsurface services for the electrical services pole (*150*), facing east.

Figure 4.47 OA1, the spoon drain (*50*) and associated contexts, facing east.

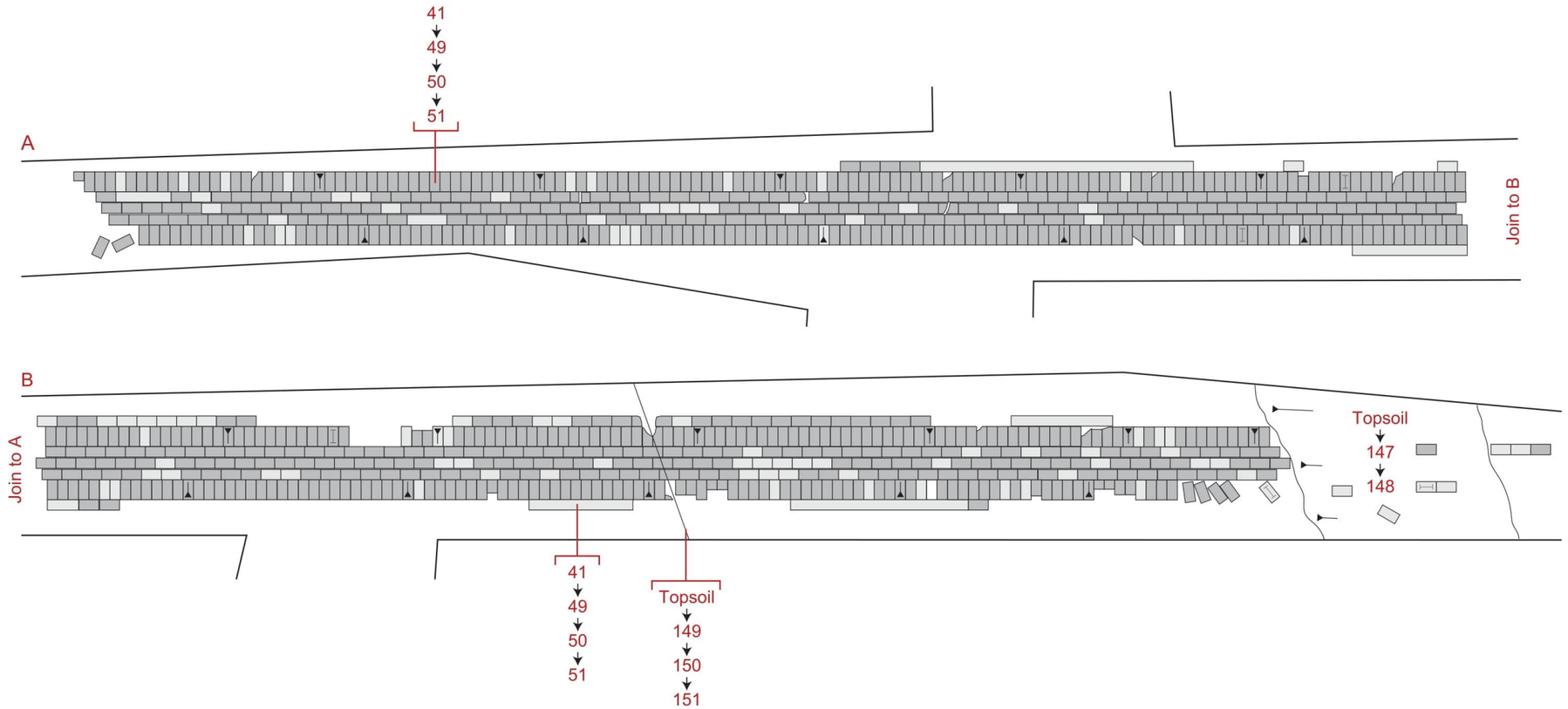


Figure 4.48 OA1, the spoon drain, context *50* group.

Brick and concrete footings (context *124* group)

The context *124* group consisted of a series of partially demolished brick and concrete footings (*124*) and associated demolition rubble (*125*) located in the southern extent of OA1 adjacent to the boundary fence (Figure 4.49 and refer to Figure 4.50). The footings had been constructed from a row of six bricks placed in the soldier position and bonded in cast concrete, which sloped on the eastern edge. These were adjoined to seven bricks on their western edge, six of which were arranged in stretcher bond. All visible frogs were 'simple'.

A friable ash and charcoal deposit (*126*) was identified adjacent to the footings, however, the connection between the two features could not be established.

The presence of a mature shrub in the internal space of the footings obscured identifying any further footings or deposits associated with their use. Additionally, no artefacts were identified in any of the excavated deposits.

Figure 4.49 OA1, the brick and concrete footings (*124* [left background]) and ash deposit (*126* [right mid- and foreground]), facing west.

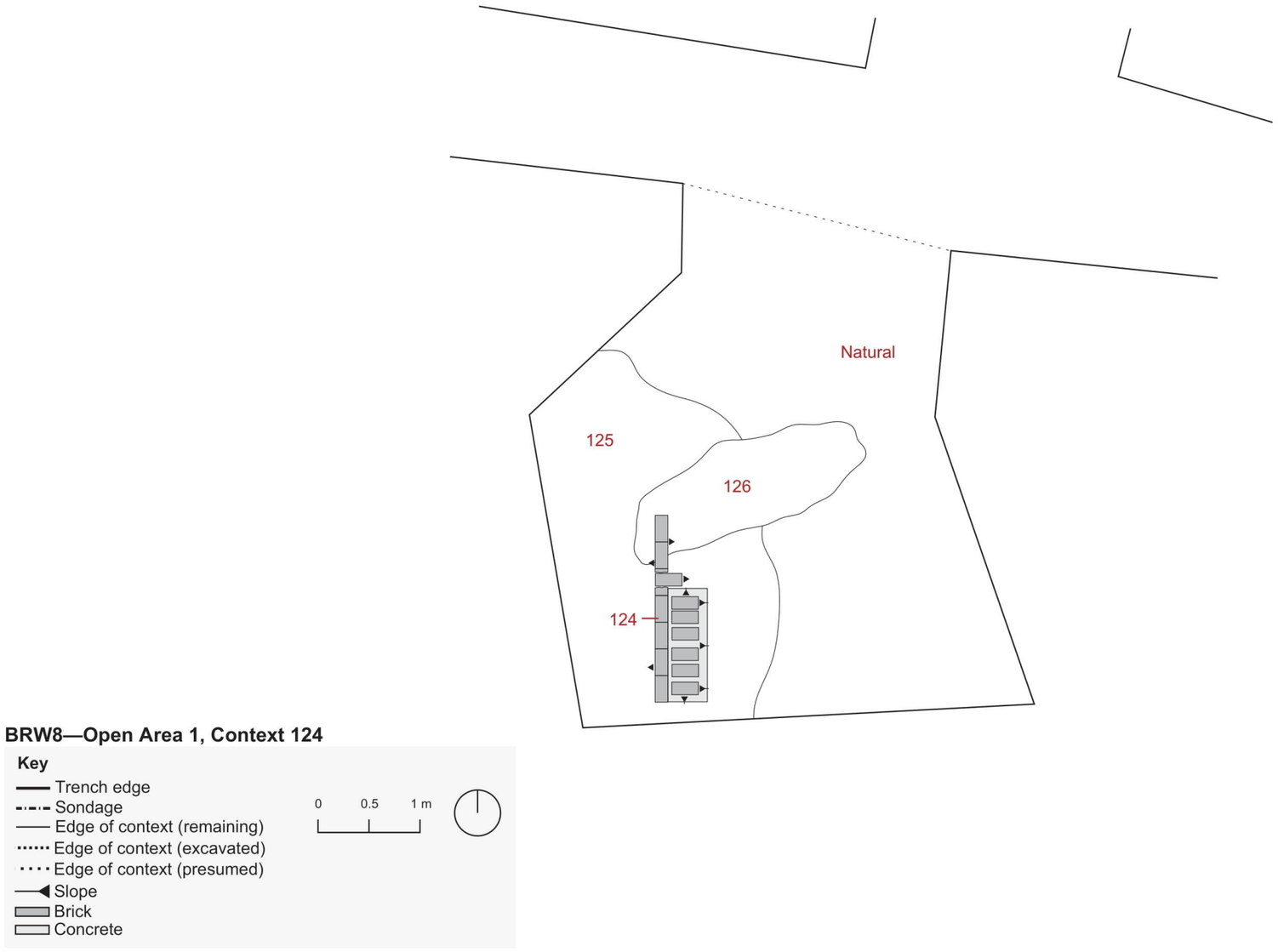


Figure 4.50 OA1, the brick and concrete footings, context *124* group.

Box drain and postholes (context *132* group)

A brick box drain (*132*) was located in the northeastern extent of OA1 (refer to Figure 4.56). The drain was oriented northwest–southeast and measured approximately 14.7 metres long x 0.24 metres wide x 0.2 metres high (Figure 4.55 and Figure 4.51). It had been constructed from two rows of shiner bricks placed approximately 0.06 metres apart, capped by a single line of row lock bricks. Many of the bricks were misaligned or crooked. All visible frogs were 'simple'. The fill (*131*) in the drain was a moderately compact dark reddish brown clayey silt. No artefacts were identified within the portions of fill that were sampled for excavation. The base of the drain rested directly on natural soils.

Figure 4.51 OA1, the brick box drain (*132*) and overlying stratigraphy (including *41*), facing northeast.

At its western end, the drain appeared to terminate naturally within a 'spill' of compact brownish orange silty clay (*133*) (Figure 4.52). However, a sondage excavated within the clay (*133*) identified a quantity of brick rubble, indicating the western extent of the box drain (*132*) had been disturbed. The eastern extent of the drain ended similarly ambiguously within a deposit of compact crushed charcoal (*135*) and loosely compact decomposed mortar (*134*) (Figure 4.53). The eastern end of the drain was not in an alignment that would have allowed it to join to the brick spoon drain (*50*).

Three postholes were aligned with the drain (Figure 4.54). The central posthole (*158* and *159*) was circular in plan, with two 'simple' frogged bricks embedded in the sides and filled with a partially decomposed rectangular timber post. The two eastern post holes (*160* and *161*, and *162* and *163*) were similar—*161* was circular in plan and filled with decomposed organics, whilst *163* was rectangular and contained a partially decomposed rectangular timber post. The eastern postholes had been overlaid by the crushed charcoal (*135*) and decomposed mortar (*134*) deposits.

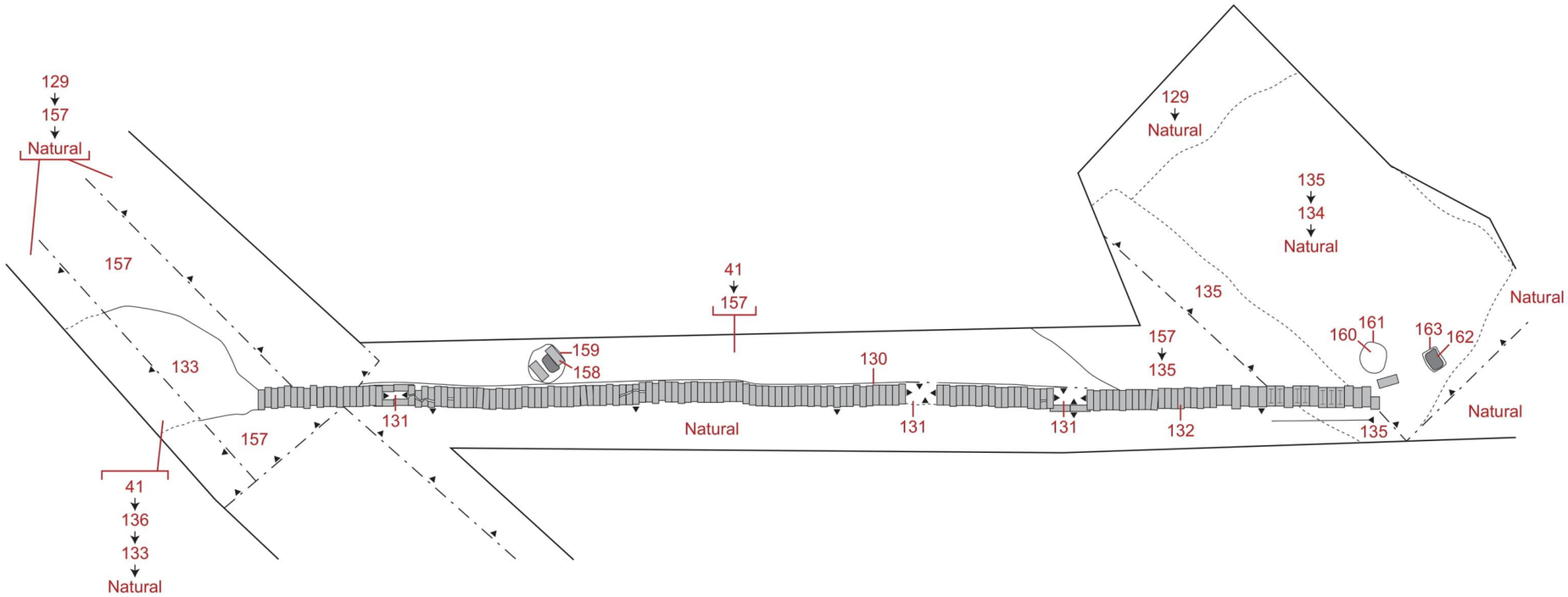
The association of the crushed charcoal (*135*) and decomposed mortar (*134*) with the other features in the *132* group was ambiguous. The roughly rectangular shape of the deposits was reminiscent of a building footprint, however, no further structural features or accompanying artefacts were identified (Figure 4.53). Moreover, the lack of brick or timber inclusions within the decomposed mortar (*134*) suggested it did not originate during a demolition event, despite the high level of decomposition.

Figure 4.52 OA1, western extent of the brick box drain (*132*) where it terminates in orange silty clay (*133*), facing east.

Figure 4.53 OA1, eastern extent of the brick box drain (*132*) where it terminates in decomposed mortar (*134*) and crushed charcoal (*135*), facing west.

Figure 4.54 OA1, postholes aligned with the brick box drain (*132*), facing northeast. Left: *158* (fill) and *159* (cut). Right: *160* (fill) and *161* (cut). Far right: *162* (fill) and *163* (cut).

Figure 4.55 OA1, the brick box drain (*132*) and associated contexts, facing north.



BRW8—Open Area 1, Context 132

Key

- Trench edge
- Sondage
- Edge of context (remaining)
- Edge of context (excavated)
- Slope
- Brick
- Decomposed organics
- Visible frog ('basic')

0 0.5 1 m

Figure 4.56 OA1, brick box drain, context *132* group.

Kiln A (context *137* group)

The context *137* group was located in the western extent of OA1 (refer to Figure 4.60). It was characterised by several brick structures (*137*) embedded in an expanse of extremely compact heat-affected mid orangey red clay (*140*) (Figure 4.59). The structures formed the internal space of a kiln (Kiln A).

The structures consisted of three complete pairs and two partial pairs of elongated 'U'-shaped brick channels. The total feature measured 7.5 metres long x 3 metres wide, with 1 metre spacing between each structure. There was some consistency in the design of the structures—each had been formed from a single header brick and two rows of stretchers, one of which was placed in a head joint against the header brick (Figure 4.57). 'Simple' frogged bricks had been used. The number of courses varied between two and three, occasionally within the same pair of structures. This arrangement created a central cavity that had been filled with a friable mid orangey red sand with white ash and crushed brick (*139*), occasionally with additional slag inclusions (*221*). No other artefacts were identified within this matrix.

The presence of a considerable amount of rubble through the centre of the feature was initially interpreted as a later cut (*141*) and fill (*142*) event. However, further investigation between the two eastern-most structures suggested it may be part of the internal space and intended use of the feature (Figure 4.58). Regardless, the creation of this internal deposit resulted in disturbance to the brick features—whilst they appeared as 'pairs', the fragmented internal ends of the features was indicative of disturbance and that they had once been complete 'strips'.

The sondage also revealed the stratigraphy underlying the baked clay (*140*) (Figure 4.58). The upper 0.25 to 0.30 metres of stratigraphic matrix comprised the extremely compact clay (*140*), which capped intact natural soil horizons (*69*). These horizons had taken on a darkened, 'burnt' or 'smoke-affected' look.

Several additional features were present in the same area (Figure 4.59). West of the brick structures (*137*) was a small area of laid bricks (*143*), but due its fragmentary nature could not be definitively associated with the former feature. If it was part of the kiln structure (*137*), it may have acted as a production floor for shaping and preparing the green bricks for firing. A circular posthole filled with decomposed organics (*154* and *155*) was located on the southern edge of the brick structures (*137*); no corresponding postholes were found elsewhere within the excavated area. A later cut (*145*) filled with compact dark blackish brown silty clay (*146*) had removed the southwestern extent of the brick structures (*137*).

Figure 4.57 OA1, brick structures (*137*), heat-affected clay (*140*), and central rubble (*142*), facing west.

Figure 4.58 OA1, underlying darkened natural soil profile (*62*), brick structures (*137*), heat-affected clay (*140*), and central rubble deposit (*142*), sondage section, facing east.

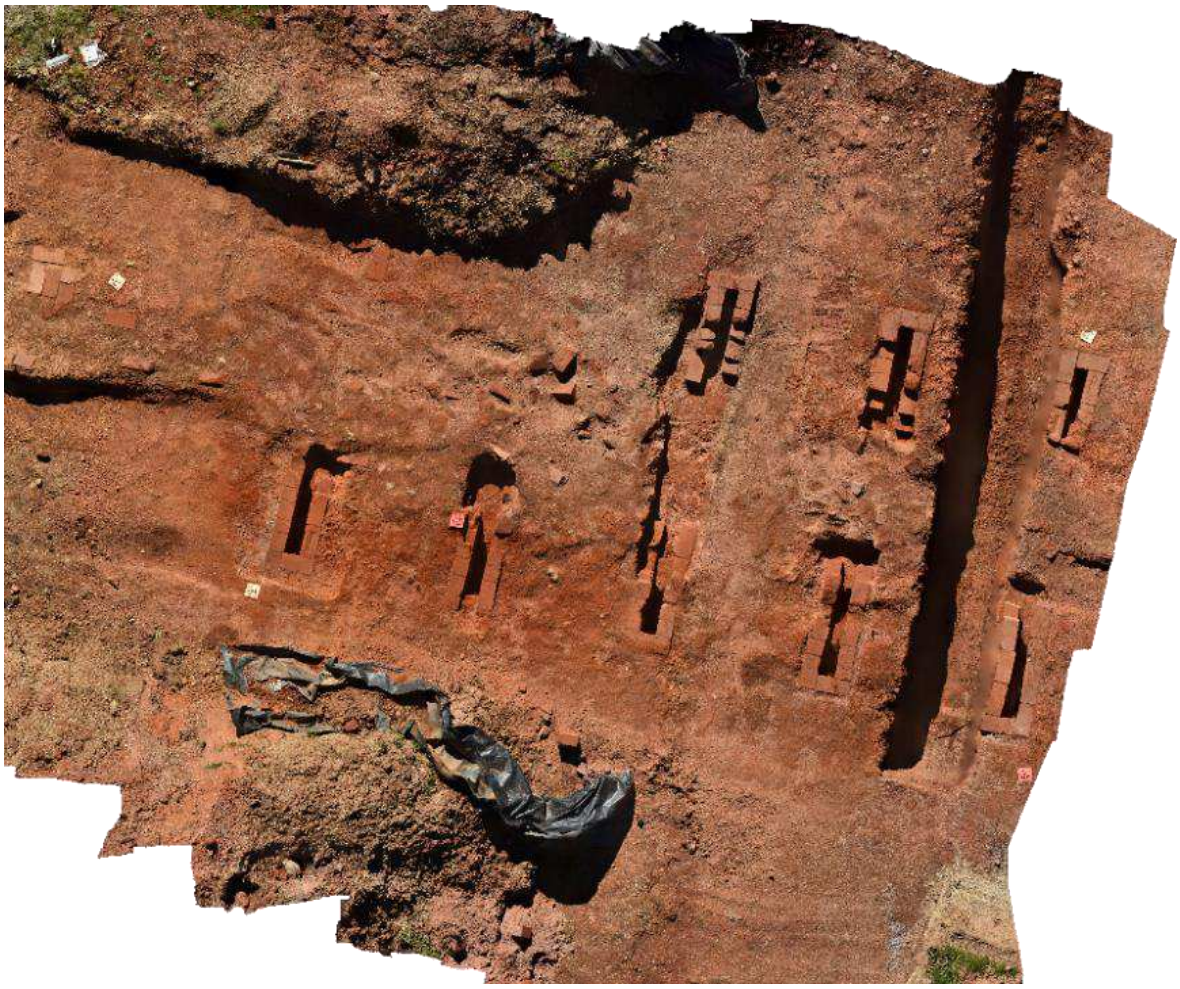


Figure 4.59 OA1, brick structures embedded in the heat-affected clay (*137* and *140* [centre]), laid bricks (*143* [mid far left]) of Kiln A, and later cut (*145* [bottom left]), facing north.

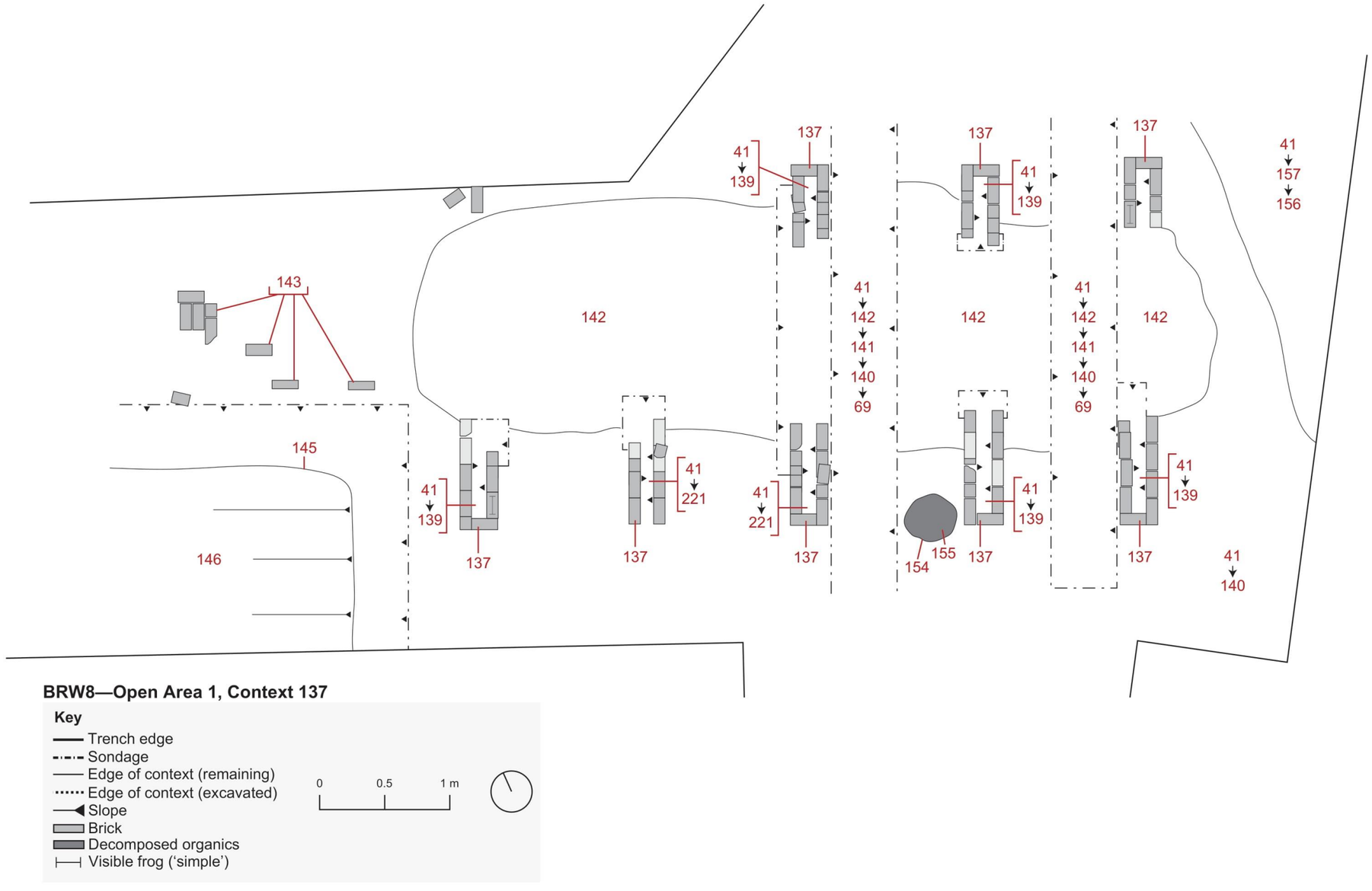


Figure 4.60 OA1, Kiln A, context *137* group.

OA2

OA2 was located south of the southern boundary fence for the quarry adjacent to Denman Street. It comprised a predominantly level area and the termination of a slope to the east.

The excavation of TT10 South identified part of the internal firing space and eastern external wall of a kiln (*115*), whilst further isolated remnant footings were identified throughout TT11 (*72*, *179*, and *195* and *196*). As a result, the area encompassing these features was opened up as OA2.

Similarly to OA1, the upper stratigraphy of OA2 was largely homogenous. The crushed yellow granite gravel deposit (*41*) was present in the western extent of OA2 and immediately overlaid the features associated with Kiln B (*115*). The remainder of the OA was characterised by widespread rubble deposits. In the central extent this was a moderately to loosely compact mid reddish brown deposit with a high proportion of brick rubble (*76*); the eastern extent was overlaid by a friable reddish brown clayey sand with a high proportion of brick rubble (*29*). Artefacts—predominantly glass beer bottles—associated with one of the rubble deposits (*76*) dated to the mid 1930s. A concentrated artefact lens (*222*) within the rubble (*76*) contained large quantities of glass condiment jars, personal hygiene product jars, and domestic electrical items such as light fittings and door locks (Section 4.2). Few artefacts were recovered from the second rubble deposit (*29*), however, the deposit contained 'CANBERRA' frogged bricks indicating it likely also dated to the 1930s (Section 4.2).

Beneath these deposits, four kiln structures were identified:

- a set of partial western (*164*) and eastern and northern (*115*) walls and associated internal heat-affected clay (*118* and *119*) surfaces;
- a set of partial eastern walls (*179* and *180*) and associated internal heat-affected clay (*173* and *174*) surfaces;
- a set of partial western (*72* and *223*), northern (*166*), and eastern (*167*) walls, including a brick-lined flue channel (*168* and *170*), and associated internal heat-affected clay (*203* and *204*) surfaces; and
- a set of partial western (*196*) and eastern (*195*) walls, including a flue channel (*193*), and associated internal heat-affected clays (*190* and *199*) surfaces.

These kilns were aligned in a single northwest–east row across the space (refer to Figure 4.61).

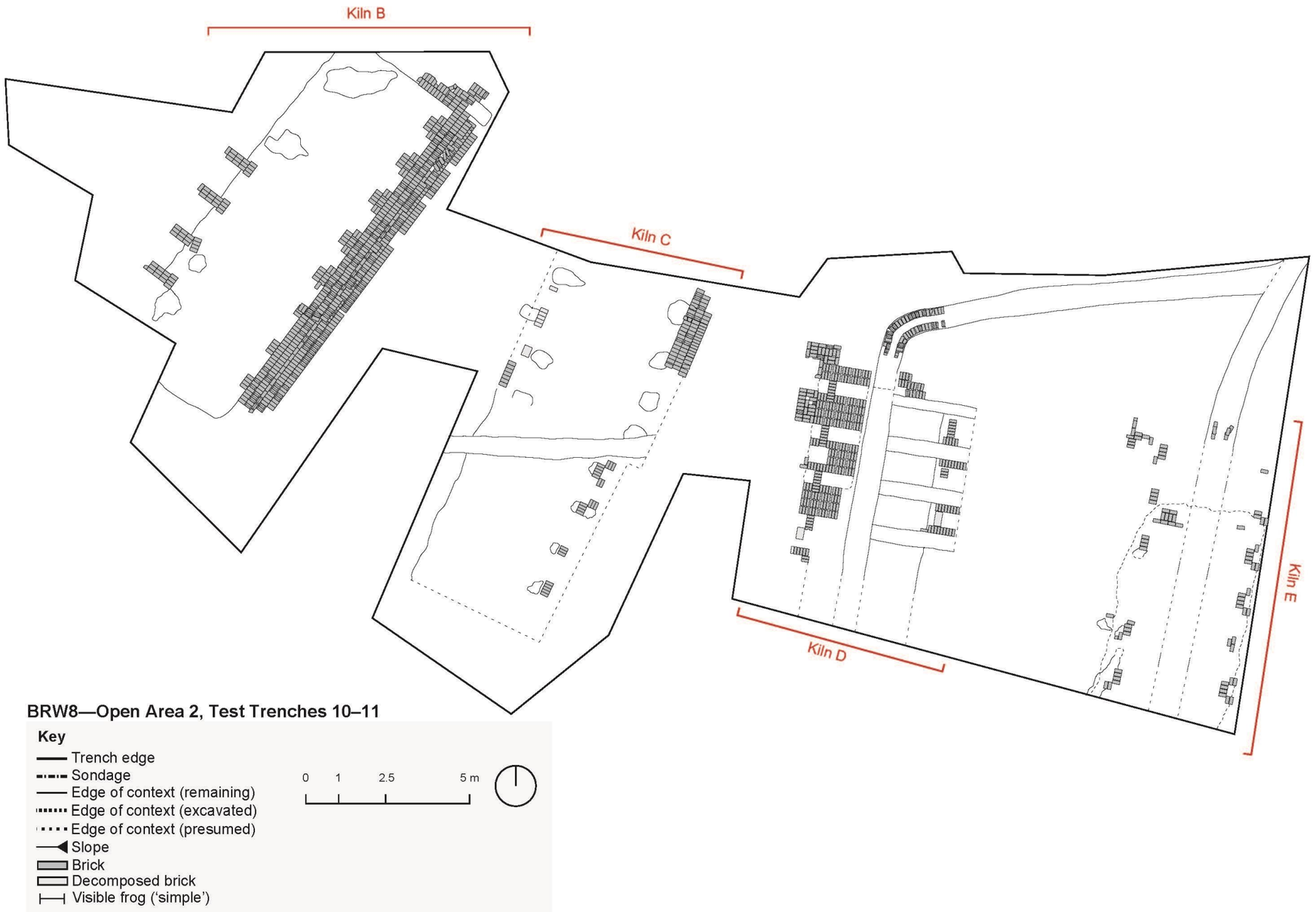


Figure 4.61 OA2 features.

Kiln B (context *115* group)

In the far western extent of OA2 was the context *115* group (Figure 4.67). It comprised an eastern and partial northern external wall (*115*) and several isolated footing pads for a western external wall (*164*) of a kiln structure (Kiln B). The internal floor space was composed of several discrete layers, including an area of extremely compact heat-affected mid orangey red clay (*118* and *119*). A number of ash deposits were also located throughout the internal space (*121* and *122*), however, not within the fireboxes formed by eastern external wall (*115*)—these had been filled with sandy deposits (*117* and *123*).

The eastern external wall (*115*) had been constructed from two courses of 'simple' frogged bricks (Figure 4.62). The bottom course consisted of four rows of header bricks, separated into pairs by a single line of stretchers. An additional fifth row of headers was occasionally present on the western edge of the formation when needed to support the upper course. This course had been used to create fireholes. Three rows of header bricks formed the northern and southern sides, whilst a 'U'-shaped formation of four headers and two pairs of stretchers 'capped' the gaps on the internal side of the eastern external wall (*115*) (Figure 4.65). Each firehole cavity was spaced 1.09 metres apart and measured 0.32 metres wide. The return northern external wall (*115*) comprised two rows of header bricks.

Between approximately 3.27 metres and 3.5 metres west of the eastern external wall (*115*) were the footings for the western external wall (*164*) (Figure 4.63). Highly fragmentary, *164* comprised four discrete brick footing pads. Whilst some of the pads had been disturbed, they generally had been constructed from a single course of four rows of header bricks capped by a single stretcher on the western edge. They were approximately aligned to the spaces between the fireholes in the eastern external wall (*115*).

The internal space between the eastern (*115*) and western (*164*) external walls was filled with a friable mid reddish orange clayey sand (*118*), which overlaid an extremely compact heat-affected mid reddish orange clay (*119*). The compact clay (*119*) was approximately 0.23 metres thick and capped a natural soil horizon that had taken on a darkened, 'burnt' or 'smoke-affected' look (*120*) (Figure 4.64).

Several ash deposits (*121* and *122*) were distributed throughout the internal space of the eastern (*115*) and western (*164*) external walls, some of which were located adjacent to the eastern wall on its western edge (Figure 4.66). No ash deposits were identified in the eastern fireholes. These had been filled with very compact mid whiteish yellow sandy clay (*117*) and loosely compacted greyish brown sandy silt (*123*). Artefacts identified in these contexts dated to the early 1920s (Section 4.2).

Beneath the northeastern corner of the eastern external wall (*115*) was a cut (*211*) and fill (*210*) feature. The cut was regular, with vertical sides and a flat base, and had been filled with a friable mid to dark greyish brown sandy clay, which included a quantity of crushed brick rubble and partially decomposed timber post.

Figure 4.62 OA2, the eastern external wall (*115*), facing northwest.

Figure 4.63 OA2, one pad in the western external wall (*164*), facing north.

Figure 4.64 TT10 South, the heat-affected clay (*119*, upper) and underlying darkened natural soil profile (*120*, lower), facing east.

Figure 4.65 TT10 South, the fireholes in the eastern external wall (*115*), facing northwest.

Figure 4.66 TT10 South, an ash deposit (*121*) in the internal space of Kiln B adjacent to the eastern and northern external wall (*115*).

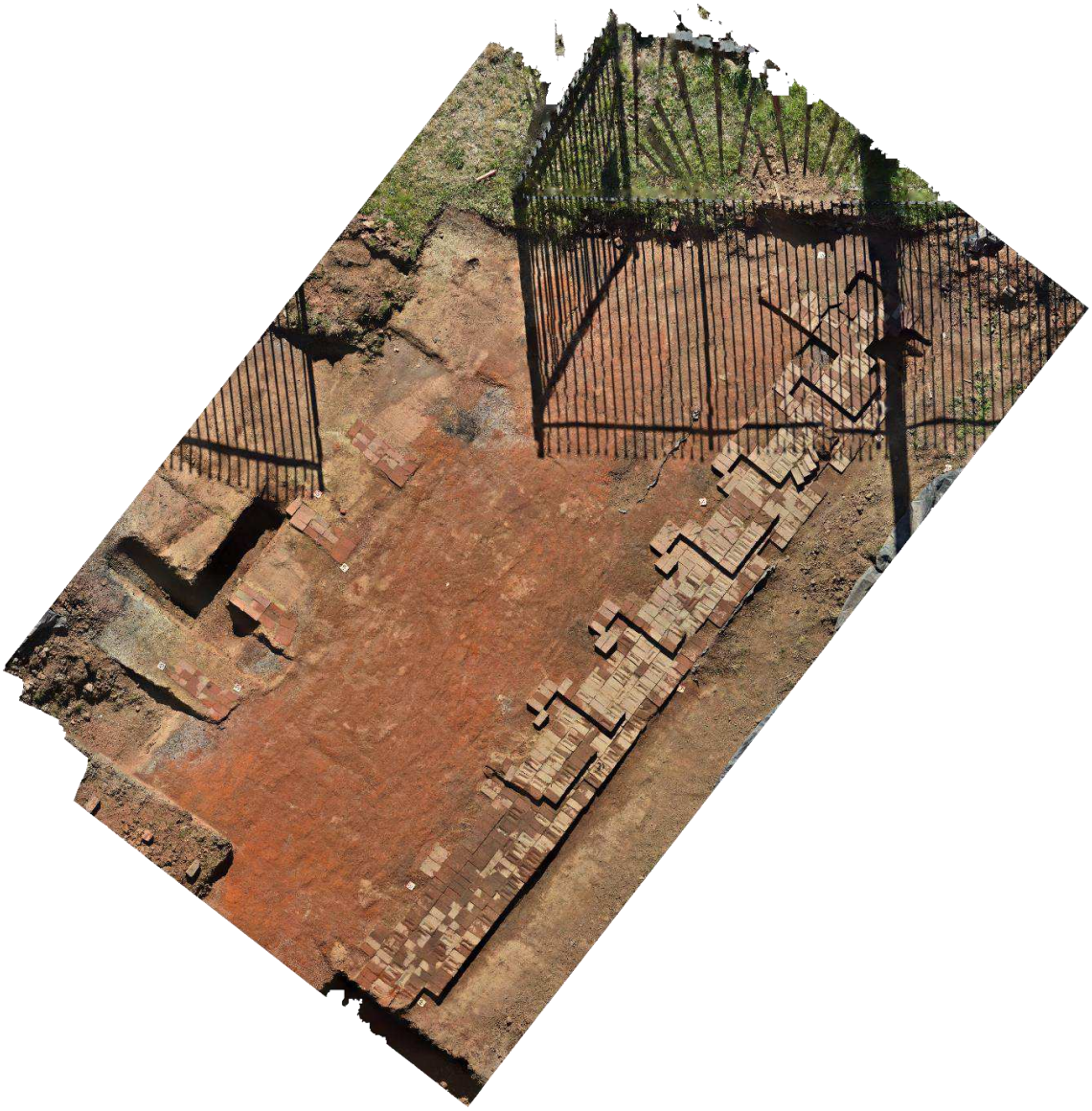


Figure 4.67 OA2, the western *164* (left) and eastern *115* (right) external walls, and heat-affected clay firing floor (*119*, centre) of Kiln B, facing north.

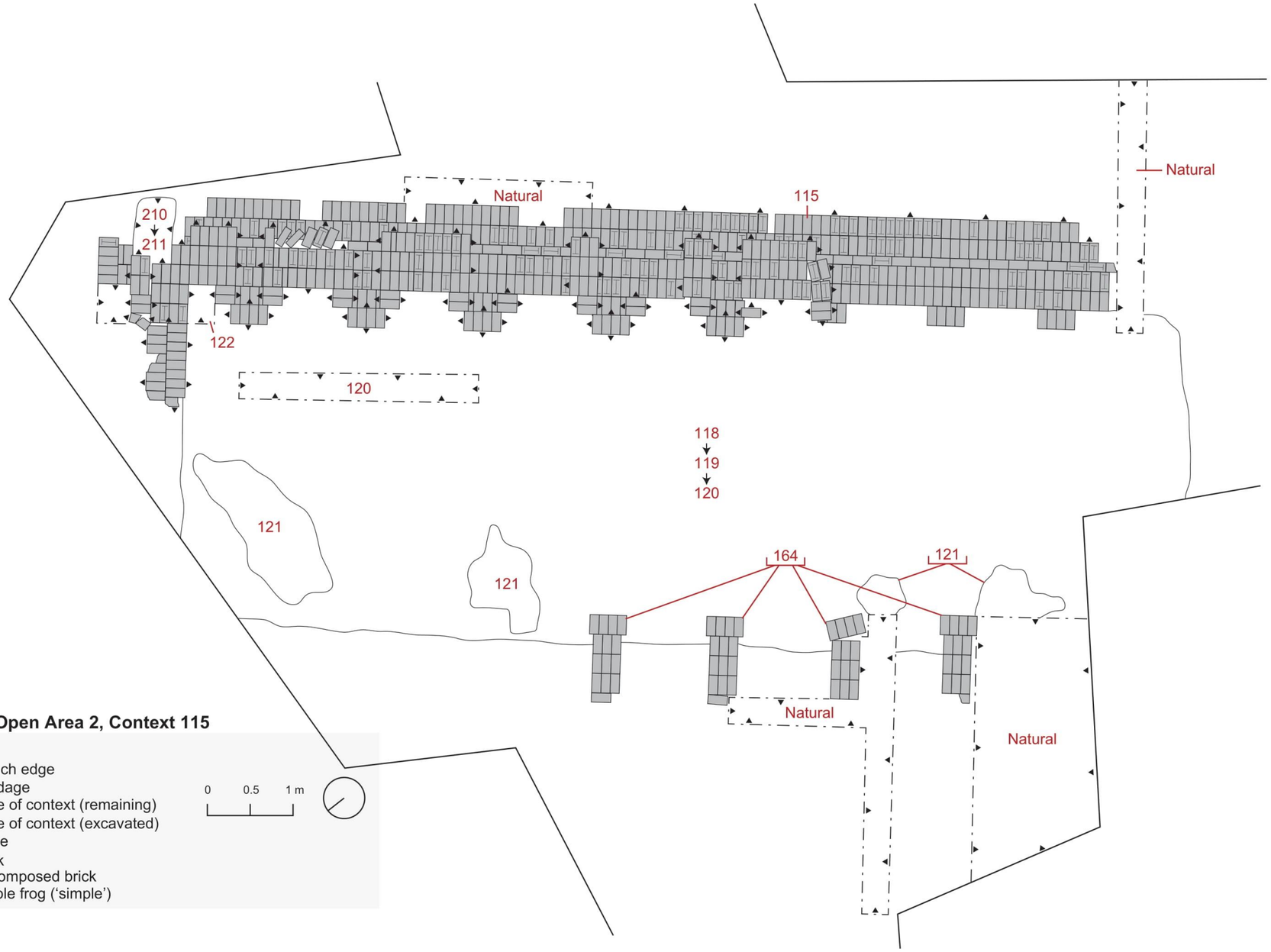


Figure 4.68 OA2, Kiln B, context *115* group.

Kiln C (context *179* group)

The context *179* group was located in the central western extent of OA2, occupying the space between Kiln D (context *72* group) and Kiln B (context *115* group) (Figure 4.72). It formed the partial eastern external wall (*179*) and fireboxes (*180*), and fragmentary western external wall (*181* and *218*) of a kiln structure (Kiln C). The internal floor space was composed of several discrete layers (*173* and *174*), which included areas of staining (*224*). Ash deposits (*201*) were located within the fireboxes formed by *180*. No artefacts were identified within this group.

The partial eastern external wall (*179*) had been constructed from 'simple' frogged bricks arranged in a mixture of single- and double courses—the western two rows comprised two courses of header bricks, which were capped on the east by a single course of rowlock bricks (Figure 4.69). The total feature measured approximately 2.55 metres long x 0.71 metres wide. The rowlock bricks only accounted for 1 metre of this length, with either side bordered by a continuation of the two-coursed headers.

South of the partial eastern external wall (*179*) was *180*, an alignment of four highly fragmentary fireboxes (Figure 4.70 and Figure 4.71). Only the northern-most firebox displayed the full 'U'-shaped arrangement—at least three rows of shiner bricks formed the northern and southern sides, whilst a row of five rowlock bricks 'capped' the gap on the internal side. Quantities of ash (*201*) were deposited within the 'U'-shaped cavity of the fireboxes.

The western external wall (*181* and *218*) of the feature was highly fragmentary (Figure 4.72). *181* comprised a single row of seven header bricks. North of this was *218*, a number of highly decomposed header bricks offset slightly from *181* to the east.

The internal space was filled with a friable mid reddish orange clayey sand (*173*), which overlaid four roughly linear series of mid to dark bluish or greenish grey localised patches of discoloured clay (*224*) (Figure 4.72). These discoloured patches were set into an extremely compact heat-affected mid orangey red clay (*174*), which capped a natural soil horizon that had taken on a darkened, 'burnt' or 'smoke-affected' look (*225*) (Figure 4.71).

Figure 4.69 OA2, the partial eastern external wall (*179*), facing west.

Figure 4.70 OA2, the eastern fireboxes (*180*) and associated ash (*201*) deposits, facing west.

Figure 4.71 OA2, sondage adjacent to the northern-most firebox (*180*) showing the heat-affected clay (*174*) and underlying darkened natural soil profile (*225*), facing west.

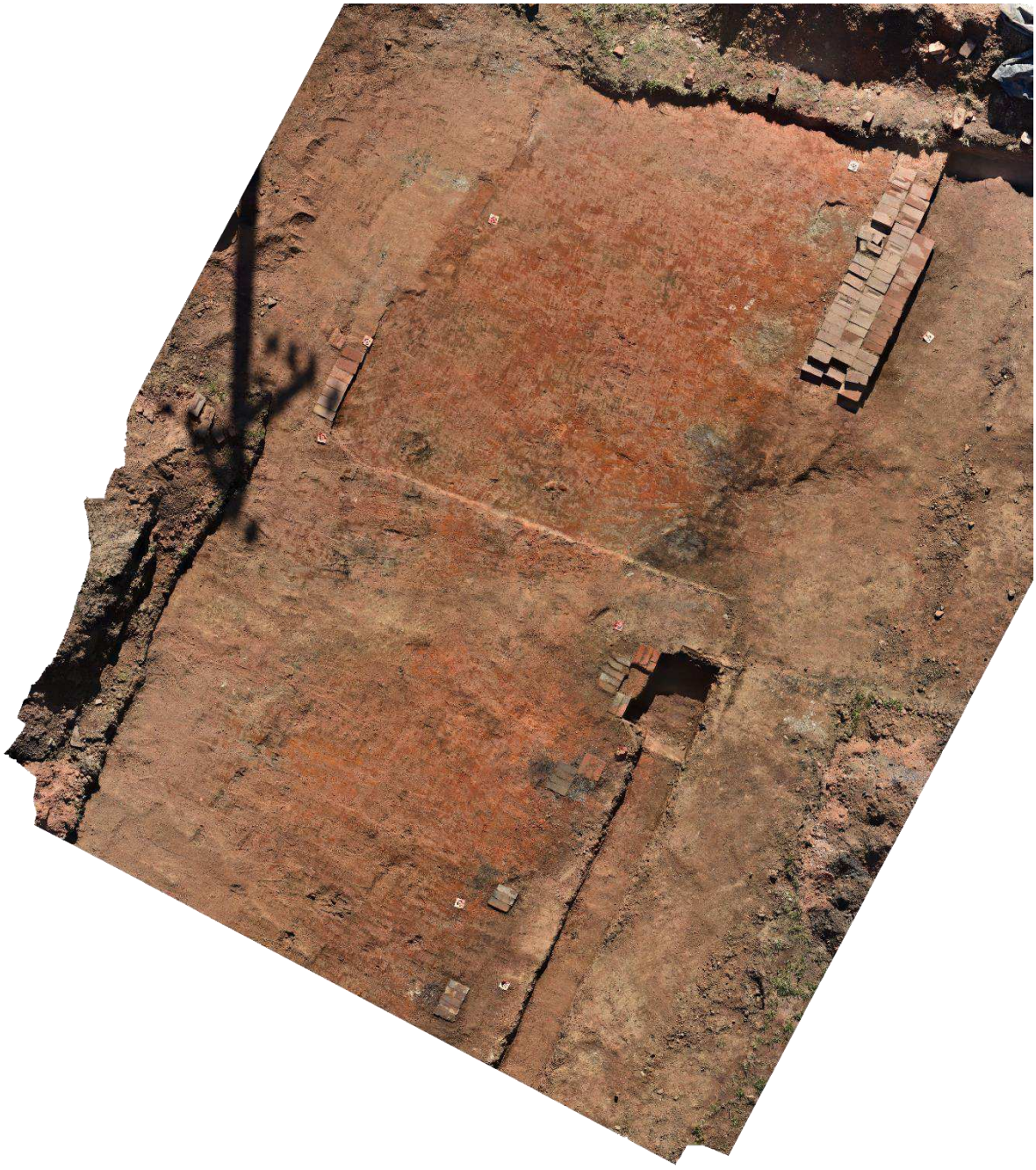
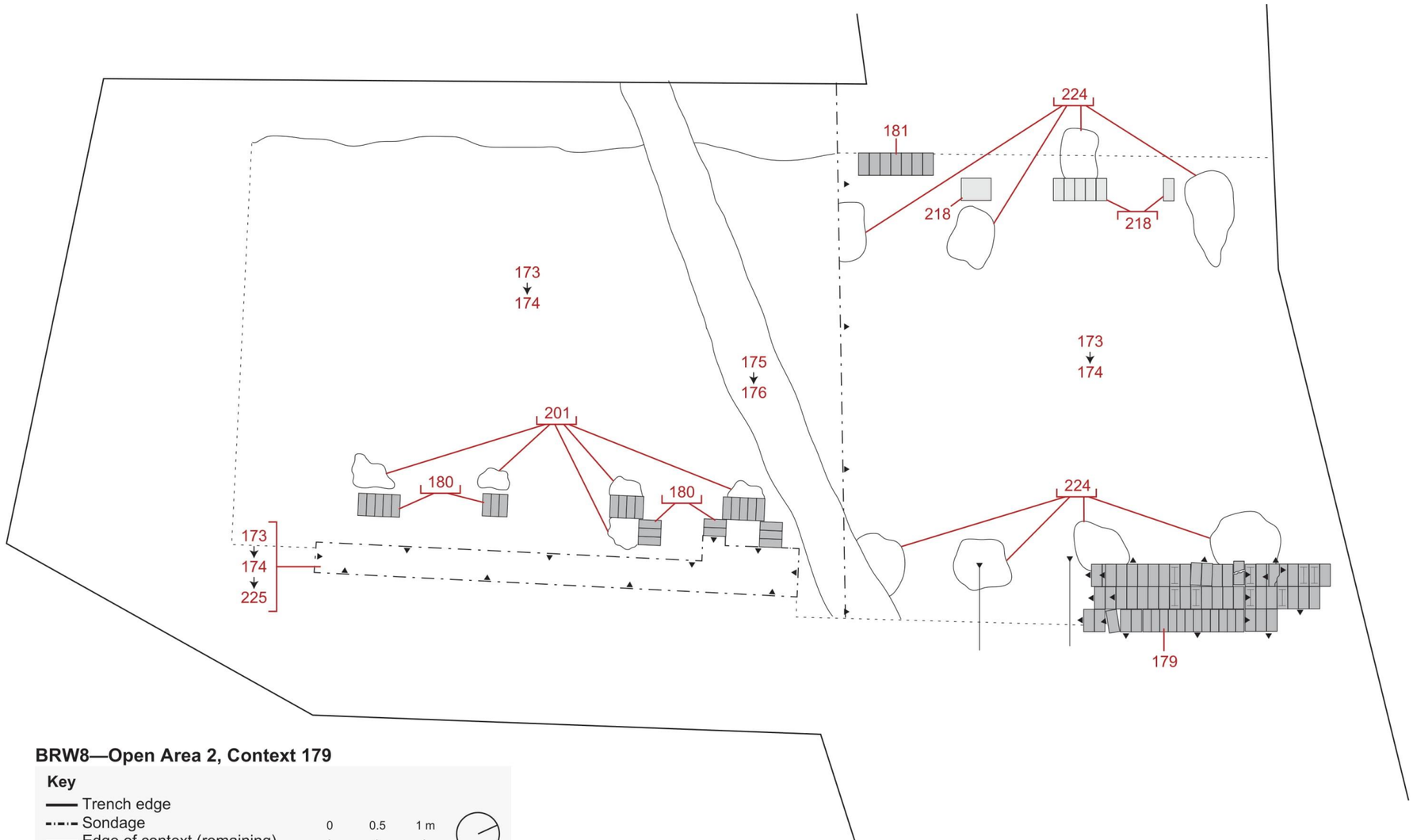


Figure 4.72 OA2, the partial eastern external wall (*179* , top right), fireboxes (*180*, bottom right), fragmentary western external wall (*181* and *218*, left), heat-affected clay firing floor (*174*, top centre) and discolouration patches (*224*, top centre), and sandy upper firing floor (*173*, bottom centre) of Kiln C, facing north.



BRW8—Open Area 2, Context 179

Key

- Trench edge
- Sondage
- Edge of context (remaining)
- Edge of context (excavated)
- Edge of context (presumed)
- Slope
- Brick
- Decomposed brick
- Visible frog ('simple')

0 0.5 1 m

Figure 4.73 OA2, Kiln C, context *179* group.

Kiln D (context *72* group)

The *72* group was located in the central eastern extent of OA2, east of the Kiln C (context *179* group) and west of Kiln E (context *195* and *196* group). The group formed the western (*72* and *223*), eastern (*167*) and northern (*166*) external walls of a kiln structure (Kiln D), which included a partially demolished brick-lined flue (*169*), remnant flue cut (*170*), and associated fills (*168*, *203*, *212*, *213*, *214*, *215*, and *216*). The internal floor space was composed of several discrete layers (*203* and *204*), which included areas of staining (*208* and *217*). A number of ash deposits were located within the fireboxes formed by the western external wall (*72*) (*171*, *183*, *184*, *185*, *186*, and *187*) and around the wall structures (*205*). No artefacts were identified within this group.

The western external wall (*72*) measured 4.1 metres long x 2.1 metres wide (Figure 4.74). It had been constructed from 'simple' frogged bricks arranged predominantly in single courses of shiners and rowlocks. The body of the wall (*72*) comprised four discrete blocks of rowlock bricks; these had been set in groups of three, oriented north–south, and measured 1 metre wide. On their eastern edge, the blocks were separated by fireboxes that measured approximately 0.36 metres wide x 1 metre long (Figure 4.74 and Figure 4.75). Each block of rowlock bricks was connected to the adjacent block by a single row of shiners. The western termination of the blocks was more uncertain. Mirrored fireboxes were present within the western external wall (*72*), however, two additional sections of brick (*223*) had been added to the northwestern side. These additions comprised two courses of bricks, arranged in a pattern-less combination of stretcher and header bricks (Figure 4.83).

The eastern fireboxes had been filled with successive layers of friable to loosely compact mid orangey red clayey sand with ash inclusions (*183, 184*, and *185*), moderately compact crushed charcoal (*186*), and friable ash deposits (*187*). The western fireboxes contained similar materials (*187*), although with fewer distinguishable layers.

Approximately 2.63 metres east of the western external wall (*72*) was the eastern external wall (*167*). Highly fragmentary, the eastern wall (*167*) comprised three brick arrangements that mirrored the eastern fireboxes of the western wall (*72*) (Figure 4.75). It had been constructed from 'simple' frogged bricks which had been placed in single courses of shiners and rowlocks. Due to the level of disturbance, no further construction pattern could be determined.

Perpendicular to the western (*72*) and eastern (*167*) external walls on the northern extent of the feature was a partial northern wall (*166*) and a curved, subsurface brick-lined flue (*169*) extending south–northeast. The northern wall (*166*) comprised a highly fragmentary block of rowlock bricks, arranged in a matching pattern to the western external wall (*72*) (Figure 4.79). The subsurface flue (*169*) had also been partially demolished; only

approximately 2.47 metres of the brick lining remained in situ (Figure 4.76 to Figure 4.77). The outer curve had been constructed predominantly in header bond—the occasional stretcher used to account for the curve—in five courses; the inner curve contained more stretchers and had been constructed in six courses. All bricks were 'simple' frogged. The internal space of the flue (*169*) had been filled with loosely compact mid reddish brown silty sand which contained a high proportion of brick rubble (*168*), likely representative of its partial demolition.

The cut (*170*) for the flue (*169*) extended northeast to merge with the flue (*193*) for Kiln E (discussed below in 'Kiln E (context *195* and *196* group') and south into the internal space between the western (*72*) and eastern (*167*) external walls.

Northeast of the brick lining for the flue (*169*), the flue cut (*170*) contained a number of fills representative of simultaneous demolition and rubbish deposition (*213* and *216*) interspersed with layers of crushed coal (*212* and *214*). Beneath the second layer of crushed coal (*214*) was *215*, a layer of preserved textiles (Figure 4.78). The textiles represented a single, complete piece of fabric and had no formal garment or bag structure (Section 4.2). Artefacts identified in the fill included faunal remains, glass beer bottle fragments, and several leather shoe pieces (Section 4.2).

In the internal space between the western (*72*) and eastern (*167*) external walls, the flue cut (*170*) displayed a stepped break of base, suggesting that the brick lining (*169*) had extended south prior to demolition (Figure 4.81). Following the removal of the lining, the flue had been filled with a friable mid greyish orange clayey sand with a high proportion of crushed brick rubble (*203*).

This friable clayey sand (*203*) was also distributed throughout the space above the flue cut (*170*) between the western (*72*) and eastern (*167*) external walls, although it contained considerably less brick rubble at this level (Figure 4.80). Here it also overlaid *208*, which comprised four distinct lines of discolouration extending from the eastern fireboxes of the western external wall (*72*) to the corresponding spaces in the eastern external wall (*167*) (Figure 4.82). The discolouration gradated west–east, often appearing as mid mottled dark greenish or yellowish grey adjacent to the eastern external wall (*167*) and transitioning to a mid reddish orange where it met the western external wall (*72*). The discolouration (*208*) was set in an extremely compact heat-affected mid orangey red clay (*204*).

Figure 4.74 OA2, the western external wall (*72*), facing northwest.

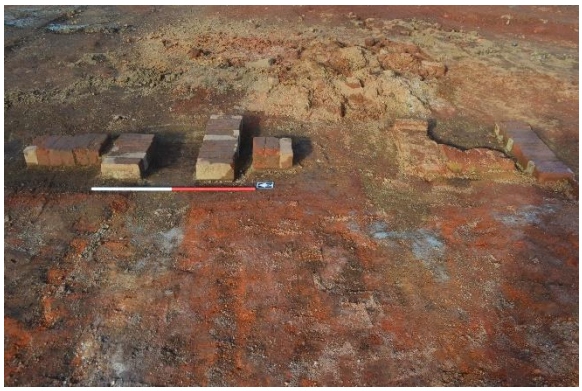


Figure 4.75 OA2, the eastern external wall (*167*), facing east.

Figure 4.76 OA2, the brick lining (*169*) for the flue cut (*170*), facing north.

Figure 4.77 OA2, the brick lining (*169*), facing north. Left: southern edge of the brick lining (*169*) within the flue cut (*170*). Right: northeastern edge of the brick lining (*169*) within the flue cut (*170*).

Figure 4.78 OA2, a layer of preserved textiles (*215*) within the flue cut (*170*), facing north.

Figure 4.79 OA2, the northern external wall (*166*), facing north.

Figure 4.80 OA2, the flue cut (*170*) where it passes through the internal space between the western (*72,* left) and eastern (*167*, right) external walls, facing north. *170* abuts *72*.

Figure 4.81 OA2, stepped base of the flue cut (*170*), facing east.

Figure 4.82 OA2, the discolouration (*208*) adjacent to the eastern external wall (*167*), facing south.

Figure 4.83 OA2, the western external wall (*72*) and addition (*223,* left), eastern external wall (*167,* right), northern external wall (*166*) and brick lining (*169*) for the flue (*170,* top), and heat-affected clay firing floor (*204,* centre) of Kiln D, facing north.

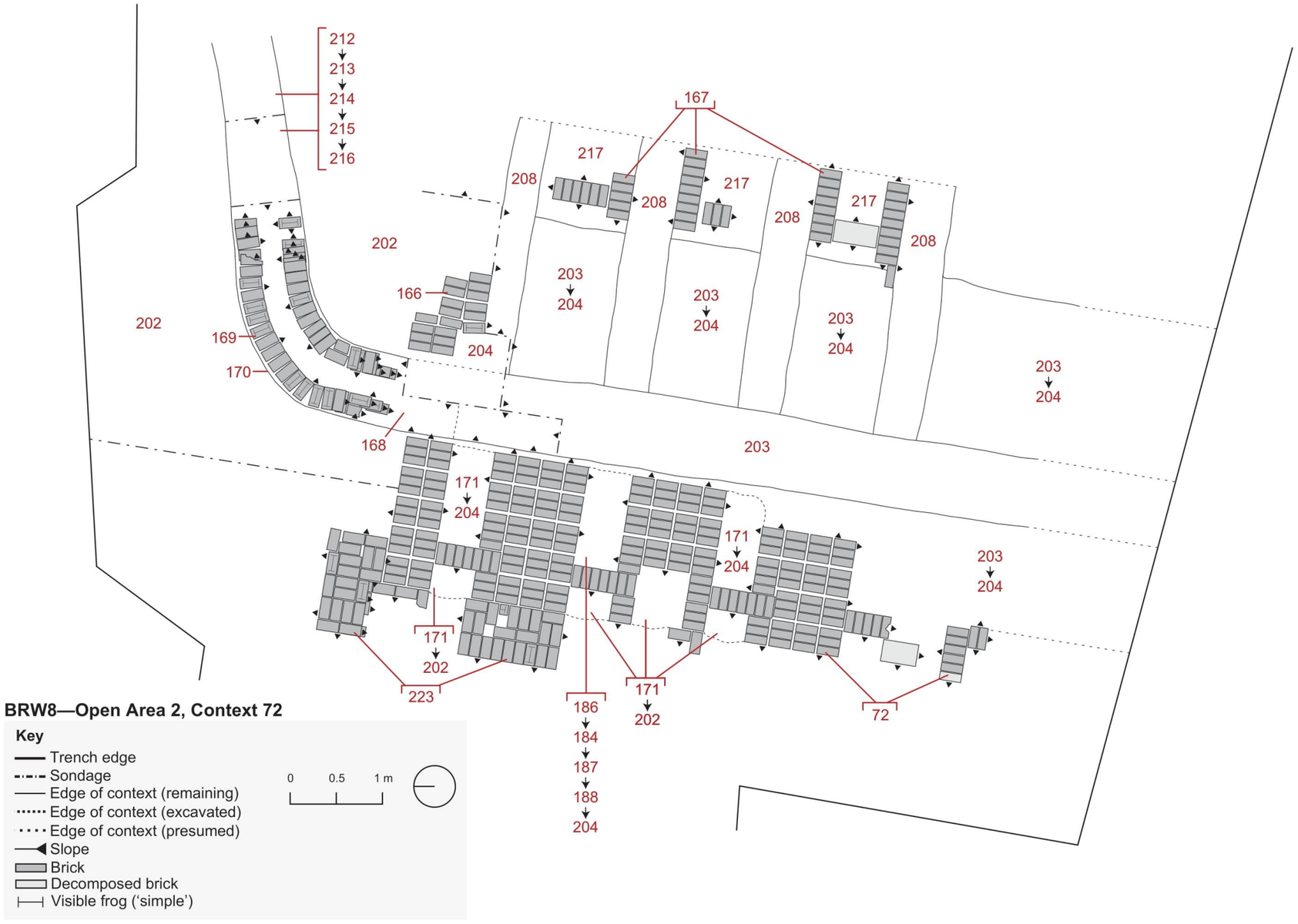


Figure 4.84 OA2, Kiln D, context 72 group.

Kiln E (context *195* and *196* group)

Located in the far eastern extent of OA2, the context *195* and *196* group consisted of the eastern external wall (*195*) and western external wall (*196*) of a kiln structure (Kiln E) (Figure 4.91). The structure also included the possible brick lining (192) and cut for a subsurface flue (*193*), and several later brick features (*197* and *198*). The internal floor space was composed of several discrete layers (*190* and *199*), including a layer of crushed coal (*194*).

Both the eastern (*195*) and western (*196*) external walls comprised partial alignments of fireboxes. These had been formed from a 'U'-shaped configuration of four headers and two pairs of stretchers 'capped' the gaps on the internal sides (Figure 4.85). Quantities of ash (*200*) were located within and around the fireboxes.

Adjacent to the western external wall (*196*) were several later structural additions (Figure 4.86). These comprised a single course of bricks arranged in a single row of header bond capped on the northern and southern edges by a row of stretchers (*198*). No identifiable pattern was determined in *197*, which had been constructed from two courses of mixed header and stretcher bricks adjacent to several rowlock bricks. Both *197* and *198* were raised above the level of the western external wall (*196*), making the relationships between the three features uncertain.

The internal space between the eastern (*195*) and western (*196*) external walls contained two heat-affected clay deposits. The upper deposit (*190*) was a very compact mid greyish orange sandy clay, which overlaid an extremely compact light orange clay with bluish discolouration (*199*). Above both of these layers was *194*, a widespread loosely to moderately compact crushed coal deposit approximately 0.03 metres thick (Figure 4.87).

Extending through the centre of the internal space and underlying the firing floor deposits (*194* and *190*) was the cut (*193*) for a subsurface flue (Figure 4.88 and Figure 4.89). The flue had been filled with a friable mid greyish red clayey sand with a high proportion of brick rubble (*191*); the quantity of this rubble decreased in the external space north of the kiln structure.

A possible remnant of brick lining was identified in this external space (*192*) (Figure 4.90). Although its fragmentary nature and the overall fill matrix made its identification unclear, the quantity of rubble present would suggest that a brick lining was present. This would have been completely demolished when the flue was decommissioned and a new firing floor layer (*190*) deposited over the feature.

Figure 4.85 OA2, the western (*196*, left) and eastern (*195*, right) external walls, facing various.

Figure 4.86 OA2, the later additions (*198*, left, and *197*, right) adjacent to the western external wall (*196*), facing north.

Figure 4.87 OA2, the crushed coal deposit (*194*), facing north.

Figure 4.88 OA2, the flue cut (*193*) and rubble fill (*191*), facing south.

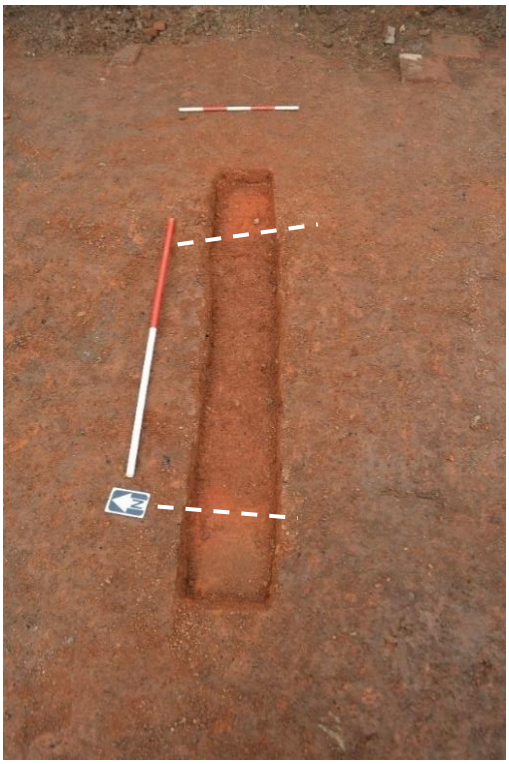


Figure 4.89 OA2, slot trench showing the flue cut (*193*) visible (annotated) beneath the second firing floor (*190*), facing east.

Figure 4.90 OA2, the possible brick lining (*192*) within the flue cut (*193*), a section of the rubble fill (*191*) visible in the background, facing south.

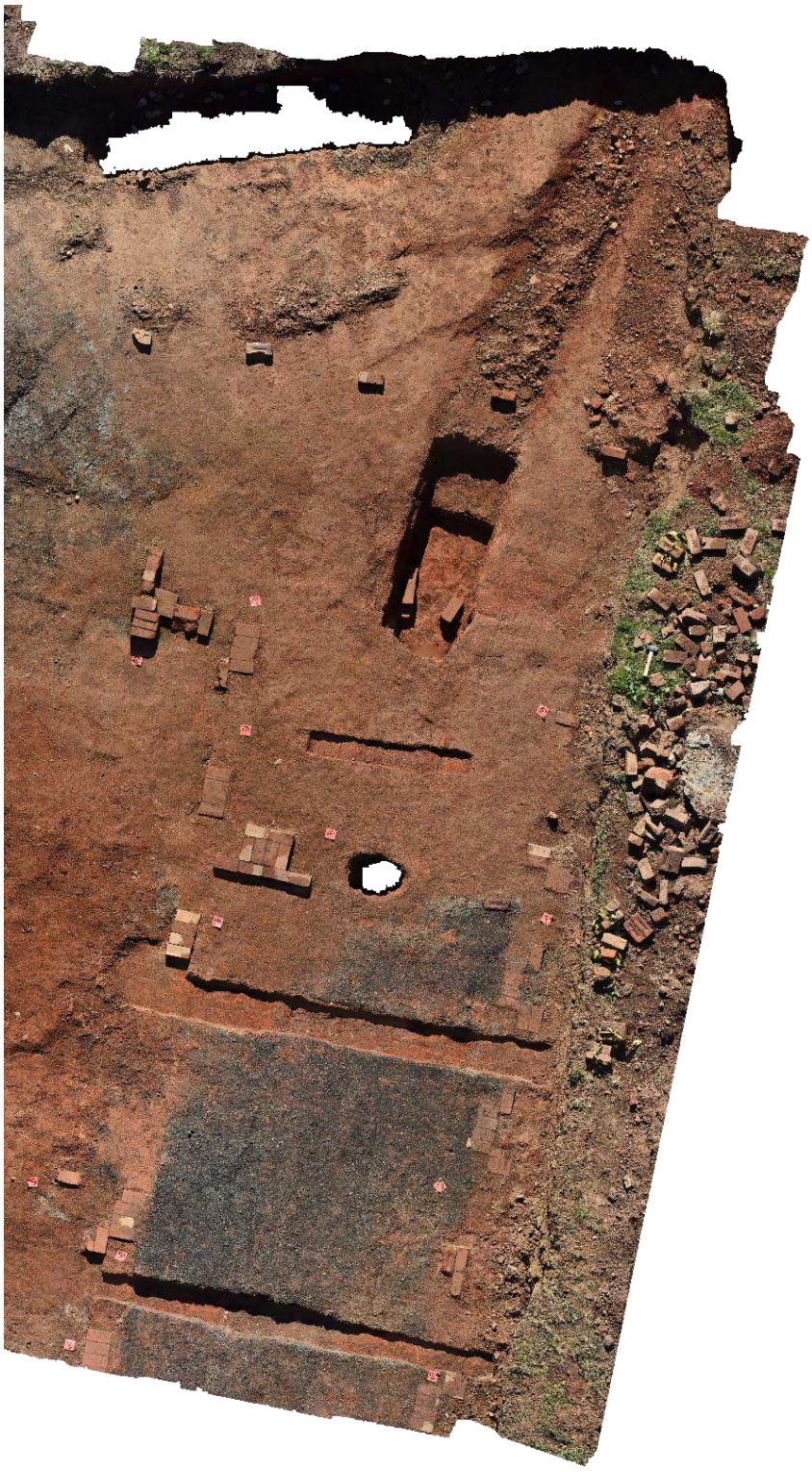


Figure 4.91 OA2, the western externa wall (*196*, left), eastern external wall (*195*, right), later additions (*197* , centre left, and *198*, centre), crushed coal deposit (*194*, centre), and flue cut (*193*, centre top) of Kiln E, facing north.

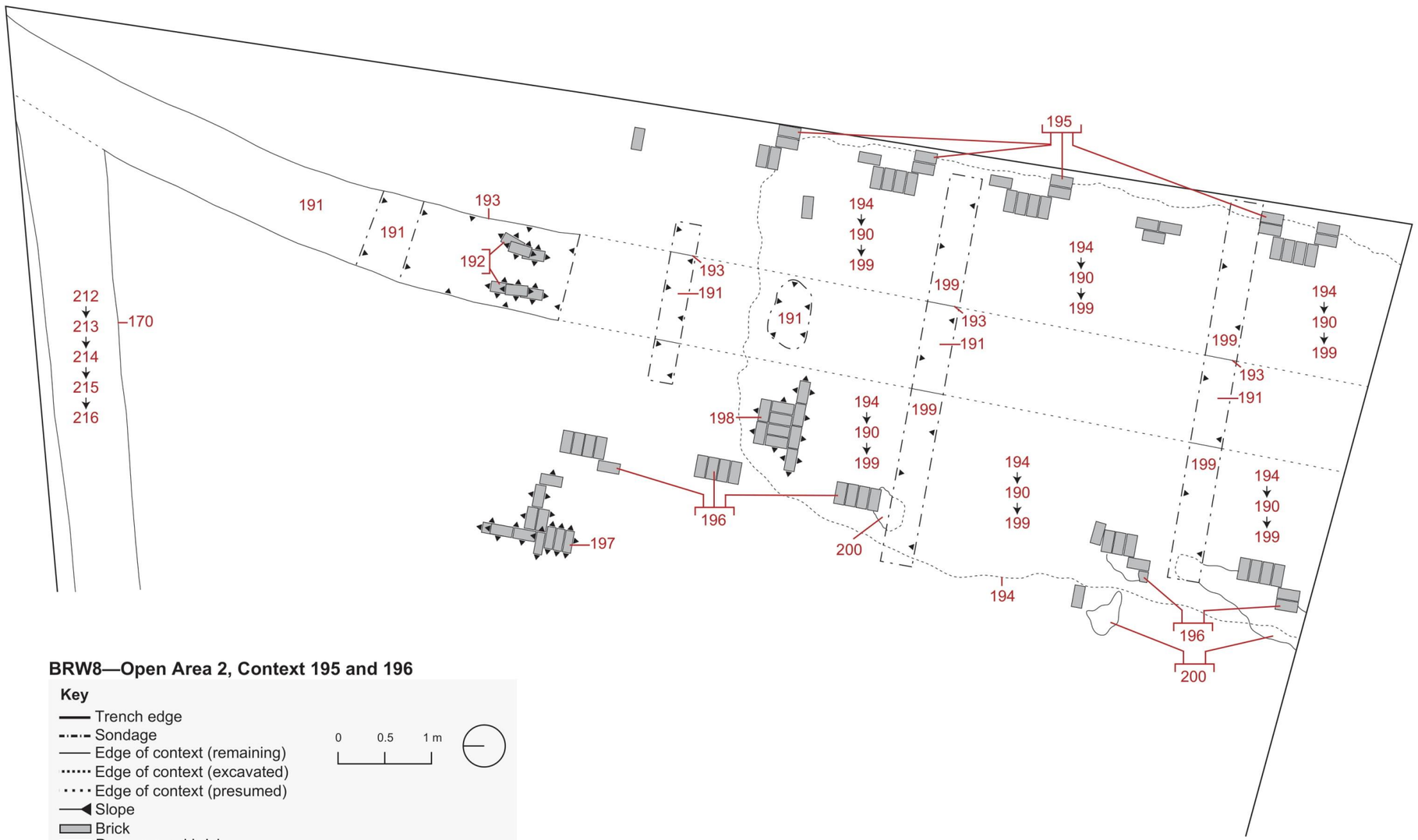


Figure 4.92 Kiln E, context *195* and *196* group.

Interpretation of structures

Kilns

Five kilns were identified in BRW8 during the archaeological excavations:

- Kiln A (context *137* group);
- Kiln B (context *115* group);
- Kiln C (context *179* group);
- Kiln D (context *72* group); and
- Kiln E (context *195* and *196* group).

While the extent of demolition present meant that the full footprint and structural composition of the kilns could not be determined, the remaining features provide valuable insight into their formations.

Prior to the construction of the kilns, the natural ground surface had been levelled to provide a base for the structural components. The external walls showed few similarities across the kilns. The solid eastern walls of Kilns B and C, and western wall of Kiln D each had a completely different construction style. Kiln B comprised two courses, with clear patterning in the use of header and stretcher bonds, whilst Kiln D had a single course composed of sets of rowlock bricks. The remnants of Kiln C were too fragmentary to determine a pattern, but had used both two courses of header bond and a single course of rowlock bricks.

In Kilns C and E, isolated fireboxes contributed to the walls—these were oriented externally and constructed largely in the same pattern, although Kiln C utilised shiner and rowlock bonds, compared to the stretcher and header bonds present in Kiln E. Fireboxes had been built into the eastern wall of Kiln B and western wall of Kiln D. In Kiln B, these formed the second course of the wall, utilising the lower course as a solid base, however, the fireboxes of Kiln D were located at the base of the wall. Additionally, the Kiln D fireboxes were mirrored, with boxes present on both the external and internal aspects of the western wall. Ash deposits were found in all fireboxes except for those in Kiln B, which also showed no sign of heat damage.

Each kiln had two identifiable floor surfaces. The upper surface comprised a friable clayey sand, often pinkish or reddish orange. This immediately overlaid a lower surface of extremely compact baked mid orangey red clay. Where areas of this lower floor were excavated (eg Kilns A, B, and C), the natural soil horizons below had darkened in colour and taken on a 'burnt' appearance. In Kilns C and D, the hardened clay floor had been stained in a linear pattern; in Kiln D these were aligned with the fireboxes present in the external walls.

Subsurface flues were identified in Kilns D and E. However, the characteristics of the two flues were very different:

- Location—In Kiln D, the flue was adjacent to the western wall, whilst in Kiln E it occupied the centre of the space.
- Orientation—The Kiln D flue curved after exiting the kiln to an almost perpendicular angle, whilst the Kiln E flue remained relatively parallel. The orientation of each flue may not be a specific differentiation between the two kilns. While the difference could have been used as a point of experiment—differing heat control and air flow between the two orientations—it is more likely that the two kilns shared a chimney (not identified during the excavations), and the flues were oriented differently because they were headed towards a common point.
- Internal treatment—A defined brick lining was identified in a portion of Kiln D (with evidence that it likely extended at least through the internal space of the kiln), whilst only possible evidence for a lining was identified in Kiln E.

At some point during the use of the two kilns, the flues had been decommissioned. The brick lining was largely or totally removed, and the channels were backfilled with a combination of rubble and other materials.

Flues were not identified in either Kilns B or C. The elongated structures in Kiln A, however, may have been a rudimentary form of flue; each structure forming a cavity within the internal space of the kiln, which may have assisted in the control of airflow during firing.

The overall similarities in the structures identified is consistent with that observed in kilns excavated in other archaeological contexts. This is discussed below.

Comparative archaeology

There are two main classes of kilns: intermittent kilns (where the fires are dampened at the completion of each firing) and continuous kilns (where fires are constantly maintained). A detailed discussion of these kiln types is provided in Appendix C of the 2021 CMP, however, a summary is provided here.

There are three primary intermittent kiln forms (Figure 4.93):

- Clamp kilns—Unfired (green) bricks are arranged in a manner that allows hot air to move through the stacks within the internal space of the kiln, whilst the outside surface is sealed, usually with mud. Heat distribution in clamp kilns is extremely uneven and brick wastage is unavoidably high. As they are only designed to withstand a single firing event, clamps typically leave little archaeological residue apart from a shallow depression in the ground; however, channels and flues have survived in the more sophisticated examples of the kiln.[34]

- Scotch kilns—These are open, roofless constructions with three permanent walls and one temporary wall, the latter of which would be erected after the green bricks had been placed within the kiln and demolished after firing.
- Downdraught kilns—The most elaborate of the intermittent kilns, downdraught kilns are typically rectangular in plan with a number of fireholes and/or fireboxes distributed down the long sides and wickets on the short ends. Inside the single chamber the hot air is channelled out through subsurface flues to a detached chimney stack. Occasionally low walls (bag walls) are constructed within the internal space to regulate the flow of heat.

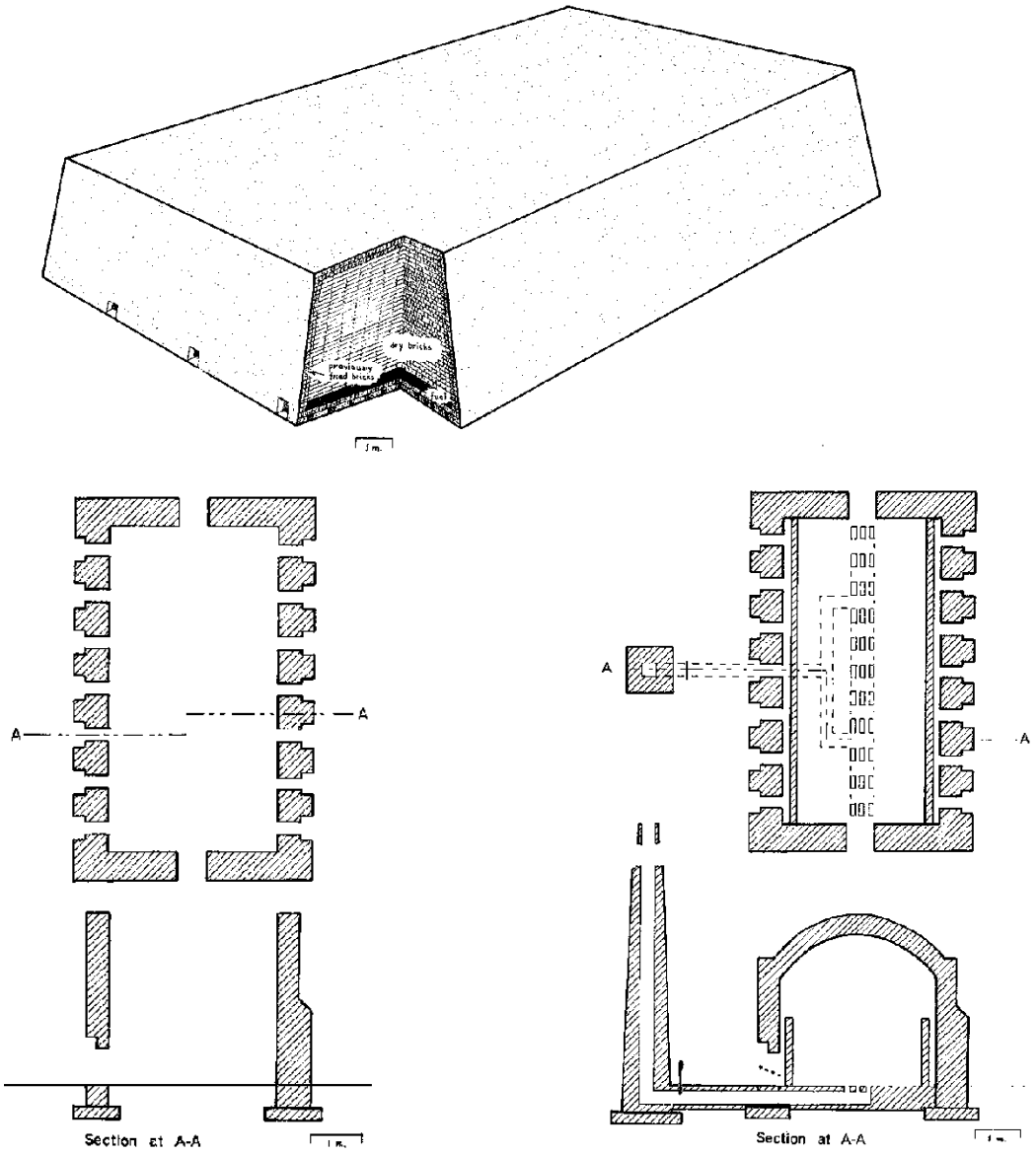


Figure 4.93 Schematic drawings of a clamp kiln (top), Scotch kiln (bottom left), and downdraught kiln (bottom right). (Source: International Labour Office, 1990

Continuous kilns come in a much wider variety of forms. The first major continuous kiln form was the Hoffman kiln design. This design features discrete firing chambers that can be operated independently, which allows for the continuous loading and unloading of the kiln without requiring the entire structure to cool. Variations on the Hoffman include Hardy patent, Staffordshire, and tunnel kilns.

The archaeological remnants of continuous kilns are generally easily identifiable and well understood, as they represent the larger, more distinctive kiln variations. However, archaeological traces of smaller kilns, intermittent kilns—particularly the clamp and Scotch kilns—can be more difficult to identify due to their more impermanent natures. As such, the following discussion will largely concentrate on archaeological investigations that have successfully identified intermittent kilns.

As clamp kilns are constructed from the green bricks intended for firing and designed to withstand a single firing event, the remaining evidence of clamp kilns can vary significantly. This can be from a shallow depression of burnt clay, a hard packed clay floor, a 'paved' floor of previously-fired bricks, or more extensive internal channels and flues.[35]

Excavations at the Whau Brickworks, West Auckland, New Zealand, in the 1980s identified a mid to late nineteenth century clamp kiln (Figure 4.94).[36] The kiln consisted of a fully paved floor. Although its footprint had been disturbed by the later Scotch kiln (Figure 4.94), the original space would have measured approximately 6.2 metres long x 6 metres wide.[37]

A similar nineteenth century clamp kiln was identified in 2009 in the Cortez Mining District, Nevada, United States of America (USA). The brick floor surface 'displayed wide, alternating banks of pink and white … The white bands [were] permanent ash discolourations delineating the [seven] flues' (Figure 4.95).[38] The structure measured approximately 9 metres long x 9 metres wide.[39] On the same site were the more subtle remains of a second clamp kiln:

> There was no brick or orange staining anywhere on the surface. It was not until the black thermal signature was uncovered that the excavators realised it was another clamp.[40]

It was suggested that the lack of structural definition may have been because the fired bricks were completely removed following firing (as opposed to left in situ as a 'floor').[41]

The remains of a clamp kiln identified near Shelbyville, Kentucky, USA, represents an intermediate between the clamp kilns observed at the Whau Brickworks and in the Cortez Mining District. Similar to the patterning present in the Cortez Mining District clamp kiln, this kiln floor had been differentially stained through the construction of several flue channels (Figure 4.96).[42] However, the kiln floor consisted of hard packed clay, rather than bricks.

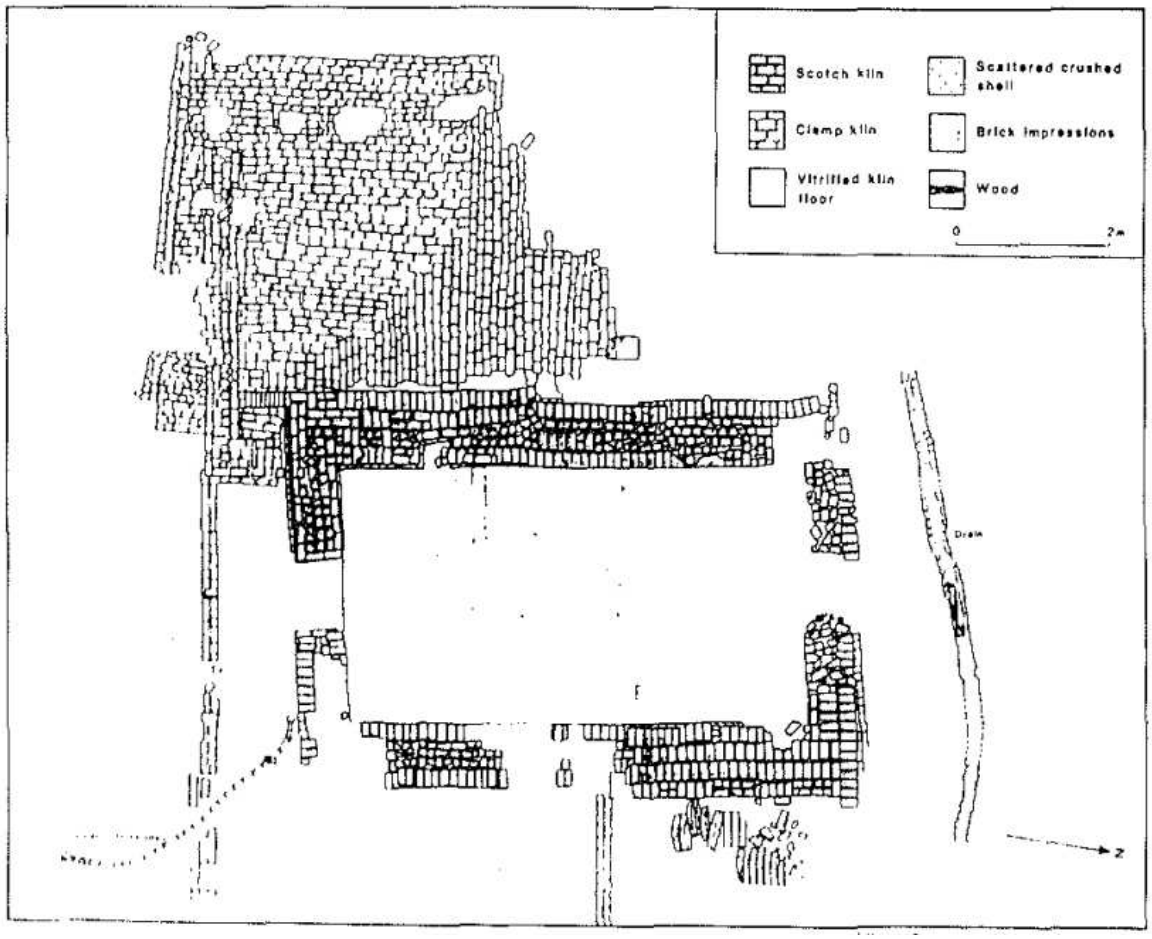


Figure 4.94 The clamp kiln (fully paved surface) and Scotch kiln (dark rectangle) identified at the Whau Brickworks. (Source: Clough 1989, p 4)

Figure 4.95 The partially intact 'paved' clamp kiln floor identified in the Cortez Mining District. (Source: McQueen and Ross-Hauer 2013, p 21)

Figure 4.96 Several flue channels present in the baked clay floor of a clamp kiln near Shelbyville. (Source: O'Neill 2001)

The construction of permanent walls during the use of a Scotch kiln generally aids in their identification when found in archaeological contexts.

In 2008, archaeological excavations were undertaken at a late nineteenth century Scotch kiln located on the Bridgman Ridge Estate, Singleton, NSW. The excavations uncovered two external walls of a rectangular brick kiln structure sitting on the levelled, natural ground surface (Figure 4.98).[43] Passing between the two walls through the internal kiln space were four pairs of flues, which were partially defined by brick lining and partially excavated into the ground surface.[44] Fireboxes were situated at each external end of the flues. The internal surface of the kiln (Figure 4.97):was characterised by an…

> … orange-red rubble and brick dust fill' which was above 'concentrated amounts of the baked clay which sat in a reddish-brown sand … above a hardened natural surface [and a centralised burnt deposit above a] blackened natural horizon.[45]

The whole kiln footprint measured 6.3 metres long x 6.4 metres wide, however, evidence of demolition at the western end of the kiln meant that its true extent was unknown.

Figure 4.97 The internal stratigraphy of the brick kiln at Bridgman Ridge Estate. (Source: AMAC 2011, p 60)

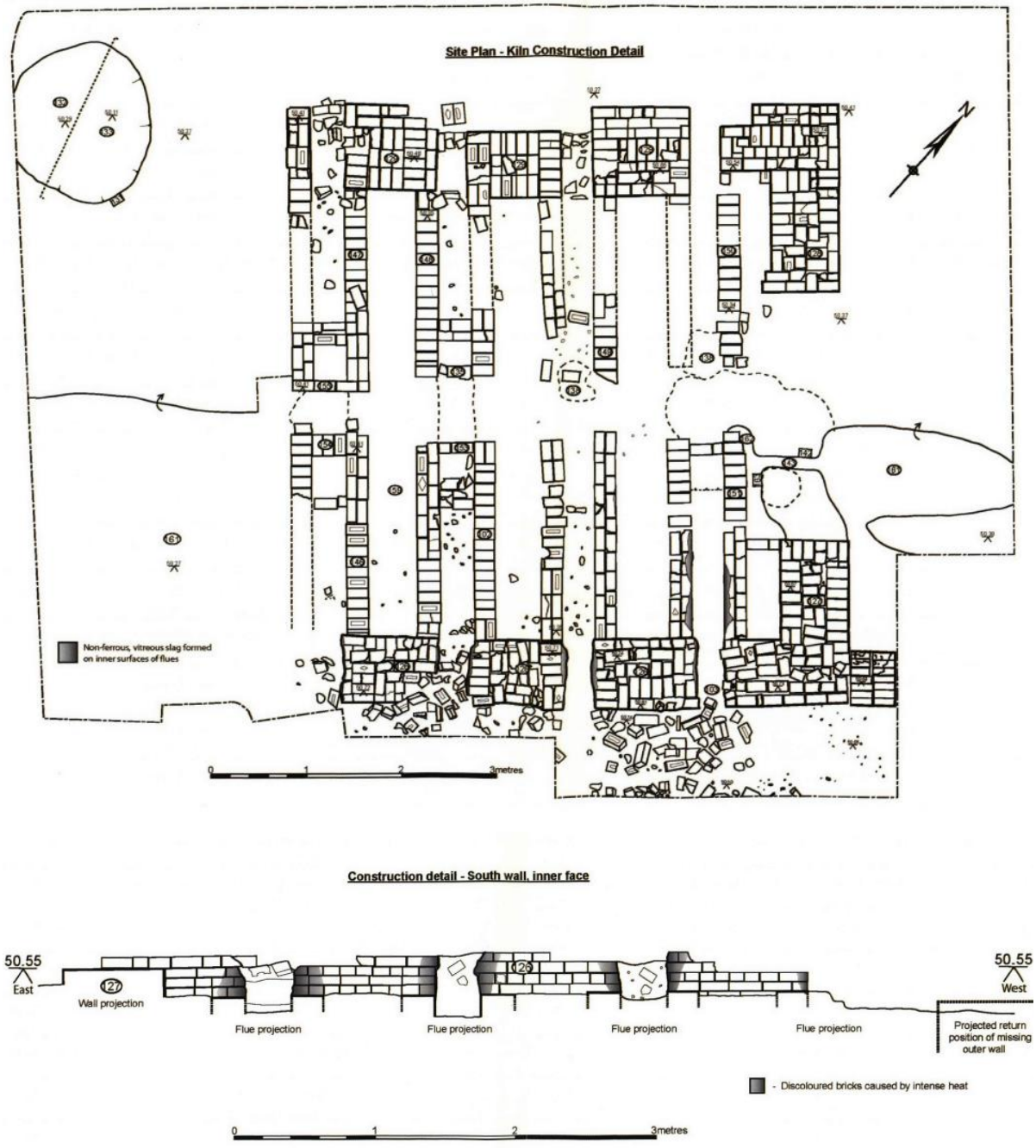


Figure 4.98 Plan of the brick kiln structure and section of the flue projections identified at Bridgman Ridge Estate. (Source: AMAC 2011, p 44–45)

Another example of a mid to late nineteenth century Scotch kiln was excavated at the Whau Brickworks, which partially overlaid the clamp kiln discussed above (Figure 4.94). The excavations at the Whau Brickworks identified a rectangular structure approximately 6.75 metres long x 5 metres wide.[46] The four walls were nearly complete, each

approximately 0.8 metres thick and with six fireboxes built into each of the long walls.[47] Unlike the Bridgman Ridge kiln, no surface flue structures or cuts were identified within the internal kiln space.

Downdraught kilns have a very similar footprint to Scotch kilns, albeit with a key difference—unlike open-roofed Scotch kilns, the enclosed space within a downdraught kiln necessitates the hot air to be vented via a subsurface flue to an external chimney stack. In more elaborate examples (such as the three extant downdraught kilns at the Precinct Section 4.1.7) there may be numerous flue channels connected to a central flue tunnel, however in smaller and/or simpler structures there is usually a single flue channel.

In the 1990s, a number of archaeological surveys were conducted at the brick kiln near the Fenny Compton tunnel, Warwickshire, United Kingdom (UK). Constructed in the mid nineteenth century, the site comprises the above ground remnants of a downdraught kiln measuring approximately 12.6 metres long x 5.8 metres wide (Figure 4.99).[48] The existing remains indicate that the kiln had eight fireholes/fireboxes on each of the long walls and wickets in both short walls.[49] A single subsurface flue channel was present beneath the floor surface, which vented air down through a latticed brick floor—approximately three courses deep—at either end of the kiln.[50] The external chimney was located approximately 0.5 metres from the southwestern corner of the kiln.[51]

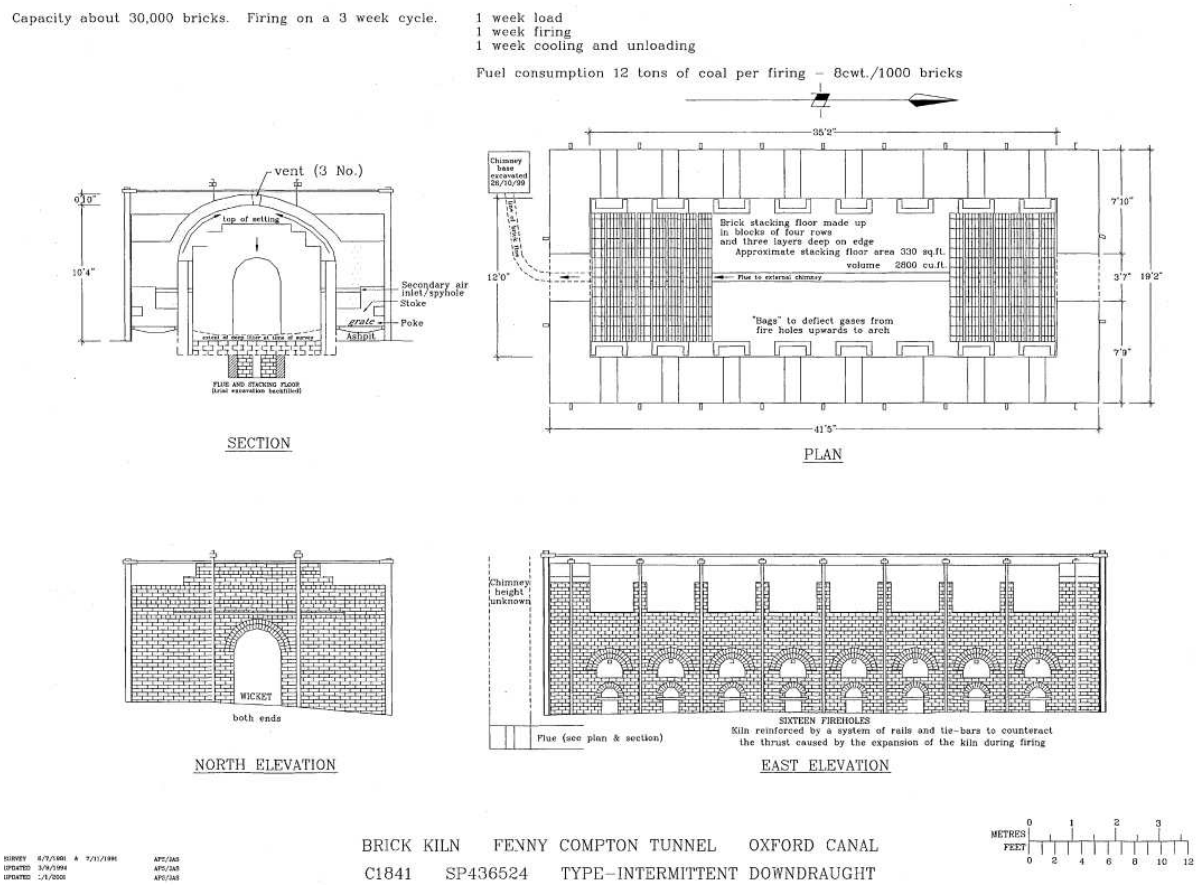


Figure 4.99 Plan of the downdraught kiln near the Fenny Compton tunnel. (Source: Selby 2002, p 113)

The Canberra Brickworks experimental plant

Although there are documentary references to the Canberra Brickworks experimental plant (Section 2.1), a plan for the layout of the plant has not been found. However, three photographs from the same time period are known.

Figure 4.100 shows a large crushing pan shed situated to the left and partially in front of several kilns. The two visible kilns immediately behind the crushing pan shed show open constructions—two long side walls are present, with at least one short end and the ceiling left open. Fireboxes or -holes can be seen at the base of the left kiln's right wall, although little detail can be made out. It is probable that they were similar to the fireboxes visible in the front-most kiln. These show five domed openings, constructed approximately one or two courses above ground level. The low height of the wall in this kiln and the adjacent stack of bricks suggests that the photograph was taken either part way through construction (if a Scotch or downdraught kiln) or dismantling (if a clamp kiln). The walls of a fourth kiln are partially visible behind this front kiln.

Figure 4.101 has been taken from the same angle as Figure 4.100, but at a different stage in the production process. The short ends of the two left-most kilns are sealed with bricks, indicating that the contents were being fired at the time the photograph was taken. The central kiln also appears to be rooved—several 'beams' appear to be present between the two external walls, shadowing the internal space. Although a chimney is not visible, the presence of the roof would suggest that the kiln was operating as a downdraught kiln. The lack of a lean-to on the side wall of the crushing pan shed indicates Figure 4.101 likely predates Figure 4.100.

Figure 4.102 has been taken from the rear of the experimental complex. Primarily it shows the beginnings of the quarry, with the roof of the crushing pan shed visible behind the landform in the background. Right of this—and barely discernible—are several fireboxes in the long wall of a kiln. This is likely the same kiln visible in Figure 4.100 behind the machinery shed. The large stack of bricks to the right of the photograph is also the same as seen in Figure 4.100.

The lack of identifying landmarks and the extent of landscape modification that has occurred means it is difficult to ascertain which aspect these photographs were taken from.

Figure 4.100 Photograph of the experimental plant. The date is catalogued as c1912–1920. Based on the construction timeline of the experimental plant and Staffordshire kiln, it is likely pre-1914. (Source: NLA, Trove, PIC Row 13/8/5 #PIC/P2184/5)

Figure 4.101 Photograph of the experimental plant. This photograph was taken from the same angle as Figure 4.100, but likely shows an earlier stage of the experimental plant. (Source: CDHS, 2295).

Figure 4.102 Photograph of the experimental plant. This photograph is contemporary with Figure 4.100 but was taken from the rear of the plant, in a quarry. This quarry might not be the same as the present quarry. (Source: NLA, Trove, PIC Row 13/8/5 #PIC/P2184/6)

Identifying the experimental plant kilns

Synthesis of the above archaeological observations for clamp, Scotch, and downdraught kilns indicate there are several key features that aid in assisting the identification of different kiln remains found within BRW8 (Table 4.1).

Table 4.1 Archaeological features of clamp, Scotch, and downdraught kilns.

Archaeological feature	Clamp kiln	Scotch kiln	Downdraught kiln
Permanent external walls	No, all walls are temporary	Yes, three permanent walls, one temporary wall	Yes, four permanent walls
Wickets	No, green bricks are used to construct the kiln	No formal wickets, although the temporary fourth wall acts as one	Yes, generally two wickets, one in each short wall
Fireboxes and fireholes	Yes, usually only fireboxes, constructed through the patterning of green bricks	Yes, usually only fireboxes	Yes, both may be present
Paved floor surface	Sometimes, present as remaining in situ fired bricks	No paved floor	Sometimes, present as a partial latticed floor for flue venting
Flues	Sometimes, may be on the floor surface as part of the firebox arrangement, or partially cut into the floor surface	Sometimes, may be on the floor surface as part of the firebox arrangement, or partially cut into the floor surface	Yes, one central subsurface flue, which is sometimes used in conjunction with smaller flue channels projecting into the external walls

In applying this model to the archaeological kiln remains identified in BRW8 (context groups *137, 115, 179, 72,* and *195* and *196*, Figure 4.103), the following conclusions can be drawn.

Kiln A had no evidence of external walls, fireboxes or -holes, or paved floor surfaces (Figure 4.60). It did, however, have five brick channels that may have acted as rudimentary flues. The simplicity of the structure and overall lack of features is consistent with observations made for other clamp kilns. It would have been dismantled following firing to collect the bricks intended for the next kiln. It is unknown where in the timeline this clamp would have

been active. The kiln visible in the foreground of Figure 4.100 had five fireboxes—it is probable that these openings correlated with the channels in Kiln A, and that the low wall height was indicative of the kiln being dismantled following firing.

Kiln B was a more complex structure. It had permanent external walls on its western, northern, and eastern aspects (Figure 4.68). No southern wall or flue channel was identified. The open short wall and lack of flue is indicative of a Scotch kiln. This kiln was likely the left-most kiln visible behind the crushing pan shed in Figure 4.100 and Figure 4.101.

The remains of Kiln C were highly fragmentary (Figure 4.73). A permanent eastern external wall and corresponding alignment of fireboxes were identified, with ephemeral evidence for a western wall present. The lack of flue channel and presumed absence of a permanent short wall on its southern end suggests that the structure was a Scotch kiln. It is likely the second left kiln visible in the background of Figure 4.100 and Figure 4.101.

Kilns D and E present much more complex structures, with multiple phases of use clearly defined.

The first phase of Kiln D included permanent eastern, western, and northern external walls (Figure 4.84). Fireboxes were present in the western wall, and likely had corresponding openings in the eastern wall. The original kiln included a flue channel, which had at least been partially lined with bricks (most likely just within the internal space of the kiln and immediately to the north of it). The presence of a flue channel is strongly indicative of a downdraught kiln structure. These kiln types, however, are not open—all four walls are permanent and the ceiling is enclosed. At some point during the use of Kiln D, the flue channel was dismantled and infilled. This is indicative of the kiln being converted to a Scotch kiln, which would have also required demolishing a short wall and the ceiling. As shown in Figure 4.93, the footprints of Scotch and downdraught kilns are highly similar, and little effort would be required to convert the latter kiln type into an open kiln. Kiln D may have been the central kiln visible with a roof in Figure 4.101 and without a roof in Figure 4.100.

Similar evidence for conversion from downdraught to Scotch kiln was present in Kiln E (Figure 4.92). Western and eastern alignments of fireboxes were identified, which likely formed part of the permanent external walls. No southern or northern walls were present. The central flue channel had also been decommissioned during the use of the kiln, with new floor surfaces overlaid onto the cavity. Several additional structures had been added to the northwestern corner of the kiln, supporting the evidence for ongoing alterations. By dismantling the flue and removing a short wall and ceiling, Kiln E would also have been converted from a downdraught kiln into a Scotch kiln.

The flue channels present in Kilns D and E connected to form a single tunnel north of Kiln E. It is probable that this was done to save effort in the construction of chimneys—by merging the two channels, only one chimney stack was required instead of two. Evidence for a chimney stack was not identified during the excavation.

Collectively, these kilns represent five of the six kilns referred to by Christie in his 1913 descriptions of the experimental plant (Section 2.1) and one additional clamp kiln. The variation of designs present in the structural remains demonstrates that the early Brickworks workers were trialling different construction methods for the kilns, in addition to experimenting with brick form. The workings of the experimental plant are discussed further in Section 5.1.1.

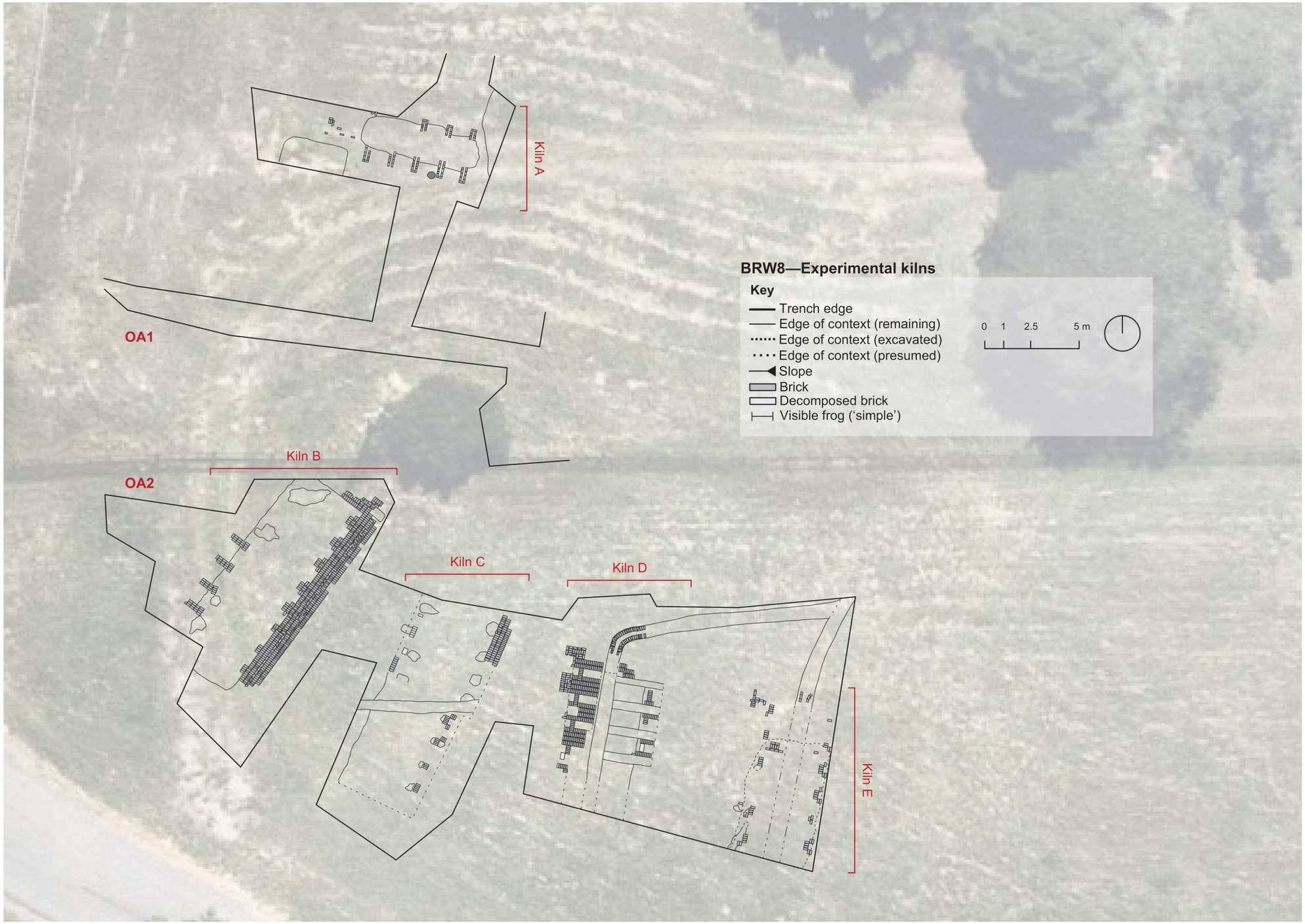


Figure 4.103 The layout of the five kilns identified in the experimental plant, OA1 and 2. (Source: Near Map 2020 with GML additions)

Dormitories and bathhouse

There was limited archaeological evidence for domestic structures within BRW8. The evidence that was identified was constrained to two areas of the site (Figure 4.105):

- southern extent—brick and concrete footings (*124*); and
- northeastern extent—an approximately rectangular area of decomposed mortar (*134*), three aligned postholes (*158* and *159,* 160 and *161*, and *162* and *163*), and a brick box drain (*132*).

There are no known documentary records for the dormitories and bathhouse other than the 1916 contour survey map (Figure 4.104). This map places both the dormitories and bathhouse north of the experimental plant. The two domestic buildings are separated by a 'Brick Drain', which appears as a partially dashed line.

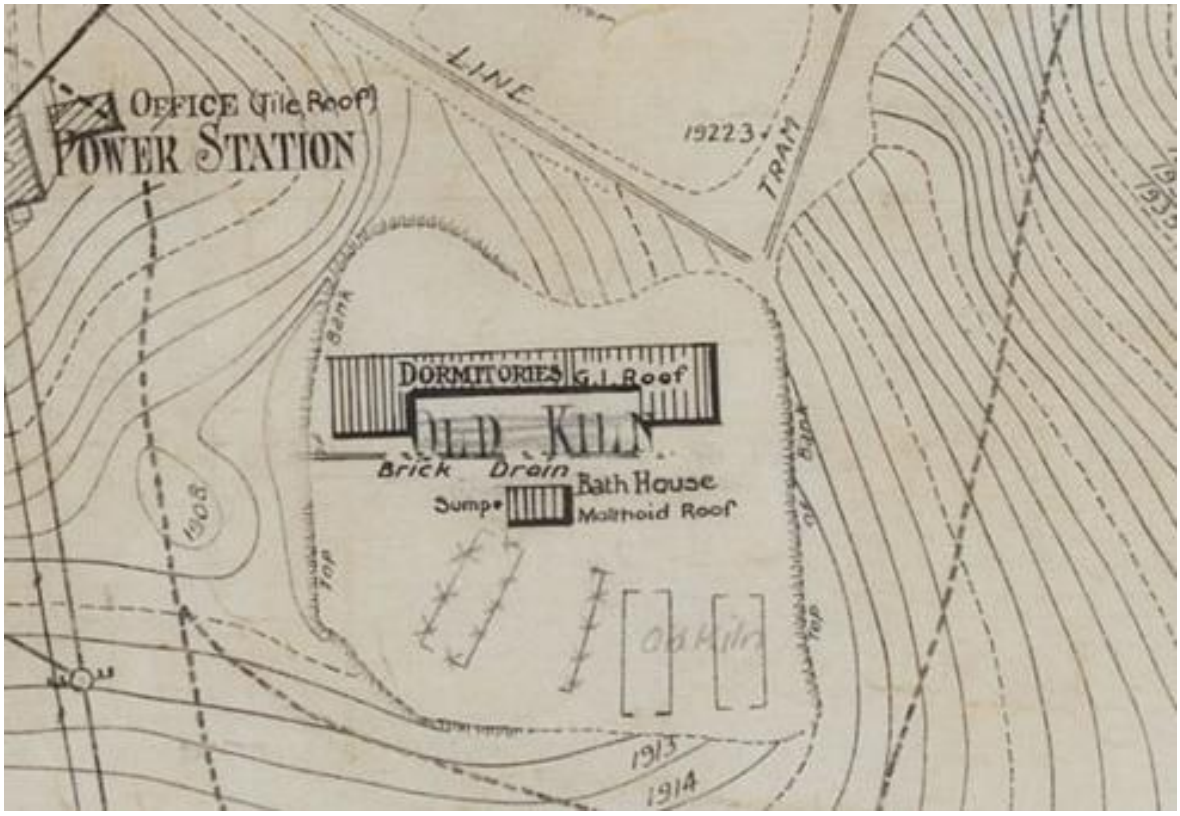


Figure 4.104 Detail from the 'Contour and Detail Survey, Canberra Brick Yards, 20 December 1916'. (Source: NAA A6664, L165A)

The brick and concrete footings correlate with the eastern wall of the bathhouse (Figure 4.50). Due to the location of the mature shrub adjacent to these footings, the internal space of the structure could not be examined.

The footprint of the dormitories in Figure 4.104 is not consistent with the identified archaeological features. The clearest departure from the illustrated layout of the dormitories is the brick box drain (Figure 4.56). Due to its rough construction, it is unlikely the drain was designed to be viewed on the ground surface. As such, it would have been located beneath the dormitories. However, the northwest–southeast orientation of the drain does not align with the west–east placement of the dormitories—this would have resulted in water being channelled from the northern external wall to the southeastern corner and no drainage for the western extent.

This may have been intentional if there was a particular directional drainage issue present on the site when the dormitories were constructed. The drain also would not have interacted with the footings of the dormitories if the above structure was supported on stumps rather than in-ground footings. The alignment of three postholes along the drain, however, is not indicative of a west–east building and suggests a structure on the same orientation as the drain.

No other structural evidence for the dormitories was identified. The lack of building debris (eg brick or timber fragments) within the decomposed mortar would suggest it did not originate during, or as part of, a demolition event. Its location above two postholes does not support this—if the mortar was contemporary with the postholes, it would be expected that the posts would not be covered by it.

It is unknown whether the spoon drain present between the bathhouse and the dormitories was associated with these structures or the earlier kilns (Figure 4.48). Its demarcation as a dashed line in Figure 4.104 may suggest it was partially demolished at the time of drawing, or, alternatively, was simply not drawn in full. The deposition of the c1960s carpark (*41*) directly above the spoon drain may indicate that it remained in use beyond the first phase of the Brickworks, although it is probably more likely that it was re-exposed during the construction of the carpark.

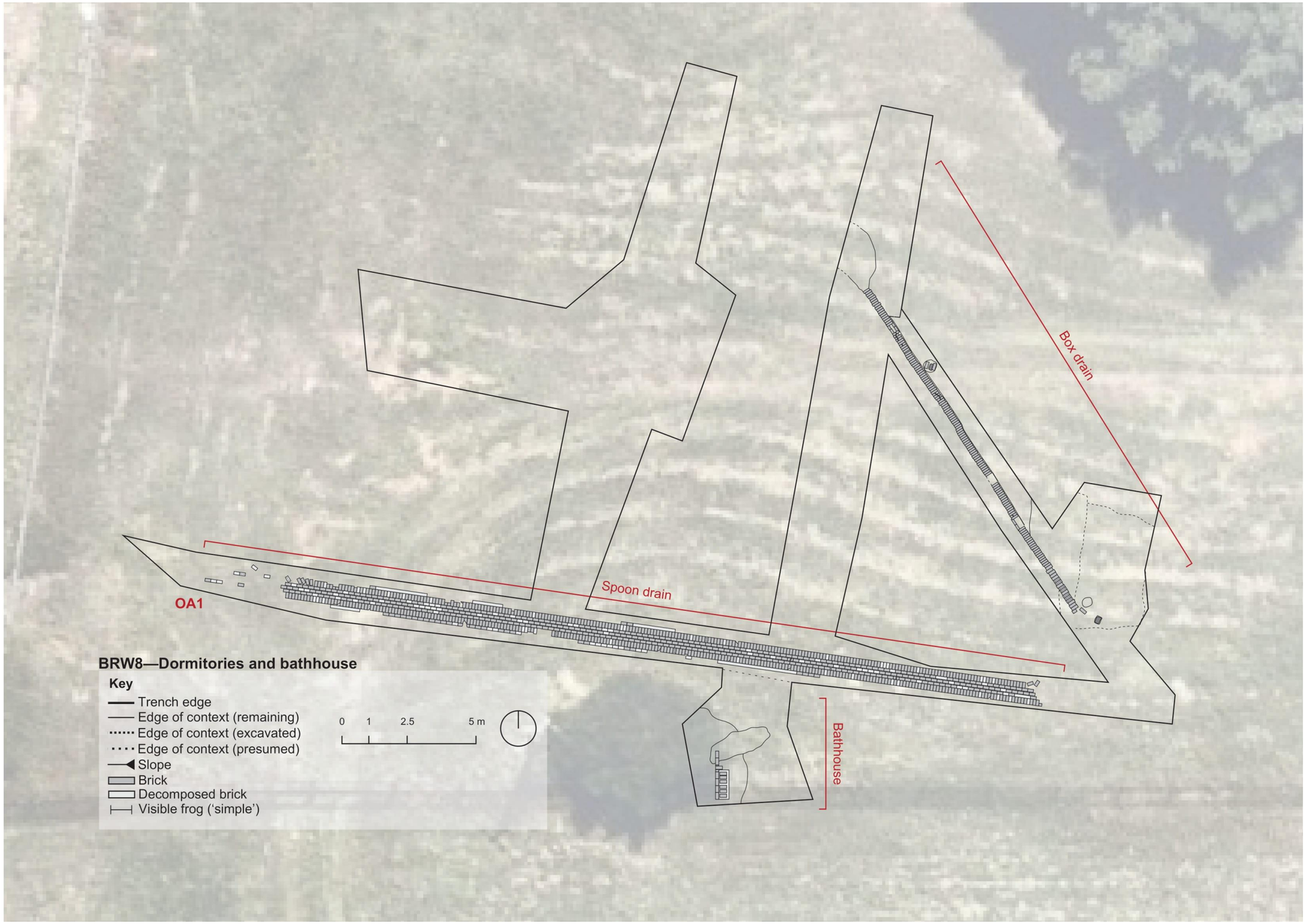


Figure 4.105 Layout of features in the area of the bathhouse and dormitory, OA1. (Source: Near Map 2020 with GML additions)

4.1.5 BRW10—Railway remnants

BRW10 consists of the remnant railway cuttings present in the southwestern extent of the precinct. The AA noted that, whilst the railway structure had likely been completely removed when the Brickworks railway was decommissioned by 1929, there was moderate potential for some materials to remain.[52]

Three TTs (25, 26, and 27) were excavated in BRW10.

TT25 was located in a clearing on an area of level ground (refer to Figure 4.106). Approximately 0.23 metres below the topsoil was a ferrous water pipe (*103*) aligned north–south. An isolated deposit of loosely compacted brownish grey sandy silt with brick rubble (*106*) had partially been cut by the insertion of the water pipe.

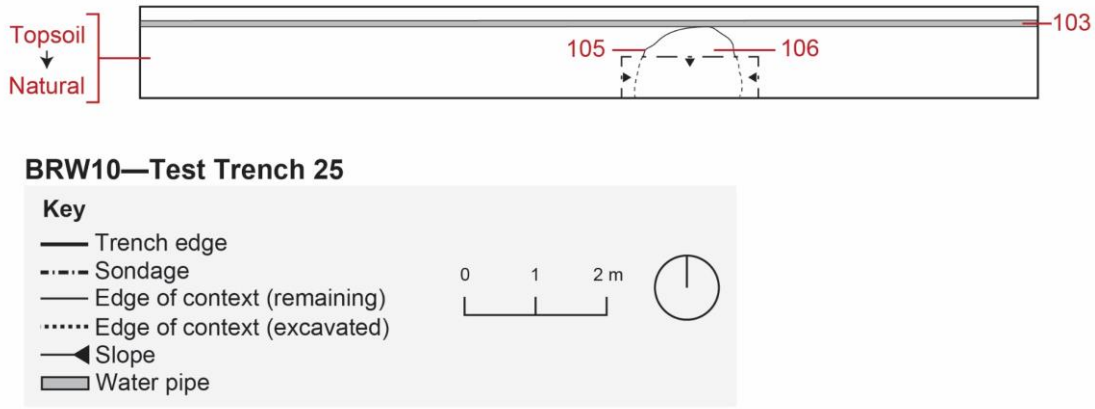


Figure 4.106 TT25.

TT26 and 27 were positioned to capture the cross section of two of the extant railway cuttings (refer to Figure 4.109 and Figure 4.110). Each TT was situated within one of the remnant cuttings and partially overlapped the central embankment. These cuttings were densely overgrown with self-seeded mature trees and low shrubs.

The excavation of the railway cuttings during the construction of the railway had removed the upper natural soil profiles, which had subsequently been deposited on the embankment between the two cuttings. A portion of stacked natural shale rubble was visible in the profile of TT27 (Figure 4.107).

A deposit of 22 steel railway joint bars was identified in TT26 (Figure 4.108, Section 4.2.3). The joint bars had been dumped adjacent to the eastern side of the cutting. Bolts, other railway track components, or archaeological deposits associated with the presence of the railway were not found.

Figure 4.107 Central embankment between TT26 and TT27, aspect east.

Figure 4.108 TT26, in situ deposit of railway joint bars.

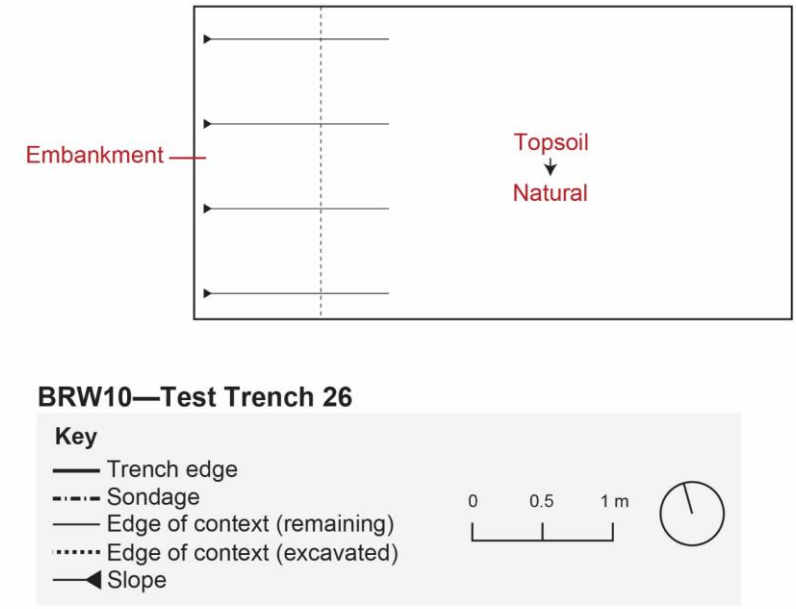


Figure 4.109 TT26.

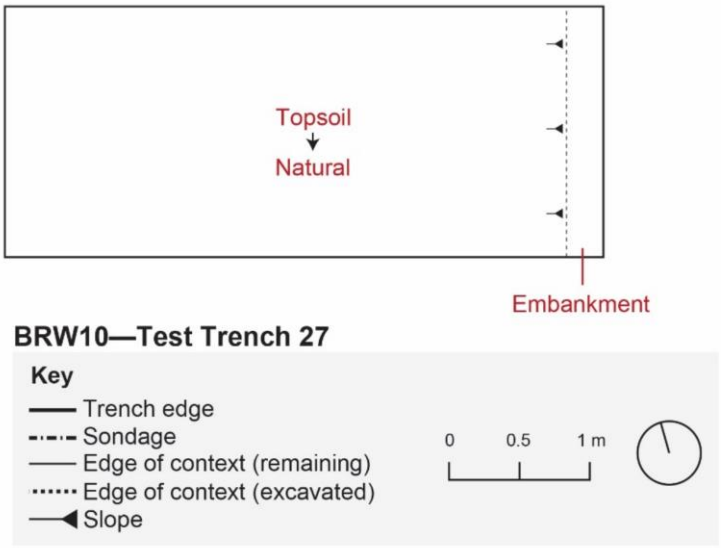


Figure 4.110 TT27.

4.1.6 BRW11—Railway siding extension

BRW11 consists of the northeastern extent of the Brickworks railway, where it extended into the Precinct and terminated adjacent to the Staffordshire Kiln. In c1971 this area was covered by a concrete slab for the extrusion plant, however, the AA noted that there was some potential for railway infrastructure to still be present.[53]

Contamination and geotechnical investigations within BRW11 were undertaken by Agon Environmental on 25 February 2021. These works were monitored by GML for impact to any unidentified archaeological features. The results of the archaeological observations made during the works are included in Appendix E. Overall, BRW11 was characterised by a high degree of contaminated soils and isolated deposits of asbestos material. No evidence of railway infrastructure was identified.

Four TTs (3, 4, 5, and 6) were excavated in BRW11.

TT3 comprised extensions to the west and south from the sunken footings (*18*) for absent machinery (refer to Figure 4.114). The footings consisted of three 'basins' constructed from cast concrete (Figure 4.111). The total structure measured 5.15 metres long x 3.25 metres wide (tapering to 1.4 metres wide at the base) x 0.5 metres deep. On the tops of the walls dividing each basin were two iron bolts for securing machinery in place. The western and central basins were filled with a friable bluish grey clay with a high proportion of shale fragments (*21*). The eastern basin contained an iron frame and pipe fitting embedded in a very compact light bluish grey sandy clay (*23*), which overlaid a moderately compact mid greenish grey clay (*24*) (Figure 4.112).

West of the sunken footings (*18*) was characterised by a vertical cut roughly delineated with amorphous cast in place concrete (*8*). The fill (7) for the cut comprised friable dark brown sandy clay with mixed rubble, charcoal, and timber fragment inclusions (Section 4.2). South of the sunken footings (*18*), a sondage identified a sloping cut (*16*) with three fills (*13*, *14*, and *15*). No artefacts were associated with any of these deposits. Adjacent to the external wall of the sunken footings (*18*) were three unbonded, unorganised 'CB' frogged bricks (*19*) (Figure 4.113). It was unclear whether these bricks were within the cut for the sunken footings (*20*) or the southern cut (*16*). The far western and southern extents of the two extensions consisted of *12*, a very compact mid yellowish brown sandy clay.

Figure 4.111 TT3, the sunken footings (*18*), aspect east.

Figure 4.112 TT3, eastern basin of the sunken footings (*18*) showing the compact clay fills (*23* and *24*), aspect east.

Figure 4.113 TT3, the stack of unbonded bricks (*19*) abutting the external wall of the sunken footings (*18*), aspect north.

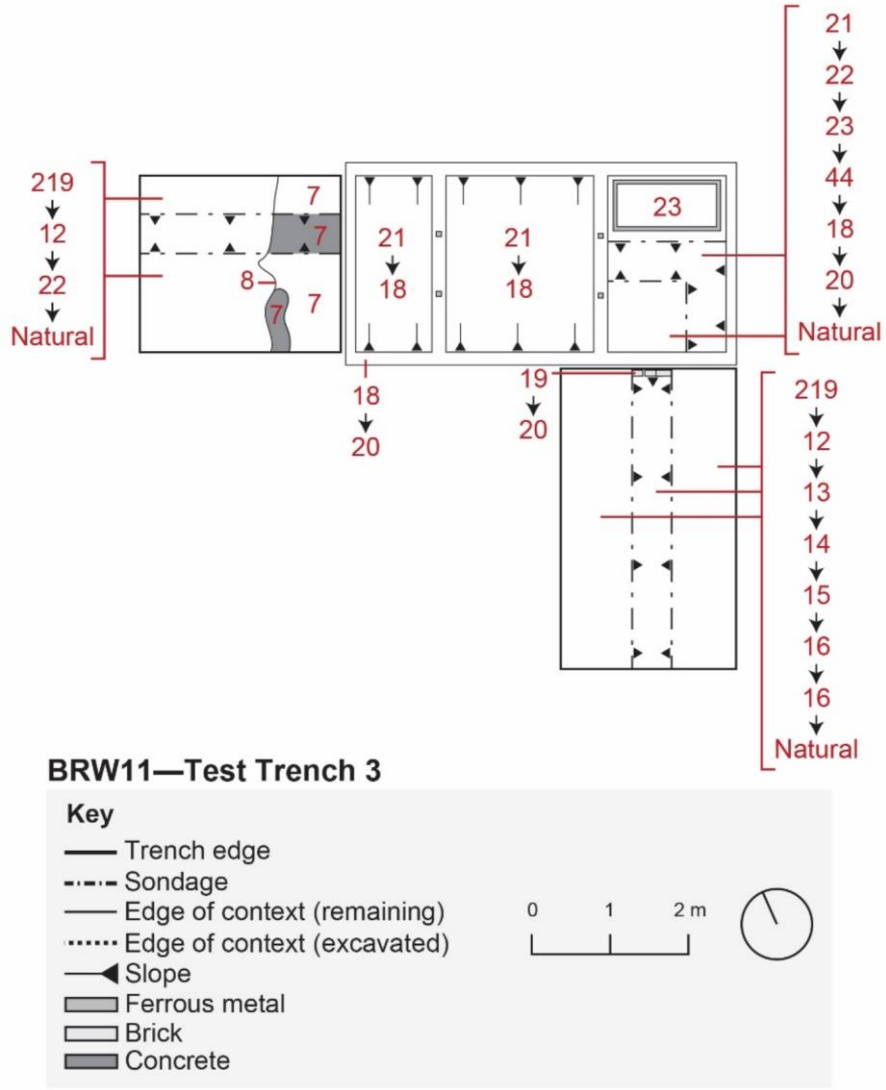


Figure 4.114 TT3.

TT4 was positioned at the far western extent of the concrete slab (*219*), partially within the footprint of the extrusion plant and partially within the adjacent grassed area. The stratigraphic matrix beneath the concrete slab (*219*) was consistent with the observations made during the geotechnical investigations—beneath was a levelling deposit of loosely compact gravel (*27*) and mid yellowish brown to brownish yellow sandy clay with brick rubble (*26*), which overlaid an oil-stained natural clay (Figure 4.115). Adjacent to the concrete slab (*219*) within the brownfield was a friable mottled brown silty sand (*25*) that contained a high proportion of worked and waste timber pieces and iron nails (Section 4.2).

Figure 4.115 TT4, oil-stained natural beneath the levelling gravel deposit (*27*) and clay with brick rubble (*26*), aspect south.

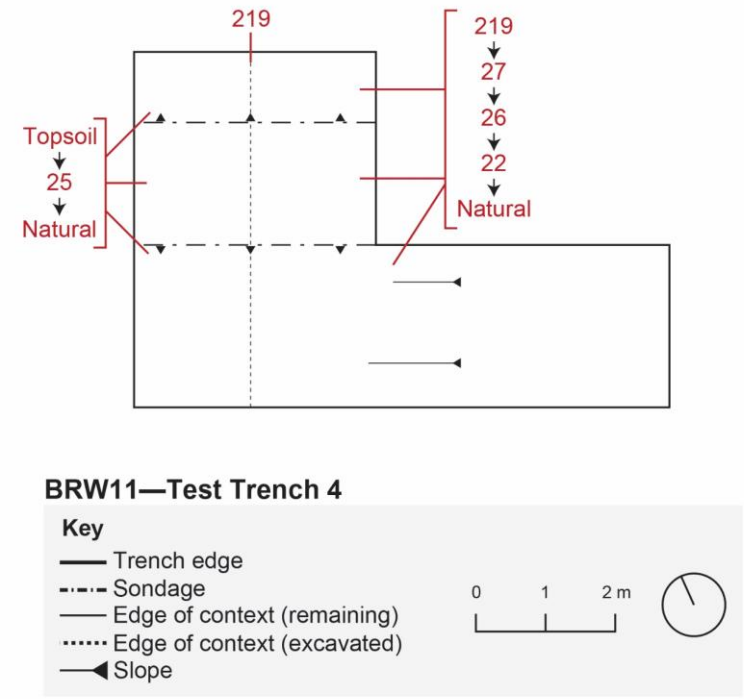


Figure 4.116 TT4.

TT5 and 6 were located entirely beneath the concrete slab (*219*) for the extrusion plant (refer to Figure 4.117 and Figure 4.118). They were characterised by a widespread cut (*22*) that had been used to level the area prior to the deposition of the concrete slab (*219*). The cut had been partially filled with a compact mid greyish brown clay (*17*), which contained isolated lenses of brown sand and brick rubble throughout.

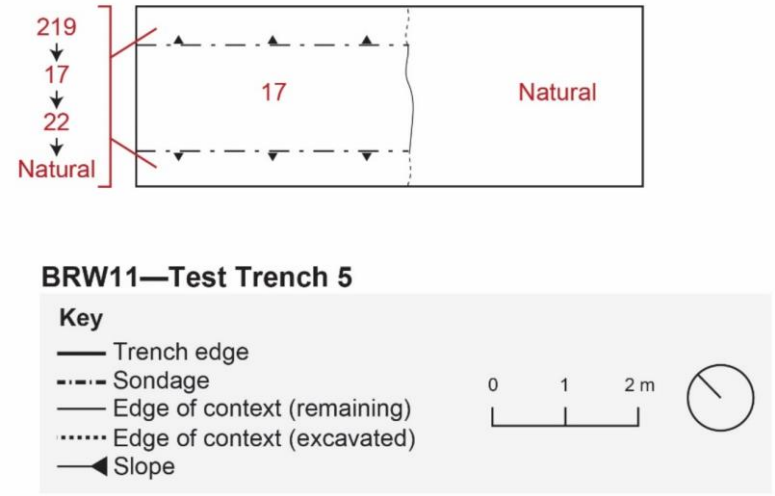


Figure 4.117 TT5.

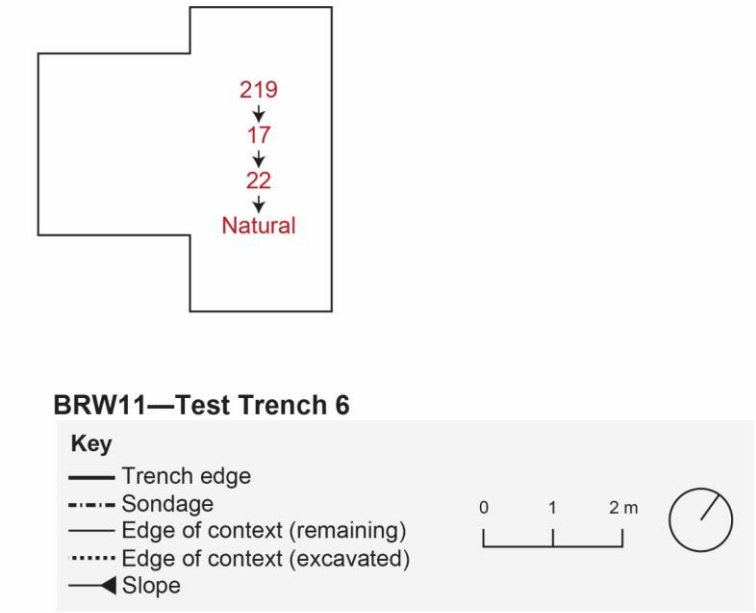


Figure 4.118 TT6.

4.1.7 BRW12—Flues and subsurface workings

There are four extant kilns in the Canberra Brickworks Precinct:

- Staffordshire Kiln and associated fan house and chimney, 1916;
- Hardy Patent Kiln 1 and associated fan houses and chimney, 1927 rebuilt c1955;
- Hardy Patent Kiln 2 and associated chimney, c1954; and
- Downdraught Kilns (consisting of three separate kiln structures) and associated chimney, c1960.

Each of the kilns is serviced by an arrangement of subsurface flues (Figure 4.3). These flues assisted in drawing hot air out of the kiln spaces and allowed for better temperature control during the firing process.

Staffordshire Kiln

The Staffordshire Kiln comprises a two storey structure, with 20 individual kiln chambers on the ground level and a firing floor above (see GML 2021 CMP for a full description of the kiln). Ventilation of the kiln is assisted by a single fan house and chimney, located 20 metres west of the kiln structure.

The subsurface flue for the kiln consists of one central tunnel, 60 metres long x 1.5 metres wide x 1.2 metres high (Figure 4.119). The rear wall of the tunnel—set in a modified English bond—has not been keyed into the domed ceiling and walls, suggesting it was constructed as a free-standing wall before the adjoining tunnel was built. The floor of the tunnel is approximately 1.8 metres below the ground surface. 20 smaller flue channels branch off the central tunnel, each one leading to an individual kiln chamber. These begin at 25.4 metres east of the fan house and are regularly spaced at 3.5 metre intervals (Figure 4.124). The channels on the northern side of the central tunnel are staggered from the southern side, resulting in alternating channel spacing. The entrance to each channel is approximately 0.8 metres high (exclusive of sediment build up) x 0.62 metres wide (Figure 4.120). The channels extend 9.5 metres from the central tunnel, before turning at a right angle and ascending to two openings within each kiln chamber—one in the floor surface within the wicket and one in the external wall adjacent to the wicket (Figure 4.121).

There is a single service hole for accessing the flues from the ground surface, which is located 3.1 metres west of the kiln structure. The service hole measures 0.6 metres x 0.8 metres wide. The channel leading to the service hole from the central flue tunnel is 1.4 metres long. The only other openings into the flue are located in the fan house. The floor of the central tunnel steps up divides in two to enter the fan machinery, where the tunnel then reconverges to direct air towards the chimney (Figure 4.122 and Figure 4.123).

The entire structure appears to have been constructed from 'simple' frog bricks. It is generally in good condition, with no vandalism and little visible deterioration of the bricks or structural condition.


Figure 4.119 The central tunnel and rear wall, aspect southeast. Entrances to the smaller flue channels are visible in each wall of the tunnel.

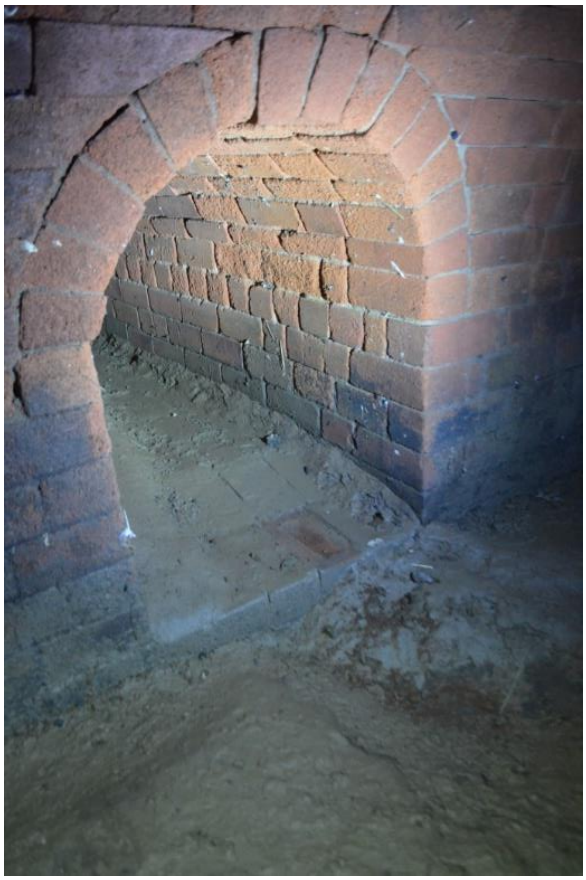



Figure 4.120 One of the smaller flue channels leading off the central tunnel.

Figure 4.121 Each smaller flue channel leads to an individual kiln chamber, where it meets the surface in two locations—one in the floor surface within the wicket (front left, visible adjacent to internal wall) and one in the external wall adjacent to the wicket (right, visible as arched opening).

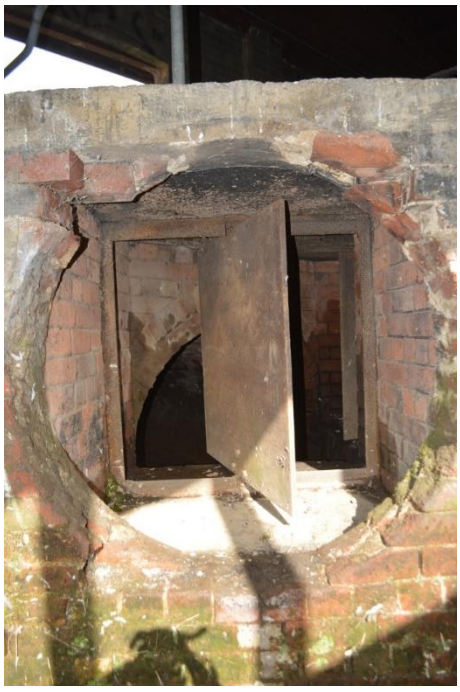


Figure 4.122 Entrance to the central tunnel via the fan house where the fan machinery has been removed.

Figure 4.123 Split in the central tunnel where it funnels air through the fan machinery towards the chimney.

Figure 4.124 The subsurface flues for the Staffordshire Kiln.

Hardy Patent Kiln 1

The Hardy Patent Kiln 1 comprises a two storey structure, with two long chambers running through the centre of the kiln and a firing floor above (see GML 2021 CMP for a full description of the kiln). Ventilation of the kiln is assisted by a two fan houses and a chimney, located 18 metres west of the kiln structure.

The flues could not be physically accessed. This was due to intact fan machinery still being present within the fan houses and no service hole on the ground surface. A combination of ground penetrating radar (GPR) and hydro excavation was used to identify the likely arrangement of the subsurface flues.

GPR identified a single tunnel leading east from the fan houses to the kiln, aligned along the southern wall of the kiln (Figure 4.125). This tunnel turns north to enter the kiln space approximately 45 metres from the fan houses, coinciding with the 'Kent' oxygen analyser mounted on the external wall (Figure 4.125). Readings from the internal space indicated that two flue tunnels are aligned through the centre of each chamber. These presumably connect to eight smaller flue channels (four in each chamber), identified by the downwards shaft in the firehole (Figure 4.130).

Results from the hydro excavation predominantly supported the observations made through GPR, although indications of considerable alteration to the subsurface flues were identified.

Externally, the single tunnel leading from the fan houses to the kiln was corroborated. However, this appeared in two different forms. Two hydro excavation potholes—1.8 metres and 11.2 metres west of the fan houses—revealed a rectangular cast concrete structure (Figure 4.126). Between these, a third pothole identified a partial brick arch and significant brick rubble collapse (Figure 4.127). This arch had been constructed predominantly from 'CANBERRA C'WEALTH' frog bricks, which included a single bullnose brick.

Within the internal space of the kiln, hydro excavation indicated that further alterations had been made to the original flue layout. A pothole excavated in the western passage between the two kiln chambers revealed a quantity of brick rubble embedded in the stratigraphy beneath the floor surface (Figure 4.128). No concrete flue channels were identified within the kilns—all other identified intact flues were constructed from brick (Figure 4.129).

Figure 4.125 GPR identified a single tunnel leading from the fan houses to the kiln, which enters the kiln at the location of the 'Kent' oxygen analyser.

Figure 4.126 Part of the central concrete flue leading from the fan houses.

Figure 4.127 Part of a damaged remnant brick flue.

Figure 4.128 Brick rubble embedded beneath the floor surface in the western passage between the two kiln chambers.

Figure 4.129 An intact brick flue.

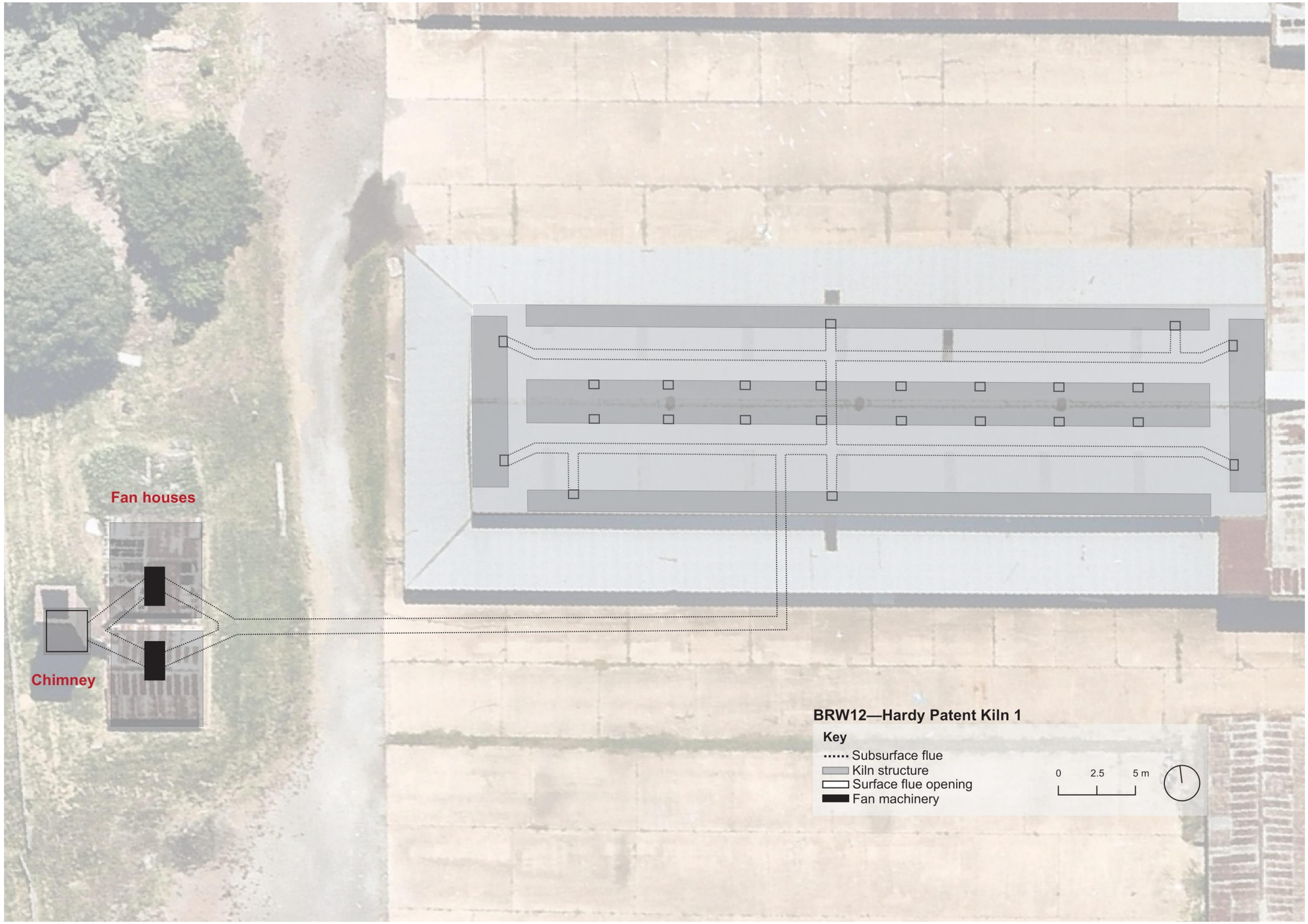


Figure 4.130 The subsurface flues for the Hardy Patent Kiln 1.

Hardy Patent Kiln 2

The Hardy Patent Kiln 2 is constructed in the same style as the Hardy Patent 1 Kiln (see GML 2021 CMP for a full description of the kiln). Ventilation of the kiln is assisted by a single chimney, located 12.5 metres north of the kiln structure.

The flues could not be physically accessed. This was due to both channels leading from the chimney and the chimney feeder being blocked with steel dampers (Figure 4.131). GPR and hydro excavation were used to identify the likely arrangement of the subsurface flues.

GPR readings indicated an almost identical layout to that in Hardy Patent Kiln 1, with two tunnels aligned through the centre of each kiln chamber. However, the arrangement in Hardy Patent Kiln 2 differs in two places. Lacking a return wall at the western end of the kiln (comprising instead of two wickets), the flue openings within the kiln are located in the north and south walls and connected by a channel that crosses through the western passage between the two kiln chambers (Figure 4.135). The other departure from the configuration used in the Hardy Patent Kiln 1 is the apparent presence of two tunnels leading from the kiln to the chimney. Although both tunnels are parallel and aligned directly to the chimney, one is located slightly to the south and appears to divert air through a duct for (now absent) fan machinery before it exits the chimney (Figure 4.135).

Hydro excavation in the southern kiln chamber indicated the Hardy Patent Kiln 2 flues had undergone a similar level of disturbance observed in Hardy Patent Kiln 1. The majority of the hydro excavation potholes revealed collapsed rubble, with only one intact brick arched tunnel located (Figure 4.132 and Figure 4.133). Brick rubble was also found in many of the flue channels within the internal walls of the kiln (Figure 4.134).

Figure 4.131 Steel dampeners blocked the flue tunnels from the chimney (left) and adjacent tunnel (right).

Figure 4.132 Brick rubble embedded beneath the floor surface in the southern kiln chamber.

Figure 4.133 An intact brick flue.

Figure 4.134 Brick rubble in the downwards shaft of a flue channel in the internal wall of the southern kiln chamber.

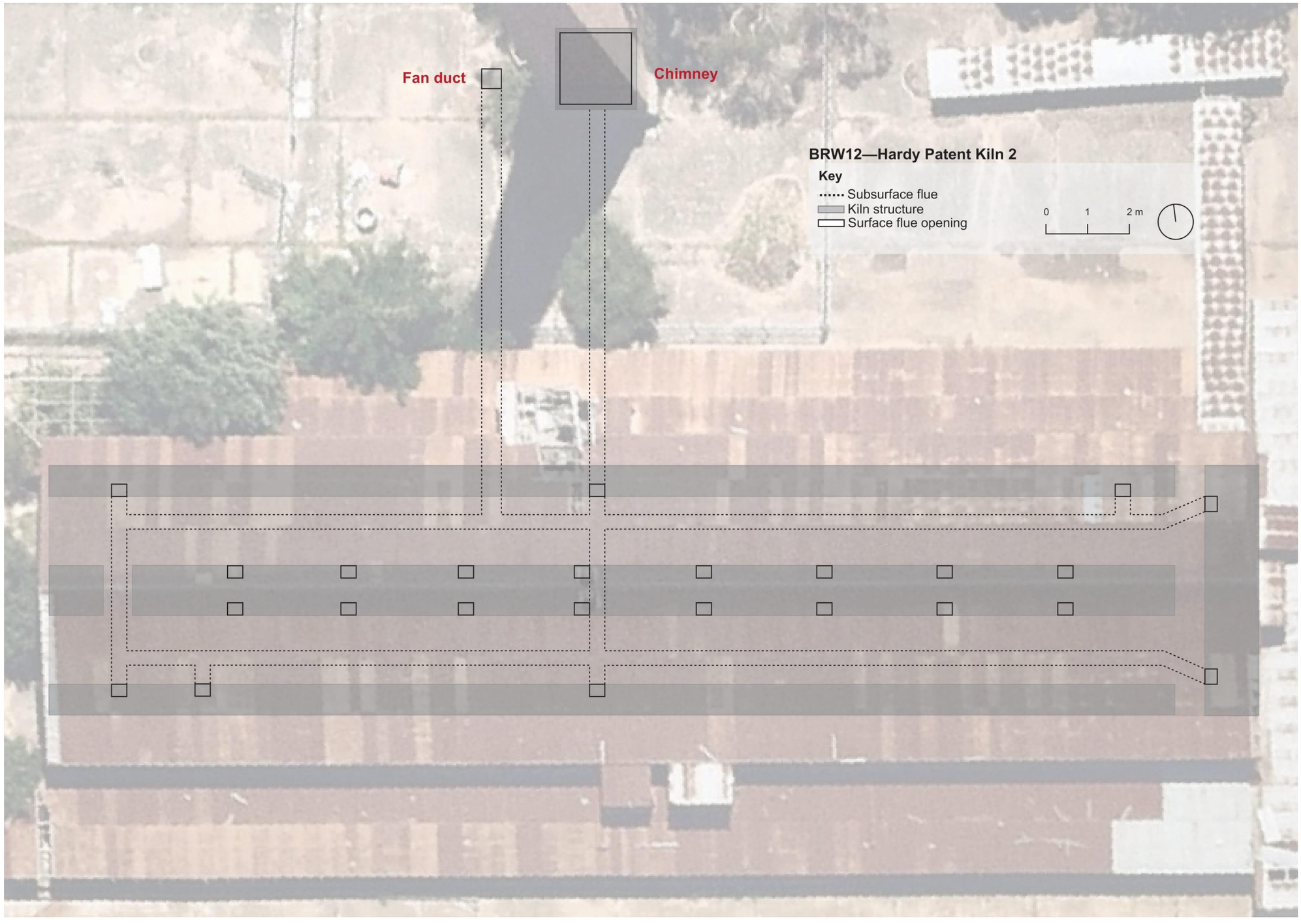


Figure 4.135 The subsurface flues for the Hardy Patent Kiln 2.

Downdraught Kilns

There are three Downdraught Kilns present in the precinct. Each kiln is a single storey, single chamber structure (see GML 2021 CMP for a full description of the kilns). Ventilation of the kilns is assisted by a fan house (since removed) and a chimney, located 24 metres south of the kilns.

The subsurface flue for the kilns comprises a series of tunnels. The central tunnel leading from the fan machinery duct is 15 metres long x 1.4 metres wide x 2.2 metres high (Figure 4.136). The floor of the tunnel is approximately 3.3 metres below the ground surface. At the northern end of the tunnel, four smaller tunnels branch off, two to the west (A and B) and two to the east (C and D) (Figure 4.136 and Figure 4.142).

The openings to the two northern-most side tunnels (B and C) measure 1.2 metres high x 0.67 metres wide and step up 0.74 metres from the floor of the central tunnel (Figure 4.137). Both tunnels service the central Downdraught Kiln, and are located either side of the external walls (Figure 4.137). Each tunnel has three clear segments, measuring:

- Tunnel B—Total length 33.7 metres (consisting of 5.2 metres + 3.9 metres + 24.6 metres).
- Tunnel C—Total length 32.3 metres (consisting of 6.1 metres + 2.9 metres + 23.3 metres).

The openings to the southern-most side tunnels (A and D) measure 1.7 metres high x 0.76 metres wide and step up 0.16 metres from the floor of the central tunnel (Figure 4.138). These tunnels service the western and eastern Downdraught Kilns, and split into two further passages located either side of the external walls (Figure 4.138). These measure:

- Western Downdraught Kiln:
  - Tunnel A1—Total length 49.5 metres (consisting of 20.6 metres + 4.4 metres + 24.5 metres). At the division of A1 and A2, A1 decreases in size to measure 1.28 metres high x 0.76 metres wide and steps up 0.57 metres from the floor. An inclined slope is present in the north–south portion of the tunnel.
  - Tunnel A2—Total length 30.6 metres (consisting of 5.6 metres +25 metres). It branches from A1 at 5.7 metres west of the opening, and decreases in size to match A1. An inclined slope is present in the north–south portion of the tunnel.
- Eastern Downdraught Kiln:
  - Tunnel D1—Total length 47.8 metres (consisting of 20.8 metres + 4.8 metres + 22.2 metres). At the division of D1 and D2, D1 decreases in size to measure 1.28 metres high x 0.76 metres wide and steps up 0.57 metres from the floor. An inclined slope is present in the north–south portion of the tunnel.

- Tunnel D2—Total length 32.2 metres (consisting of 5.6 metres + 26.6 metres). It branches from D1 at 5.7 metres east of the opening, and decreases in size to match D1. An inclined slope is present in the north–south portion of the tunnel.

The subsurface flues have several openings on the surface. These include several vents along the length of each flue and connections into the flue channels located within the external walls of each kiln (Figure 4.139).

Two vents are present along each external side of each Downdraught Kiln. The southern-most vents are aligned with the southern wickets of each kiln (Figure 4.139). These measure:

- A1—0.91 metres long x 0.3 metres wide, 1.35 metres west of the external kiln wall.
- A2—0.91 metres long x 0.34 metres wide, 1.4 metres east of the external kiln wall.
- B—0.91 metres long x 0.32 metres wide, 1.4 metres east of the external kiln wall.
- C—0.83 metres long x 0.35 metres wide, 1.4 metres west of the external kiln wall.
- D1—0.83 metres long x 0.34 metres wide, 1.4 metres west of the external kiln wall.
- D2—Obscured by modern concrete deposit.

The positioning of the northern-most vents differs, although they are generally towards the northern extent of each kiln. These measure:

- A1—0.77 metres long x 0.77 metres wide, 1.42 metres west of the external kiln wall, 1.88 metres south of the northern wicket.
- A2—0.79 metres long x 0.75 metres wide, 1.39 metres east of the external kiln wall, 3.9 metres south of the northern wicket.
- B—0.77 metres long x 0.77 metres wide, 1.39 metres west of the external kiln wall, 1.8 metres south of the northern wicket.
- C—0.77 metres long x 0.77 metres wide, 1.4 metres east of the external kiln wall, 3.9 metres south of the northern wicket.
- D1—0.77 metres long x 0.77 metres wide, 1.32 metres west of the external kiln wall, 11.2 metres south of the northern wicket.
- D2—0.77 metres long x 0.77 metres wide, 1.47 metres east of the external kiln wall, 3.3 metres south of the northern wicket.

Each Downdraught kiln has 10 fireholes on each long wall (Figure 4.140). The fireholes are regularly spaced at approximately 2.1 metres apart. Four fireholes out of each set also act as flue channels that connect to the subsurface tunnels. These are indicated by the presence of steel dampers.

The overall condition of the flues is poor. The central tunnel is prone to flooding during rain events, which had led to the entire structure being subject to damp. This has resulted in extensive salt damage to the eastern tunnels and cracking in the brickwork throughout

(Figure 4.136 and Figure 4.141). However, there is little evidence of vandalism; the accumulated rubbish in the side tunnels has predominantly been dropped through the surface vents.

The extent of deterioration and combination of brickwork used in the flues obscures the identification of construction or design choices, or different phases of repair. Several different types of brick appear to have been used throughout the structure, including red bricks (presumably made on site, although no frogs were observed) and fire bricks. Cream or white-painted bricks were also keyed into the tunnel openings, creating a quoin-like appearance (Figure 4.136). In the domed ceilings of the side tunnels, irregular striations of different coloured brick are present (Figure 4.137 and Figure 4.138). Additionally, there are distinct changes in the brick appearance in certain parts of the tunnel walls. The inconsistency of the patterning cannot be explained by differential heat damage or by deliberate design choice.

It is possible that isolated parts of the brick bond had to be replaced due to deterioration, however, the short period in time between the completion of the Downdraught Kilns and the closure of the Precinct would suggest there was too little time for complete repairs to be required.

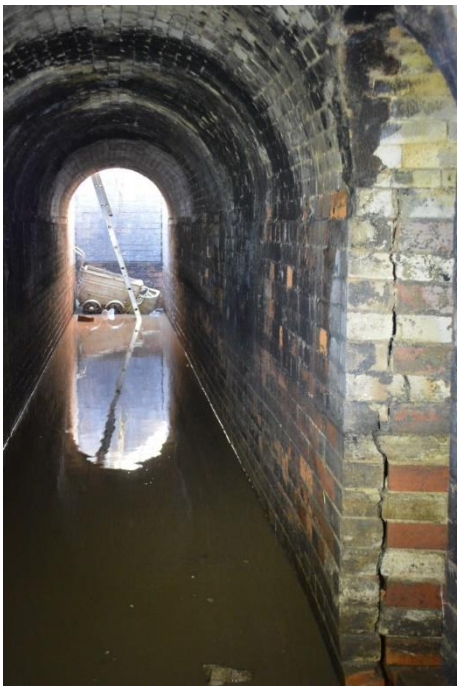
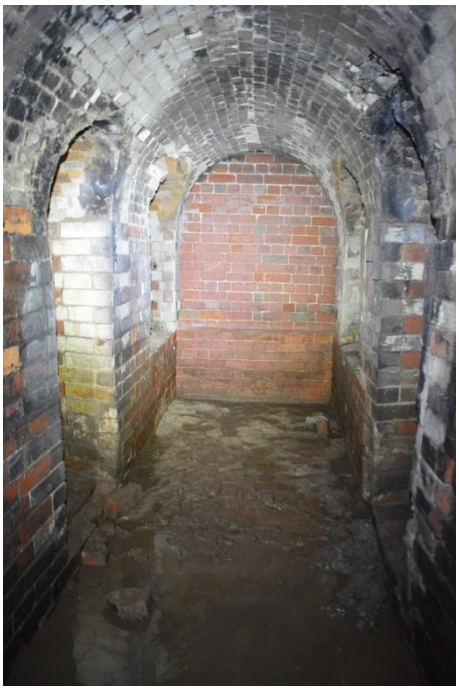



Figure 4.136 Right: the central tunnel, aspect south towards the entrance of the fan duct. Left: the rear wall of the central tunnel, with the four branching side tunnels: A (left foreground), B (left background), C (right background), and D (right foreground).


Figure 4.137 Left: the entrance to Tunnel B from the central tunnel. Right: the inclined slope in the north–south portion of Tunnel C, showing the rear wall of the flue where it exits at the northern-most vent adjacent to the northern wicket of the central Downdraught Kiln. *Note: the B and C tunnels are mirrored, so these characteristics are present in both tunnels.*

Figure 4.138 Top left: Tunnel A from the entrance in the central tunnel, the step up into A1 visible in the background. Top right: the split between Tunnels D1 (right) and D2 (left). Bottom left: the bend in Tunnel A2 as it heads north towards the western Downdraught Kiln. Bottom right: the slope upwards in Tunnel D1 in the north-south alignment. The light in the background is from the vent adjacent to the southern wicket. *Note: the A and D tunnels are mirrored, so these characteristics are present in both tunnels.*

Figure 4.139 Top: western side of the western Downdraught Kiln, showing the southern vent aligned with the wicket. Bottom left: view down the southern vent aligned to the eastern side of the western Downdraught Kiln. Bottom right: northern vent aligned to the western side of the eastern Downdraught Kiln.

Figure 4.140 Two fireholes in the western side of the western Downdraught Kiln. The left firehole is connected to the subsurface flues, as indicated by the steel damper, whilst the right firehole leads directly to the internal kiln space.

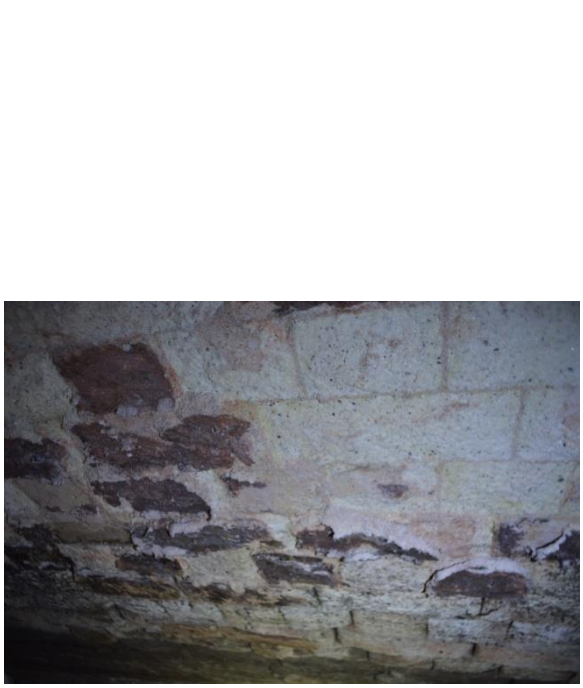


Figure 4.141 Damp conditions have resulted in extensive salt damage and cracking in the brickwork (see also Figure 4.136).

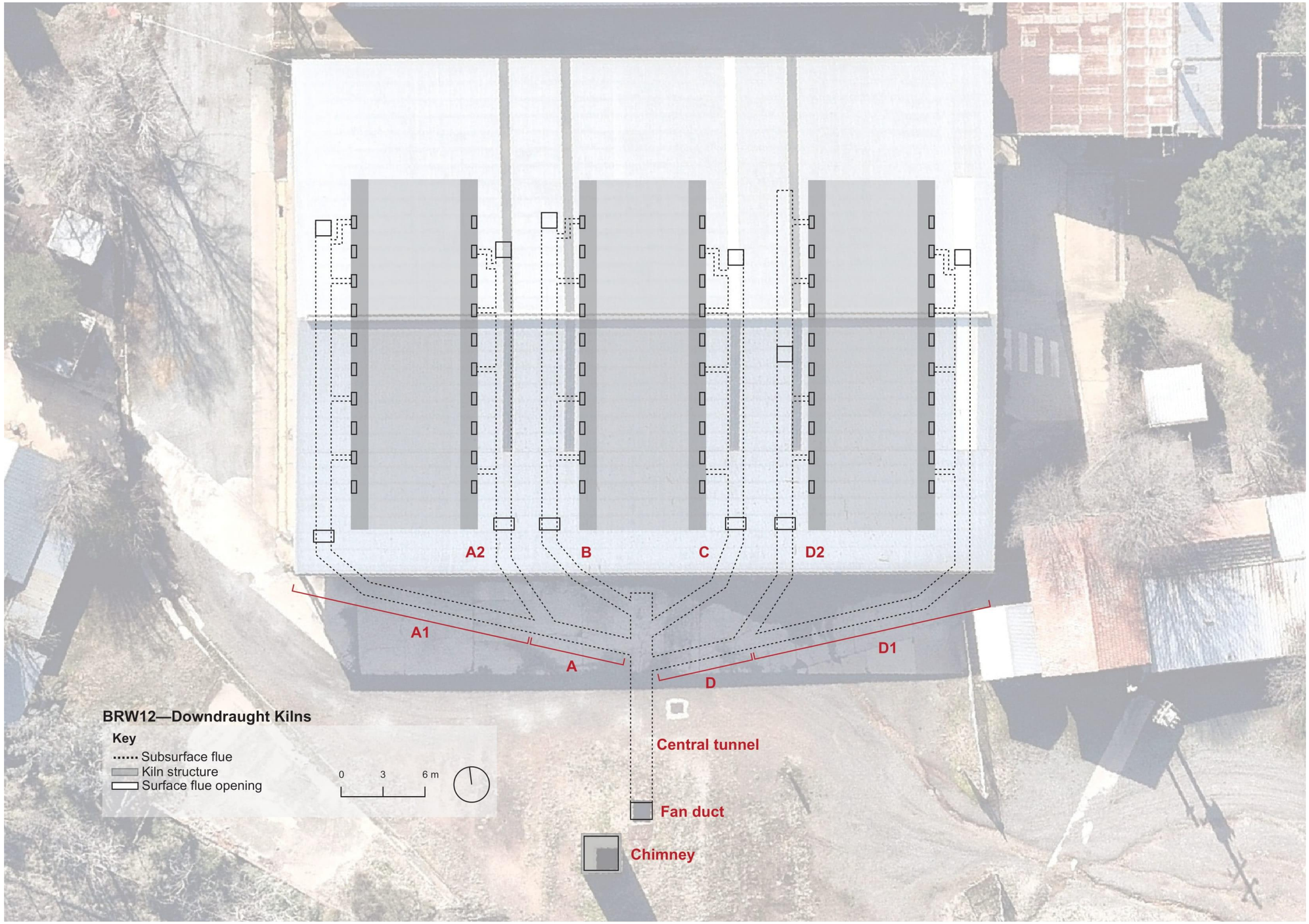


Figure 4.142 The subsurface flues for the Downdraught Kilns.

4.2 Artefacts

The final artefact assemblage recovered during the archaeological investigations comprised of 231 catalogue entries, which included both individual artefacts and typological groups recovered from the same archaeological context. These artefacts had been collected from 38 contexts, the majority of which were demolition or general rubbish deposits, characteristic of the widespread movement of debris around the site.

The catalogue entries were dominated by metal artefacts (29.9 per cent) and building materials (29.4 per cent). This was followed by glass (17.7 per cent). Smaller numbers of ceramic (7.4 per cent), plastic items (5.2 per cent), and faunal remains (5.2 per cent) and other organic materials (4.8 per cent) were also recorded. When assessed for their function, the catalogue entries predominantly related to subsistence (22.1 per cent) (eg beverage bottles and butchered faunal remains), and industrial purposes (13 per cent) and building materials (11.7 per cent) (eg machinery parts, timber pieces, and nails). Few entries were associated with personal items (4.3 per cent).

4.2.1 Building materials

Brick—either whole, rubble, or crushed—was encountered in approximately 40 per cent of recorded archaeological deposits and fills. It was also found in a number of instances to be pressed into natural soil horizons.

Nine frog and maker's mark variations were identified in the collected brick samples (Table 4.2, Figure 4.143 to Figure 4.145).

Seven of these variations were known to be produced at the Brickworks during its numerous stages of operations (Figure 4.143). The earliest frog was 'simple'. Bricks with this frog had been used to construct the Staffordshire Kiln and the five kilns identified as part of the experimental plant (Section 4.1.4). Limited examples of the frog were also identified in other contexts across the complex, although these consisted largely of demolition rubble. As such, they were likely solely produced by the experimental plant during its operational years. When the Precinct reopened in 1921, two new frogs—'CANBERRA C'WEALTH' and 'C'WEALTH CANBERRA'—were used. In the early 1930s the 'C'WEALTH' component of the frog was removed, resulting in a simple 'CANBERRA' stamp. This was then produced until the closure of the Brickworks in 1942. Following the reopening of the Precinct in 1944, the frog was further simplified to 'CB'—presumably standing for 'Canberra Brickworks'—which was then produced until its final closure in 1976. At some point during this final phase, an air brick was also produced. Two variations of a 'blank' frog and an unfrogged brick were also identified. These bricks could not be definitively attributed to a phase of operation.

In addition to these bricks, two additional maker's marks were found (Figure 4.145). This included a firebrick imprinted with a 'W'. Firebricks were not manufactured at the Brickworks and were only imported for the construction of select kilns. The only kilns on the site that have firebricks are the Downdraught Kilns. The firebricks identified in the Downdraught Kilns flues, however, are imprinted with 'IFD'. It is unknown which phase of kiln construction the 'W' firebrick was intended for. A cream common brick with a stylised 'E' or '3' stamp was also located. The manufacturing origins of this brick are unknown. The Brickworks produced limited numbers of cream coloured bricks from c1930s to c1966, however, no definite examples of these bricks were identified during the archaeological investigations. If the cream brick was manufactured at the Precinct, it would be expected it would share one of the standard frogs used for the red bricks (Figure 4.143). The presence of a different frog suggests that it was produced at a facility elsewhere.

In addition to bricks, several other building material forms were recovered (Figure 4.145). This included fragments of three different types of roof tiles. Two of the roof tile types were likely manufactured at the Brickworks—both were low profile interlocking tiles, likely of the 'Marseilles' design. The fragments recovered showed that one type had been frogged with 'C'WEALTH' while the other had been imprinted with 'AUSTRALIA'. The 'C'WEALTH' roof tiles were likely produced in the 1920s with the corresponding brick frog, although it is unknown when the 'AUSTRALIA' roof tiles were produced. The third roof tile was a green painted concrete variety imprinted with 'M'. In addition to the roof tiles, a paver manufactured at the Brickworks was also recovered.

Figure 4.143 Bricks made at the Precinct. Top row, left to right: common 'simple' frog, common 'CANBERRA C'WEALTH' frog, common 'C'WEALTH CANBERRA' frog'. Second row: single bullnose 'simple' frog, squint brick 'CANBERRA C'WEALTH', single bullnose 'CANBERRA C'WEALTH'. Third row: common 'CANBERRA' frog, common 'CB' frog, air brick. Bottom row: common 'blank' frog (Type 1), common 'blank' frog (Type 2), common unfrogged brick.

Figure 4.144 Other building materials made at the Precinct include 'C'WEALTH' roof tiles (far left), 'AUSTRALIA' roof tiles (centre left), and common pavers (right).

Figure 4.145 Other building materials identified during the excavation included a possible common Canberra cream brick (left), 'W' imprinted common brick (centre), and 'M' imprinted green-painted concrete roof tile (right).

Table 4.2 Identified building material types.

Frog / brick type	Description	Date	Type specimen
Bricks produced at the Canberra Brickworks			
'Simple' red	Red (2.5YR 4/6) brick with a total size of 240 millimetres long x 110 millimetres wide x 82 millimetres high. The frog presents as an inverted triangular prism set in the approximate centre of the brick. It measures 163 millimetres long x 57 millimetres wide x 13 millimetres deep. Two clamp imprints are present between the outer edges of the frog and the edges of the brick. One special brick was identified: • Single bullnose—Reddish brown (2.5YR 5/3) brick with a total size of 230 millimetres long x 110 millimetres wide x 7.5 millimetres high. The left side of the brick has been curved to form a rounded arc. The frog shape has been shrunk but retains its rectangular form. It measures 123 millimetres long x 56 millimetres wide x 10 millimetres deep.	1912–1916	CBW_54 (commons), CBW_30 (single bullnose)
'CANBERRA C'WEALTH' red	Reddish brown (2.5YR 4/4) brick with a total size of 230 millimetres long x 110 millimetres wide x 73 millimetres high. The frog presents as a rectangle set in the approximate centre of the brick. It measures 180 millimetres long x 63 millimetres wide x 10 millimetres deep. The frog has been imprinted with 'CANBERRA C'WEALTH' spaced over two lines. Two special bricks were identified:	1921–c1930	CBW_157 (commons), CBW_29 (squint brick), CBW_192 (single bullnose)

Frog / brick type	Description	Date	Type specimen
	• Squint brick—Reddish brown (2.5YR 5/4) brick with a total size of 220 millimetres long x 105 millimetres wide x 73 millimetres deep. The left side of the brick has been tapered to form an off-centred point. The frog shape has been adjusted accordingly. • Single bullnose—Reddish brown (2.5YR 5/4) brick with a total size of 225 millimetres long x 150 millimetres wide x 73 millimetres high. The bottom left corner of the brick has been curved to form a rounded arc. The frog shape has been adjusted accordingly but retains the standard 'CANBERRA C'WEALTH' imprint.		
'C'WEALTH CANBERRA' red	Red (2.5YR 4/6) brick with a total size of 225 millimetres long x 110 millimetres wide x 73 millimetres high. The frog presents as a rectangle set in the approximate centre of the brick. It measures 185 millimetres long x 65 millimetres wide x 10 millimetres deep. The frog has been imprinted with 'C'WEALTH CANBERRA' spaced over two lines.	1921–c1930	CBW_82
'CANBERRA' red	Red (2.5YR 5/6) brick with a total size of 225 millimetres long x 105 millimetres wide x 80 millimetres high. The frog presents as a rectangle set in the approximate centre of the brick. It measures 170 millimetres long x 60 millimetres wide x 10 millimetres deep. The upper half of the frog has been imprinted with 'CANBERRA' spaced 20 millimetres inwards from the outer edges of the frog. Two clamp imprints are present 50 millimetres inwards from the outer edges of the frog.	C1930–1942	CBW_31

Frog / brick type	Description	Date	Type specimen
'CB' red	Red (2.5YR 4/6) brick with a total size of 227 millimetres long x 105 millimetres wide x 75 millimetres high. The frog presents as a rectangle set in the approximate centre of the brick. It measures 150 millimetres long x 53 millimetres wide x 10 millimetres deep. The centre of the frog has been imprinted with 'CB', which is flanked by two clamp imprints. The clamp imprints are present 35 millimetres inwards from the outer edges of the frog.	1944–1976	CBW_23
Air red	Red (2.5YR 4/8) brick with a total size of 225 millimetres long x 110 millimetres wide x 76 millimetres high. Three cylindrical holes ('air' holes) are present through the broad surface of the brick. Each hole has a diameter of 35 millimetres. The outer holes are spaced 35 millimetres inwards from the edge of the brick, with 20 millimetres between each hole.	Late 1960s–1976	CBW_133
'Blank' red	Two variations of the 'blank' frogged red bricks were identified: • Type 1—Red (2.5YR 4/6) brick with a total size of 230 millimetres long x 110 millimetres wide x 80 millimetres high. The frog presents as a blank rectangle set in the approximate centre of the brick. It measures 175 millimetres long x 57 millimetres wide x 10 millimetres deep. Two clamp imprints are present 55 millimetres inwards from the outer edges of the frog. • Type 2—Reddish brown (2.5YR 5/4) brick with a total size of 235 millimetres long x 110 millimetres wide x	Unknown	CBW_63 (Type 1), CBW_210 (Type 2)

Frog / brick type	Description	Date	Type specimen
	72 millimetres high. The frog presents as a blank rectangle set in the approximate centre of the brick. It measures 190 millimetres long x 67 millimetres wide x 7 millimetres deep. Two clamp imprints are present 60 millimetres inwards from the outer edges of the frog.		
Unfrogged red	Red (2.5YR 4/6) brick with a total size of 225 millimetres long x 110 millimetres wide x 75 millimetres high. No frog or other mark is present on the brick.	Unknown	CBW_132
Other building materials produced at the Canberra Brickworks			
'AUSTRALIA' roof tile	Red (2.5YR 5/6) low profile interlocking ceramic roof tile, likely of 'Marseilles' design. Incomplete examples only, full dimensions unknown. Visible incomplete 'AUSTRALIA' stamp on right corner of tile. Remaining lettering unknown.	Unknown	CBW_156
'C'WEALTH' roof tile	Red (2.5YR 4/6) low profile interlocking ceramic roof tile, likely of 'Marseilles' design. Incomplete examples only, full dimensions unknown. Visible incomplete 'C'WEALTH' stamp on left corner of tile. Remaining stamp lettering unknown, may be same as 'C'WEALTH CANBERRA' frog bricks.	c1920s	CBW_156
Paver red	Reddish brown (2.5YR 5/4) paver with a total size of 225 millimetres long x 105 millimetres wide x 50 millimetres high.	Unknown	CBW_34

Frog / brick type	Description	Date	Type specimen
Building materials produced elsewhere			
'W' firebrick	White (2.5YR 8/1) firebrick with a total size of 220 millimetres long x 110 millimetres wide x 75 millimetres high. The maker's mark presents as a single 'W' imprinted in the approximate centre of the brick. It is oriented vertically and measures 45 millimetres long.	Unknown	CBW_137
'M' concrete roof tile	Concrete low profile interlocking roof tile, likely of 'Marseilles' design. Incomplete examples only, full dimensions unknown. Visible incomplete 'M' stamp on centre of tile. Remaining lettering unknown. Remnants of green paint on portions of tile.	Unknown	CBW_131
Unknown			
Cream	White (10YR 8/1) brick with a total size of 230 millimetres long x 115 millimetres wide x 75 millimetres high. The frog is partially obscured by mortar. It presents as a rectangle set in the approximate centre of the brick. It measures a minimum of 105 millimetres long x 40 millimetres wide x 13 millimetres deep. The centre of the frog has been imprinted with a stylised 'E' or '3'.	Unknown	CBW_209

4.2.2 Glass

Glass artefacts dominated the total assemblage recovered from the Brickworks. Large concentrations of whole and fragmented beer bottles, soft-drink bottles, condiment jars, and several personal toiletries jars were recovered. These generally dated to the 1920s and 1950s–1960s, with limited examples from the 1930s–1940s.

Beer bottles from all decades were found. Bottles from the 1920s had short bulged necks and high shoulders (eg CBW_25) (Figure 4.146). The upper half of the body was marked with 'This bottle is the property of', which was completed near the heel with 'The NSW Bottle Company Ltd'. By the 1950s the bottle shape had elongated and the neck tapered to lower shoulders to resemble a more modern beer bottle shape (eg CBW_56) (Figure 4.146). The positioning of the manufacturer's mark split between the shoulder and heel of the bottle was maintained, as was the date of manufacture on the base of the bottle. This shape was continued through the 1960s. No brewery brands were identified on any of these bottles (see Section 4.2.3 for cans).

Examples of other beverage bottles were limited. A 1920s 'Udolpho Wolfe's Schiedam Aromatic Schnapps' bottle (CBW_97) was recovered, as were several 1930s 'Brooke's Lemos' cordial bottles (CBW_221 and 233). A number of soft-drink brands appeared in the 1960s (see Section 4.2.3 for cans). These included 'Pepsi Cola' (CBW_143), 'Dixi-Cola' (CBW_216), 'Big Sister Tutti Frutti' (CBW_175), 'Schweppes', and 'Tarax' (CBW_49) (Figure 4.147).

Condiment jars were generally dated to the pre-1940s occupation of the Precinct. Many of the condiments were from staple brands such as 'H M Leggo & Co', 'Rosella P & M Co Ltd', and 'Sanitarium Health Food Co' (CBW_221), which manufactured products such as pasta sauces, chutneys, spreads, and other preserves.

A number of late 1920s to early 1930s personal toiletry product jars were also recovered. These included men's grooming products such as 'Ingram's Shaving Cream' (CBW_233) and 'Brylcreem' styling cream (CBW_221). Several medical products were also identified, including 'Vicks VapoRub' (CBW_230), 'Kruschen Salts' dietary supplement (CBW_233), and the tincture 'Clarke's World Famed Blood Mixture' (CBW_221) which was advertised as a remedy for a number of skin and blood diseases (Figure 4.148).

A single marble (CBW_95) was identified in the fill of the spoon drain (*49*, Section 4.1.4). Likely a machine-made marble, it had been crafted from a black glass base with loose swirls in seafoam green and light blue. Some pitting was present on the surface (Figure 4.149).

Figure 4.146 The shape of the beer bottle changes markedly between the 1920s (left, CBW_25) and the 1960s (right, CBW_56).

Figure 4.147 A number of other beverages were consumed, including (left to right): schnapps (CBW_97), cordial (CBW_233), and a variety of soft-drinks (right, CBW_216, 143, 175, and 49).

Figure 4.148 Personal products were also consumed at the Precinct, including Vicks VapoRub (left, CBW_230) and dietary salts (right, CBW_233).

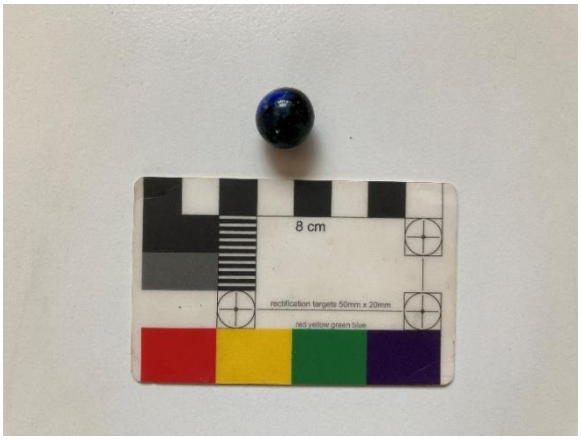


Figure 4.149 A glass marble (CBW_95).

4.2.3 Metal

Metal artefacts predominantly consisted of miscellaneous iron nails, bars, machine and structural fittings, sheets, and non-diagnostic fragments. These would have contributed to the industrial function of the site.

Twenty-two steel rail joint bars were found in one of the abandoned railway cuttings (Section 4.1.5). Each joint measures 460 millimetres long x 50 millimetres wide x 15 millimetres high and weighs approximately 3 kilograms. The joints are perforated with four holes for bolts, which were used to fix each joint to two railway tracks, holding the tracks together.

In addition to the glass beer and soft-drink bottles recovered (Section 4.2.2), a number of steel can examples were also located. The brands included 'Foster's Lager' (CBW_47), 'Tooheys Draught' (CBW112), 'Woolworths Sparkling Lemonade' (CBW_19), 'Fanta' (CBW_47), 'Tarax' (CBW_130), and 'Coca Cola' (CBW_220). These cans were also dated to the late 1960s and early 1970s operation of the Precinct.

Thirty-five addressograph plates were recovered from the rubble of the Brickyards Mess house (*95*, Section 4.1.2). Originally patented in 1896, the addressograph was a common administrative tool of the 1960s. It provided a quick way in which to print addresses or other information onto letterhead. Thin steel plates embossed with the appropriate information were fitted into the addressograph machine, run across an inked ribbon, and then pressed onto the printing medium. When not in use, the addressograph plates were placed in steel cassettes. Twenty-two of the recovered plates were related to personnel—they detailed a full name, address, birth date, and what was presumably an employee code and start of employment date (Table 4.3, Figure 4.150). The remaining 13 plates were associated with vehicles and their registered drivers (

Table 4.4, Figure 4.150). It is unknown whether the individuals or vehicles detailed on the addressograph plates were directly employed or associated with the Brickworks.

Figure 4.150 The addressograph plates included the details of individuals (top, CBW_51) and vehicles (bottom, CBW_52).

Table 4.3 Personnel addressograph plates recovered from the remains of the Brickworks Hostel mess house (*95*).

Employee code	Date of employment	Name	Address	Birth date
E/3922	27 Nov 1969	James Pantos	90 La Perouse St, Griffith ACT	16/01/1938
E/4518	30 Nov 1964	John M Houston	Flat G3 Block C Currong Flats, Braddon ACT	21/09/1928
T/1574	–	Lillian E Colebatch	RMC Duntroon ACT	–
C/7306	31 Oct 1960	James K Nell Thorpe-Quibell	Kambah Lane, Via Queanbeyan	1918
–	1959	Harold Herbert Strachan	Wentworth Ave, Kingston ACT	12/11/1899
C/35371	21 Jan 1970	Allen T Watson	40 Causeway, Canberra ACT	2/11/1925
D/17998	9 Nov 1960	Thomas Livesley Phillips	21B Currong Flats, Braddon ACT	19/01/1920
A/29811	1 Sep 1962	William McGinn	Ainslie Hostel	27/06/1921
T/1870	–	Kevin J Johnston	8 Hart St, O'Connor	–
T/1526	–	William E Clarke	35 Nardoo Cres, O'Connor	–
T/1511	–	Colin Francis Gunn	Bolderwood St, Turner	–
A/34825	3 Dec 1964	James M Calvert	Lawley House, Barton ACT	6/03/1913
C/34241	16 Oct 1969	Alois Dukkl	Hillside Hostel, Canberra	2/03/1936
A/35227	11 Jan 1969	Daryl Gai Chalker	22 Shortland Cresc, Ainslie ACT	26/02/1939
A/30467	11 Nov 1960	Alfred Krotil	Capital Hill House, Canberra	25/11/1930
A/24916	31 Oct 1960	Marion R Bosci	10 Ebden St, Ainslie ACT	3/05/1932

Employee code	Date of employment	Name	Address	Birth date
C/34857	4 Dec 1969	Guen E R Koch	Lot 26 Duffy St, Ainslie ACT	24/11/1928
A/30478	13 Nov 1962	Barbara A Cowdroy	3 Turner Place, Yarralumla ACT	17/09/1940
A/4198	20 Oct 1960	Lillian L Lamidey	12 Arthur Circle, Forrest ACT	25/4/1895
E/1480	28 Oct 1969	Donald G Roberts	97 Canberra Ave, Griffith ACT	24/10/1919
C/8655	12 Apr 1962	Darcy A Armstrong	12/16th St, Narrabundah ACT	23/06/1923
A/35758	22 Feb 1963	Joseph Conrad	35 Blackbutt St, Lyneham ACT	10/09/1916

Table 4.4 Vehicle addressograph plates recovered from the remains of the Brickworks Hostel mess house (*95*).

Vehicle type	Car code	ID	Manufacturer	Driver name	Driver address
Car	23976	65562	Holden	Donald N Kime	7 Glover St, Lyneham ACT
Car	23410	EOTTA131688	Ford (Zephyr)	Elvin K Blewitt	Mt Causeway, Canberra ACT
Car	29/837	1G17690	Austin	George R Graf	12 Landsborough St, Griffith ACT
Car	20344	EP154/D4/48754	Morris	Antonius A Van Huet	Gorman House, ACT
Car	34506	V16814E	Standard	Francis M Sheppard	Lennox House, Canberra ACT
Car	28445	L320800	Holden	Capital Motors Pty Ltd	Flinders Way, Manuka ACT
Car	26971	C473841	Ford	William C Coulthard	20 Carstenz St, Griffith ACT
Lorry	25896	ARA1303	Ford	Karl Schreiner Transport Shipping Corp Pty Ltd	Cotter Rd, ACT
Car	25078	L614570	Holden	John F & Nancy M Rillatt	15 Wandoo St, O'Connor ACT
Car	28-609	72483	Morris	Colin J Duff	20 Coranderrk St, Reid ACT
Car	8562	APHM84998	Morris	Bert F Ward	10 Gunn St, Yarralumla ACT
Car	18330	EP98548	Vauxhall	Robert J O'Doherty	32 Nardoo Cres, O'Connor ACT
Lorry	24096	270333080	Commer	AS Heaton (Holding P/Ltd	47 East Row, Civic ACT

4.2.4 Ceramic

Nine ceramic telegraph insulator brackets were identified. These primarily consisted of stay or guy insulators (CBW_166, 181, 182, 198, and 201), with a single whole spool shackle insulator (CBW_229). They were generally found around the electrical services pole in BRW8.

Fragments of 13 teacups and mugs were collected. These largely comprised undecorated, simple white glazed fragments. Where decoration was present, it was typically simple gold rims (eg CBW_96, 194, and 236) or floral patterns (eg CBW_50 and 113) (Figure 4.151).

Figure 4.151 Decoration included gold motifs (left, CBW_236), simple gold lines (centre, CBW_96), and floral patterns (right, CBW_50).

4.2.5 Organics

Leather

The fragments of approximately six leather boots were recovered (CBW_60, 123, and 185). These fragments included pieces from a men's dress shoe and pull-on ankle boot and the pointed toe of a possible women's shoe.

Figure 4.152 Leather shoe fragments, including a pull-on ankle boot (left, CBW_60), throat with eyelets (centre, CBW_123), and pointed toe (right, CBW_185).

Wood

A variety of raw and worked wooden pieces were identified. These were largely unidentifiable, non-diagnostic pieces that were likely waste from the crafting or repair of timber implements and joinery on site.

The exception to this was a composite timber sheet, constructed from four individual thin layers of plywood (CBW_24, Figure 4.153). Each layer was cut on an alternate grain to the preceding sheet. A semi rounded ferrous 'knob' was embedded in one side of the sheet. It may have been a plywood door with latch from a storage unit.

Figure 4.153 The top (left) and second (right) layers of the composite timber sheet (CBW_24), in situ in TT3 (*12*).

Faunal remains

Faunal remains were identified in a limited number of contexts. However, the majority of these contexts dated to the pre-1930s activity of the Brickworks, providing insight into the subsistence of the early workers and inhabitants of the site.

Notably, the faunal assemblage was dominated by sheep remains, which were primarily leg and mandible pieces. Butchery marks were present on a number of the remains. Also identified was almost three kilograms of *Saccostrea glomerata* (Sydney Rock Oyster) shells

(CBW_202). The entire assemblage of shell was located within the fill (*49*) of the spoon drain (*50*) (Section 4.1.4), likely dumped either during or shortly after consumption.

A single shell button was also recovered (CBW_98) (Figure 4.154).

Figure 4.154 A shell button (CBW_98).

4.2.6 Other

Plastic items were generally recovered from debris associated with the 1976 closure and subsequent demolition of the Brickworks buildings and following use of the site. These included plastic soft-drink bottles, food wrappers, and other single-use items.

4.2.7 Interpretation

The artefactual assemblage recovered during the archaeological investigations was not only characteristic of the industrial nature of the site, but also provided insight into the lives of the workers and inhabitants of the Brickworks over its operation.

A total of 15 brick and building products manufactured at the Precinct was identified. These would have been a small representative sample of the total quantity and variation of

materials produced. As the Brickworks successively closed and reopened, new frogs were designed for each stage. In some instances, two variations of a similar frog were in circulation around the same time, such as the 1920s 'CANBERRA C'WEALTH' and 'C'WEALTH CANBERRA' frogs. It is possible that the two different frogs were produced to denote two different markets, such as bricks intended for the construction of government and public buildings versus privately owned dwellings. The 1920s were a significant period of development for Canberra, with many of the early government buildings established at this time coupled with a push to increase the accommodation options and population density of the city. The production of the two different frogs may also explain the two 'blank' frog variations, which could have been produced concurrently to other frogs for alternate consumer markets.

Although all phases of worker accommodation that had been present at the Precinct have since been demolished, a considerable quantity of material relating to the occupation of the site remained. This was dominated by glass beverage bottles, which notably included a vast number of beer bottles, although smaller amounts of soft-drink, cordial, and schnapps bottles were also recovered. It is probable that the consumption of alcoholic beverages was used for relaxation or team bonding. Regarding the consumption of solid foods, this was generally represented by butchered faunal remains. The lack of representation of the full skeletal assemblage was indicative of select meat cuts being sourced off-site and brought back for consumption, rather than complete animals being processed on site. The prevalence of sheep—a large meat yielding animal—is suggestive of larger groups of people being fed, perhaps in a communal-style. The identification of a single quantity of oyster shell suggests that shellfish were not a common component of the workers' diets.

The Brickworks workers were also characterised through their remaining personal artefacts. These objects included items that would have contributed to grooming habits—such as shaving cream, hair styling cream, and leather dress shoes—and health—such as decongestant, blood and skin tonics, and dietary supplements. The ownership of these items shows that at least a number of the workers cared about their appearances and wellbeing, which would have been affected by the hard manufacturing labour. The addressograph plates recovered from the Brickyard Mess House may detail a number of the individuals who worked at the Precinct, although this requires further research to confirm.

4.3 Endnotes

[28] GML Heritage Pty Ltd, Canberra Brickworks Precinct—Archaeological Research Design, prepared for Doma Group, September 2020, p 20.

[29] GML Heritage Pty Ltd, Canberra Brickworks Precinct—Archaeological Research Design, prepared for Doma Group, September 2020, p 21.

[30] GML Heritage Pty Ltd, Canberra Brickworks Precinct—Archaeological Research Design, prepared for Doma Group, September 2020, p 22.

[31] GML Heritage Pty ltd, Canberra Brickworks Quarry—Statement of Heritage Effects, prepared for Doma Group, September 2021, p 13.

[32] GML Heritage Pty ltd, Canberra Brickworks Quarry—Statement of Heritage Effects, prepared for Doma Group, September 2021, p 13.

[33] GML Heritage Pty Ltd, Canberra Brickworks Precinct—Archaeological Research Design, prepared for Doma Group, September 2020, p 28.

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

[35] Lester Firth Associates Pty Ltd, *Old Canberra Brickworks, Conservation Plan*, June 1986, Section 2.1.1 (Brick Firing Kilns); McQueen, R and Ross-Hauer, J, 2013, 'Brick manufacturing in the Cortez missing district, Nevada', *Nevada Archaeologist* 26, p 19.

[36] Clough, R, 1989, 'Documents and Digs—Investigation of the Copper and Clay Industries in New Zealand', *Australian Historical Archaeology* 7, p 4.

[37] Clough, R, 1989, 'Documents and Digs—Investigation of the Copper and Clay Industries in New Zealand', *Australian Historical Archaeology* 7, p 4.

[38] McQueen, R, and Ross-Hauer, J, 2013, 'Brick manufacturing in the Cortez Mining District, Nevada', *Nevada Archaeologist* 26, p 20.

[39] McQueen, R, and Ross-Hauer, J, 2013, 'Brick manufacturing in the Cortez Mining District, Nevada', *Nevada Archaeologist* 26, p 20.

[40] McQueen, R, and Ross-Hauer, J, 2013, 'Brick manufacturing in the Cortez Mining District, Nevada', *Nevada Archaeologist* 26, p 20.

[41] McQueen, R, and Ross-Hauer, J, 2013, 'Brick manufacturing in the Cortez Mining District, Nevada', *Nevada Archaeologist* 26, p 20.

[42] Wingfield, D M, Richmond, M D, McKelway, H S, and Ball, D B, 1998, 'Archaeological remains of a mid nineteenth century brick clamp—A first look at brick clamps in Kentucky', *Ohio Valley Historical Archaeology* 12.

[43] Archaeological Management and Consulting Group Pty Ltd, Scotch Kiln at Bridgman Ridge, Singleton, NSW, Final Archaeological Report, October 2011, prepared for Bridgeman Ridge Holdings, p 40.

[44] Archaeological Management and Consulting Group Pty Ltd, Scotch Kiln at Bridgman Ridge, Singleton, NSW, Final Archaeological Report, October 2011, prepared for Bridgeman Ridge Holdings, p 40.

[45] Archaeological Management and Consulting Group Pty Ltd, Scotch Kiln at Bridgman Ridge, Singleton, NSW, Final Archaeological Report, October 2011, prepared for Bridgeman Ridge Holdings, p 41.

[46] Clough, R, 1989, 'Documents and Digs—Investigation of the Copper and Clay Industries in New Zealand', *Australian Historical Archaeology* 7, p 4.

[47] Clough, R, 1989, 'Documents and Digs—Investigation of the Copper and Clay Industries in New Zealand', *Australian Historical Archaeology* 7, p 4.

[48] Selby, J, 200, 'The Fenny Compton tunnel, Oxford Canal', *Industrial Archaeology Review* 24(2), p 113.

[49] Selby, J, 200, 'The Fenny Compton tunnel, Oxford Canal', *Industrial Archaeology Review* 24(2), p 113.

[50] Selby, J, 200, 'The Fenny Compton tunnel, Oxford Canal', *Industrial Archaeology Review* 24(2), p 113.

[51] Selby, J, 200, 'The Fenny Compton tunnel, Oxford Canal', *Industrial Archaeology Review* 24(2), p 113.

[52] GML Heritage Pty Ltd, Canberra Brickworks Precinct—Archaeological Research Design, prepared for Doma Group, September 2020, p 30.

[53] GML Heritage Pty Ltd, Canberra Brickworks Precinct—Archaeological Research Design, prepared for Doma Group, September 2020, p 32.

5 Discussion

5 Discussion

The 2021 CMP outlines four phases of development for the Precinct (discussed in Section 2):

- Establishment Phase, 1911–1920
- Expansion Phase, 1921–1942
- Post World War II Phase, 1944–1976
- Post Closure Phase, 1976–2017

The archaeological evidence identified during the investigations primarily relates to the later phases of use, particularly the late Expansion Phase and Post World War II Phase. The discovery of the early experimental plant, however, enables several subphases to be added to the chronology under the Establishment Phase:

- Experimental Plant Operation Subphase, 1913–c1916
  - Kiln A, 1913
  - Kiln B, 1913–c1916
  - Kiln C, 1913–c1916
  - Kiln D Downdraught, 1913–c1914
  - Kiln D Scotch, c1914–c1916
  - Kiln E Downdraught, 1913–c1914
  - Kiln E Scotch, c1914–c1916

The following section examines the archaeological evidence for each phase and contextualises it with the research questions proposed in the ARD (Appendix C).

5.1 Phases

5.1.1 Establishment phase, 1911–1920

Archaeological evidence for the first few years of the Brickworks is mainly associated with the experimental plant (discussed below) and the Staffordshire Kiln.

The Staffordshire Kiln comprises a two storey structure, with 20 individual kiln chambers on the ground level and a firing floor above. Construction of the kiln began in 1914 and was completed in early 1916. Prior to the construction of the superstructure, the trench for the subsurface flue would have been excavated. This was then lined with bricks—made in the experimental plant—to create the domed flue tunnel (Section 4.1.7). Once the flues were completed, the remainder of the structure was formed. There is some ambiguity

concerning whether the extant flues are the original 1915 construction. This is discussed further in Section 5.1.3.

With regards to the accommodation of workers on the site, this predominantly occurred outside the area of investigation. However, the location of the dormitories as depicted on the 1916 contour survey plan was examined. A small number of features—such as several postholes and a box drain—indicative of a structure was present. However, these were largely insubstantial and did not correspond with the building footprint depicted on the 1916 contour survey (Section 4.1.4). No domestic artefacts were identified in connection with these features. There was, however, a concentrated dump of domestic items within the larger spread of c1930s rubble overlying the experimental plant (Section 5.1.2). These artefacts included glass condiment jars, personal hygiene product jars, and domestic electrical items such as light fittings and door locks (Section 4.2). The location of these artefacts within the rubble deposit would suggest they originated from a nearby domestic building. This may not have necessarily been the dormitories or the c1913 single men's quarters that was located immediately south of the experimental plant. The dating of 1930s artefacts would suggest this rubble is related to the demolition of the 1927–1942 married quarters, which was located further west. This is discussed further below.

Experimental Plant operation subphase, 1913–c1916

Work at the Precinct began with the construction of the experimental plant. Although this plant was neither designed nor intended to be the long-term solution for the Brickworks, it was more than a makeshift or temporary operation. The aim of the experimental plant was twofold: to produce bricks for the construction of the Kingston Powerhouse and, later, the Staffordshire Kiln; and to trial the local materials and types of bricks that could be made.

The first kiln—a clamp kiln—was a truly temporary kiln. The purpose of this kiln was to produce bricks for the construction of the first experimental kiln, probably a Scotch kiln. To construct a Scotch kiln, somewhere in the order of 15,000 bricks would be required for a kiln approximately 8 metres long x 4 metres wide with walls 2 metres thick x 2 metres high. Hill wrote in June 1913 that this 'first kiln of bricks about 20,000' would be burnt to obtain bricks for the construction of the following kiln (Section 2.1). This quantity would account for the approximately 20 per cent of brick loss that would occur during a clamp kiln firing whilst ensuring that enough good bricks would be produced.

It is possible that—in order to concentrate the efforts of the open kilns on producing bricks for use outside the plant—a separate clamp kiln was used to construct each experimental kiln. When Christie wrote in August 1913 about the experimental plant containing six kilns (Section 2.1) this number likely did not include any clamp kilns. As many as 12 kilns—accounting for one clamp kiln for each Scotch or downdraught kiln—may have been present in the experimental plant. Evidence for any additional clamp kilns would have been

ephemeral (as seen with Kiln A), and has likely since been removed by the construction of other kilns, structures, or the advancement of the quarry.

Following the firing of the first clamp kiln, the construction of No 1 Kiln commenced. Based on Figure 4.100 and Figure 4.102, at least two Scotch kilns were constructed before further experimentation with kiln types was undertaken. Although both Scotch kilns would have been consistent in their layout, the variations in brick bond and firebox positions demonstrate that experiments with construction methods were occurring.

Archaeological evidence from Kilns D and E show that the early Precinct workers did not limit themselves to open kilns, but also trialled downdraught kilns. It is unknown why these downdraught kilns were eventually converted into Scotch kilns. There are several viable theories:

- Inefficiency—Based on Christie's letters (Section 2.1), the Scotch kilns were surpassing expectations in terms of brick quality and productivity. The downdraught kilns may not have been as much of a success, perhaps resulting in high proportions of misfired bricks or requiring excessive effort to conduct each firing. Given the enclosed nature of downdraught kilns, they tend to be generally more fuel efficient and consistent in temperature than open kilns like Scotch kilns. So while it would seem unlikely the downdraught kilns were less efficient than the Scotch kilns, there may have been peculiarities or defects in their design and construction that rendered them less desirable in this setting.
- Flawed design—Two different forms of flue channel were used in Kilns D and E. The channel in the former kiln was positioned off-centre adjacent to the western external wall and curved as it left the kiln. Accounting for the brick lining, the width of the channel was approximately 0.25 metres wide. Conversely, the flue in Kiln E ran through the centre of the internal space and was approximately 0.6 metres wide (assuming a brick lining was present originally). The two kilns shared a chimney. Given the different characteristics, it is likely the two flues vented hot air at different rates or with different levels of success. If the functionality of one (or both) flues was compromised, it may have been preferable to decommission both instead of attempting to redesign them or the chimney. Alternatively, there may have been a flaw with the way the chimney had been constructed or was operating.
- Damage—The presence of the chimney is key to the operation of a downdraught kiln. If the chimney had been damaged and had to be removed, once again, it may have been easier to alter the kilns than build a new chimney.

A year prior to the first closure of the Precinct in 1916, the Staffordshire Kiln had been completed. Initially, it had not been planned to continue using the experimental plant once the Staffordshire Kiln was functional. However, the modification of Kilns D and E show an active investment in the longevity of the experimental plant—if the kilns were not expected

to produce bricks for more than a year or two, supplying resources for ongoing repair and modification would be wasteful when these could be put towards a new temporary kiln. The investment of effort in altering the two kilns demonstrates that extending their lifespan was a key consideration.

It is unknown when the two downdraught kilns were converted into Scotch kilns. No chimney stack is visible in any of the early photographs of the experimental plant (Figure 4.100 to Figure 4.102). The enclosed nature of one of the kilns visible in Figure 4.101 and the changes visible in Figure 4.100 suggest that the conversion occurred early in the developmental sequence, potentially prior to 1914.

The experimental plant was likely to have still been partially functional at the time of the first closure of the Brickworks. The 1916 contour map depicts four of the six kilns (Figure 2.5). Two of these kilns have been crossed out—suggesting either demolition or lack of use—whilst two other kilns have not. The continued depiction of these kilns, despite the lack of detail, may indicate that they were at least still being informally used.

5.1.2 Expansion phase, 1921–1942

To prepare for the reopening of the Brickworks, several modifications were made. If the dormitories were present, they would have been demolished at this time. The experimental plant was also certainly fully decommissioned and demolished as part of the reinvigoration of the Precinct. The nature of this demolition appears to have been the removal of the upper walls, leaving the floors and footings behind. The quantity of rubble present in the area indicates the debris was not removed from site and simply levelled. Much of this was left exposed, allowing a topsoil to accumulate. Further rubble deposits and a carpark (Section 5.1.3) were overlaid onto parts of the rubble at later dates.

Despite the loss of the experimental plant, the output of the Staffordshire Kiln was initially able to keep up with the demand for bricks. To support the effective distribution of the finished materials, a railway network was constructed from the Precinct to major building locations within Canberra (eg the Provisional Parliament House). Where the network connected to the Brickworks, two cuttings through the western hill landform led to the sidings adjacent to the Staffordshire Kiln. The only identified archaeological evidence of this railway network was these cuttings—all railway infrastructure had been effectively removed when the network was decommissioned by 1929. Any remnants of the sidings were likely removed prior to the construction of the extrusion plant (Section 5.1.3).

In the late 1920s, further developments came in the form of a new kiln and expanded accommodation facilities—Hardy Patent Kiln 1 and the new married quarters.

In 1927, construction of the Hardy Patent Kiln 1 was completed. The Hardy Patent Kiln 1 comprises a two storey structure, with two long chambers running through the centre of

the kiln and a firing floor above. The original brick flues had presumably been installed in a similar manner to the Staffordshire Kiln flues, where the channel was excavated and the brick lining fitted before the superstructure was constructed. These flues were subsequently modified c1945 (Section 5.1.3).

No structural evidence of the 1927–1942 married quarters was identified during the excavations in BRW2. This is likely due to the demolition of the site during World War II and subsequent construction of the Brickworks Hostel (Section 5.1.3). If the rubble had been allowed to remain in situ immediately following the demolition of the quarters, it would have been removed from the area at this time. The quantity of 1930s artefacts in the rubble above the experimental plant is likely to have originated from the married quarters. Instead of completely clearing the married quarters rubble from the Precinct, it would have been easier to deposit the rubbish in a vacant part of the Precinct—if the experimental kilns were already in a visibly ruinous state, this would have provided an obvious location for the dumping of additional debris.

5.1.3 Post World War II phase, 1944–1976

The Post World War II Phase represents a large proportion of the archaeological remains at the Brickworks. Numerous alterations and additions were made during this period.

Some of the most extensive changes made concerned the extant kilns. Both the Hardy Patent Kiln 1 and Staffordshire Kiln underwent repairs, which were followed by the installation of the Hardy Patent Kiln 2 and Downdraught Kilns.

In 1945, there was a report that the two 'dome kilns' were in poor condition (Section 2.3). It is unknown which two specific kilns this was in reference to.

The archaeological investigations identified that extensive modifications had been made to the Hardy Patent Kiln 1 flues. The main tunnel leading from the fan houses to the kiln had been completely replaced with a new concrete structure. A large quantity of brick rubble was identified beneath the floor in the internal kiln space suggesting that at least some tunnels had been collapsed and replaced. If concrete was used to replace the main tunnel, it may have also been used to construct any new tunnels within the internal kiln space. This should not be assumed though, as one intact brick flue and no concrete flues were identified within the internal space.

There was no evidence within the Staffordshire Kiln flues to indicate this was the other 'dome kiln' affected by deterioration. Presumably, if the Staffordshire Kiln flues had been replaced around the same time as the Hardy Patent Kiln 1 flues, the same methods and materials would have been used. In this case, the brick Staffordshire Kiln flues would have been replaced with the same concrete forms. This was not the case, and the visible brick frogs matched those produced by the experimental kilns (Section 4.2). However, the brick bonding used throughout the Staffordshire Kiln flues closely match those used in the

Downdraught Kiln flues. It is possible that the latter flue system was constructed to match the earlier one, if this had demonstrated effective use and longevity. Alternatively, both flues were constructed around the same time and the same approach was used.

It is unknown what the form, or condition, of the Hardy Patent Kiln 2 flues are, as these could not be accessed. Given the similarity between the two Hardy Patent Kilns, it is probable that the latter kiln's flues were designed to replicate the modifications made to the first Hardy Patent Kiln flues.

In the 1960s, a crushed yellow granite carpark was installed at the entrance to the Precinct. This material was found immediately overlying several of the Establishment Phase features, such as the spoon drain and Kiln B (Section 4.1.4). The minimal thickness of the crushed granite carpark surface suggests that the early structures may have been visible on the ground surface prior to or during the construction of the carpark. If they were, there was evidently no effort expended to expose or remove the entire features, although additional portions may have been removed to aid in levelling the area.

Despite the widespread demolition that had occurred in the area of the Brickworks Hostel following the closure of the Precinct (Section 5.1.4), the remaining structural features were consistent with the documentary evidence. Partial footings were found for one sleeping hut, the kitchen portion of the mess hall, and the meat safe, and the concrete slab for the wet area portion of the amenities block were all still extant (Section 4.1.2). The artefacts recovered from this area provided little insight into the people who occupied the hostel. The materials comprised a large quantity of beer and soft-drink bottles—particularly dating to the mid to late 1960s—with few personal artefacts (Section 4.2). The main personal items recovered included a number of stamped identification plaques (Section 4.2), although these related to individuals who resided outside of the hostel.

The final modification made in this period was the installation of the extrusion plant. This required the levelling of a large area west of the Downdraught Kilns to support the laying of a concrete slab. Widespread cuts and fills were identified in this area, which included several in-ground cast concrete structures. If any remnant material from the 1920s railway siding had been present in the area following its decommission in c1929, the construction of the extrusion plant would have removed all remaining features.

5.1.4 Post-closure phase, 1976–2017

The archaeological deposits derived following the closure of the Brickworks are predominantly associated with demolition. These are concentrated in the area to the southwest of the extant Precinct and within the quarry.

Following the vacation of the Brickworks Hostel, the area was effectively razed. Large quantities of brick rubble—particularly associated with the kitchen and mess hall—were present throughout the area (Section 4.1.2).

Enormous quantities of brick rubble were identified along the eastern boundary of the quarry. Initially this area had generally been considered to be an intact hill landform with isolated spoil heaps and minimal amounts of disturbance. However, excavation in this area revealed widespread and deep (up to 7 metres) deposits of brick rubble (Section 4.1.3). The bricks in southern extent of this distribution tended to have 'CB' frogs, whilst the bricks to the north comprised a higher quantity of 'air' bricks. Both types of bricks were manufactured post World War II. The generally high quality of these bricks and low quantity of misfired bricks indicates that the deposits were unlikely to represent the general accumulation of misfired batches, which is supported by the homogeneity of the deposits. As a result, the brick dumps along the eastern boundary of the quarry are likely to be representative of unsold brick stock that was dumped when the Precinct was closed.

The floor of the quarry presented a similar story. The depth of quarrying activity on the western face of the landform had suggested that a base geological deposit had been reached, and that this formed the extant floor of the quarry. Excavation within the floor, however, identified further deposits of brick rubble—although not of the same quantity and depth as the eastern deposits—and various matrices of dumped materials (Section 4.1.3). These materials included artefacts such as broken railway tracks, beverage bottles and cans, machinery pieces, and household appliances (Section 4.2). No evidence of the miniature railway planned by Marr in the centre of the quarry was identified (Section 2.4).

5.2 Research framework

Following the observations made in the AA, the potential of the 12 identified areas to contain archaeological remains was discussed (Appendix D). Based on the data collected during this investigation, the predicted archaeological potential has been updated to reflect the results (Table 5.1).

Table 5.1 The updated archaeological potential of the BRW areas. (Source: after NOHC, 2016, p 44–46).

Area	NOHC, 2016	Update
BRW1—Building platform and concrete features	Moderate archaeological potential This feature suggests a function associated with water, either for storage or drainage. The in situ surface features suggest a level of intactness	Nil archaeological potential The identified surface features were ephemeral pre-cast concrete remnants and were not associated with any further subsurface features, such as water storage or drainage

Area	NOHC, 2016	Update
		infrastructure, or other structural purposes. This area has nil potential to contain further archaeological features or deposits.
BRW2—Married quarters and Brickworks Hostel	High archaeological potential The married quarters were built to the southwest of the Brickworks in the 1920s, and were subsequently replaced in the 1940s by the Brickworks Hostel. The hostel was then demolished in the 1970s. This area has remained undisturbed since the demolition of the hostel.	Moderate archaeological potential No archaeological evidence of the 1927–1942 married quarters was identified. All structures were completely removed in preparation for the construction of the Brickworks Hostel. Partial footings for several of the hostel buildings were identified, including the kitchen, meat safe, and wet area of the amenities block. Few domestic or personal artefacts were recovered. This area has moderate potential to contain further fragmented footings and plumbing features associated with the Brickworks Hostel. There is low potential for any remains associated with the married quarters to be present.
BRW3—Area of postholes and other remains	High archaeological potential This area was originally a more ephemeral Brickworks camp and then later the location for dormitories or hostel-like accommodation.	Low archaeological potential No evidence of an ephemeral camp was identified. Partial footings for a sleeping hut associated with the Brickworks Hostel was identified. No domestic or personal artefacts were recovered. This area has low potential to contain further structural features. Any remaining features would likely be associated with the sleeping hut.
BRW4—Single men's quarters	Low archaeological potential	Not investigated

Area	NOHC, 2016	Update
BRW5—Clay feature and rubble	Low archaeological potential	Not investigated
BRW6—Rubble heap/refuse dump	Low archaeological potential	Not investigated
BRW7—Quarry	High archaeological potential The quarry comprises fragments of in situ concrete slab and a number of depressions.	High archaeological potential No evidence of structures located within the quarry cutting were identified. However, vast quantities of brick rubble and general waste deposits were located throughout the quarry, especially on the eastern ridge. Artefacts were reflective of the nature of this debris, primarily consisting of broken mechanical equipment and domestic rubbish. This area has high potential to contain further similar deposits. There is low potential for any remains associated with structures to be present.
BRW8—Old kiln and dormitories	Low archaeological potential This area has remained relatively undisturbed since the demolition of the kilns and dormitory. Some carparking was introduced in the c1960–1970s, which involved the layout of concrete. This was removed by 1980. There may have been some disturbance through vehicle movement. No other land disturbance appears to have occurred here.	High archaeological potential Four of the six experimental kilns were identified, plus an additional clamp kiln. The remains of these kilns were generally fragmentary, but certain features had been well preserved. Limited evidence was identified for the dormitories and bathhouse, however, this may be due to inaccurate recording in the documentary evidence rather than disturbance. Some domestic and personal artefacts were identified, although these may have originated from one of the other contemporary accommodation areas.

Area	NOHC, 2016	Update
		This area has high potential to contain additional kilns. These kilns may comprise the remains of two unidentified experimental kilns or further clamp kilns. There is low potential for any structural remains associated with the dormitory or bathhouse to be present.
BRW9—Cottage, stables, coal store	Low archaeological potential	Not investigated
BRW10—Railway remnants	Moderate archaeological potential Evidence of the railway siding, in the form of cuttings in the landscape, could be seen in aerial views well into the 1970s. Although all remnants of the track were removed in the 1920s, there is some limited potential for archaeological evidence of the railway and its operation.	Low archaeological potential Two railway cuttings were identified, which included the artificially raised bank between the two channels. No evidence of remnant railway infrastructure was identified. An isolated deposit of discarded railway joints was located within the topsoil. This area has low potential to contain features or structures associated with the railway. Apart from isolated deposits of discarded infrastructure, all materials were likely removed when the railway was decommissioned.
BRW11—Railway siding extension	Moderate archaeological potential Aerials indicate that part of this area was later covered by the concrete slab for the extrusion plant, however, there is some potential for archaeological evidence.	Nil archaeological potential Prior to the deposition of the concrete slab, the entire area was levelled through cutting and packing with waste materials. No evidence of the railway sidings were identified. This area has nil potential to contain archaeological deposits associated with the railway siding. The construction of the extrusion plant likely removed all remaining evidence of this infrastructure.
	High archaeological potential	High archaeological potential

Area	NOHC, 2016	Update
BRW12—Flues and subsurface workings	Underground flues and workings connected the kilns and their associated fan stacks. These are understood to still remain in situ and are unlikely to have been disturbed.	The subsurface flues for the Staffordshire and Downdraught Kilns were accessed. The Staffordshire Kiln flues are in good condition, with little evidence of vandalism or visible signs of structural defects. The Downdraught Kiln flues also had little vandalism, although are in poor condition due to ongoing damp conditions and salt damage to the brickwork. The subsurface flues of the Hardy Patent Kilns 1 and 2 could not be accessed. However, they are likely to still be largely intact and show similar conditions to the Staffordshire and Downdraught Kiln flues.

Section 4.3 of the ARD outlined a number of research questions. These questions were developed in response to the themes outlined in the ACT Heritage Council's *Heritage Assessment Policy* (2018) and the Australian Heritage Commission's *Australian Historic Themes Framework* (2001). These themes included:

- ACT themes
  - Canberra as the nation's capital—Exploring, surveying and mapping; and developing ACT and regional economies.
  - Canberra as a planned environment—Griffin's Canberra; and early federal government landscape and urban planning.
- Australian themes
  - Developing local, regional, and national economies—Industry, mining, and transport
  - Building settlements, towns, and cities—Accommodation
  - Working—Labour
  - Developing Australia's cultural life—Domestic life

The following table discusses the research questions developed from these themes in light of the information collected during the archaeological excavations.

Table 5.2 Response to the ARD research questions.

Research question	Theme	Response
What is the nature and extent of the archaeological resources within each of the nominated zones of sensitivity (all BRW zones)?	-	The vast majority of the archaeological deposits identified at the Brickworks comprised quantities of rubble and other waste materials. These were found across all BRW areas that were investigated. In some instances, the rubble derived from structures that had been demolished in the immediate vicinity (eg BRW2, 3, and 8), however, there was also an observable trend of debris being relocated across the site (eg to BRW7 and 8). The preservation of structures was variable. In most instances, there were no surface indications of the underlying remains. Several discrete cast concrete features were found to have no underlying structural presence (eg BRW1), and the high concentration of rubble was not a reliable indicator of in situ remains (eg BRW7). Where structures were found (eg BRW2, 3, and 8), these were often completely concealed by rubble or a thin layer of topsoil. Much of the identified material dated to the Post World War II Phase. In addition to being the longest phase of use at the Brickworks, it also saw some of the most widespread changes. This included the establishment of the Brickworks Hostel (BRW2), the construction of the extrusion plant (BRW11), Hardy Patent Kiln 2, and Downdraught Kilns, and extensive modifications to the Staffordshire Kiln and Hardy Patent Kiln 1 (BRW12). These works had comprehensively removed the majority of archaeological deposits associated with the Expansion Phase. Where materials dated to this period were identified, they also consisted of relocated rubble deposits. Extensive structural remains associated with the Establishment Phase had been preserved (BRW8). This comprised a minimum of five kilns associated with the experimental plant.

Research question	Theme	Response
Is there any remaining archaeological evidence of the early phase operation of the site (BRW1 and 8)? What light can be shed on the operation of the site in its early years from those remains? Can technological change be determined / mapped / investigated further through those remains?	ACT: • Canberra as the nation's capital—Developing ACT and regional economies • Canberra as a planned environment—Early federal government landscape and urban planning Australia: • Developing local, regional, and national economies—Industry, mining, and transport • Working—Labour	Few archaeological features were identified in BRW1. Those that were identified were associated with demolition and the dumping of waste materials. No evidence of early phase operation was identified. Extensive archaeological remains were located in BRW8. These included the remains of five kilns, two drains, and the remains of several structures (the latter two discussed below). The kiln remains were representative of three types of intermitted kiln design—clamp, Scotch, and downdraught. Each of these kilns presents different technological requirements for construction and use. Clamp kilns are the only truly temporary type of kiln. They are constructed from green bricks and designed to be fired a single time, producing approximately 80 per cent of useable bricks from the total number fired. One clamp kiln was identified in BRW8. It is not possible to determine where in the timeline of the experimental plant this kiln occurred, however, it likely fired the bricks used to construct one of the experimental kilns. Two Scotch kilns were identified. These are open kilns, with no ceiling and only three permanent walls. These kilns are generally easy to construct, although are less energy efficient and predictable. The two Scotch kilns—whilst being of the same kiln type—showed different construction methods, indicating that experiments were being conducted with the best way to construct this kiln type. Two downdraught-turned-Scotch kilns were identified. Downdraught kilns are an enclosed kiln, with four permanent walls and a ceiling. To aid in ventilation, they also have a subsurface flue and external chimney stack. Whilst they are a more complex kiln to construct and operate, they provide more predictable firing conditions. At some point during the use of the two downdraught kilns, the flues were

Research question	Theme	Response
		decommissioned, and the ceiling and fourth wall were removed to convert them into Scotch kilns. It is unknown why this occurred, but could be related to functionality, flaws in the design, or accidental damage. Historical documents indicate there was at least six experimental kilns in the plant. This suggests that at least one further kiln has not been identified. Moreover, if clamp kilns were not included in the historical kiln count, there are likely to be additional kiln remains. The use of the three variations of intermittent kiln demonstrates technological change. The first bricks would have been made in a clamp kiln—this would have been the first opportunity for the workers to experiment with size, shape, and ingredient quantities. The use of these bricks in the No 1 Kiln also would have provided valuable insight into the quality and durability of the bricks. As subsequent bricks and kilns were made, the workers would have gained detailed knowledge about the methods to create the best quality brick. Likely once the first couple of Scotch kilns were constructed and working effectively, then a foray was made into downdraught kilns. This would have required the acquisition of a number of skills, including the construction of subsurface flues and a chimney stack, and how to control the kiln for the best firing outcome. Further, the conversion of the two downdraught kilns into Scotch kilns would have required skill and effort. Rather than demolishing the kilns and constructing new ones, this action shows investment in the longevity of the kilns and the experimental plant. The identification of further kilns in the experimental plant may provide additional information, such as: • a more complete count of the total number of kilns;

Research question	Theme	Response
		• whether further variations of the Scotch kiln were made; and • whether additional downdraught kilns had been experimented with, and whether these were maintained as downdraught kilns.
Is there any remaining archaeological evidence of the extraction processes used in the quarry? Can we see phases of change in those processes? How likely is the survival of clay extraction processes in this quarry and other quarries?	-	Archaeological evidence of extraction processes was not identified in BRW7 (the quarry). Isolated remnants of broken railway track and fastener plates were recovered, although these were out of situ. It is unlikely that evidence of the extraction processes survives in the quarry. During the operation of the Brickworks, the quarry underwent continuous change and disturbance. The quarry floor comprises various deposits of debris and waste material, whilst the eastern ridge is characterised by a deep, widespread distribution of late 1960s to 1970s brick rubble. Evidence of extraction processes may survive in other quarries, however, this would be dependent on the level and nature of subsequent disturbances.
What evidence remains of the accommodation structures on site? What was their nature and configuration (BRW2, 3, and 8)?	ACT: • Canberra as a planned environment—Early federal government landscape and urban planning Australia: • Building settlements, towns,	Limited evidence was identified for the c1916 dormitories and bathhouse in BRW8. The southeastern corner of the bathhouse was located, although it had been significantly disturbed by demolition and bioturbation from a mature shrub. Structural features (eg a box drain, several postholes) were identified in the area of the dormitories. These features did not align with the 1916 contour survey plan, nor were any substantial remains or artefacts indicative of a domestic structure identified. No evidence for the 1927–1942 married quarters was identified in BRW2. It is likely all of this material was removed following its demolition and prior to the construction of the Brickworks Hostel.

Research question	Theme	Response
	and cities—Accommodation • Developing Australia's cultural life—Domestic life	The quantity of 1930s artefacts located in BRW8 may relate to the occupation of the married quarters. Several remnants of the Brickworks Hostel buildings were identified in BRW2 and 3. These included the kitchen portion of the mess hall, the meat safe, a sleeping hut, and the amenities block. The locations of these structures match the surviving plans and 1950 aerial photograph of the site.
Can we find out anything about the people who worked at the site and how they lived (BRW2, 3, and 8)? Is there a material culture difference apparent in the artefacts that show status/living conditions between living quarters? Can phases of occupation be found in the archaeological remains?	Australia: • Developing Australia's cultural life—Domestic life	Due to the effective demolition of the married quarters and Brickworks Hostel and limited evidence for the dormitories, few inferences could be made regarding status, living conditions, or phases of occupation. The remains of beverage bottles, butchered faunal remains, and personal objects provided insight into the lives of the workers who occupied the Brickworks. The quantity of alcohol bottles—particularly beer bottles—was indicative that the consumption of alcoholic beverages was commonplace. This may have been supplemented by communal cooking and meals, as sheep was a large meat-yielding animal. The presence of a number of hygiene and grooming products and dress shoes showed a consideration for personal appearance, which would have suffered during daily hard labour at the Brickworks. The addressograph plates collected during the investigations could not be determined as being directly associated with employees or vehicles at the Brickworks. These require further research to determine their purpose and why they were located within the Brickworks Hostel mess hall.
Is there any remaining archaeological evidence of the	ACT:	Two railway cuttings were identified in the northern extent of BRW10. Excavation within these cuttings identified a modified

Research question	Theme	Response
railway system used to connect the brickworks to Canberra? What can we deduce about its nature and function? Can this information be used to build a picture of the railway and similar railway remains for elsewhere in Canberra such as Old Parliament House (BRW10 and 11)?	• Canberra as a planned environment—Early federal government landscape and urban planning Australia: • Developing local, regional, and national economies—Industry, mining, and transport	embankment separating the two channels, which had been raised by the deposition of material removed during excavations for the cuttings. No evidence of the cuttings was present in the landscape once they merge into a single track. No in situ remnant railway infrastructure was identified within the two cuttings. A quantity of railway joint bars was exposed, however, these had been deposited in a pile following the removal of all other fabric. The partial presence of the cuttings and lack of further archaeological evidence of the railway line means that little can be inferred about its nature and function that is not already known from historical documentation.
Do the underground flues show evidence of change over time and modification? Do they exhibit signs of 'usewear'—vitrification of the brick surfaces from hot gases? Can they tell us more about the operation of the place than is apparent from the surface remains?	ACT: • Canberra as the nation's capital—Developing ACT and regional economies • Canberra as a planned environment—Early federal government landscape and urban planning Australia:	The subsurface flues for the Hardy Patent Kilns 1 and 2 could not be physically accessed. Hydro excavation investigations identified that the flues associated with the Hardy Patent Kiln 1 had been extensively modified—portions of the original brick flue had been collapsed and replaced by cast concrete channels, and the quantity of brick rubble below the internal floor surface may suggest that the flues were rerouted when the modifications were made. It is probable that the Hardy Patent Kiln 2 flues were constructed to reflect the changes made to the earlier kiln. There was some ambiguity concerning whether the Staffordshire Kiln flues had also been replaced in the c1950s. Overall, the flues were in good condition with no obvious signs of alteration and the observable brick frogs were consistent with those produced by the experimental kilns. This would suggest the present flues are the

Research question	Theme	Response
	• Developing local, regional, and national economies—Industry, mining, and transport • Working—Labour	original 1915 structures. However, the historical report of disrepair and that the c1960s Downdraught Kiln flues have been constructed using a highly similar brick bond casts some doubt on this. No obvious 'usewear' was identified in the Staffordshire Kiln flues. Irregular striations of white and grey brick and distinct changes in brick appearance were identified in the Downdraught Kilns flues. However, the inconsistency of the patterning cannot be explained by differential heat damage. The mapping of the subsurface flues of the Staffordshire and Downdraught Kilns provides additional information to understand how the heat generated during the firing process was managed.

6 Significance assessment

6 Significance assessment

The following section provides an assessment of the archaeological features identified during this investigation against the ACT Heritage criteria.

The archaeological investigation did not adhere to existing registered heritage curtilages, and—instead—investigated the Precinct as a wholistic historical landscape. As such, it has resulted in the understanding of new information, some of which is located outside of the curtilage. This significance assessment should be seen as a contributory component to that provided in the 2021 CMP.

6.1 Statutory framework

The ACT heritage legislation (the Heritage Act and the *Heritage Legislation Amendment Bill 2013*) aims to represent and protect the rich natural and cultural heritage of the ACT. The legislation establishes a system for the recognition, registration, and conservation of natural and cultural heritage places and objects, including Aboriginal places and objects. Amendments made to the Heritage Act in 2014 formally adopted the Heritage Convention (HERCON) criteria for assessing heritage significance:

a) Importance to the course or pattern of the ACT's cultural or natural history
b) Uncommon, rare, or endangered aspects of the ACT's cultural or natural history
c) Potential to yield important information that will contribute to an understanding of the ACT's cultural or natural history
d) Importance in demonstrating the principal characteristics of a class of cultural or natural places or environments
e) Importance in exhibiting particular aesthetic characteristics valued by the ACT community or a cultural group in the ACT
f) Importance in demonstrating a high degree of technical achievement for a particular period
g) Strong or special association with the ACT community or a cultural group within the ACT for social, cultural, spiritual reasons. This includes the significance of a place to Indigenous peoples as part of the continuing and developing of cultural traditions
h) Special association with the life or works of a person, or people, important to the history of the ACT

The 'Yarralumla Brickworks' and the 'Yarralumla Brickworks Railway Remnants' are included on the ACT Heritage Register (Appendix A).

A significance assessment of entire Precinct is provided in Section 4 of the CMP. The assessment found that:

- 'Yarralumla Brickworks' meets criteria a), b), c), d), e), and g);
- 'Railway Remnants' meets criteria a) and b).

6.2 Archaeological significance

The archaeological components of the Brickworks are not referenced in the 'Yarralumla Brickworks' or 'Railway Remnants' citations. The significance assessment of the Brickworks and railway remnants in the 2021 CMP noted that the archaeological potential of the site may contribute to criteria a), b), c), d), and f).

A number of the features identified as intrinsic to the heritage significance of the 'Yarralumla Brickworks' citation have been subject to archaeological assessment during this investigation (eg the quarry and railway remnants). Where archaeological features have been assessed as not meeting the relevant heritage criterion, the overall significance of the item should not be considered diminished as they may meet other criteria for attributes beyond their archaeological value.

The following table provides an assessment of the identified archaeological remains against the HERCON criteria.

Table 6.1 Significance assessment of the archaeological remains.

Heritage significance criteria	Assessment
a) Importance to the course or pattern of the ACT's cultural or natural history	**Establishment Phase, 1911–1920** Archaeological remains associated with this phase included those found in BRW7, 8, and 12. • BRW7—The quarry was important to the ongoing function of the Brickworks, supplying the majority of the materials required. In this way, it contributed to the course of the ACT's history, playing a crucial role in the brick manufacturing process. This is not reflected in the archaeological resource present within the quarry, which was predominantly representative of its later closure years and general waste deposition. • BRW8—The experimental plant provided the means in which to build Canberra. The kilns did this in a multitude of ways. They allowed the early brickmakers to experiment with the brick production process, such as different recipes, firing techniques, and brick forms. They also provided a space to experiment with brick kiln construction, demonstrating that a number of kiln forms were trialled. Moreover, their contribution to the course of the ACT's history went beyond the immediate experimental aims, manufacturing the bricks for the construction of the Staffordshire Kiln and the Kingston Powerhouse. In turn, both of these latter structures played significant roles in the supply of building materials and power to the growing capital city. Whilst the experimental plant was not intended nor designed to be long lasting, this does not diminish the role in played in the establishment and course of the ACT's history. • BRW12—Discussed below. The archaeological remains of this phase as present in BRW8 meet this criterion. **Expansion Phase, 1921–1942** The archaeological remains associated with this phase included those found in BRW10 and 12. • BRW10—The railway was a key component in the operation of the Brickworks, as it allowed for the bulk transport of bricks from the Precinct to major building sites around Canberra.

Heritage significance criteria	Assessment
	The two cuttings and dividing embankment are surviving elements indicative of this contribution to the course of the ACT's history. • BRW11—Archaeological evidence of the railway sidings was not identified. • BRW12—Discussed below. The archaeological remains of this phase as present in BRW10 meet this criterion. **Post World War II Phase, 1944–1976** Archaeological remains associated with this phase included those found in BRW2, 3, and 12. • BRW2 and 3—The Brickworks Hostel was an important part of the operation of the Brickworks and a component of the wider supply of worker accommodation in the ACT. This is not reflected in the archaeological resource present within this area, which was highly fragmentary and not demonstrative of its residential nature. • BRW12—The six extant kilns contributed to the course of the ACT's history as the first industrial manufacturing facility commissioned for and constructed in the Territory, with the specific purpose to construct the new capital city. The subsurface flues are extensions of this significance, as they are integral to their effective functioning. The archaeological remains of this phase as present in BRW12 meet this criterion. **Post-Closure Phase, 1976–2017** No meaningful archaeological deposits or features were identified for the Post Closure Phase. The archaeological remains for this phase do not meet this criterion. **Other** Archaeological remains that could not be attributed to the above phases included those found in: • BRW1—No meaningful archaeological deposits or features were identified in this area. The archaeological remains for this area do not meet this criterion.
b) Uncommon, rare, or endangered aspects of	**Establishment Phase, 1911–1920**

Heritage significance criteria	Assessment
the ACT's cultural or natural history	Archaeological remains associated with this phase included those found in BRW7, 8, and 12. • BRW7—The quarry is a singular example of its type for the Brickworks and an uncommon aspect of the ACT's industrial history. This is not reflected in the archaeological resource present within the quarry, which predominantly consisted of large quantities of general waste deposition and brick rubble accumulated during its later closure years. These deposits were not uncommon. • BRW8—The archaeological remains of the experimental plant are a rare aspect of the ACT's history. The Brickworks as a whole complex is the only example of a twentieth century industrial brick making complex within the ACT, and the experimental plant represents the establishment of this key facility. Moreover, the experimental plant is a rare example of archaeological remains demonstrative of the early twentieth century beginnings of the ACT • BRW12—Discussed below. The archaeological remains of this phase as present in BRW8 meet this criterion. **Expansion Phase, 1921–1942** The archaeological remains associated with this phase included those found in BRW10 and 12. • BRW10—The railway remnants are the rare example of the once extensive industrial railway network in Canberra. This network was fundamental for the for the bulk transport of bricks from the Precinct to major building sites around Canberra. The two cuttings and dividing embankment are surviving elements are the only known surviving elements of this network, making them a rare aspect of the ACT's history. • BRW11—No archaeological evidence of the railway sidings was identified in this area. • BRW12—Discussed below. The archaeological remains of this phase as present in BRW10 meet this criterion. **Post World War II Phase, 1944–1976** Archaeological remains associated with this phase included those found in BRW2, 3, and 12.

Heritage significance criteria	Assessment
	• BRW2 and 3—The Brickworks Hostel was one phase of worker accommodation at the Brickworks and one of a number of mid twentieth century worker hostels in the ACT. The archaeological resource present within this area was high fragmentary and not uncommon. • BRW12—The six extant kilns are an unusually complete example of a complex demonstrating the operation of a twentieth century large scale urban brickworks. The Staffordshire and Hardy Patent Kilns are part of a relatively small number of surviving continuous kilns in a national context. The subsurface flues are extensions of this significance, particularly as given their intact nature. The archaeological remains of this phase as present in BRW12 meet this criterion. **Post-Closure Phase, 1976–2017** No meaningful archaeological deposits or features were identified for the Post Closure Phase. The archaeological remains for this phase do not meet this criterion. **Other** Archaeological remains that could not be attributed to the above phases included those found in: • BRW1—No meaningful archaeological deposits or features were identified in this area. The archaeological remains for this area do not meet this criterion.
c) Potential to yield important information that will contribute to an understanding of the ACT's cultural or natural history	**Establishment Phase, 1911–1920** Archaeological remains associated with this phase included those found in BRW7, 8, and 12. • BRW7—Whilst the quarry is an outcome of the mining processes, the archaeological resource present within the area was not reflective of this, predominantly consisting of general waste and brick rubble deposition. • BRW8—The experimental plant has the potential to yield information to further the understanding of early twentieth century intermittent kiln construction and use, in addition to the developmental timeline of the Brickworks and the industrial processes related to brickmaking in the ACT. The early years of the Brickworks are largely unknown, and the experimental plant has the potential to identify key events and changes within this

Heritage significance criteria	Assessment
	timeline. More broadly, intermittent kilns are an under-represented feature in the archaeological record, and information from the experimental plant could contribute to the understanding of their construction, use, and maintenance. • BRW12—Discussed below. The archaeological remains of this phase as present in BRW8 meet this criterion. **Expansion Phase, 1921–1942** The archaeological remains associated with this phase included those found in BRW10 and 12. • BRW10—The railway remnants are representative of a small portion of the once extensive industrial railway network in Canberra. The archaeological resource associated with the railway did not have the potential to contribute further information about the construction, nature, or configuration of the railway. • BRW11—No archaeological evidence of the railway sidings was identified in this area. • BRW12—Discussed below. The archaeological remains for this phase do not meet this criterion. **Post World War II Phase, 1944–1976** Archaeological remains associated with this phase included those found in BRW2, 3, and 12. • BRW2 and 3—There is little documentary evidence regarding the Brickworks Hostel and its inhabitants. The archaeological resource was highly fragmentary and did not contain any deposits indicative of its residential nature. • BRW12—The superstructures of the six extant kilns are well understood for their technical achievement, functional processes, and successive alterations. The subsurface flue components have the potential to contribute further to the understanding of how the use of the kilns changed over the course of the Brickworks. The archaeological remains of this phase as present in BRW12 meet this criterion. **Post-Closure Phase, 1976–2017**

Heritage significance criteria	Assessment
	No meaningful archaeological deposits or features were identified for the Post Closure Phase. The archaeological remains for this phase do not meet this criterion. **Other** Archaeological remains that could not be attributed to the above phases included those found in: • BRW1—No meaningful archaeological deposits or features were identified in this area. The archaeological remains for this area do not meet this criterion.
d) Importance in demonstrating the principal characteristics of a class of cultural or natural places or environments	**Establishment Phase, 1911–1920** Archaeological remains associated with this phase included those found in BRW7, 8, and 12. • BRW7—The quarry demonstrates the principal characteristics of a twentieth century industrial resource extraction zone. The archaeological resource present within the area was not reflective of this, predominantly consisting of general waste and brick rubble deposition. • BRW8—The experimental plant, whilst fragmentary in places, demonstrates the principal characteristics of its kind. It comprises the footprints of multiple kilns, each one with differing characteristics indicative of the experimental nature and intentions. • BRW12—Discussed below. The archaeological remains of this phase as present in BRW8 meet this criterion. **Expansion Phase, 1921–1942** The archaeological remains associated with this phase included those found in BRW10 and 12. • BRW10—The railway remnants do not demonstrate the principal characteristics of a railway and the archaeological resource present in the area did not contribute to its character. • BRW11—Archaeological evidence of the railway sidings was not identified. • BRW12—Discussed below. The archaeological remains for this phase do not meet this criterion.

Heritage significance criteria	Assessment
	Post World War II Phase, 1944–1976 Archaeological remains associated with this phase included those found in BRW2, 3, and 12. • BRW2 and 3—The Brickworks Hostel was a precinct comprising of communal mess areas, amenities blocks, and sleeping huts. Although the archaeological resource was consistent with its function, it did not demonstrate the principal characteristics of an accommodation area. • BRW12—The six extant kilns demonstrate aspects of the processes and operations common to large scale, industrial brick production. The subsurface flues are extensions of this significance, as they are integral to their effective functioning. The archaeological remains of this phase as present in BRW12 meet this criterion. **Post-Closure Phase, 1976–2017** No meaningful archaeological deposits or features were identified for the Post Closure Phase. The archaeological remains for this phase do not meet this criterion. **Other** Archaeological remains that could not be attributed to the above phases included those found in: • BRW1—No meaningful archaeological deposits or features were identified in this area. The archaeological remains for this area do not meet this criterion.
e) Importance in exhibiting particular aesthetic characteristics valued by the ACT community or a cultural group in the ACT	**Establishment Phase, 1911–1920** Archaeological remains associated with this phase included those found in BRW7, 8, and 12. • BRW7—The quarry is an aesthetically distinctive area, comprising a combination of open space and exposed rock outcrops. The archaeological resource present in this area did not contribute to its character. • BRW8—The experimental plant was not designed to have an aesthetic quality and the archaeological remains are not indicative of any particular aesthetic design. • BRW12—Discussed below.

Heritage significance criteria	Assessment
	The archaeological remains for this area do not meet this criterion. **Expansion Phase, 1921–1942** The archaeological remains associated with this phase included those found in BRW10 and 12. • BRW10—The railway remnants are not aesthetically distinctive and the archaeological resource present in this area did not contribute to its character. • BRW11—Archaeological evidence of the railway sidings was not identified. • BRW12—Discussed below. The archaeological remains for this area do not meet this criterion. **Post World War II Phase, 1944–1976** Archaeological remains associated with this phase included those found in BRW2, 3, and 12. • BRW2 and 3—There are no extant buildings belonging to the Brickworks Hostel, and the archaeological resource of the area was highly fragmentary. It had no aesthetic characteristics. • BRW12—The six extant kilns have aesthetic significance for their industrial characteristics. The subsurface flues have aesthetic values as part of this industrial character of the Brickworks, demonstrating the use of varying brick bonds to create domed ceilings and arched passageways. The archaeological remains of this phase as present in BRW12 meet this criterion. **Post-Closure Phase, 1976–2017** No meaningful archaeological deposits or features were identified for the Post Closure Phase. The archaeological remains for this phase do not meet this criterion. **Other** Archaeological remains that could not be attributed to the above phases included those found in: • BRW1—No meaningful archaeological deposits or features were identified in this area.

Heritage significance criteria	Assessment
	The archaeological remains for this area do not meet this criterion.
f) Importance in demonstrating a high degree of technical achievement for a particular period	**Establishment Phase, 1911–1920** Archaeological remains associated with this phase included those found in BRW7, 8, and 12. • BRW7—The quarry, whilst integral in the function of the Precinct, is not a technical achievement. The archaeological resource identified in this area were not reflective of any technological processes. • BRW8—Although the experimental plant demonstrates that technical processes were being trialled, the archaeological resource of the area does not demonstrate a high degree of technical achievement. The archaeological remains for this area do not meet this criterion. **Expansion Phase, 1921–1942** The archaeological remains associated with this phase included those found in BRW10 and 12. • BRW10—The railway remnants do not display a high degree of technical achievement. • BRW11—Archaeological evidence of the railway sidings was not identified. • BRW12—Discussed below. The archaeological remains for this area do not meet this criterion. **Post World War II Phase, 1944–1976** Archaeological remains associated with this phase included those found in BRW2, 3, and 12. • BRW2 and 3—The Brickworks Hostel was an accommodation precinct built to house workers. The archaeological resource present within this area was not demonstrative of creative or technical achievement. • BRW12—The process of brick production and the six extant kilns at the Brickworks are important for the achievement of building the capital city with locally produced materials. The subsurface flues have value as part of this. However, they were not innovative or demonstrative of a high degree of technical achievement at the time of construction.

Heritage significance criteria	Assessment
	The archaeological remains for this area do not meet this criterion. **Post-Closure Phase, 1976–2017** No meaningful archaeological deposits or features were identified for the Post Closure Phase. The archaeological remains for this phase do not meet this criterion. **Other** Archaeological remains that could not be attributed to the above phases included those found in: • BRW1—No meaningful archaeological deposits or features were identified in this area. The archaeological remains for this area do not meet this criterion.
g) Strong or special association with the ACT community or a cultural group within the ACT for social, cultural, spiritual reasons. This includes the significance of a place to Indigenous peoples as part of the continuing and developing of cultural traditions	**Establishment Phase, 1911–1920** Archaeological remains associated with this phase included those found in BRW7, 8, and 12. • BRW7—The quarry as a landscape feature and component of the Brickworks holds special associations with the ACT community. The archaeological resource of this area is not reflective of the association. • BRW8—The Brickworks holds strong associations with the local Yarralumla community and with the wider Canberra population. As the experimental plant represents the establishment of the Precinct, it, by extension, may also have the same strong associations. This would require consultation with the community. The archaeological remains of this phase as present in BRW8 may meet this criterion. **Expansion Phase, 1921–1942** The archaeological remains associated with this phase included those found in BRW10 and 12. • BRW10—The railway remnants do not individually hold special associations with the ACT community. • BRW11—Archaeological evidence of the railway sidings was not identified. • BRW12—Discussed below.

Heritage significance criteria	Assessment
	The archaeological remains for this area do not meet this criterion. **Post World War II Phase, 1944–1976** Archaeological remains associated with this phase included those found in BRW2, 3, and 12. • BRW2 and 3—The Brickworks Hostel provided accommodation to the workers at the Brickworks, many of whom still reside or have descendants who reside in Canberra. The Brickworks Hostel likely held strong associations for them. However, the archaeological resource of the area is highly fragmentary and not reflective of this connection. • BRW12—The Brickworks holds strong associations with the local Yarralumla community and with the wider Canberra population. The six extant kilns are integral to this association. The subsurface flues are extensions of this significance. The archaeological remains of this phase as present in BRW12 meet this criterion. **Post-Closure Phase, 1976–2017** No meaningful archaeological deposits or features were identified for the Post Closure Phase. The archaeological remains for this phase do not meet this criterion. **Other** Archaeological remains that could not be attributed to the above phases included those found in: • BRW1—No meaningful archaeological deposits or features were identified in this area. The archaeological remains for this area do not meet this criterion.
h) Special association with the life or works of a person, or people, important to the history of the ACT	**Establishment Phase, 1911–1920** Archaeological remains associated with this phase included those found in BRW7, 8, and 12. • BRW7 and 8—The Brickworks has been associated with many locally employed workers during its operation. This is not represented within the archaeological resource of these areas. The archaeological remains for this area do not meet this criterion. **Expansion Phase, 1921–1942**

Heritage significance criteria	Assessment
	The archaeological remains associated with this phase included those found in BRW10 and 12. • BRW10—The Brickworks has been associated with many locally employed workers during its operation. This is not represented within the archaeological resource of this area. • BRW11—Archaeological evidence of the railway sidings was not identified. • BRW12—Discussed below. The archaeological remains for this area do not meet this criterion. **Post World War II Phase, 1944–1976** Archaeological remains associated with this phase included those found in BRW2, 3, and 12. • BRW2, 3, and 12—The Brickworks has been associated with many locally employed workers during its operation. The addressograph plates found in the Brickyards Mess house (Section 4.2.3) may identify some of those people. Further detailed research may show if any of those people made a significant contribution to the history of the Brickworks and/or the ACT. At this stage there is no clear evidence that this criterion is met. The archaeological remains for this area do not meet this criterion. **Post-Closure Phase, 1976–2017** No meaningful archaeological deposits or features were identified for the Post Closure Phase. The archaeological remains for this phase do not meet this criterion. **Other** Archaeological remains that could not be attributed to the above phases included those found in: • BRW1—No meaningful archaeological deposits or features were identified in this area. The archaeological remains for this area do not meet this criterion.

6.3 Statement of significance

The Canberra Brickworks Precinct is significant as the first industrial manufacturing facility commissioned for and constructed in the ACT, developed specifically to facilitate the construction of the new capital city. On the surface, the Precinct is an unusually complete example of a complex demonstrating aspects of the operation of a twentieth century large scale urban brickworks. It has a diverse range of heritage values, such as the role it has played in the course of the ACT's history, its aesthetic qualities, and the connection it holds with both the local Yarralumla community and the wider Canberran population. These values are manifested in the intact industrial landscape and the key role it played in the course of the ACT's history.

The archaeological remnants identified in this investigation are only partially reflective of these values. The site has undergone several distinct phases of operation, the later ones often obscuring the earlier activities. However, where archaeological remains that demonstrate the early and complex nature of the site are present, these have the ability to contribute to an understanding both of the site and brick making processes more widely.

The Precinct underwent several distinct phases of operations, each reflective of the broader political contexts that have determined the fluctuation of construction in the capital city.

The archaeological remains of the Establishment Phase are a significant aspect of this development, as the 1913–1916 experimental plant played an integral role in the course of the Brickworks' and the ACT's histories (BRW8). The plant provided the means in which to build the capital city, producing the materials used to construct the Staffordshire Kiln and the Kingston Powerhouse, both of which, in turn, assisted in the further development of Canberra. The surviving kiln structures yield important information that contribute to the understanding of the establishment of the Brickworks and early twentieth century brick making technologies, and embody the principal characteristics of a brickmaking plant. Although previously considered to be a temporary part of the Brickworks, the modification of two kilns to continue operations show an active investment in the longevity of the experimental plant—this demonstrates the value the experimental kilns held, and the efforts expended to continue their operation.

When the Brickworks reopened in 1921, the Expansion Phase saw a suite of changes. The archaeological remnants of these are predominantly restricted to the railway remnants (BRW10). Although no evidence of the railway infrastructure was identified, the cuttings and central embankment are evidence of the process and the surviving elements of the once extensive railway network. They demonstrate the importance of the railway network

to the early twentieth construction efforts in Canberra, particularly as a rare surviving element of this network.

The presence and generally highly intact nature of the subsurface flues (BRW12) are representative of technological developments across the entire life of the precinct. The six extant kilns contributed to the course of the ACT's history as the first industrial manufacturing facility commissioned for and constructed in the Territory, with the specific purpose to construct the new capital city. The subsurface flues are extensions of this significance, as they are integral to their effective functioning and contribute to the industrial character of the site.

Alterations made during the Post World War II and Post Closure Phases resulted in the removal of a large quantity of archaeological material. The archaeological resource of the quarry (BRW7) was particularly reflective of this, with any earlier features associated with the mining technologies obscured by accumulations of general waste and extensive brick rubble deposits. The construction of the extrusion plant in 1971 likely removed any remaining features associated with the 1920s railway sidings (BRW11), and the demolition of the Brickworks Hostel resulted in the loss of domestic deposits left by its inhabitants (BRW2 and 3).

In summary:

- The archaeological remains of the experimental plant (BRW8) have been assessed as meeting criteria a), b), c), and d). They are highly significant.
- The archaeological remains of the railway remnants (BRW10) have been assessed as meeting criteria a) and b). They are moderately significant.
- The subsurface flues (BRW12) have been assessed as meeting criteria a), b), c), d), e), and f). They are highly significant.

7 Impact assessment

7 Impact assessment

The following Statement of Heritage Effects (SHE) assesses the potential heritage impacts from the proposed works to the Precinct in relation to its identified archaeological values.

7.1 The proposal

In formulating the initial concept design for the site, a strategic approach to revitalise the historic landscape for re-use in an urban setting was established. This approach proposes to integrate the site's heritage, cultural and geological elements so that the connection to the industrial process that took place at the Brickworks is maintained.

The redevelopment works would be framed around a central 'heritage precinct', comprising a number of the extant heritage buildings and features. These would be adapted to provide for café and dining spaces, recreational facilities, and commercial and business areas.

The broader setting of the site and areas in the periphery are proposed to be developed, with 360 residential dwellings in a range of mixed-density residential accommodation, including houses, townhouses, and apartment blocks.

7.2 Assessment of impacts

The following impact assessment has been informed by the Masterplan (Figure 7.1 and Figure 7.2).

Table 7.1 Impact to the identified archaeological features and areas of potential.

Area	Impact assessment
BRW1—Building platform and concrete features	The proposed works in this area comprise: • the construction of five townhouses; and • associated landscaping for amenity and services installation. Investigation in this area did not identify any meaningful archaeological deposits or features. There would be **nil** impact to identified archaeological features.
BRW2—Married quarters and Brickworks Hostel	The proposed works in this area comprise: • the construction of 14 townhouses; and • associated landscaping for amenity and services installation.

Area	Impact assessment
	Investigation in this area identified several remnant footings associated with the 1945 Brickworks Hostel, including the 'Brickyards Mess House' and 'Meat Safe' and the concrete slab for the 'Amenities Block'. These features were highly fragmentary due to their comprehensive demolition following the closure of the Brickworks. No domestic deposits associated with the residents of the Brickworks Hostel were identified. No deposits or structures associated with the 1927–1942 married quarters were identified. There would be a **negligible** impact to identified archaeological features. Although features are present in this area, they have been identified as having no significance.
BRW3—Area of postholes and other remains	The proposed works in this area comprise: • the construction of four townhouses; • the construction of two apartment blocks; and • associated landscaping for amenity and services installation. Investigation in this area identified the remnant footings associated with a 1945 Brickworks Hostel 'Sleeping Hut'. These features were highly fragmentary due to their comprehensive demolition following the closure of the Brickworks. No domestic deposits associated with the residents of the Brickworks Hostel were identified. There would be a **negligible** impact to identified archaeological features. Although features are present in this area, they have been identified as having no significance.
BRW4—Single men's quarters	The proposed works in this area comprise: • the construction of one apartment block; • the construction of the main access road to the redevelopment; and • associated landscaping for amenity and services installation. This area has not been investigated. It has been assessed as having low archaeological potential. There **may be** impact to unidentified archaeological features.
BRW5—Clay feature and rubble	The proposed works in this area comprise: • the construction of one apartment block; and • associated landscaping for amenity and services installation. This area has not been investigated. It has been assessed as having low archaeological potential. There **may be** impact to unidentified archaeological features.

Area	Impact assessment
BRW6—Rubble heap/refuse dump	The proposed works in this area comprise: • the construction of one apartment block; and • associated landscaping for amenity and services installation. This area has not been investigated. It has been assessed as having low archaeological potential. There **may be** impact to unidentified archaeological features.
BRW7—Quarry	The proposed works in this area comprise: • infilling across two areas of the existing quarry cutting to provide level surfaces for the construction of six free-standing houses and park landscaping; and • grading of one area of the eastern ridge to provide a level surface for the construction of eight townhouses. Investigation in this area identified vast quantities of brick rubble and general waste deposits, especially on the eastern ridge. The proposed works have been assessed as part of a separate SHE. This is provided in Appendix I. There would be a **negligible** impact to identified archaeological features. Although archaeological features are present in this area, they have been identified as having no significance.
BRW8—Old kiln and dormitories	The proposed works in this area comprise: • the construction of five townhouses; and • associated landscaping for amenity and services installation. Investigation in this area identified four of the six kilns associated with the 1913–1916 experimental plant, plus an additional clamp kiln. The remains of these kilns were generally fragmentary, but certain features had been well preserved. The plant not only provided a space for the early brickmakers to experiment with varying recipes, firing techniques, and brick forms, in addition to different kiln types, but also the means in which to build the capital city—it was the operation and output of the experimental kilns that allowed for the Staffordshire Kiln and the Kingston Powerhouse to be constructed, which in turn provided the means for the ACT to develop. Although previously considered to be a temporary part of the Brickworks, the modification of two kilns to continue operations show an active investment in the longevity of the experimental

Area	Impact assessment
	plant—this demonstrates the value the experimental kilns held, and the efforts expended to continue their operation. There would be a **severe** impact to identified archaeological features. These features have been assessed as meeting ACT Heritage criteria a), b), c), and d).
BRW9—Cottage, stables, coal store	There are no proposed works for this area. This area has not been investigated. It has been assessed as having low archaeological potential.
BRW10—Railway remnants	The proposed works for this area comprise: • landscaping for amenity and provision of public green space. Investigation in this area identified two remnant railway cuttings and central embankment. No evidence of associated railway infrastructure was identified. There **may be** impact to unidentified archaeological features. The exact nature of the landscaping works has yet to be finalised. Care should be taken to maintain the legibility of the railway cuttings and embankment.
BRW11—Railway siding extension	The proposed works for this area comprise: • the construction of two apartment blocks; and • associated landscaping for amenity and services installation. Investigation in this area did not identify any meaningful archaeological deposits or features. There would be **nil** impact to identified archaeological features.
BRW12—Flues and subsurface workings	The are no proposed works for this area. The flues would be made safe and retained in situ. Investigation in this area identified that the Staffordshire Kiln flues are in good condition and the Downdraught Kilns flues are in poor condition. The subsurface flues of the Hardy Patent Kilns 1 and 2 could not be accessed. However, they are likely to still be largely intact and show similar conditions to the Staffordshire and Downdraught Kiln flues. There **may be** impact to identified archaeological features. The proposed method to stabilise and make the flues safe has not been determined.

7.3 CMP policies

The 2021 CMP includes specific conservation policies and advice on the potential incorporation of the archaeological features and potential of the Brickworks. The relevant policies have been extracted from Section 6 of the CMP and are discussed in the following table.

Action	Discussion
Policy 18. Respect the heritage significance of the site when planning to introduce new development 18.1. Ensure new development is based on a whole-of-site appreciation for the heritage significance of the site, the core, and supporting intrinsic features of the Brickworks, railway remnants, and areas of archaeological potential 18.2. Respect the heritage significance of the Brickworks as a whole complex of elements in a landscape setting, with the quarry, railway remnants, and areas of archaeological potential when introducing new development	The investigation of the archaeological features and potential of the Brickworks has provided new information and insights into the history and significance of the site. This understanding was not available at the time of the Masterplan development. The identified archaeological features located in BRW1, 2, 3, and 11 have been assessed as having no significance and, therefore, provide no constraint to the proposed redevelopment. There may be interpretation opportunities to reference these archaeological features within the broader development (eg the married quarters and Brickworks Hostel). The identified archaeological features located in BRW7 are not reflective of the quarry's established landscape and historical values. They have been assessed as having no significance and, therefore, provide no constraint to the proposed redevelopment. The identified archaeological features located in BRW8 have been assessed as having heritage significance for the integral role they played in the establishment of the Brickworks. Opportunities to incorporate the archaeological remains within the redevelopment should be investigated. The identified archaeological features within BRW10 comprise the two cuttings and central embankment of the remnant railway. These features are already recognised as part of its landscape and heritage values. These values have been appropriately incorporated into the Masterplan. The identified subsurface flues part of BRW12 have been assessed as having heritage significance as extensions of the six extant kilns. They would be retained and made safe as part of the redevelopment. There may be interpretation opportunities to reference these archaeological features within the broader development.

Action	Discussion
Policy 28. Assess for impacts from development on areas of archaeological potential 28.1. Refer to the historic archaeological analysis for the site at Section 3.4 of the CMP to understand areas of archaeological potential 28.2. Assess potential development impacts based on the historic archaeological analysis provided at Section 3.4 of the CMP 28.3. Seek an Excavation Permit under Section 61F of the Heritage Act if undertaking an archaeological excavation at the site 28.4. When undertaking excavation work on the site, following an Unanticipated Finds Protocol	This report details the investigation of the archaeological potential of the site as identified in Section 3.4 of the CMP. It has undertaken this investigation in accordance with the Excavation Permit approved under Section 61 of the Heritage Act. This report has provided an assessment of the potential development impacts based on the findings of the archaeological investigation. It is acknowledged that the Masterplan was developed prior to the understanding of the archaeological resource of the site, and that the new information has provided clarity and opportunities for the further advancement of the plan. An Unanticipated Finds Protocol (UFP) should be implemented when undertaking works in BRW1, 2, 3, 7, and 11. This is discussed further in Section 8.

Figure 7.1 Proposed redevelopment Masterplan for the Brickworks. (Source: Doma)

Figure 7.2 Impact of the redevelopment on the areas of archaeological potential. (Source: Doma, with GML overlay)

8 Recommendations

8 Recommendations

The Canberra Brickworks Precinct is significant as the first industrial manufacturing facility commissioned for and constructed in the ACT, developed specifically to facilitate the construction of the new capital city. On the surface, the Precinct is an unusually complete example of a complex demonstrating aspects of the operation of a twentieth century large scale urban brickworks.

The archaeological remnants identified in this investigation are only partially reflective of these values. The site has undergone several distinct phases of operation, the later ones often obscuring the earlier activities.

However, several key findings were made, including the 1913–1916 experimental plant—comprising four of the approximately six experimental kilns and an additional clamp kiln—and the subsurface flue networks for the Staffordshire and Downdraught Kilns, with insights into the possible layouts of the two Hardy Patent Kiln flues.

In light of this, the following recommendations are made:

- **Heritage induction for site personnel—**All site contractors involved in the earthworks stage of the redevelopment should participate in a heritage induction. This induction should include information on the history, heritage values, and significance of the Precinct, the areas of archaeological potential, and the Unexpected Finds Protocol (UFP). This induction should be prepared and delivered by a heritage specialist.
- **Interpretation Strategy**—The significant archaeological remains identified in this report should be interpreted and presented to the public as a means of mitigating any loss of the original fabric. The findings of this report should be incorporated into the Interpretation Strategy for the Precinct, allowing dissemination of the results to the current residents of Yarralumla and the future residents of the Brickworks development. This Interpretation Strategy should identify opportunities for the interpretation of the highly significant experimental plant, subsurface flues, and public display of select artefacts recovered during the excavations.
- **Archival recording**—The subsurface flues should be subject to archival recording prior to the commencement of any major interventions. This should be undertaken in accordance with the *Photographic Recording of Heritage Items Using Film or Digital Capture* (Heritage Council of New South Wales [NSW], 2006) and *How to Prepare Archival Records of Heritage Items* (NSW Heritage Office, 1998). Additional efforts should be made to access the subsurface flues of the Hardy Patent Kilns.

- **Stabilising the subsurface flues**—In accordance with Policy 10.2 of the CMP (Section 5.4.1), repair work should be undertaken to the subsurface flues (particularly the Downdraught Kilns flues) to ensure that they are made safe prior to any actions associated with the redevelopment works commencing. These works should be developed in consultation with an appropriate engineer and assessed for their impact to the heritage significance of the flues through a SHE.
- **Archaeological monitoring**—Monitoring of the proposed works should be undertaken in the following areas:
  - BRW4, 5, 6, and 9—These areas remain uninvestigated. They have been assessed as having low archaeological potential, however, monitoring during the initial groundworks should be undertaken to confirm this potential and that no archaeological features of significance are present.
  - BRW2 Brickworks Hostel 'Mess Hall' (context *95*)—A number of personnel and vehicle record plaques containing identifying information of individuals who worked at the Brickworks were identified in this area. Demolition of the remaining structure should be monitored to allow for the recovery of further plaques, if present.
  - BRW8—Any proposed works to this area should be monitored. There is high archaeological potential for additional kilns associated with the 1913–1916 experimental plant to be present, which may include two further experimental kilns, a chimney, and an unknown number of clamp kilns.
- **Unanticipated Finds Protocol (UFP)**—The proposed works may proceed in BRW1, 2, 3, 7, and 11 without archaeological monitoring. If archaeological material is identified during the works, the UFP should be implemented (Appendix J). Under the UFP, works should stop to allow for the inspection and recording of the finds by a suitably qualified archaeologist. If isolated objects not in situ are found, then these items should be collected. If structural features and/or in situ deposits are found, then the works should be suspended in that location until further assessment is undertaken and appropriate permissions are sought from the ACT Heritage Council.
- **Amendment of the 'Yarralumla Brickworks Precinct' heritage citation**—The ACT Heritage Council should review the existing heritage citation for the Brickworks and update it where necessary with the findings of this report to reflect the new understanding of the historical components and significance of the site.
- **Dissemination of this report—**A hard and digital copy of this report should be provided to the ACT Heritage Library and Canberra District Historical Society.

Appendices

Appendices

Appendix A—'Yarralumla Brickworks' and 'Yarralumla Brickworks Railway Remnants' ACT Heritage Register citation sheets

Appendix B—Excavation Permit Yarralumla-S102-B1

Appendix C—GML Heritage, Canberra Brickworks Precinct—Archaeological Research Design, prepared for Doma Group, September 2020

Appendix D—Navin Officer Heritage Consultants, Archaeological Assessment of the Canberra Brickworks and Environs, Denman Street, Yarralumla, South Canberra, prepared for Land Development Agency, September 2016

Appendix E—GML Heritage, Canberra Brickworks Precinct—Contamination Testing Archaeological Monitoring, March 2021

Appendix F—Records made during March–April and July–August 2021 archaeological test excavations

Appendix G—GML Heritage, Canberra Brickworks Precinct—Archaeological Investigations Artefact Management Strategy, prepared for Doma Group

Appendix H—Catalogue of artefacts recovered during March–April and July–August 2021 archaeological test excavations

Appendix I—GML Heritage, Canberra Brickworks Quarry—Draft Statement of Heritage Effects, prepared for Doma Group, September 2021

Appendix J—Unanticipated Finds Protocol