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Editors: Kay Walsh and David Wardle

History Under Our Feet:
Canberra's World War I Trench System

Mark Butz

Mark Butz is an environmental science graduate with a deep interest in history. He has lived in Canberra since 1980 and has been researching local social and environmental history since 2004. His current research has a particular focus on the Molonglo floodplain, with a number of books in press and in preparation.

In March 1917 changes in the course of the First World War brought to a close a short but eventful chapter in Canberra's history. That chapter, and the setting for its events, were subsequently forgotten until their rediscovery in 2014. This article outlines the unearthing of its story and its significance to the nation, extracted from a centenary history.[1]

Discovering a Forgotten Story

The riverbank setting would have been frequented by Aboriginal people through tens of thousands of years as part of the area called Biyaligee, and after European settlement its deep alluvial soils supported a lucerne paddock on Mill Flat, within the Duntroon property.

In 1910 the Duntroon homestead was selected to become the Royal Military College (RMC), and after the outbreak of the First World War the paddock was put to an altogether different purpose. In 1916-17, at regular intervals and for weeks on end, it hosted soldiers preparing for the Western Front, operating amidst smoke and explosions from bombs and grenades. But after the War was over, its military use faded from memory.

When Lake Burley Griffin filled in 1964, the water backed up onto the floodplain of the Molonglo River and Jerrabomberra Creek, creating a haven for waterbirds and other aquatic animals. Fifty years later, research into the cultural heritage of what is now the Jerrabomberra Wetlands Nature Reserve revealed multiple layers of previously little known history. One of the surprising finds was a record of First World War trenches on Mill Flat, located in the memoirs of Sylvia Curley. Other published documents confirmed trench training in this area during World War I, although the actual location was uncertain.[2]

A scan of the riverside area on 1940s and 50s aerial photographs revealed curious lines and circles directly opposite the RMC and next to the road to the Duntroon ford, and archived files and old maps confirmed that this area had indeed been the location of trenches.[3]

Responding to 'New-old' Technology at the Front

Officers returning from the Front in France and Flanders during 1914–15 brought back detailed information about tactics and weapons, including technologies which were thought to have been largely superseded. The extensive use of grenades and bombs, mortars, machine guns and entrenchments

BELOW: Aerial photograph of the trench site (contrast enhanced), 1940 .
Source: Queanbeyan Run 14302, 29 Mar 1940, NLA

required a rapid response in both munitions supply and training.

Reports also indicated that trench design had gone well beyond haphazard ditches to provide shelter from enemy fire. Sophisticated systems comprised a sequence of trenches and related structures. These were in effect 'underground villages' designed for attack and defence, and for the movement, housing, safety and support of troops. Each layer in the sequence had dimensions and configurations designed to serve a specific purpose. To avoid direct lines of sight, fire and explosive energy in an enemy raid, trenches took on zig-zag, stepped and crenelated patterns, with large earth traverses.[4]

When the Western Front entered a phase of 'mutual siege', with trenches stretching in an unbroken arc from the North Sea to the Swiss border, armies began to attack each other from underground. Mining and sapping (undermining) had characterised historic siege warfare and pre-dated by centuries the use of explosives. This was another warfare form adopted by Germany which forced a change of tactics for the Allies, requiring engineers to engage in mining and countermining.[5]

By late 1915 the British Army required all officers and 12 NCOs of each rifle company to be trained in special schools to handle bombs and grenades, and to then train their own companies. All troops were to receive training, with a special 'bombing reserve' established under an NCO.[6]

In September 1915, an officer was seconded to the Colonial Forces to provide up-to-date advice and training in trench warfare and bombing. Captain E.L.D. Brownell had been commended for distinguished bravery during the Boer War, and became a career soldier with the Worcestershire Regiment, serving in Ceylon and India, and on the Western Front at Aisne, the Marne and Mons. In October 1914 he was wounded, almost fatally. Although his days of serving at the Front were over, Brownell still had an important role to play and in October 1915 he was appointed to the Staff at the RMC. Although he was described as 'an Imperial officer', he had been born in Hobart (in 1876) and had gone to the Boer War with the Tasmanian contingent prior to joining the Worcestershire Regiment in September 1901.[7]

ABOVE: Major E L D Brownell.
Source: RMC Journal Dec. 1919 p.10

Brownell was to work with the Australian Engineers to set up a scheme for instruction of troops in grenade throwing 'under actual service conditions'. Within a few months of Brownell's secondment, all major Army camps had established instructional trench systems – at Enoggera Qld, Mitcham SA, Broadmeadows Vic, Liverpool NSW, Claremont Tas and Claremont WA. These made use of trench designs brought back from the Western Front, replete with a maze of fighting trenches, communication trenches and saps, dugouts and wire entanglements. They also provided demonstrations of mining and bombing, eagerly reported in great detail by newspapers, often with rich pictorials.[8]

National Training at Duntroon

In March 1916, officer training was centralised at RMC Duntroon, in the Australian Imperial Force (AIF) Officers'

Training School (OTS). The OTS trained junior officers of the AIF and applicants for officer commissions, including non-commissioned officers (NCOs) drawn from major camps in each Military District. This created a national standard for training and qualification, replacing separate officer schools. Although the RMC and the OTS were separate entities, the OTS made use of the facilities of the College and adjacent training grounds, and College staff taught also at the OTS. The initial School opened with 405 candidates and ran from March to April 1916; the second had 250 candidates and was longer, from April to June 1916.[9]

Brownell established at Duntroon a new Trench Warfare & Bombing School, which opened in March 1916. This would train officers and NCOs in trench warfare and use of trench weapons, grenades and bombs, or qualify candidates to command companies of grenadiers (bombers). The course ran for up to 20 days, with a written and oral examination. Twelve Schools ran over 12 months, most with 20 to 34 students, and the last (March 1917) with a cohort of 118, capping off a total of 438 students.[10]

As elsewhere, this School used a 'train-the-trainer' approach, with graduating NCOs qualified as instructors of Bombing Schools in Army camps, and assisting in formation of grenadier (bomber) platoons for the AIF. The training only of officers and NCOs was a distinguishing feature of the School held at Duntroon, whereas others around the nation were established to train troops.

Lectures were backed up with practical application in the instructional trench system across the Molonglo River on Mill Flat. The trench system had been dug by 60 men in two parties of 30 from the Liverpool and Goulburn camps. Newspapers reported that the Goulburn contingent comprised men who had volunteered in 'The Men from Snowy River' recruiting march of January 1916.[11]

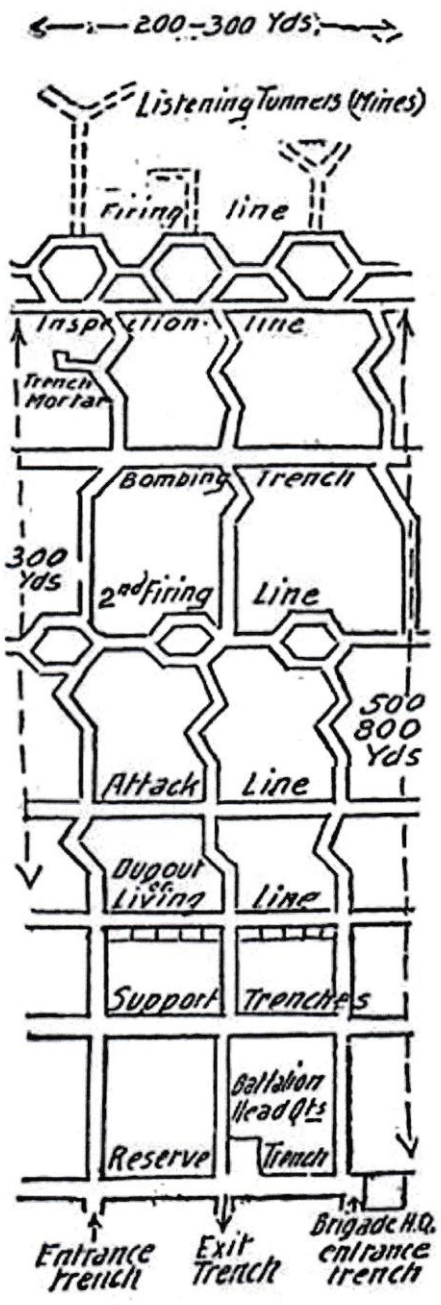
By being one of the last such systems to be built in Australia, the Duntroon system was able to incorporate the most up-to-date features of trench system design. Addressing troops at Goulburn in April 1916, the Governor-General described it as 'the most perfect system of trenches' in Australia and 'an excellent example of the sort of thing which existed at the front'.[12]

A number of sources indicate the likely structure and features of a model system, as taught at Duntroon. These sources include notes and diagrams made by attendees at the Trench Warfare & Bombing School, and a contemporary Melbourne newspaper which took its readers on a virtual tour of a modern trench system, populated with a battalion of troops.[13]

When compared with the pattern visible on aerial photographs, coupled with contemporary images, the Duntroon trenches presented a cross-section of a model trench system. In addition to two communication trenches (entrance and exit trenches), it appears to have included all key layers of a model system, including (from front-line/north-west to rear/south-east):

- an 'enemy' trench area with rear access
- barbed wire entanglements in 'no-man's-land' (from oral history)
- features excavated under 'no-man's-land' (mine tunnel, listening post, bombing sap, and gallery)
- first line fire trench with hexagonal island traverses and forward machine gun emplacements
- inspection trench
- bombing trench with recesses for spring gun, catapult, trench mortar
- trap for enemy raiders (straight trenches converging on machine guns)
- second line fire trench with island traverses
- attack / jumping-off trench
- dugouts or living trench (underground)
- support trench
- reserve trench (underground)
- rear lateral communication trench

The Duntroon system did not conform strictly to the distances cited for a model system, particularly from the second line fire trench to rear, where a model sequence through 400



ABOVE: Making the public aware of a model trench system.
Source: Age (Melb) 12 Feb. 1916, p. 4

yards (360m) is represented within about 80m. This apparent emphasis on the area from the second line fire trench forward reinforces the focus of the Duntroon trenches on training for bombing.[14]

Although the trench system had been declared out-of-bounds for cadets at the RMC, it is clear that the activities of the school made a strong impression on cadets, with one noting in June 1916: 'mock trench warfare goes on daily in our midst'. Later in that year another wrote:

> *As thunder, lightning and H— appear at times and send shudders through the earth, so the bombing schools come and go. For some time there is a silence – the party, under its able instructor, is imbibing a relish for frightfulness. Then, in the true anarchist manner, death and destruction hurtle through the air, overwhelming harmless trenches, while law-abiding citizens quake in their shoes, and pray for the best. The cadets have become familiar with those trenches. To have their functions described is interesting; to take part in attacks with bombing parties is realistic, but to occupy them for a day and a night is rather too impressive.*[15]

Following the original construction, at least nine additional trench digging parties came to Duntroon between March and November 1916. This suggests that the trenches were being repaired after bombing training and after rain and floods. Digging parties were generally of 30 men, all drawn from Goulburn camp except for the last party (of 19) from Liverpool camp, and most spent about two weeks working at the RMC.[16]

The Human Face of War

It is all too easy to focus on geometry, mechanics and technical detail of the trench system, and to lose sight of the human face of the instruction. Training in use of trench systems and bombs had one aim – to equip participants to kill and injure enemy soldiers before they themselves could be killed or injured.

Working with explosives and with high powered bomb-throwing machines was

inherently dangerous, even in the controlled environment of training. Newspapers of the day recognised the dangers, referring to bomb throwers in terms such as *'men who take terrible risks'* and *'the man who juggles death'*.[17] No-one was immune – in November 1915, at a demonstration at Liverpool camp, a jam-tin bomb exploded prematurely, injuring Brownell, and two others.[18]

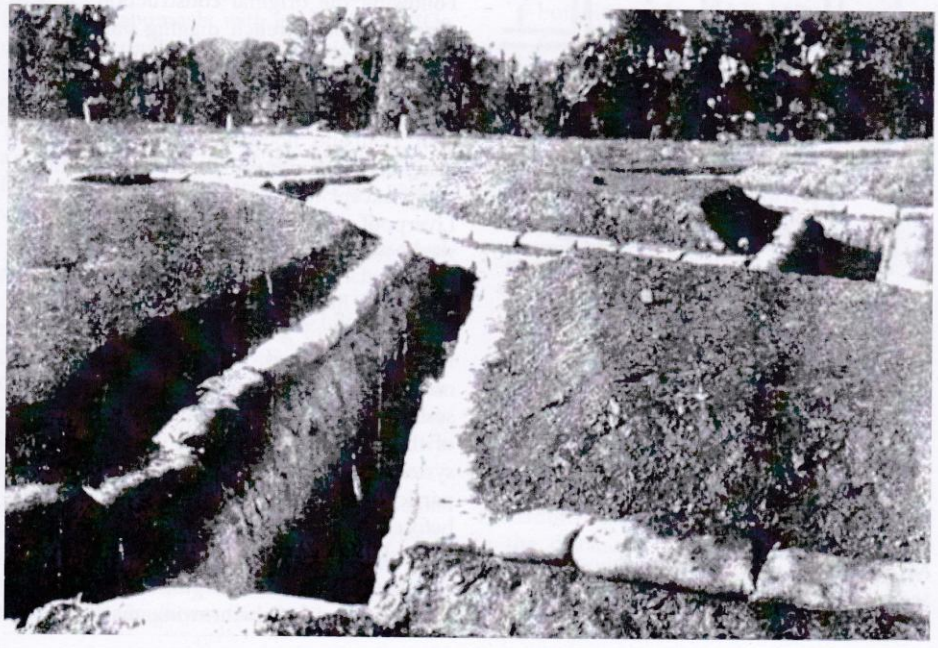
Although statistics are difficult to locate, newspapers reported accidents at camps and schools around Australia and in England and France. Those serving at the Front faced even greater dangers. Bomb throwers were often at the forefront of an attack and had to clear enemy trenches and dugouts, and a number of British and Australian bomb throwers were awarded the Victoria Cross, Military Medal and similar honours.

It is likely that about a quarter of the nearly 440 participants who attended the Duntroon School during 1916-17 did not return from the War, or did not last for long in the period after the War. These participants were officers and senior NCOs. The ranks from Captain down to 2nd Lieutenant, referred to as subalterns, suffered particularly high casualty rates, as these ranks served at the front line and led their men into 'no-man's land' and into the face of enemy fire. Most were not expected to survive unscathed, and the average life expectancy of a British subaltern in the trenches was just six weeks.[19]

This probably applied also to Australian subalterns. Although some 17.5% of the AIF gave their lives, the rate was 23% among officers. Through the course of the War, Duntroon graduates made up just over 1% of the officers of the AIF, but 28% died and two-thirds became casualties. The survivors are likely to have reflected the statistical reality that about 4% of Australian servicemen who came home were to die prematurely due to war-related causes, while 76% were damaged or disabled to some extent.[20]

It is sobering to consider that participants would spend three weeks at the School at Duntroon preparing for battle

BELOW: The front fire line of the Duntroon trench system in 1916, with a forward machine gun emplacement facing the 'enemy' to the left, and showing a maze of hexagonal island traverses and riverbank willows beyond. *Source: Sydney Mail, 10 May 1916, p. 17*



(in addition to their other quite extensive training), but as subalterns at the Western Front they might have a life expectancy of six weeks or less.

The End of the Schools

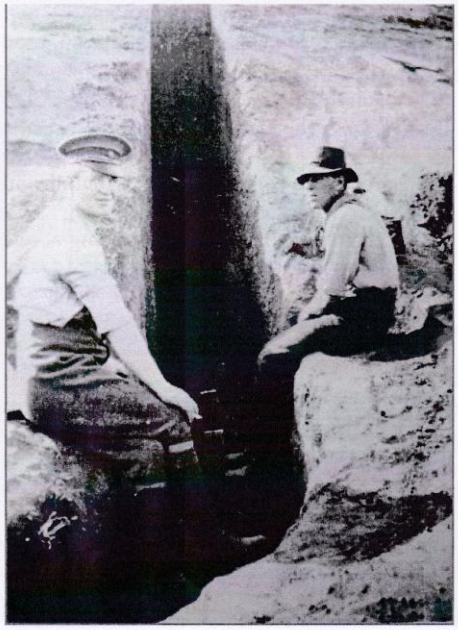
The last School held at Duntroon, in March 1917, had 118 students, more than three times the normal cohort, as it included all of the OTS plus the Instructional Staff. The use of the trench system did not cease altogether at that time. In the second half of 1917 part of the College cadet cohort was prepared for early graduation under a modified syllabus with training in the trench system to receive certification equivalent to having attended the Trench Warfare & Bombing School.[21]

The trench system at Duntroon ceased operation partly because recruit numbers had fallen off, and perhaps because a critical mass of qualified trainers had been created. The related operation at Liverpool camp had ceased four months earlier, in November 1916.[22] Although some camps continued for a time to provide trench training for troops, the ambitious and extensive operation over which Brownell had presided was over.

The nationwide training and instructional trench systems were needed to allow Allied forces to 'catch up' with the type of warfare being waged on the Western Front. It is likely that they achieved all that could be reasonably expected. As practical preparation for service at the Front, they introduced participants to 'new-old' technologies of entrenchment and bombing, and to new technological developments as they arose, in turn helping to reduce casualties. They probably succeeded as a political measure to reassure potential recruits and the broader community that the nation was prepared and capable, at least for a time.

Nonetheless, neither participants nor the broader community could be adequately prepared for what troops ultimately encountered in massive artillery bombardments, tank and aircraft attacks, gas

BELOW: The Duntroon system 20 Apr. 1916 (during Trench Warfare & Bombing School No.2):
(top left) second line fire trenches, looking east; (bottom left) trench catapult in a bombing recess; (right) underground sap
Source: Army Museum of Officer Training



attacks, vicious hand-to-hand trench raiding, and prolonged periods in the mud and misery of the Western Front.

After the War

After the OTS closed in July 1917, the trench system remained largely unattended, despite some use for instruction of Duntroon cadets. Trenches would have quickly begun to collapse without the regular attention they had received from digging parties in 1916–17. Major floods in 1922 and 1925 would have exacerbated this. When the RMC moved to Sydney as a Depression-era saving, from 1930 to 1936, the trenches were largely forgotten, although Max Hill, whose father held the adjacent block as a vegetable garden, recalls playing in the trenches as a child (probably in 1929–30).[23]

After the system fell into disuse, the trench site was delineated in 1920 as a 19 acre block, one of 36 parcels of 'lucerne lands' for fodder growing, with priority intended to be given to soldier settlers. Block 4 was by then referred to as the 'RMC bombing area' or 'Bombing paddock'. Although it attracted rental at a discount rate because of the trenches, it was not actually allocated.[24]

Following the major floods of 1922 and 1925 land use on Mill Flat was changed to four large dairy blocks which operated from 1926.[25] The trench system now became a liability. It had presented hazards for owners of cattle agisted on the old Duntroon paddocks, with instructions issued in 1917 to close gates to prevent cattle gaining access to the 'bombing trenches'.[26] Lessees of Dairy Block 3 also expressed concerns about the risk they posed. It was unclear whether permission had been granted to the RMC to install the trench system ten years earlier and approaches to the Defence Department seeking funds to fill them in had no result. In 1936, an approach road to a new bridge across the Molonglo (later Dairy Flat Bridge) cut across the system and obliterated some of the alignments.[27]

Both the lucerne lands and the dairy leases had been considered temporary leasing arrangements, because the plan for Canberra intended that the flat be permanently inundated as part of East Lake. This was abandoned in 1950 and removed from the City Plan, offering the dairy lessees a reprieve. In the late 1960s, after nearly half a century of this land use, the name Dairy Flat supplanted the Campbell-era name of Mill Flat.

During the 1960s various schemes were mooted for roads crossing Mill Flat, with some potential routes cutting directly through the now forgotten trench system site. Other sensibilities prevailed and routes to the east were ultimately chosen. The trench system site continued to be partly grazed and partly cropped until about the late 1970s, by which time it had been crossed with powerlines and the underground water main from the Googong dam. By 1980 most of the trench system site appears to have gone out of active use, with only the rear one-third of the trench area still under cultivation, within the Goldenholm dairy.

Through the 1980s much of the site was occupied by extensive spoil dumps. Some of this fill may have originated from Capital Hill, excavated for construction of the new Parliament House in 1981–82. The stockpiles here may have been used to construct the approach causeway for a new Dairy Flat bridge and flood protection mounds for the 132kV powerline across Dairy Flat. Some may also have been used in landscaping works for the Jerrabomberra Wetlands in 1987-88. After this period, it is likely that residual spoil was redeployed elsewhere, with remnants spread over the site.

Most of the trench system site became part of the Jerrabomberra Wetlands Nature Reserve in 1990, with the remainder in Goldenholm being sold in 2002 to the Canturf turf farm, which still operates.

While the site in the reserve had been greatly disturbed, its location on the floodplain had precluded urban development which would have compromised or destroyed the trench system. By contrast, most other major instructional trench systems around the country were largely absorbed into urban growth:

Liverpool NSW	Industrial development at Moorebank, Sydney
Broadmeadows Vic	Suburban and industrial development and Maygar Barracks (army), Melbourne
Mitcham SA	Suburban development, Colonel Light Gardens, Adelaide
Enoggera Qld	Within Enoggera (or Gallipoli) Barracks (army), Brisbane
Claremont WA	Suburban development and showground, Claremont, Perth
Blackboy Hill WA	Suburban development, schools and ovals, Greenmount, Perth
Claremont Tas	Suburban and commercial development, Cadbury Estate, Cadbury Factory, Claremont Golf Club, Hobart

Revealing the Site

While the site itself was protected from development, it was unclear what might still remain of trench structures below the surface. Armed with background historical research, initial archaeological investigation was undertaken in late 2014 by the Australian National University, supervised by Dr Tim Denham. A range of geophysical techniques proved inconclusive, largely due to the undulating surface and the effects of site disturbance during the 1980s.[28]

In June 2015 trial excavations followed initial auger samples to develop soil profiles across the site, with locations chosen on the basis of 1940 aerial photography. In the first test excavation it was found that the instructional trench system is still discernible about 60–80cm below today's surface, overlain by a mix of flood sediments and more recent spoil. The old trenches appear as yellow sand bands, contrasting with the black soil of the floodplain.

Several longitudinal layers of the trench system were revealed, representing the sequence from front-line trench to bombing trench. Test pits within trench areas yielded a few artefacts, including a cartridge casing and the metal bases of several shotgun cartridges, possibly a relic from the use of Stokes mortars. These and other metal fragments are being examined through the ANU.

The fill material within the trenches was varied, probably a mixture of back-filled materials and silt from floods in the 1920s and 1930s, topped up with material used by the lessee in 1936 (possibly sand and soil from road construction). A high concentration of sand at the top of some trenches may be due to the inclusion of sandbag fill, either loose or in bags which subsequently degraded. The excavations were backfilled after these investigations, both for safety and to protect the site from the elements.[29]

Conclusion – a National Heritage Asset

The Duntroon trench system is nationally notable as a rare extant example of a World War I instructional trench system, albeit buried. It was of a sophisticated model design and represented the pinnacle of 'scientific warfare' at that time (1916).

Unlike others around the country, the Duntroon system was used only for training of officers and senior NCOs. It appears to have been the last such system to be constructed in Australia, and the last to be in systematic use for instruction.

BELOW: Excavations in June 2015 reveal the trench system: trench line visible as a light sandy band across black soil.
Source: The Author, 2015

The Duntroon system is all the more significant because its location on a river floodplain prevented it being lost to development, whereas other trench system examples around Australia have been absorbed into urban fabric or otherwise developed.

It is essentially an invisible historic place, in that its important design features persist below the modern ground surface. Protection of the trench layout can be readily achieved by leaving it buried (and invisible) and by backfilling after any archaeological excavation.

The early stages of revealing the place have generated significant levels of community interest and enthusiasm, as well as national and international media coverage, reflecting the distinctive nature of this archaeological site. Development and management will focus on enhancing the evocative quality of the place and its value for education and reflection.

In September 2015 the ACT Heritage Grants Program awarded funds to commence above-ground interpretation of the trench system in its centenary year. The site now has markers for trench alignments, educational signs, and the first stage of a loop trail with a self-guiding leaflet, which provide visitors with an understanding of the history of the system and an appreciation of its length and breadth. A future orientation ('mock trench') structure will enhance visitor appreciation of its depth and intentional design.

The 'trench trail' is being integrated into interpretation/education facilities and materials of the nature reserve, and into a future Molonglo River Walk. In time, this walk will address historic uses and broader associations of the place and its environs (Aboriginal, and pre- and post-World War I), to be presented in the broader context of the floodplain (Biyaligee, Mill Flat, Dairy Flat).

Archaeological excavation is expected to continue, seeking to reveal and record more of the site in stages over time. These excavations may provide opportunities for volunteer activities and for public inspection of excavations, subject to site protection and visitor safety requirements.

Additional community involvement in the site may be generated by artworks and performances, particularly by interweaving of cultural and natural heritage of the reserve, with artists-in-residence and writers-in-residence programs, and theatrical/performance works on-site.

Together these activities will help to realise the potential of the site as a singular element in the heritage of Canberra and the nation.

Acknowledgements

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