Sydney Opera House—Lift 36

Historical Archaeology Excavation Report

Report prepared for Sydney Opera House

May 2019

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Report Register

The following report register documents the development and issue of the report entitled Sydney Opera House, Lift 36—Historical Archaeological Assessment and Management Plan, undertaken by GML Heritage Pty Ltd in accordance with its quality management system.

Job No.	Issue No.	Notes/Description	Issue Date
18-0311C	1	Draft for client review	12 March 2019
18-0311C	2	Final report	26 March 2019
18-0311C	3	Final report, with edits to recommendations	9 May 2019

Quality Assurance

GML Heritage Pty Ltd operates under a quality management system which has been certified as complying with the Australian/New Zealand Standard for quality management systems AS/NZS ISO 9001:2008.

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

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Issue No.	3	**Issue No.**	3
Signature		**Signature**	
Position:	Principal	**Position:**	Principal
Date:	9 May 2019	**Date:**	9 May 2019

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1.0 Introduction

1.1 Preamble

The Sydney Opera House (SOH) is undertaking accessibility upgrades and other venue improvements on the Joan Sutherland Theatre. These include works on Lift 36 (Figure 1.1) that have the potential to impact historical archaeological deposits, structures and/or relics.

The project was initially approved under a Section 60 (S60) from the Heritage Council of NSW (2016/s60/64).

GML Heritage Pty Ltd (GML) prepared an archaeological assessment and excavation methodology to mitigate possible impacts arising from the Lift 36 work in July 2018. In summary, we found that:

> *Based on the 2010 assessment, and historical plans … the area associated with Lift 36 holds historical archaeological potential.*
>
> *GML's 2018 assessment of significance describes these items as holding heritage significance at the State and local levels.[1] However, the analysis of archaeological potential may be tempered by the results of bore core analysis.*
>
> *A bore log … provides further insight of the extant sub-surface stratigraphy connected with Lift 36. The log shows five alternating layers of concrete and 'fill' to a depth of 1.65m, whereupon sandstone bedrock is present. A concrete layer abuts the sandstone bedrock, which may be connected with the construction of the SOH. There is a (low) possibility that the lower concrete and sandstone layers relate to the 1902 tram tracks site phase.*
>
> *On the basis of the bore core analysis, the location of Lift 36 is unlikely to be associated with historical archaeological deposits, structures, or relics—if archaeology were present it would comprise locally significant tram tracks. This statement of potential would require archaeological verification.*[2]

In September 2018, Lift 36 construction work began. However, a stop work order was triggered on 27 September when possible archaeological structural remains were found on the southern side of the excavation area.

An initial inspection of the excavation area on 27 September confirmed the presence of historical archaeological features associated with prior historically significant site uses. All construction works within the trench were halted, and the trench was archaeologically cleaned and recorded on 2 and 3 October. Representatives of the NSW Heritage Division inspected the works area and potentially significant remains on 3 October.

The archaeological features potentially relate to the sites use as a nineteenth-century fort (Fort Macquarie) and for the early twentieth-century tram infrastructure (Tramcar House). In December 2018, GML prepared an archaeological recording and a revised heritage assessment and management plan for the finds, which were used to support the project's second S60 application.[3]

In January 2019, after the issue of the S60 for archaeological works (s60/2018/227, Appendix A), GML undertook further excavation in line with S60 conditions 3(a) to 3(f). Works associated with the impact of the archaeological resource were completed in January 2019.

This report complies with S60 consent conditions 3(g), analysis and reporting, and 3(h), final report. It details the findings and outcomes of the archaeological excavations and provides recommendations for the interpretation of the finds.

1.2 Heritage Background for the Current Assessment

The background for assessing the nature of the archaeological items and features identified, and connected heritage values of these items, is based on details provided in the following reports:

- Sydney Opera House Conservation Management Plan (2017 CMP) (*Respecting the Vision, Sydney Opera House—A Conservation Management Plan*, fourth edition, Alan Croker);[4]
- the 2004 archaeological excavation for a lift shaft approximately 7m southwest from the current excavation area, which identified the outer walls of Fort Macquarie (Sydney Opera House Archaeological Recording [GML 2004]);[5]
- the historical archaeological management plan (Sydney Opera House: Vehicle and Pedestrian Safety Project [VAPS] and Forecourt—Archaeological Management Plan and Archaeological Impact Assessment [GML 2010]);[6] and
- the outcomes of our archaeological excavations for the VAPS (Sydney Opera House Bennelong Stormwater Channel Diversion and VAPS Project—Historical Archaeological Excavation Report).[7]

These documents have been used to inform the identification and assessment of archaeological structures identified through the current works.

1.2.1 Heritage Management—Sydney Opera House Conservation Management Plan

The 2017 CMP presents a basic overview of archaeology and a single policy for its management. Archaeology is acknowledged as being present through and across the site and reference is made to an overlay of historical plans that indicate potential former structures (eg 2017 CMP, Figure 4.5.10). However, this overlay is not an archaeological zoning plan and does not assess the integrity or potential of archaeology. The heritage significance assessment does not include historical archaeology.

The 2017 CMP requires that all archaeology, both above and below water level be managed in accordance with Section 4.20.6:

> *With the history of excavation and major construction on the site, and the low-lying rocky nature of the original peninsula, the likelihood of finding material evidence relating to pre-European use and occupation of the site is considered to be limited. However, any surviving material evidence of Aboriginal occupation of the site, including Bennelong's Hut, would be of significance and add to the overall Indigenous cultural heritage values of the site. Any research or archaeological finds resulting from excavation or other disturbance on the site could provide invaluable material for understanding the evolution and occupation of the site, and should be appropriately interpreted to the public.*
>
> *Parts of the original Fort Macquarie walls, constructed c.1817–1821, are the earliest known surviving structures on the site. Although substantially demolished for the tram depot, some sections remain below the Podium and may extend to other areas. Sections of later seawalls and remains of wharves and jetties are also known to exist.*
>
> *The Bennelong Drain, constructed in the 1850s, originally traversed the site but was diverted and encased in concrete during construction work in the 1960s, '70s and '80s. It was diverted again in 2011 as part of the construction of a new underground loading dock under the Forecourt, but remnants of the original drain remain to the south of the Opera House site.*
>
> *The remains of a crude pit for burning shells for building lime was located on the eastern foreshore during the Vehicle Access and Pedestrian Safety Project and has been interpreted in a short film.*

The location of archaeological features and material already found on the site to date should serve as a guide for future work.[8]

Policy 20.10—Archaeology states:

Work involving excavation or investigation of sub-surface objects must be planned and executed in accordance with the requirements of relevant legislation regarding archaeology. This includes:

- *Assessments of the likely archaeological impact of any proposed excavation works by a qualified archaeologist during the planning stages so that any mitigation procedures are handled in a planned and timely manner.*
- *Disturbance or removal of archaeological material, including unexpected finds, carried out under the guidance of a qualified archaeologist.*

Sydney Opera House is responsible for the proper engagement of archaeological expertise and for commissioning post excavation analysis. It is also responsible for the conservation, storage and interpretation of archaeological findings and collections.

Under Policy 18.24 (collections management), all archaeological relics are to be included under the Collections Management Policy that details the strategy to monitor, maintain and manage the collections.

1.3 Structure of this Report

- Section 1—introduction
- Section 2—the historical and archaeological background
- Section 3—the archaeological excavations
- Section 4—updated heritage significance assessment
- Section 5—the photographic archival recording
- Section 6—recommendations arising from the work

1.4 Archaeological Work, Report Authorship and Acknowledgements

Archaeological work and recording were undertaken by Dr Tim Owen (Principal), with advice from Abi Cryerhall (Principal). Emily Bennett (Consultant) and Tim Hill (Consultant) provided on-site assistance. Archival photography was taken by Sharon Johnson (Photographer), assisted by Tim Owen.

This report was prepared by Dr Tim Owen (Principal), with input and review provided by Abi Cryerhall (Principal). Figures were prepared by Annabelle Wijaya (Heritage Consultant) and Cardno (which provided a formal survey of the site with reduced levels).

GML thank Stirling Smith (Heritage Division) and Caitlin Allen for discussion of Sydney forts and their layouts, notably Fort Phillip.

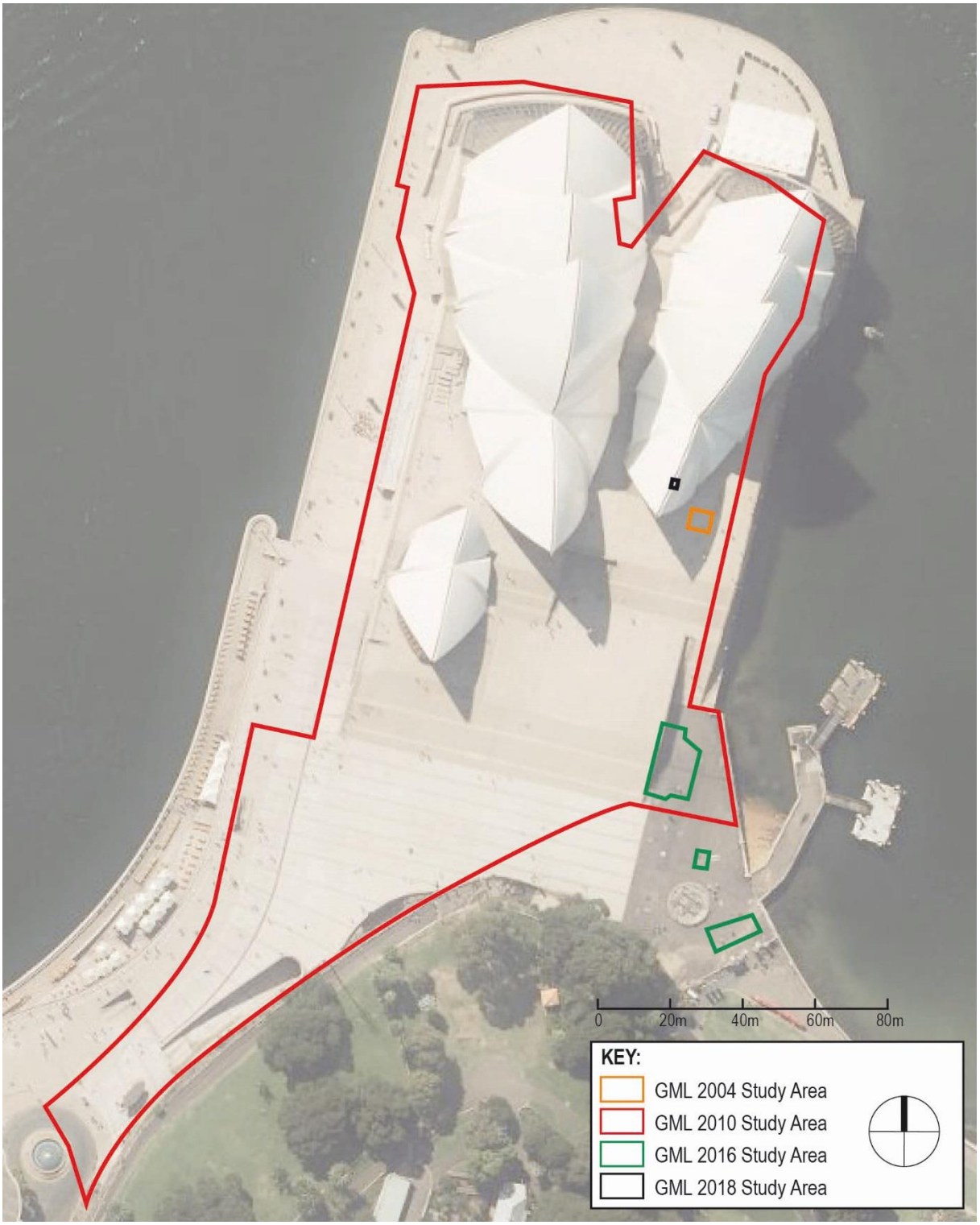


Figure 1.1 Sydney Opera House aerial, with the location of relevant archaeological excavations. The location of Lift 36, and the 2018 archaeological work is shown. (Source: Google Earth Pro, 2018, with GML additions)

1.5 Endnotes

1 GML Heritage, Sydney Opera House Forecourt Excavation—Historical Archaeological Assessment and Management Plan, report prepared for Sydney Opera House, June 2018, p 34.
2 GML Heritage, Lift 36 Historical Archaeological Assessment and Proposed Mitigation Methodology, report prepared for Sydney Opera House, 2018.
3 GML Heritage, Sydney Opera House, Lift 36. Historical Archaeological Assessment and Management Plan, report prepared for Sydney Opera House, 2018.
4 Croker, A, Respecting the Vision: Sydney Opera House—A Conservation Management Plan, report prepared for the Sydney Opera House Trust, 2017.
5 Godden Mackay Logan, Sydney Opera House Archaeological Recording, report prepared for Sydney Opera House, 2004.
6 Godden Mackay Logan, Sydney Opera House: Vehicle and Pedestrian Safety Project and Forecourt—Archaeological Management Plan and Archaeological Impact Assessment, report prepared for the Sydney Opera House Trust, February 2010.
7 GML Heritage, Sydney Opera House Bennelong Stormwater Channel Diversion and VAPS Project—Historical Archaeological Excavation Report, report prepared for the Sydney Opera House Trust, January 2016.
8 Croker, A, *Respecting the Vision: Sydney Opera House—A Conservation Management Plan*, report prepared for Sydney Opera House Trust, pp 225–226.

2.0 Historical Background

2.1 Historical Summary

Bennelong Point's history has been the subject of numerous reports and publications. This section builds on GML 2010, which was underpinned by the endorsed *Sydney Opera House—A Revised Plan for the Conservation of the Sydney Opera House and its Site* (third edition) by James Semple Kerr. A detailed analysis of historical plans of the study area has been presented to underpin the analysis.

Bennelong Point's layered colonial and post-Federation history can be contextualised into the following periods of land use:

- Phase 1: 1788–1795—The earliest period of colonial settlement in Sydney Cove, when Bennelong Point was the location of Bennelong's brick hut and, a short while later, a saltworks and windmill.
- Phase 2: 1788–1802—A period of anxiety for the early colonial settlers when the defensive value of Bennelong Point was realised through the construction of a redoubt (1789), which later fell out of use and was replaced with a 'half moon' battery (1798).
- Phase 3: 1810–1843—Work commenced on the construction of a fort at the northern tip of the peninsula (Fort Macquarie) in 1817; large parts of the rest of Bennelong Point and the surrounding area were reserved for parks and public space.
- Phase 4: 1843–1901—Although it was generally regarded as a flawed defensive facility, Fort Macquarie dominated the area.[1] In the 1860s the fort was augmented with new gun batteries and an esplanade was built around it by creating an encircling seawall. In the 1890s, the western rampart of the fort was demolished (Figure 2.1).
- Phase 5: 1901–1958—In the early twentieth century Fort Macquarie was demolished and a large brick 'tramcar house' was constructed on Bennelong Point (Figure 2.2). The 'shed', built over the former Fort Macquarie, was large enough to house 72 trams on 12 parallel tracks. It became redundant in the 1950s and was briefly used as a carpark.
- Phase 6: 1955–present—This period saw the conception of Sydney Opera House, which was completed over the next two decades amid ongoing controversy and opened in 1973.

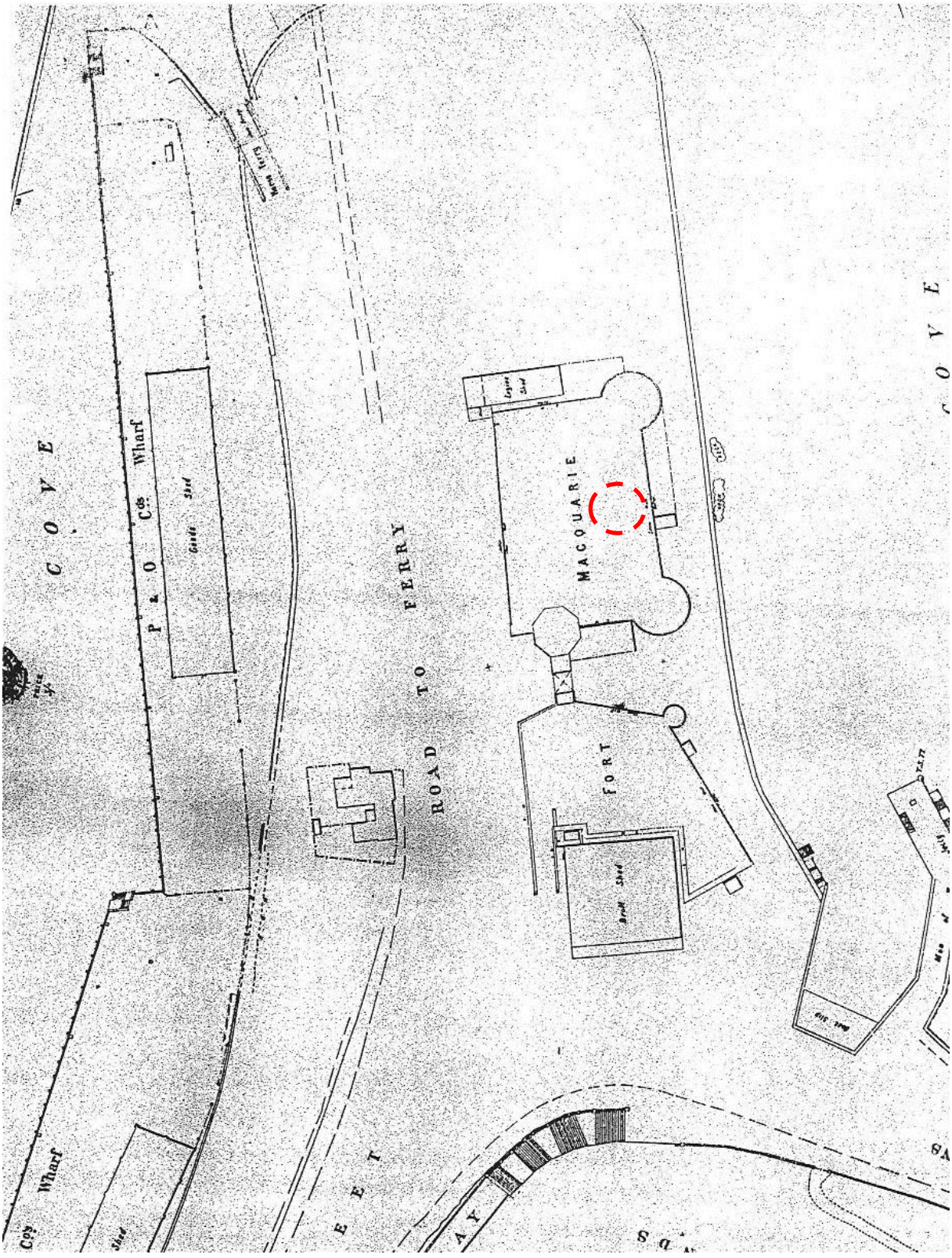


Figure 2.1 1894 plan of Fort Macquarie and Bennelong Point showing the southeastern extension of Fort Macquarie, the boat harbour and wharf facilities along the western shore. The naval volunteers drill shed has been constructed. The location of Lift 36 is outlined in red. (Source: Metropolitan Detail Survey M Ser 4 811.17/1 Sydney Sheet P4; National Archives of Australia [NSW] B1905/10192)

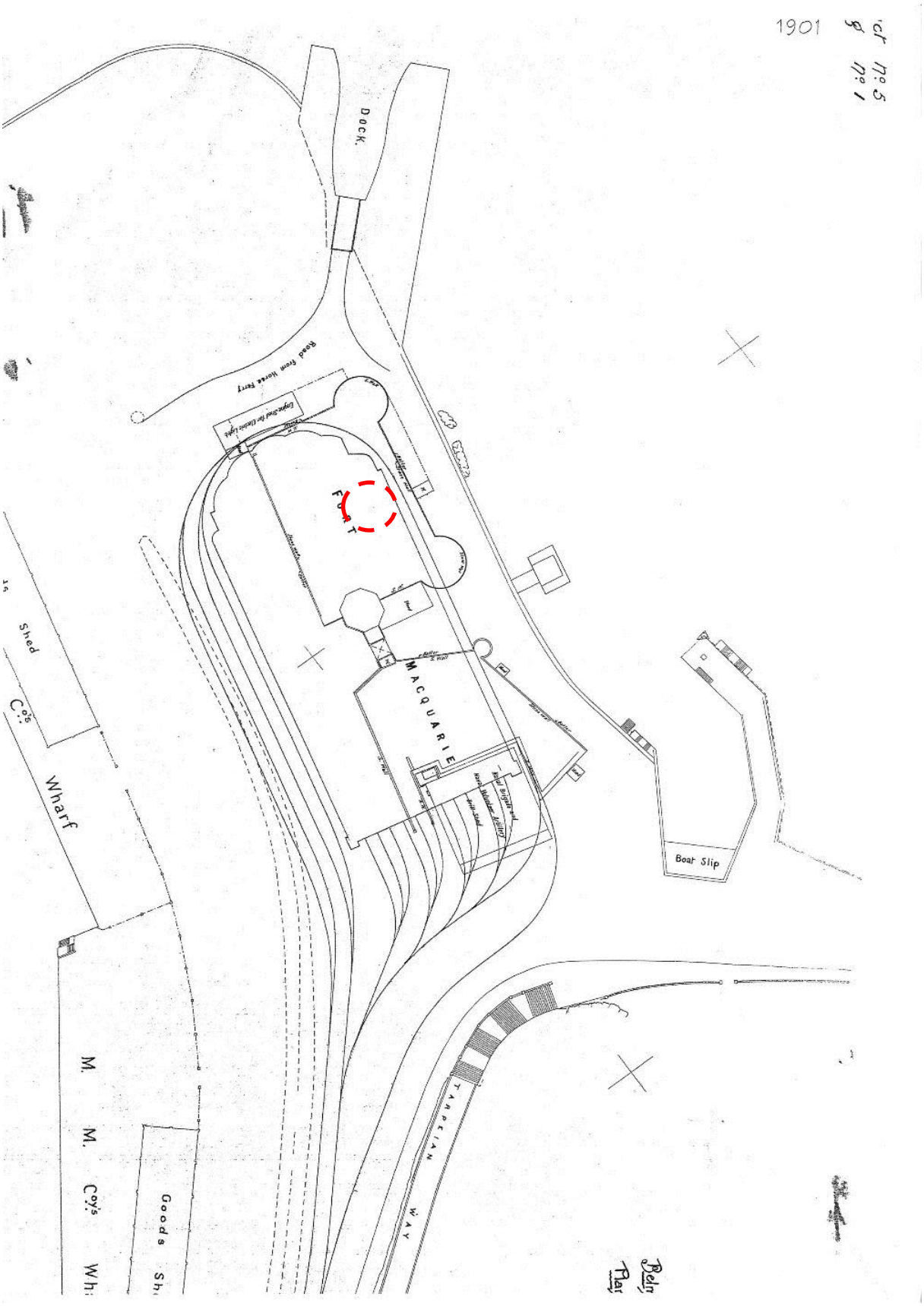


Figure 2.2 Extract of 1901 NSW Government Transport Plan—'Belmore Park to Fort Macquarie Electric Tramway Plan Showing Position of Car House…'. This plan shows the location of Fort Macquarie in relation to the Tramcar House and naval drill shed. The location of Lift 36 is outlined in red. (Source: NSW State Archives, CGS 12909, SR Plan No. 61078)

2.2 Site Formation and Disturbance

The potential for archaeological features, deposits and relics to survive at the site depends on the nature of activities undertaken there over the years (the phases of development). Some activities have the potential to disturb or destroy relics, while others (such as introducing or removing fill deposits) can enhance or reduce the chances of archaeological relics surviving.

On the basis of the many activities that have taken place on the site in the twentieth century, the NSW State Heritage Register (SHR) citation states:

> *After the profound building effort required to construct the Sydney Opera House, it is unlikely that any archaeological potential is retained in relation to its historical associations with famous people and important themes in Australian history.*[2]

However, excavations beneath Sydney Opera House in the early 1990s, excavations for a lift well in 2004 and the extensive excavations for the VAPS project in 2011–2014 have exposed significant archaeological evidence below current surface deposits, suggesting that levels of disturbance in parts of the site might be lower than expected. The following sections detail the major historical events, and consequent relevant archaeological excavations and interpretations.

2.2.1 Land Reclamation

Bennelong Point was used throughout the nineteenth and twentieth centuries for a variety of purposes, and reclamation of the shorelines and modification of the landform changed the shape and character of the area throughout its history.

The first formal government construction was in 1793 when a redoubt with eight embrasures was constructed on the eastern side of the harbour at Bennelong Point.[3] There are few available details on this structure, its precise location, or whether landforms associated with the promontory and island at Bennelong Point were modified.

The commencement of construction for Fort Macquarie required shoreline changes. In 1817, 'gangs of convicts' started to quarry the 'Tarpeian Rock' at Bennelong Point—the small island off the point was connected to the mainland in preparation for the construction of Fort Macquarie.[4] By 1829, parts of the shoreline of Bennelong Point had been modified and reclaimed. This process continued over the next century, with various phases of seawall and wharf construction.

The shoreline along the southeastern section of the peninsula was the first section to be reclaimed (by 1829) and a boat slip had been created in this area by 1845. In 1861, an esplanade was created around Fort Macquarie by erecting an encircling seawall and filling the area formerly covered by high tides (Figure 2.4). The western shore was used from the 1860s (but mainly from the 1880s) for wharves, jetties and wharf buildings. In the late nineteenth century, earlier wharf buildings were demolished and then replaced with larger wharf facilities by P&O. The present shorelines of Bennelong Point, which are contained by seawalls, represent entirely reclaimed land.

An understanding of land reclamation and alterations to the original shoreline is important archaeologically because features identified for this project are associated with intact bedrock. Interpretation of these features partially relies on an understanding of historical 'levels' across Bennelong Point.

2.2.2 Fort Macquarie, Phases 3 and 4: 1810–1901

A succinct description of Fort Macquarie is provided by Oppenheim:

> *By 1827 Fort Macquarie was a square redoubt, three faces of which were lapped by the waters of Port Jackson. Each face was 39.5m in length with the external surfaces covered in stone… The walls on the northern battery were 2.7m thick on the bastions and 1.8m on the terreplein. At each corner of the square there was a circular bastion, 1.5m above the level of the main battery platform [the terreplein]. On the southern land side of the redoubt was a two storied stone tower… [in the base] was a powder magazine which had a capacity for 200 barrels of gunpowder… Three 24-pounder [guns were] on each of the three … sides.*
>
> *Throughout the next 75 years the ordnance mounted at the fort varied from time to time. Guns were removed and then more were added and again removed as the defences were built up and the allowed to deteriorate.*[5]

From a materials construction position, and thus potential archaeology, beyond the fort's dimensions (each side being 39.5m in length, with external walls 6.7m above sea level),[6] the written historical record provides little information that can be used to interpret archaeological deposits. The available historical imagery also lacks the detail necessary for archaeological analysis, principally because the fort is a distant landscape item, or views to the eastern walls and terreplein are blocked by the towers. No information has been identified to confirm the mode of initial construction, or the materials and method of infill inside the fort's external walls. Two historical images (Figures 2.3 and 2.4) provide some limited insight.

The terreplein and bastions (Figure 2.3) show a flat level surface across the internal space of the fort, with the 1.5m drop between the top of the external bastion wall and terreplein. A stone surface adjacent to parts of the western wall abuts a flat grassed area.

Figure 2.3 View north into and across the terreplein at Fort Macquarie. Lift 36 is located out of frame to the right. (Source: State Library of NSW, SPF/121)

The external buttress wall (Figure 2.4) comprises uniform sized sandstone blocks; the lower two thirds are thicker at the base, sloping slightly inwards to a curved course, approximately level with the terreplein, above which the wall becomes vertical. An early seawall with tidal floodplain can be seen outside the fort, creating the 1860s esplanade around the fort.

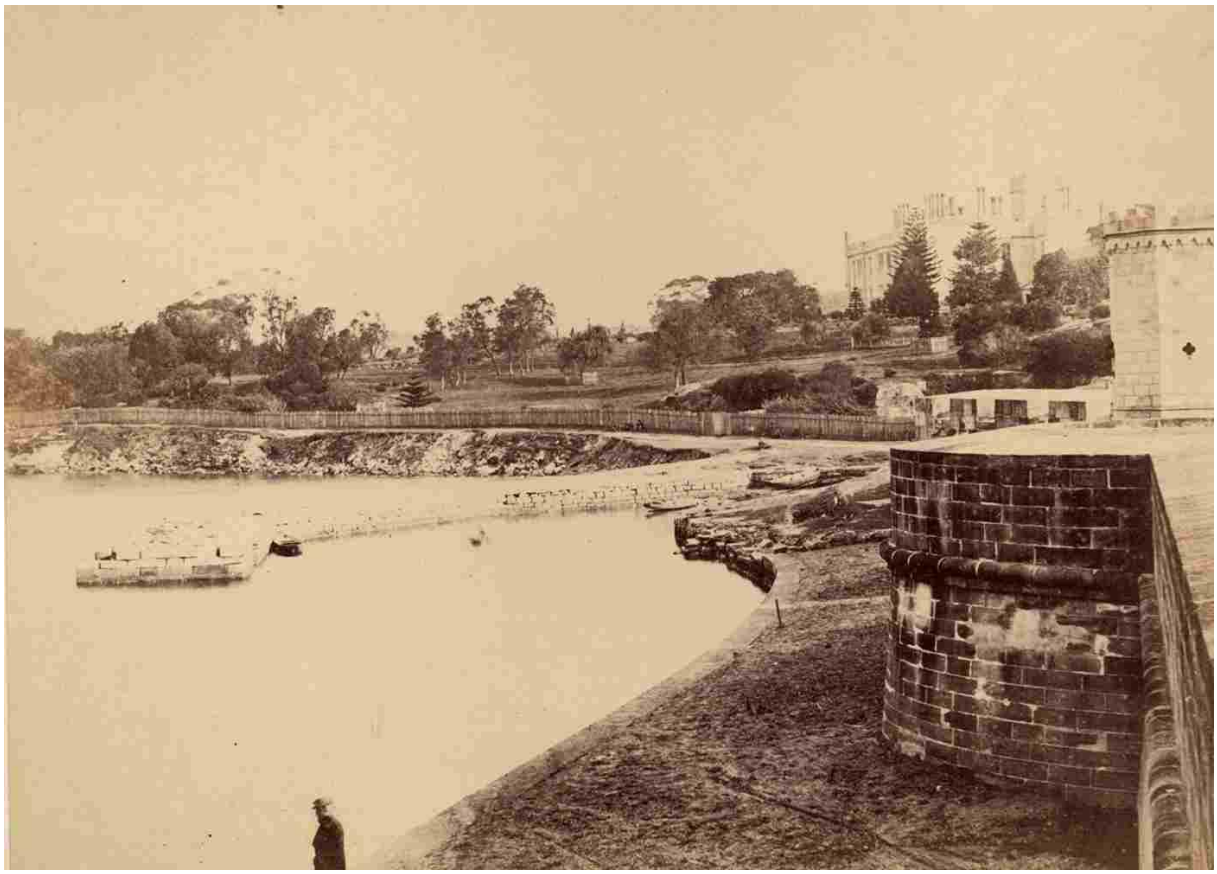


Figure 2.4 Eastern side of Fort Macquarie, facing south, showing the height of the external buttress ashlar sandstone wall, and the low seawall, with the esplanade defining the extent of land reclamation. (Source: State Library of NSW, FL1227860)

2.2.3 Tramcar House, Phase 5: 1901–1958

Little is known about the Tramcar House's construction. No details on the method of Fort Macquarie's demolition, the re-use, salvage, or otherwise of its sandstone walls, and/or internal fills have been identified.

Photographic evidence of the tramcar shed is limited except for distant views to the southern entrance. The tram shed was constructed on a level surface, with reclaimed land on the eastern and western sides. Four sets of tram tracks entered the shed, although a permanent wooden post-and-rail fence blocked one set (Figure 2.5). This fence appears to have prevented tramcar access into the eastern tracks of the shed.

Materials used to manufacture the building were brick and faced sandstone (Figure 2.6 and Figure 2.7). The sandstone has a height of around 1.5m, above which an internally buttressed red-brick wall was constructed.

Figure 2.5 Entrance to the Tramcar House. The eastern tram tracks are blocked by a permanent wooden post and rail fence. (Source: City of Sydney Archives 044/044481)

Figure 2.6 Western external side of the Tramcar House with sandstone foundations to ~1.5m. (Source: City of Sydney Archives 044/044475)

Figure 2.7 Internal view within the Tramcar House following closure of the tram system and use as a carpark. The floor is either wooden or concrete slats. The external lower sandstone wall is clearly visible at the height of the car roofs. (Source: City of Sydney Archives 101/010405 NSCA CRS 48-405)

2.2.4 Sydney Opera House, Phase 6: 1955–Present

Construction of the Sydney Opera House from the 1960s to 1970s had a dramatic impact on the physical form of Bennelong Point, including:

- modification of the shape of Bennelong Point, with the construction (and some replacement) of seawalls around the entire shoreline;
- regularisation of ground levels through the introduction of fill deposits to create a level forecourt and boardwalk platforms;
- excavation for the construction of basement levels and other structural elements of Sydney Opera House itself; and
- construction of other infrastructure associated with Sydney Opera House and its operation.

Analysis of prior archaeological excavation indicates that most of the historical archaeological evidence survives at depths equivalent to the current basement level of Sydney Opera House, that is, between levels +3.66m and -0.30m (+12' and -1') (Figure 2.8).

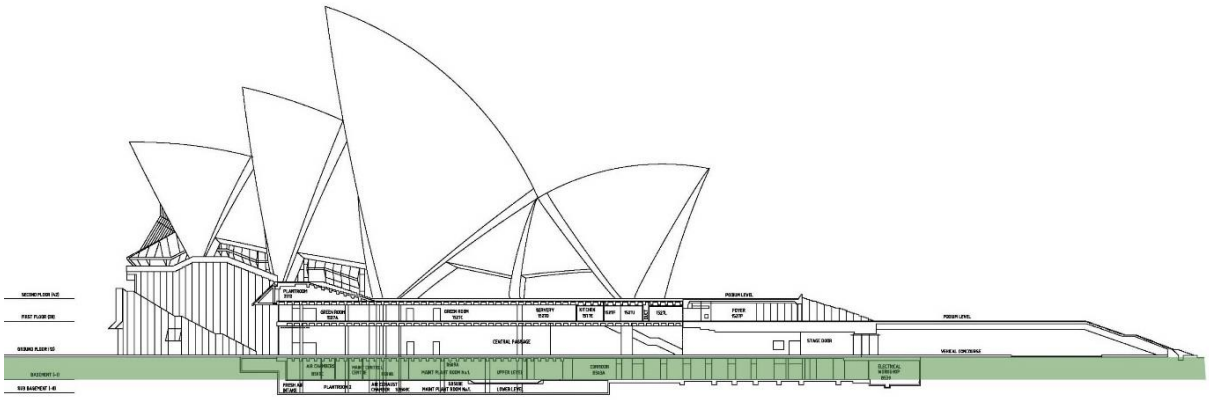


Figure 2.8 Section drawing of Sydney Opera House showing the levels of existing building elements. The majority of the site's potential archaeological remains would be located at depths equivalent to the existing basement level (between +12' and -1'), which is shown here shaded green. (Source: Sydney Opera House Trust)

2.2.5 Lift 36—Geotechnical Analysis

Within the Lift 36 construction area, a single borehole was mechanically drilled by Douglas Partners—BH 301A.[7] The bore log presents the following profile:

- concrete—to 0.17m, underlain by;
- fill, brown ripped sandstone—to 0.5m, underlain by;
- concrete—0.1m, underlain by;
- filling, moderately compacted brown ripped sandstone gravel with some clayey sand—0.85m, underlain by;

- concrete—0.2m depth, underlain by;
- sandstone—medium to high strength, slightly weathered, slightly fractured, pale grey, medium grained, commencing at a depth of 1.65m below the start of the borehole.

These layers were interpreted as 1950–1960s fill over a concrete layer bonded to sandstone bedrock, associated with either the Tramcar House or the construction of the Sydney Opera House.

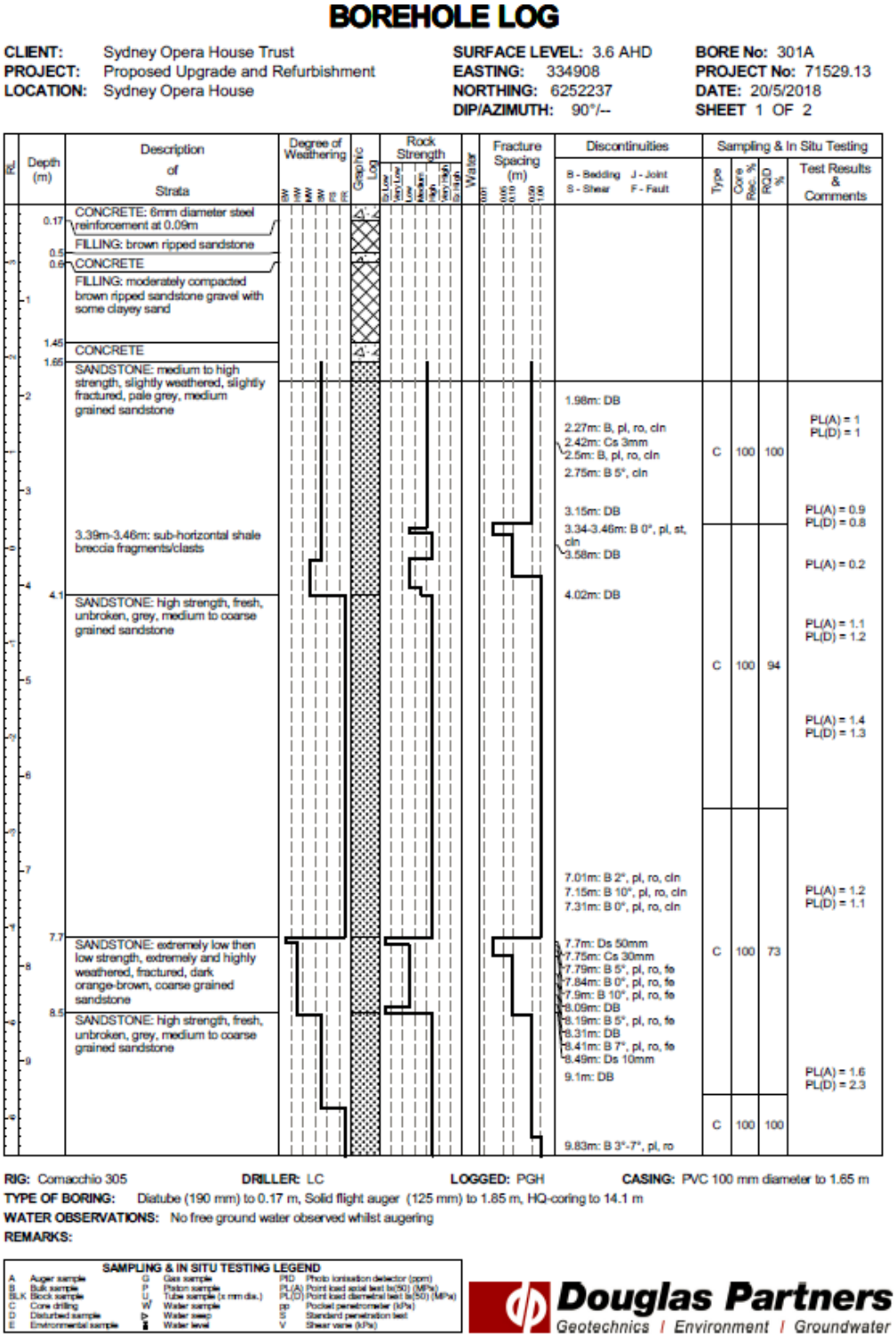


Figure 2.9 Bore log profile associated with the location of Lift 36. (Source: Douglas Partners 2018)

2.3 Prior Archaeological Excavation

Two prior archaeological excavations have identified archaeological deposits historically connected with the current works. Relevant evidence from these two excavations is provided, along with photographs from each excavation.

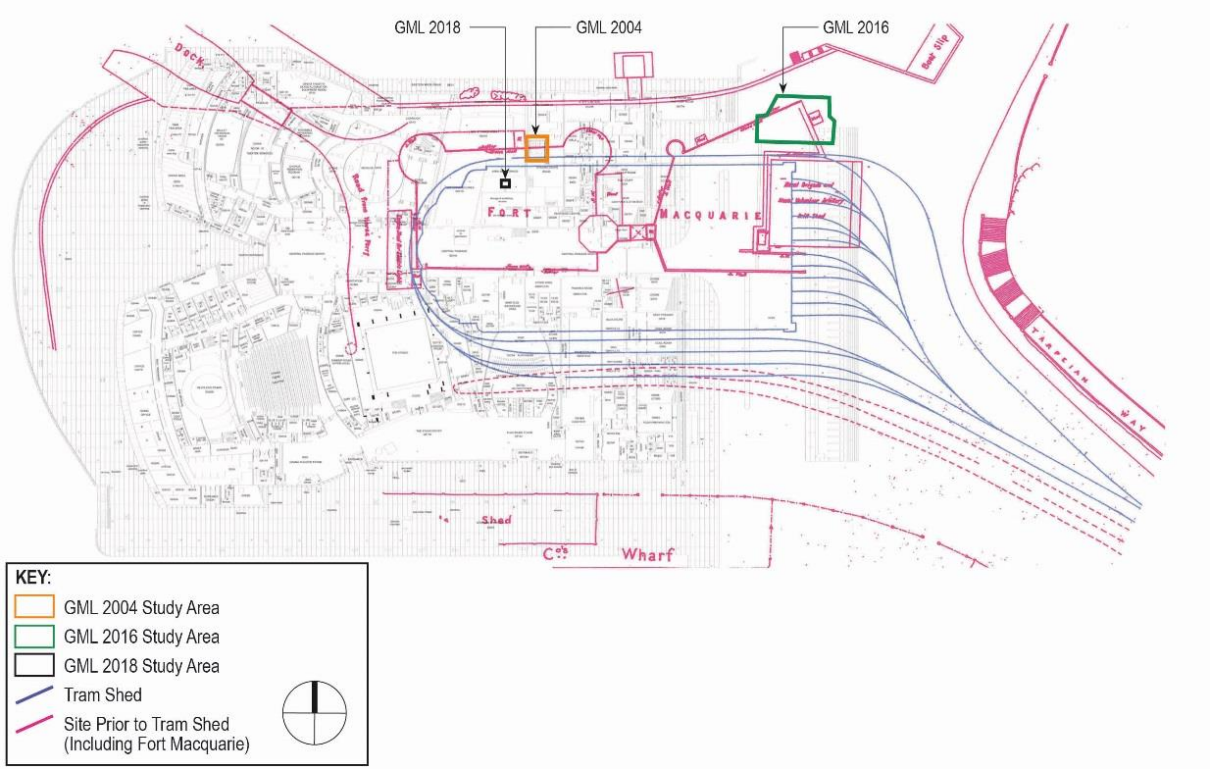


Figure 2.10 Location of relevant prior archaeological excavations, with historical plans showing Fort Macquarie and the Tramcar House, with the current SOH plan. (Source GML 2018)

The locations of each excavation have been imposed on a plan showing key phases of Bennelong Point's history (Figure 2.10)—Phase 3, Fort Macquarie (pink); Phase 5 Tramcar House (blue); and the Sydney Opera House (black).

Purely based on spatial mapping, the 2004 and 2016 works were expected to uncover the external walls of Fort Macquarie and fills associated with construction and land reclamation. Both the 2004 and 2016 works contained some potential for the external and internal surfaces associated with the Tramcar House.

2.3.1 GML 2004—Lift GL15[8]

Excavation for a lift well shaft revealed the external walls of Fort Macquarie, and a series of associated archaeological deposits, relating to natural ground level, construction trench cut and fill, post demolition 1900s fills, and later Sydney Opera House phase fills. The 2004 trench was positioned 6m east from the 2018 trench, and 5m north. GML 2004 does not provide reduced levels (RL) for the various elements. Assuming the floor level of the Sydney Opera House today is level consistent at 3.62m Australian Height Datum (AHD), the RL for the different items has been inferred based on measurements provided in the plans. The key archaeological features identified in the 2004 trench include:

- A sandstone wall (the external wall of Fort Macquarie), orientated north–south, with ashlar blocks bonded with a fine mortar with no identifiable shell inclusions (Figures 2.11 and 2.12, context [A][9]).

- The wall's sandstone blocks had a variable thickness, being 0.63m wide at the deepest recorded point, and 0.53m wide at the top (three courses apart). This could result in the external wall's slope observed in historical photographs (Figure 2.4).
- East of the wall (external to the fort) was:
  - a construction trench cut with a crushed sandstone rock mixed with a sterile loose sandy deposit (Figure 2.11, [B]). This ended on cut sandstone bedrock (RL 0.53m). The construction trench had cut a natural sandy layer [C];
  - a loose sandy deposit with artefactual material dated between 1839–1904 (Figure 2.11, [C]), which was over;
  - a dark brown deposit (Figure 2.11, [D]), containing evidence of vegetation including grass reeds, which was over;
  - a black loamy soil, [E], which was over;
  - uncut sandstone bedrock, [F], 0.69m AHD.
- West of the wall (internal to the fort) was:
  - a yellow–orange crushed sandstone rubble fill [G], overlying;
  - cut sandstone bedrock [H], 1.51m AHD.

The excavations provide evidence for the size of sandstone blocks, cutting bedrock for construction, fill inside the fort walls, and the natural soil profiles outside the fort walls.

Figure 2.11 Fort Macquarie wall [A] external face, with the construction trench comprising a crushed sandstone fill [B], cutting a loose sandy deposit with artefacts [C] over a dark brown deposit [D]. (Source: GML 2004)

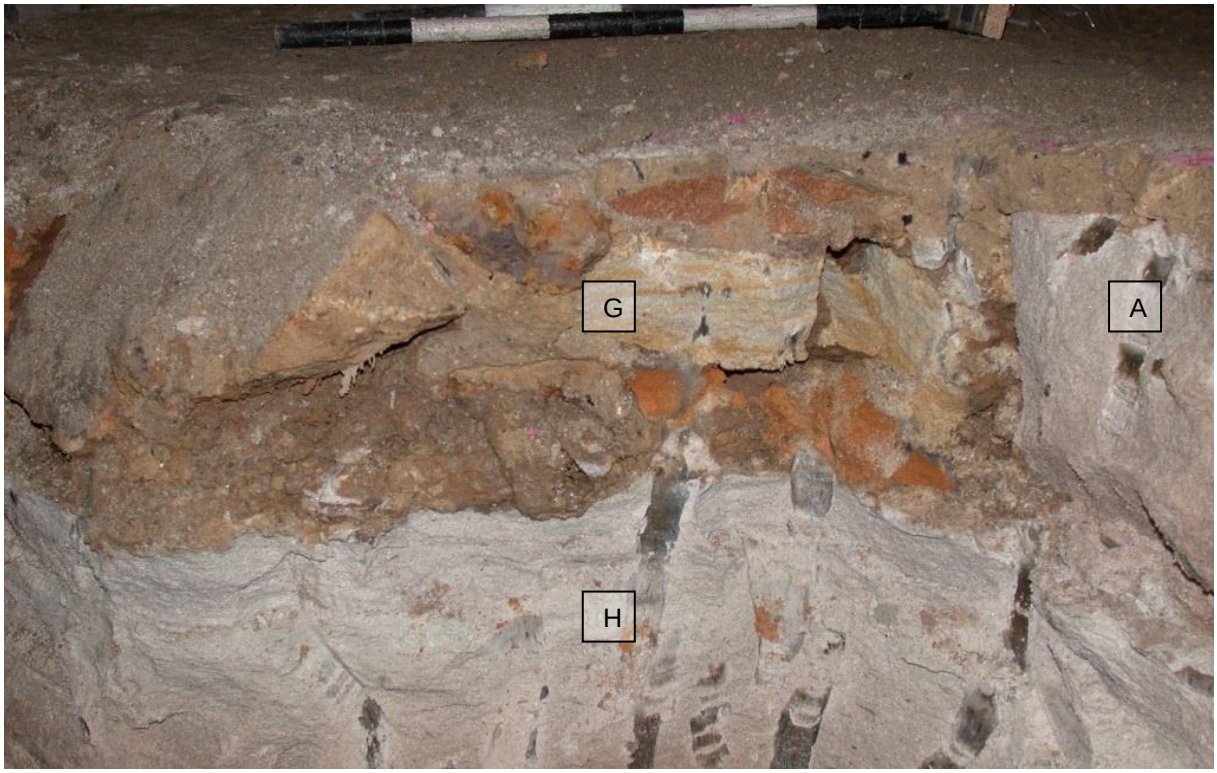


Figure 2.12 Fort Macquarie wall [A] internal face, with a loose sandstone rubble [G], over cut sandstone bedrock [H]. (Source: GML 2004)

2.3.2 GML 2016—VAPS Works[10]

Between 2011 and 2014, archaeological monitoring, recording and open area excavation in conjunction with the redevelopment of the Sydney Opera House Forecourt VAPS identified numerous features and deposits relevant to this report, including:

- evidence of the 1902 Tramcar House and small waiting room building on the eastern shore of the boat harbour/slip;
- stone footings that could be associated with Fort Macquarie's eastern buttress wall; and
- several seawalls from various phases of the site development (ie the 1864 esplanade wall and c1901 seawall) and associated land reclamation.

The evidence of the 1902 Tramcar House phase included the upper external bitumen surface to the Tramcar House [034=083] constructed over a thick layer of grey-brown fill [076] consisting of demolition material, stone rubble and sporadic artefacts (Figure 2.13). The RL of these features was 2.96m AHD; this report has extrapolated this height as the surface level associated with the tram lines and internal to the Tramcar House. The substantial thickness of this fill—measuring between 200mm and 1.2m—indicates that it was used for levelling for the construction of the Tramcar House complex. The upper [034=083] and lower [058] bitumen/asphalt levels were separated by a retaining wall [048=161] constructed of two to three courses of dressed sandstone blocks; these could be re-used sandstone blocks from Macquarie Fort. A portion of a brick platform with four steps [050] extended northeast–southwest. The steps were also constructed of dry-pressed bricks and covered with a concrete render (Figure 2.14).

Fort Macquarie's eastern buttress wall comprised a sandstone alignment [077] orientated north–south (Figures 2.15 to 2.18). The alignment formed a footing that consisted of rectangular sandstone blocks measuring 350mm–500mm wide. The stone blocks were bonded with fine yellow shell mortar with charcoal. More of the same footing was found during the excavation for the services plenum for the eastern boardwalk (Figures 2.16 and 2.17). This portion [200] represented the northern extension of footing [077]. Portion [200] was only 1.7m long, but with intact width inclusive of the construction trench [202]. The sandstone consisted of a double row of sandstones measuring 650mm wide. The overall width, inclusive of stone rubble packing [201] within the construction trench, was 1.23m. The stone rubble packing [201] was set in sand, which also contained sporadic artefacts (roofing tiles, animal bone and sandstock brick fragments). The large stone blocks used for construction measured 390mm x 800mm x 250mm, and 440mm x 650mm x 250mm. Small stone and terracotta roofing tile fragments were used to fill in the gaps between the joints (Figure 2.18).

Footing [200] was only preserved to the basal course of stone, which was fitted amongst uneven shoreline shelves that required cutting, and above sand, shell (mainly pipis) and charcoal deposits [203] that filled in bedrock crevices and provided level ground for construction. This footing and its construction appear to differ in size and composition to the GML 2004 footing. This indicates a different construction phase associated with Fort Macquarie.

The evidence for the 1864 esplanade wall comprised a substantial seawall [208] (Figure 2.19). The sandstone blocks measured approximately 1100mm x 870mm in size. The top-course sandstones had rounded edges, whereas the lower courses had sharp edges. The top stone blocks were secured together with decayed cement mortar that was added at a later stage. Patches of lime wash were identified on the top of the wall. The asphalt surface connected to the seawall from the western mainland side. The asphalt surface and its road base were built over a thick layer of reclamation rubble fill. This fill for 1864 reclamation differs from the fills identified in GML 2004 excavations inside Fort Macquarie in nature and composition.

Figure 2.13 View looking northwest showing the structural remains identified in the southern half of the loading dock. This area comprises the eastern shoreline between the Tramcar House and the boat slip. Photo scale: 2m. (Source: GML 2012)

Figure 2.14 Concrete and dry-pressed brick steps [050] and platform are associated with the former waiting room at the shoreline end of the boat harbour/slip. (Source: GML 2012)

Figure 2.15 A section of sandstone footing [077] believed to be part of the Fort Macquarie buttress wall was revealed in the north section of the piling trench. Photo scale: 2m. (Source: GML 2012)

Figure 2.16 The north extension of sandstone footing [077] marked as context [200] provided a glimpse of the size of the Fort Macquarie buttress wall. (Source: GML 2013)

Figure 2.17 A detail in footing [200] showing the use of terracotta tile fragments for packing between the stone block joints. (Source: GML 2013)

Figure 2.18 The south section of the substation exhaust plenum shows the reclamation rubble fill and the line of asphalt surface. Photo scale: 1.4m. (Source: GML 2014)

2.3.3 Fort Phillip

Archaeological excavations[11] at Fort Phillip (built 1804–1806, demolished 1850s) identified foundations of the fort and an internal bombproof chamber. This internal chamber is of comparative importance to the current assessment.

The bombproof chamber was built into the rampart, located at the midway point along the rampart wall. It was constructed of dressed stone on its eastern and western walls, which formed an arched roof to the chamber. The chamber was approximately 19m^2, with walls approximately 4.5m by 4.2m. The bombproof chamber had an earthen/plaster floor.

2.4 Summary of Prior Evidence

Prior archaeological excavations have presented evidence for key features possibly associated with the current Lift 36 works—notably, the eastern walls of Fort Macquarie, their depth and nature of construction fills; and the upper external layers associated with Tramcar House and the surface level external to the building (extrapolated to the internal space). Key details include:

- Fort Macquarie, eastern external wall thickness was 0.5m. Construction included cutting bedrock and a construction trench for the wall. The RL of cut bedrock (construction trench) outside the fort was 0.53m, inside the fort the RL of cut bedrock was 1.51m.
- A crushed sandstone rock was used to fill inside the external wall. The distance between Fort Macquarie's eastern external wall and the current 2018 excavation trench is 7.5m.
- Tramcar House was constructed on grey-brown fill with depths over 1m in places. The operating surface RL was 2.96m.
- A waiting room adjacent to Tramcar House had steps, with concrete set over red dry-pressed bricks.

2.5 Endnotes

1 Oppenheim, P 2004, *The Fragile Forts: The Fixed Defences of Sydney Harbour 1788–1963*, Army History Unit, Canberra, ACT.
2 Office of Environment and Heritage, State Heritage Inventory, 'Sydney Opera House', 01685, viewed 15 May 2018 <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5054880>.
3 Oppenheim, P 2004, *The Fragile Forts: The Fixed Defences of Sydney Harbour 1788–1963*, Army History Unit, Canberra, ACT, p 8.
4 Oppenheim, P 2004, *The Fragile Forts: The Fixed Defences of Sydney Harbour 1788–1963*, Army History Unit, Canberra, ACT, p 20.
5 Oppenheim, P 2004, *The Fragile Forts: The Fixed Defences of Sydney Harbour 1788–1963*, Army History Unit, Canberra, ACT, p 25.
6 Journeys in Time, 'Fort Macquarie', Macquarie University, viewed 15 May 2018 <https://www.mq.edu.au/macquarie-archive/journeys/related/fortmacquarie.html>.
7 Douglas Partners, Proposed Upgrade & Refurbishment – Lift 36 and Thrust Block, Sydney Opera House, Bennelong Point, prepared for Sydney Opera House, February 2017.
8 Godden Mackay Logan, Sydney Opera House Archaeological Recording, report prepared for Sydney Opera House, 2004.
9 GML 2004 did not assign context numbers. A simple letter system, [A] to [H], has been allocated for interpretation purposes under this report.
10 GML Heritage, Sydney Opera House Bennelong Stormwater Channel Diversion and VAPS Project—Historical Archaeological Excavation Report, report prepared for the Sydney Opera House Trust, January 2016.
11 Government Architect's Office, Fort Phillip Archaeological Excavations, Sydney Observatory, Final Excavation Report', Powerhouse Museum, 2011.

3.0 The Archaeological Excavations

3.1 Archaeological Works

The archaeological work for Lift 36 was undertaken in two phases:

- Phase 1—September 2018, which identified archaeological features and relics.
- Phase 2—January 2019, when the archaeological trench was expanded to uncover the full extent of the steps and investigate the contexts which contained relics.

Archaeological works occurred with a trench measuring 3.30m (approximately east to west) by 3.5m (north to south). The archaeological works adhered to the excavation methodologies presented in the two GML reports relating to the site[1] as approved under the S60 approval (Appendix A), conditions 3(a) to 3(f).

Archaeological cleaning and recording identified 20 contexts, which relate to historical phases 4 (Fort Macquarie, 1843–1901), 5 (Tramcar House, 1901–1958), and 6 (the Sydney Opera House, 1955–present) (Section 2.1). This section describes these features and interprets these features within the historical context of the wider site. The heritage significance of these features is described in Section 4. The archival photographic recording of the excavation is provided in Section 5.

A summary of all archaeological contexts is provided in Table 3.1. Figures 3.1 to 3.4 provide the final plan and section drawings for the Lift 36 trench.

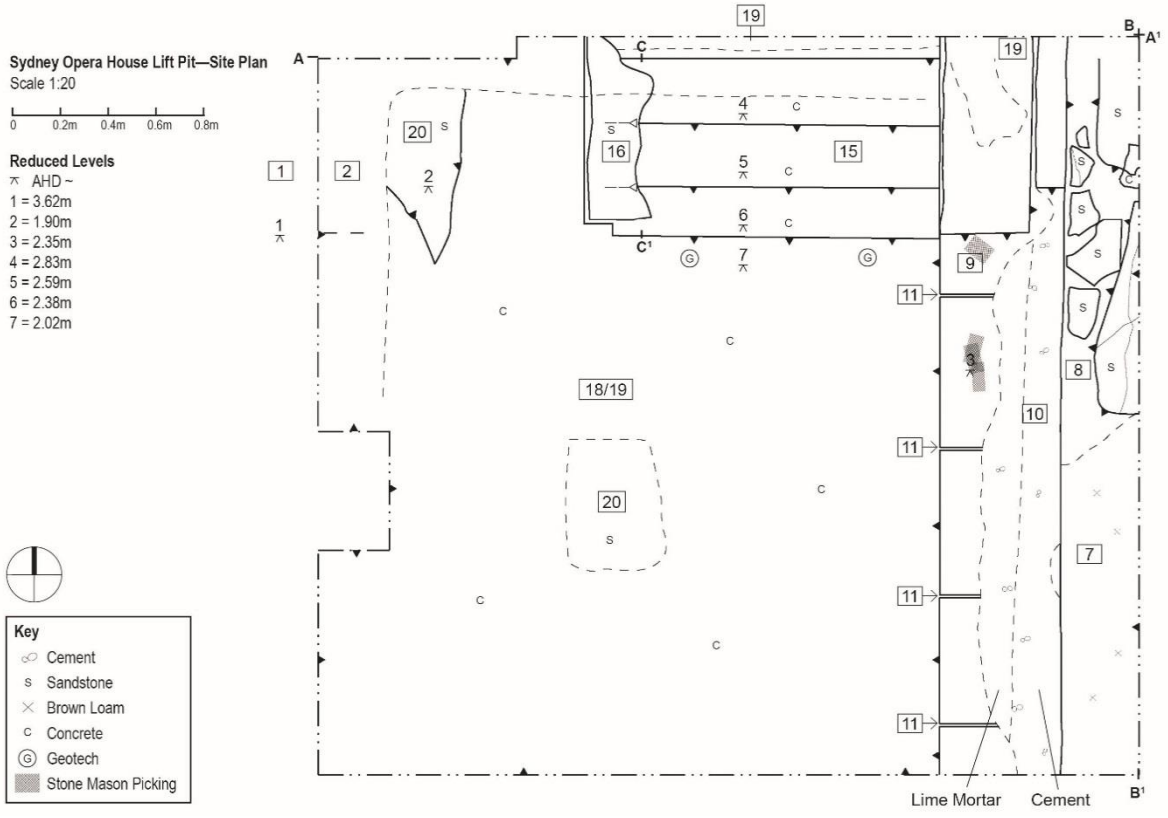


Figure 3.1 The end of Phase 2 excavation—plan showing the archaeological features identified. (Source: GML 2019)

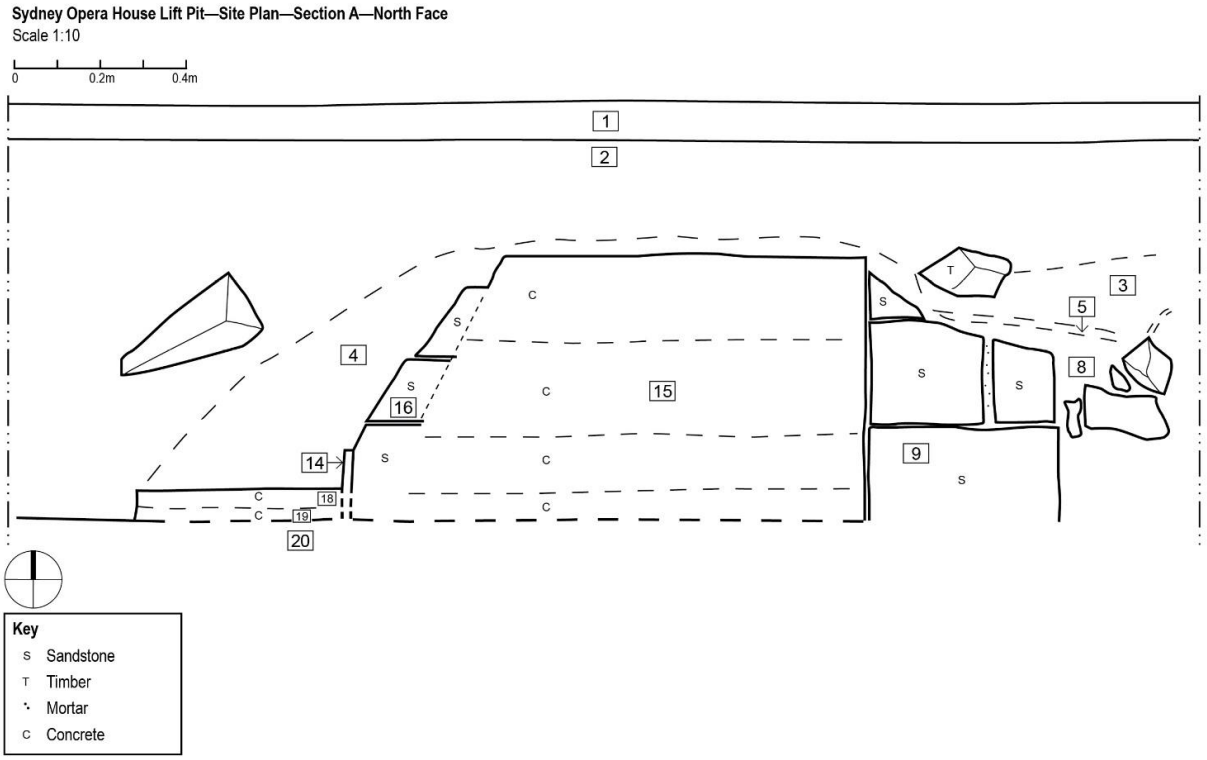


Figure 3.2 Northern trench section plan. (Source: GML 2018)

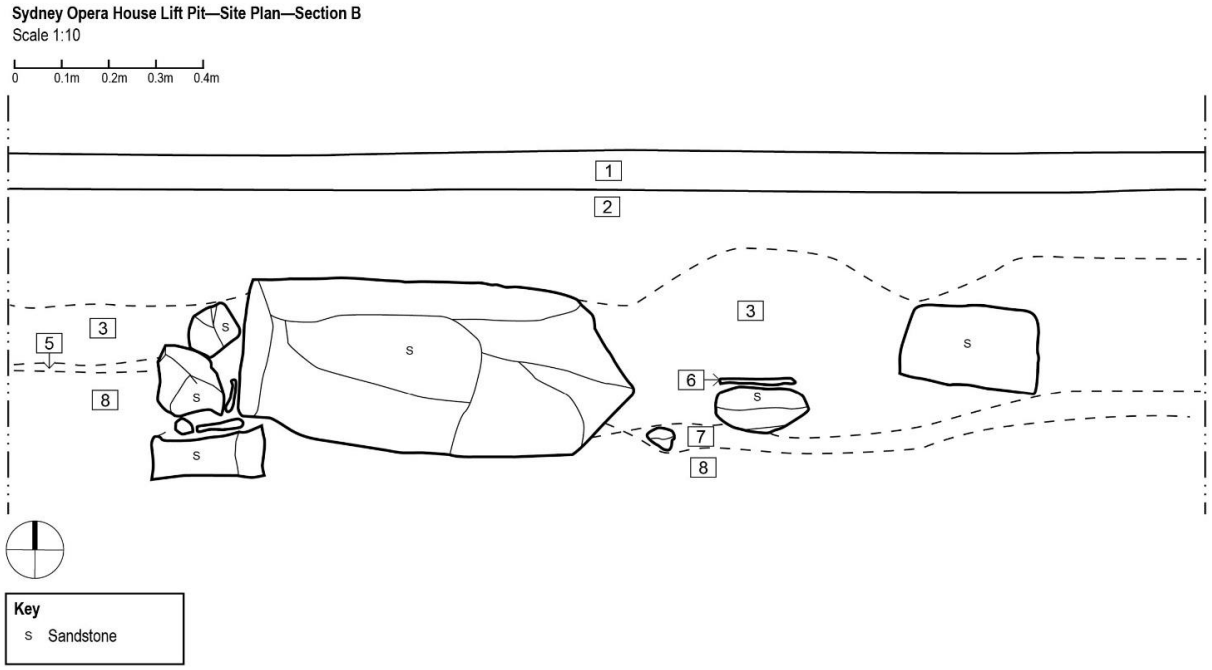


Figure 3.3 Eastern trench section plan. (Source: GML 2018)

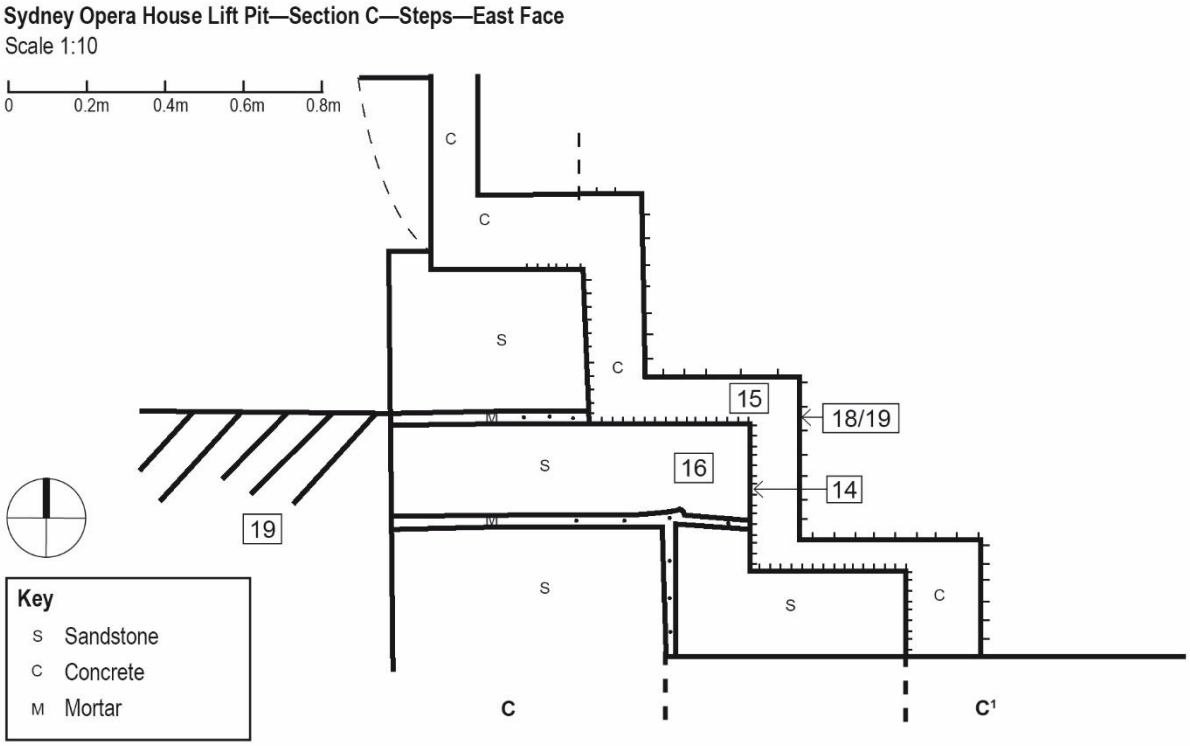


Figure 3.4 Eastern face of the sandstone and concrete steps, section plan. (Source: GML 2019)

3.2 Archaeological Contexts Recorded

The contexts identified are summarised in Table 3.1 and shown photographically in Figures 3.5 to 3.14.

Table 3.1 Summary of All Archaeological Contexts and Associated Historical Phases.

Context	Description	Type	Above	Below	Abuts	Historical Phase
1	Mass concrete slab, 0.22m to 0.27m thick	Structural	2	–	–	Phase 6
2	Brown sandy fill, 0.5 to 1.3m thick	Fill	3	1	–	Phase 6
3	Crushed sandstone, orange sandy deposit	Fill	7	2	9	Phase 4/5
4	Grey-brown fine sandy fill	Fill	9, 12	2 and 5		Phase 6
5	Brown/black loamy lens	Fill	4	3		Phase 4/5
6	Brown clay lens, inside [3]	Fill	3	3		Phase 4
7	Dark brown/black loamy soil	Surface?	20	3		Phase 4/5
8	Foundation trench (cut bedrock) with sandstone packing fill	Construction	20	3, 7		Phase 4
9	Cut sandstone bedrock, forming the base of an internal 'wall'	Structural	–	4	8, 16, 17	Phase 4/5
10	Cement over a lime mortar over the sandstone bedrock 'wall' [9]	Structural	9	4		Phase 5/4
11	Cuts into sandstone bedrock 'wall'	Construction	9	4		Phase 5
12	White paint over black surface on the concrete steps	Surface	13	4		Phase 5
13	Black surface on the concrete steps	Surface	14	12		Phase 5
14	Black concrete on the west side of steps	Surface	20	4		Phase 5
15	Concrete steps	Structural	16	13	9	Phase 5
16	Sandstone steps	Structural	20	15	9	Phase 4
17	Black surface on smooth concrete floor	Surface	18	2		Phase 5
18	Light grey smooth concrete, 0.035m thick	Surface	19	17	9, 16	Phase 5
19	Light grey rough concrete, 0.07m thick A preparation area is present behind the steps [16]	Surface	20	18	9, 17	Phase 5
20	Sandstone bedrock (cut?), forming the floor inside the 'room'	Surface	–	19	11	Phase 4
21	Stonemason pick marks in the cut sandstone bedrock [9]	Construction	–	10	9	Phase 4

Figure 3.5 Excavation phase 1—View east into the trench, showing the concrete surface abutting the cut stone wall. The concrete covering the steps and wall is visible. A variety of fills are evident in the section face. (Source: GML 2018)

Figure 3.6 Excavation phase 2—View east into the trench, showing the full remnant extent of the steps, with a surface used to prepare the concrete [19] behind the steps. (Source: GML 2019)

Figure 3.7 Excavation phase 1—View south into the trench, showing the steps and modified sandstone wall with concrete from the Tramcar House phase. Earlier fills can be seen adjacent external to the wall (left). (Source: GML 2018)

Figure 3.8 Excavation phase 2—showing the full extent of the concrete steps [15], the relationship with the sandstone blockwork to the east (left) of the steps [9], and the surface behind the earlier sandstone steps used for preparing concrete [19]. (Source: GML 2019)

Figure 3.9 Excavation phase 1—View northeast showing the sandstone [16] and concrete steps [15]. The separate sandstone blocks comprising the steps are evident. (Source: GML 2018)

Figure 3.10 Excavation phase 2—full remnant extent of steps [15] and [16]. The preparation area (surface) for the concrete [19] is located behind the sandstone steps, and would have been shovelled across the floor of the room from this location. (Source: GML 2019)

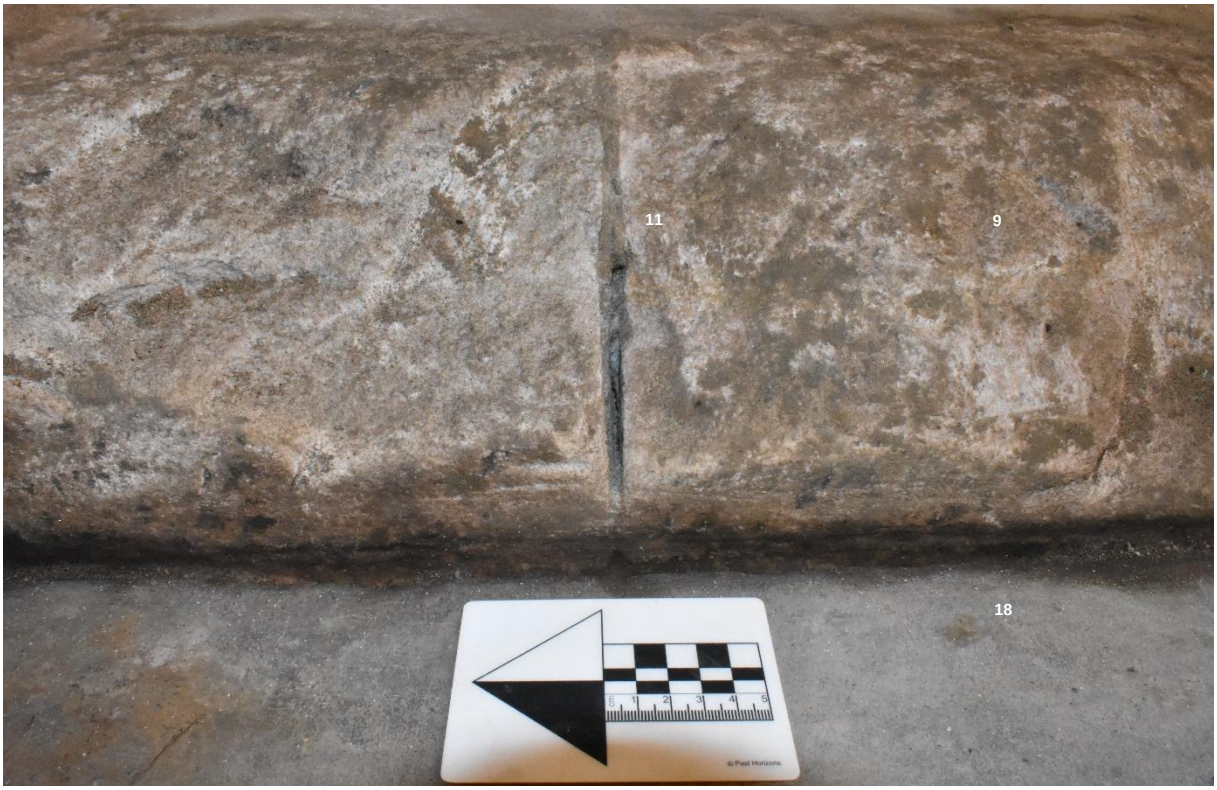


Figure 3.11 Excavation phase 1—Modifications to the sandstone wall [9], with cut-and-fill with concrete [11]. The rough chamfering to create a curved edge is evident. A wear line in the sandstone parallel to the concrete surface can be seen. (Source: GML 2018)

Figure 3.12 Excavation phase 2—demonstrating all phases of the site in one location. The earliest construction work (Phase 4) cut bedrock [20] to form the room, and the wall base [9]. This activity left its mark through the faint but distinct pick marks of the stonemasons [21] on the top or prepared surface of the early wall. Some faint traces of a lime mortar [10], used for construction of the wall are present on this surface. In Phase 5 the sandstone wall was partially deconstructed and re-cut using mechanical saws, resulting in the square cut lines [11]. A new brick wall was constructed to form the side of the tram inspection pit, leaving their bonding cement [10] over the top of the chamfered wall. (Source: GML 2019)

Figure 3.13 Excavation phase 2—The concrete steps [15] were cut (removed) from the sandstone steps [16], revealing the picked sandstone blockwork [21] of the earlier steps. (Source: GML 2019)

Figure 3.14 Excavation phase 2—The sandstone steps [16] were disassembled and comprised a number of distinct rectangular blocks, with some lime mortar binding. (Source: GML 2019)

3.2.1 Descriptions of Contexts

Context 1—the mass concrete slab covering the current ground (basement) floor level of the Sydney Opera House. This slab varies in thickness between 0.22m and 0.27m.

Context 2—a brown sandy fill with a fine sandy matrix and small crushed sandstone blocks, up to 200mm by 200mm, although most are 50mm by 50mm. Small inclusions of blackened carbon or wood and bitumen. Two fragments of red machine dry-pressed brick, presumably from Tramcar House. There is some crude layering within the context, although the layers grade into one another. The layer varies in depth between 0.5m and 1.3m. Interpreted as a fill layer consequent to the demolition of Tramcar House, used as levelling fill prior to Sydney Opera House construction.

Context 3—crushed sandstone, in a matrix of an orange sandy deposit, 0.2m to 0.3m deep. A sharp interface with surrounding deposits indicates a single deposition event without consequent mixing. Context is only present on the outside (east) of the wall [9], except a pocket of collapse westward over the 'wall' [9], indicating a demolition fill from Fort Macquarie prior to the start of Tramcar House construction.

Context 4—grey-brown fine sandy fill, with small sandstone fragments, pushed into and around the steps and wall. A sharp interface with [2]. Only present inside the 'room'. Likely the first infill from Sydney Opera House construction consequent to the demolition of the Tramcar House.

Context 5—a thin brown/black loamy lens, 20mm deep, between [3] and [4], sticky but not clay. Possibly decayed wood. Part of the fill associated with Fort Macquarie demolition.

Context 6—a distinct brown clay lens inside [3], 20mm deep by 200mm in length, contains a few artefacts including black (olive) glass and ceramic. This context was not excavated as was only identified within the trench section, and therefore outside the area of impact.

Context 7—dark brown/black loamy soil, up to 100mm thick, with some small sandstone fragments and small fractured artefacts, including greenish bottle glass, opaque glass, porcelain and a metal fragment. This layer could be a possible former surface; it could be comparable to context [E] in GML 2004. Excavation of this context (in 2019) was only undertaken inside the trench. The portion in the trench section was left unexcavated and intact.

Context 8—a foundation or bedding trench abutting the vertical cut sandstone western wall face with a packing fill of sandstone on the eastern side of the 'wall' [9]. The sandstone fill comprised 200mm by 300mm angular blocks, packed with a yellow/orange sand matrix. This context is comparable to context [G] observed in the GML 2004 excavation. This context abuts [7]. The phasing of this context (to Fort Macquarie) is on the basis of its location outside the sandstone bedrock wall [9], the absence of connection with later construction contexts, such as [10], and comparability to other nearby archaeological deposit similarly phased.

Context 9—cut sandstone bedrock forming the 'base' for a sandstone blockwork wall internal to Fort Macquarie outer buttress walls. The wall's base has a consistent width of 500mm and runs the length of the trench north to south (3m). The top of the remnant wall base is approximately 400mm above the cut sandstone bedrock exposed in the northwest corner of the trench [20]. This wall was formed to this height during the Fort Macquarie phase, evidenced by the stonemason pick marks [21] and small expressions of adhering lime mortar [10]. A sandstone wall was laid on top of the horizontal wall base, and sandstone blockwork is present adjacent to the steps. These blocks originate from the Fort Macquarie phase and have some remnant lime mortar adhering to surfaces. The blocks have been reused during the Tramcar House phase and rebounded with cement. The dual layers of mortar and

cement are described as [10]. The wall base would extend farther north and south and could be expected to form a square or rectangular room, dimensions unknown. The sandstone steps [16], and later concrete steps [17], are flush but separate from the wall base. The wall base has a continuous wear line just above the height of the concrete surface [18], indicating movement back and forwards of a service 'trolley' within the Tramcar House phase of use.

The earliest phasing of this context (to Fort Macquarie) is on the basis of location inside the fort, the comparable wall thickness (the same as the external buttress walls), the method of sandstone cutting (including stone mason picking [21]), the nature of re-use and how that has cut and chamfered the sandstone, and how concrete has been bonded to the outer part for brickwork only.

Context 10—a dual layer of cement over the remains of a limestone mortar, which in turn sits over the sandstone bedrock wall base [9]. The cement is pushed into the cuts [11] in the sandstone wall base [9]. Some brick marks are present in the cement, indicating use as the bonding material in a Tramcar House phase brick wall.

Context 11—a series of thin parallel cuts into the sandstone bedrock wall [9], a consequence of reducing the height of the wall prior to its re-use for the Tramcar House. Four cuts were observed, each with a square flat section base, above the height of the upper poured concrete surface [18] internal to the room/space. The cuts were used to create a curved (chamfered) corner, preventing a right angle, which is evidenced on the southern cut, where the sandstone has fractured into the cut, and is not covered by concrete.

Context 12—white paint over black surface [13] on the concrete steps [15].

Context 13—a black surface on the concrete steps [15].

Context 14—blackened concrete on the western side of the steps, forming a vertical surface 25mm thick. This joins the concrete in [13]; it was poured at the same time.

Context 15—the poured concrete steps. Three treads are present, two fully exposed inside the trench and both measuring 230mm; three risers are visible, measuring 140mm, 220mm and 220mm (bottom to top). The concrete steps have been poured after the two concrete floor surfaces [18 and 19], in a single pour. The sandstone steps [16] form the base for the concrete steps. These steps are similar in construction to those observed in GML 2016 (Figure 2.14), although the other concrete steps were poured over dry-pressed bricks.

Context 16—sandstone steps made from sandstone blocks, detached from the bedrock [20], and bedrock wall base [9]. The steps comprise distinctly different sandstone blocks, with different colour sands and grain orientations. Three treads are fully visible, two fully exposed inside the trench, measuring 220mm (lower) and 230mm (upper); two risers are fully visible, measuring 220mm and 220mm (bottom to top). The sandstone block forming the lowest step includes a right angle cut to form the riser and tread. The sandstone blocks are tightly bonded with a fine grey mortar (the same as that in [10]), which does not contain evidence of shell (the mortar is comparable to that seen in the external Fort Macquarie wall, GML 2004). The phasing of this context to Fort Macquarie is on the basis of construction methods, form of the steps, material use and the presence of the fine mortar, with no shell, between the steps. Further, it is very unlikely the Tramcar House phase works would have constructed a set of sandstone steps, and consequently concrete them over.

Context 17—a black surface on the concrete floor [18].

Context 18—the light grey smooth concrete, 35mm thick, which contains no aggregate. This formed the working surface inside the room/pit used during the Tramcar House phase.

Context 19—the light grey, rough concrete, 70mm thick, with a course stone aggregate, poured over bedrock [20]. A preparation area (surface) for this concrete was identified behind the steps [15] and [16], prepared on bedrock [20]. The concrete is evident spilling over the bedrock adjacent to the steps (on the western side).

Context 20—the sandstone bedrock (cut), forming the floor inside the 'room'. It is assumed the surface would connect to the bedrock of the wall base [9].

Context 21—stonemason pick marks in the sandstone [9].

3.2.2 Material Culture

The Phase 2 archaeological program aimed to recover material culture (possibly relics) from context [7], the dark brown/black loamy soil up to 100mm thick. A few small fractured artefacts had been observed in this context where it was present in the section.

The excavation of [7] inside the trench removed a thin (20mm to 30mm) layer, covering an area approximately 1m (north to south) by 150mm (east to west); soil was sieved through a 3mm mesh. The excavated soil contained three small fragments:

- two black (dark olive) glass bottle fragments, without identifiable marks; and
- one ceramic fragment, without further identifiable marks.

Beyond suggesting an early to late nineteenth century date, these three items present limited evidence of the nature of deposit [7].

3.3 Archaeological Interpretations

The archaeological evidence can be interpreted as a subterranean room or space connected with the Fort Macquarie phase (phase 4), later re-used and re-purposed as part of the Tramcar House phase (phase 5).

The specific use, purpose or function of the room during the Fort Macquarie phase is unknown, although its location within the fort lends itself to being either a bomb-shelter room (similar to that observed at Fort Phillip), or a temporary powder storage room (such as at Dawes Point). It is not clear whether the room was constructed as part of the earliest phase of Fort Macquarie (1820s) or the later 1860s works associated with additional land reclamation. It is possible the rooms were part of the 1860s refurbishment of the fort, based on the mortar present between the sandstone steps [16] and the glass objects from context [7]. It is noted that neither the steps or room are not shown on any historical plan, and later photographs over the fort's terreplein do not capture the precise location of the room.

Physical evidence associated with the Fort Macquarie (phase 4) room is limited, comprising the base of a north–south wall and the steps descending to the cut sandstone floor of the room. The wall base [9] is interpreted as an internal eastern wall of the sunken room. This room was constructed by cutting the bedrock to form a square or rectangle space, with a rough sandstone floor [20]. The sandstone bedrock formed the lower parts of a wall, which would have had sandstone blockwork set on top of the solid bedrock base. The physical marks of the stone mason's hand are present along the top of this wall. The lower three steps jut into the room and appear to extend across a second (north) cut bedrock wall (which is to the rear and beneath the steps, and covered in concrete [19]).

The size of the room is unknown but must have been at least 4m by 4m—if a powder store or bombproof room, a size of 4m by 4m would be comparable to the bombproof room at Fort Phillip. The floor of the room has an RL of 1.9m, which allows a maximum head space of 3.3m below the terreplein above. The RL for the room's bedrock floor [20] would be 0.39m higher than the bedrock identified inside the fort's wall in the 2004 excavation; an increase in height would be expected moving 'inland' away from the high tide line. This lends support to the phasing of the earlier structural remains.

The room is located precisely midway between the two western bastions (20m) from the northeastern and southeast fort bastions, 7.5m inside the external wall (Figure 3.15). The distance inside the external wall is important due to lateral pressure on both the external wall and internal wall of the room—the extent of fill should have been sufficient to be self-supporting, and the room small enough to not require considerable buttressing. The steps ascend to a position approximately in line with the inner curve of each bastion, with possibly 10 steps required to reach the terreplein. The position and alignment of the room inside the fort is precise and typical of military layout and planning, creating symmetry through deliberate positioning and use of the space. The position of this room is similar to the bombproof room in Fort Phillip.

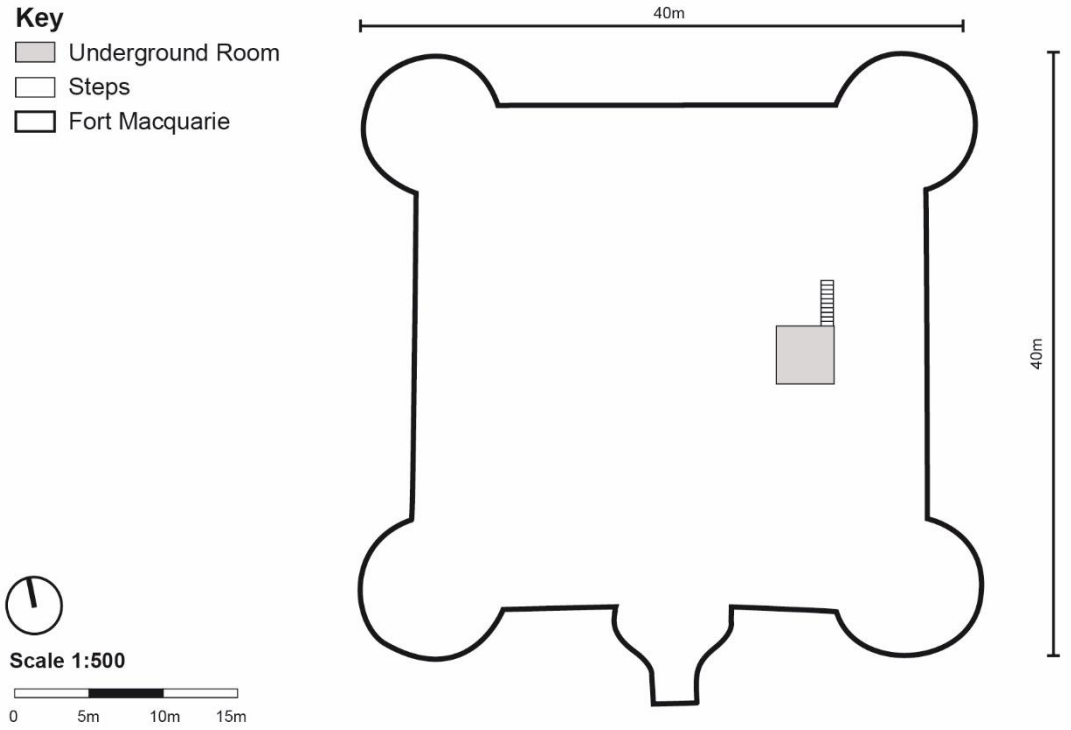


Figure 3.15 Position of the room within Fort Macquarie. Note this is an interpretation from the evidence. (Source: GML 2019)

On demolition of Fort Macquarie, the blockwork parts of the wall were disassembled. The sandstone wall base was cut [11] and chamfered for re-use to form the base for a 'pit' in Tramcar House. The cut bedrock wall was reused as a foundation during the Tramcar House phase, evidenced through cement [10] used to bond brick on the top of the bedrock. The lower sandstone steps were retained and reused. A two-stage concrete floor was poured, with a concrete mixing area apparent behind the steps. Some of the sandstone blocks have been reused adjacent to the steps; the steps were finally covered with layers of concrete to change the tread and riser heights.

Interpretation of levels across the wider Sydney Opera House suggest this pit had a depth of approximately 1m. The top of the external foundation trench [8] is parallel with the wall reduction cuts

[11] into the bedrock wall base [9] (produced during Phase 5). This indicates that construction for the Tramcar House reduced the ground surface to a consistent level prior to pouring the cement [10] over the sandstone wall, which was used for construction of brick walls that would have been approximately 0.7m high.

These factors mean that this area was more likely used as a type of service pit rather than as a storage area during the Tramcar House phase. Contrast with other historical tram service pits (Figures 3.16 to 3.18) provide an indication of possible use. A short series of steps allows access into the shallow pit. Tools are stored within alcoves set into the wall of the pit, while the ground surface remains free of tools or other infrastructure.

However, use of the pit specifically for servicing trams is tempered by two factors. Firstly, the width of the pit is wider than a tram (note the width of the pit in the figures below)—if used as a tram service pit, there should have been internal wall features allowing tracks to extend over the pit. Secondly, the tram tracks on the eastern side of the Tramcar House had been blocked off and may not have been used by trams, this can be seen in Figure 2.5.

Figure 3.17 Tool storage alcoves set into the wall of the service pit. (Source: GML 2019)

Figure 3.16 View down the stairs into a tram service pit. The wall height is around 1m. (Source: GML 2018)

Figure 3.18 A historical tram in place over a tram service pit. (Source: GML 2019)

3.3.1 Integrity of the Deposits

The archaeological structural remains confirmed remains of Fort Macquarie and Tramcar House. The evidence excavated was limited and had been substantially truncated by the Sydney Opera House construction, for example contexts [2] and [4]. The remnant steps from the Fort Macquarie phase [16] and the overlying concrete Tramcar House steps [15] held moderate integrity, with some fabric damage to the sandstone steps. Both retain their original spatial position, which has allowed for interpretation of the space. The sandstone wall base [9] was cut and repurposed during the Tramcar House phase. Archaeological features connected with the re-use of the wall base are limited and were fundamentally removed by Sydney Opera House construction. The sandstone walls had been truncated and significantly modified from their original form. If considered reflective of the original feature (likely a wall with a possible height of ~3m), the walls were considered to have low integrity. Artefact bearing layer [7] was also truncated, although the lower part retained intact soil.

All archaeological remains identified have been either removed or impacted by the construction of Lift 36. This has resulted in a loss of archaeological integrity within the pit, and could have altered the integrity of deposits directly adjacent to the lift pit.

Overall, the remains present had moderate to low integrity, and beyond being a wall and steps, were difficult to interpret within a historical, functional and spatial context.

3.4 Addressing the Research Questions

The assessment of significance identified research potential in connection with the Fort Macquarie phase of the site's history. Three archaeological contexts held potential to provide additional information on the room/space, its construction, and possibly its use:

- the cut sandstone bedrock forming an internal wall [9];
- the sandstone stairs ascending from the room/space [16]; and
- some fills possibly connected with the construction of the room/space [7] and [8].

The primary questions to be addressed through the investigation of these features and deposits are set out below. Each question is considered following the completion of excavation.

- Is the room part of the original Fort Macquarie or a second phase possibly associated with the 1860 works?

Without a date carved in the sandstone, marker, or other material evidence, this question cannot be definitively addressed. The fabric of the room is comparable with the fort in general, an absence of shell in the mortar could suggest a later 1860s construction. The wider context of the fort's development over the nineteenth century is discussed below.

- What are the physical dimensions and characteristics of the fill layers east of the wall? How do these relate to the wall and phases of the site's history?

Soil layer [7] was a shallow layer of brown sticky soil, which contained three artefacts. On removal, this layer yielded to the underlying bedrock, which was degraded and had been modified to form the base of the wall. This layer could be a small area of intact soil, albeit redeposited, or it could be fill material redeposited on the site with other fills.

Foundation trench and sandstone block packing [8] was removed (where possible) and found to extend onto bedrock, which was connected with that below [7].

The bedrock evident below both [7] and [8] is degraded and had been cut to form the base of the wall [9].

- What are the relics observed in a fill layer to the east of the wall? And do these relics provide evidence for site phasing?

The layer contained only three objects, two fragments of black glass and one white ceramic. Unfortunately, none of the items were diagnostic, other than suggesting an early to late nineteenth century date.

- How was bedrock modified to form the room/space?

The room was deliberately positioned within the fort. The area would have been surveyed and the dimensions for the room set out. Bedrock has been cut by hand, forming the flat floor of the room. The external wall base was deliberately cut and hand-picked to form the foundation room's blockwork walls.

- Can the dimensions of the space be further inferred?

The precise dimensions of the room are not known, although the northeast corner of the room was identified, with steps ascending north from this corner. An interpretation of the room and its location within the fort is provided in Figure 3.15.

- Was a surface material (a pitch, bitumen or slate) applied to the stairs to prevent spark generation?

No further evidence was identified to confirm this mode of spark prevention.

- If part of the 1860s changes to the fort, why was the room formed? How does it relate to changes in Sydney's harbour defences at this time? Were the changes a response to geopolitical threats associated with perceived invasion threats by Russia in association with the 1850s Crimean War (noting that Fort Dension was completed in 1855)?

The archaeology of the room has not provided any direct answers to this question. However, the archaeology adds to the wider body of evidence for changes to the defences in Sydney harbour between the 1840s and 1870s. If designed and constructed as a response to the perceived need to upgrade Sydney's defences, the addition of a powder or magazine room demonstrates the need enhance the management of munitions within the fort. Rather than moving powder from the main magazine in the tower, this room could have provided a storage facility closer to the guns. The absence of knowledge (detail on maps or plans etc) relating to the room and its intended use, suggests this was implemented in some secrecy.

General military opinion of Fort Macquarie and its defensive capabilities had always been unfavourable and critical,[2] and perhaps the addition of this room aimed to supplement the fort's capabilities. In 1863 the 'Ward report' identified the need for upgrading magazine facilities at three of Sydney's forts:

> *The Works at Dawes Point, Fort Macquarie, Mrs Macquarie's Point, being on the Sydney side of the harbour, might be provided with serviceable magazines…*[3]

Whether the magazine room was added as a consequence of this comment, or whether Ward had viewed the 'magazine' and determined that movement of powder up three metres of steps was ill-advised during enemy engagement is unknown. By 1865 the guns at Fort Macquarie had been upgraded,

although an 1870s commission into the state of Sydney's defences saw Fort Macquarie as 'particularly dangerous and easily rendered untenable, and should not be occupied'.[4]

The changing geopolitical situation in the 1880s and 1890s, coupled with the significant change in military technology, saw Fort Macquarie descend to become an obsolete military feature as part of the harbour's defensive system. Changes to the fort's layout in the 1890s included demolition of the western rampart (as can be seen in the 1894 plan, Figure 2.1), and the addition of a drill hall in the southern area. The location and presence of the fort was eventually deemed of such little importance that the fort was demolished in 1901 for Tramcar House.

3.5 Archaeological Potential and Wider Connection

The history and pattern of development across the wider Sydney Opera House site (illustrated with recent updates in Figure 3.19) is tempered by the place's history of development, notably the impacts resultant from Sydney Opera House construction. Incremental works to the Sydney Opera House site (eg VAPS) are also reducing the extent of the archaeological sites. The remnant archaeological resources across the Sydney Opera House site are dwindling as a resource; the area of possible evidence for original shorelines, land reclamation, and Fort Macquarie primarily restricted to the southern portions of the site.

The archaeological potential in and around the extent of exposure includes the potential for further structural remains connected with the Fort Macquarie 'room', the fort's infill material and materials of original fort construction (including buttress walls), the original landforms of the island, its shore lines and soil deposits. The archaeological potential around this specific area in relation to pre-1901 archaeological deposits is therefore high; this has been demonstrated through the current work, and GML 2004 and GML 2016.

The area may also contain evidence for Tramcar House, but based on ground and construction levels, only deeper elements of this historical phase would be likely. The archaeological potential for post-1901 archaeological deposits (under the footprint of the Sydney Opera House) is generally low.

Figure 3.19 GML 2010 archaeological zoning plan for the SOH. The location of Lift 36 is shown inside the dark red circle. (Source: GML 2010: Figure 3.1)

3.6 Endnotes

[1] GML Heritage, Lift 36 Historical Archaeological Assessment and Proposed Mitigation Methodology, report prepared for Sydney Opera House, 2018, p 3.
GML Heritage, Sydney Opera House, Lift 36. Historical Archaeological Assessment and Management Plan, report prepared for Sydney Opera House, 2018.Section 7.2.

[2] Oppenheim, P 2004, *The Fragile Forts: The Fixed Defences of Sydney Harbour 1788–1963*, Army History Unit, Canberra, ACT, pp 22-23, 34, 38, 56, 91.

[3] Oppenheim, P 2004, *The Fragile Forts: The Fixed Defences of Sydney Harbour 1788–1963*, Army History Unit, Canberra, ACT, p 76.

[4] Oppenheim, P 2004, *The Fragile Forts: The Fixed Defences of Sydney Harbour 1788–1963*, Army History Unit, Canberra, ACT, p 91.

4.0 Revised Heritage Significance Assessment

The NSW Heritage Council has adopted specific criteria for heritage assessment, related to the *Heritage Act 1977* (NSW) (Heritage Act) (as amended).[1] Seven criteria have been developed based on the Burra Charter (2013) values of historical significance, aesthetic significance, scientific significance and social significance.[2] Archaeological sites (and potential) are frequently considered under criterion E—archaeological research potential. Some aspects of archaeological significance can be associated with individuals, events, groups of historical importance (under criteria A, B and D); aesthetic or technical significance (under criterion C); and their ability to demonstrate the past (under criteria A, C, F and G).[3]

4.1 Assessment of Historical Archaeological Potential

Archaeological significance refers to the heritage significance of known or potential archaeological remains. In NSW, archaeological remains are managed in accordance with their assessed levels of significance in line with *Assessing Significance for Historical Archaeological Sites and 'Relics'*, published by the NSW Heritage Branch—now Heritage Division, Office of Environment and Heritage (OEH)—in 2009.

This significance assessment specifically considers the historical archaeological resource of the site.

4.1.1 Assessment of Research Potential—Bickford and Sullivan's Questions

The area in and around Lift 36 has confirmed archaeological deposits and structural features associated with two phases of Bennelong Point's history—Fort Macquarie and Tramcar House. However, any deposits need to be contextualised with reference and relevance to the wider site's history, historical themes and specifically the research potential of the deposits.

> *Archaeological research potential is the ability of archaeological evidence, through analysis and interpretation, to provide information about a site that could not be derived from any other source and which contributes to the archaeological significance of that site and its 'relics'.*[4]

To assess the research potential of the site, three basic questions (commonly referred to as the Bickford and Sullivan questions)[5] are addressed:

1. Can the site contribute knowledge that no other resource can?

2. Can the site contribute knowledge that no other site can?

3. Is this knowledge relevant to general questions about human history or other substantive questions relating to Australian history, or does it contribute to other major research questions?

The archaeological deposits identified within the Lift 36 works area will likely extend below adjacent construction deposits and retain archaeological research potential. The wall base is likely to extend outside the excavated trench and therefore could provide information on the layout of the former room/space inside Fort Macquarie. There could be portions of the floor bedrock [20] not covered with concrete [18/19], which may provide an ability to further understand the Fort Macquarie use of this space. Fill layers [7] and [8], connected with the two historical phases of significance, have been truncated, but could yield some further information that might provide information on the age, processes and phases of construction.

The information that could be obtained from these deposits is specific to the internal space of Fort Macquarie and not available from other known resources; as such, further remnant archaeological

deposits and features have some ability to inform our understanding of the internal function of Fort Macquarie as a defensive facility. The archaeological features and deposits are unlikely to further inform the record on the functioning of the public tram system.

However, in consideration of the wider function of defensive forts around Sydney Harbour, 1810 to 1900, the archaeological features and structures are unlikely to provide new information that is not available through the investigation of other sites, eg the powder store at Dawes Point, or the bombproof room in Fort Phillip. Some of these other sites are also more readily interpretable, open to the public and archaeologically accessible.

The archaeological features and deposits are relevant to our understanding of Bennelong Point's history—which is significant in the context of the Sydney Opera House and its World Heritage listing. The principal value would lie in the contribution that they may make to our knowledge on the nature of development of the site itself (Bennelong Point) and the surrounding area. This contribution has principally been achieved through the evidence presented in this report.

4.1.2 Prior Heritage Assessment

The 2017 CMP does not include any archaeological value in the significance assessment, under world, national or state heritage values.[6] The State Heritage Register, the National Heritage List and World Heritage List citations for Sydney Opera House do **not** include the site's archaeological potential. These listings focus on the Sydney Opera House, not earlier historical phases.

Prior archaeological work has demonstrated that the overall site contains some significant archaeological deposits connected with earlier phases in the place's history—that is, before construction of the Sydney Opera House.

4.1.3 Current NSW Heritage Assessment

The historical archaeological resource of the study area has been assessed against the seven NSW heritage criteria. The assessment is presented in Table 4.1.

Table 4.1 Assessment of Potential Archaeological Features Against the NSW Heritage Criteria.

Criteria	Assessment
(a) an item is important in the course, or pattern, of NSW's cultural or natural history (or the local area)	The archaeology identified is not associated with the Sydney Opera House, but rather the phases of historical development prior to the construction of the opera house. At the state level, the archaeological evidence has association with the history of Fort Macquarie. Evidence of the landform modifications (cut bedrock), and the remains of built fabric that are a component of the fort, are of significance in the context of understanding the history of NSW. At the local level, the archaeological evidence identified provides historical evidence for the twentieth-century tram operations. The items are of significance as a component of Sydney's public transport system.
(b) an item has a strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the local area)	Whilst the archaeology of the original fort (Phase 2, 1810–1843) is connected with Francis Greenway, the archaeological evidence identified in the Lift 36 does not meet this criterion. The remains associated with this part of the fort are likely an 1860s modification, not part of the Greenway original design.

Criteria	Assessment
(c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area)	The archaeological evidence identified does not meet this criterion. The integrity of the structural remains has been lessened as a result of Sydney Opera House construction.
(d) an item has strong or special association with a particular community or cultural group in NSW for social, spiritual or cultural reasons (or the local area)	The archaeological evidence identified does not meet this criterion.
(e) an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the local area)	The research potential of the site's archaeological resource (outside the area now excavated) is discussed below according to various categories of potential evidence associated with the site's historical phasing. **Fort Macquarie** Fort Macquarie represents a significant phase in Australia's defensive history, despite the fort's limited defensive capacity. The research potential of further remains may yield information on the process of construction and development, as well as some additional insight into the operation and occupation of the fort throughout its history. Archaeological features of the fort are of state significance. **Twentieth-Century Tram Operations** The archaeological remains associated with the operation of the trams on Bennelong Point have limited potential to yield information relating to the development of Sydney's public transport system. While holding value for historical significance (criterion A), there is little value in the research potential of this item.
(f) an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the local area)	Archaeological sites in the Sydney Central Business District dating to the nineteenth century are increasingly rare (and form part of an ever-diminishing resource). Works in and around Bennelong Point have also diminished the extent of archaeological sites associated with the Sydney Opera House. Archaeological remains associated with early defensive sites are generally considered to be rare surviving elements of Sydney's history. The level of significance associated with the rarity of this deposit relates to the historical and research value of the specific feature. The presence of an internal space or room inside the fort is considered rare, and as a component of Fort Macquarie, is of state significance. Remains of the tram operation do not hold value under criterion F.
(g) an item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places or cultural or natural environments (or the local area)	The archaeological evidence identified does not meet this criterion. The structural remains are both truncated and limited in exposed extent.

4.2 Summary of Significance of Site Features

The following table summarises the significance of the site's features. The archaeological remains associated with Fort Macquarie are significant under criteria A, E and F; those associated with the Tramcar House are significant under criterion A.

Table 4.2 Summary of Significance Associated with All Potential Site Features.

Phase	Site Features	Date	Identified Archaeological Items	Significance
4	A subsurface room or space inside Fort Macquarie	1817–1901	The cut sandstone bedrock forming an internal wall	State
			The sandstone stairs ascending from the room/space	State
			Some fills possibly connected with the construction of the room/space	State
5	Modified room/space inside the Tramcar House	1901–1950s	Modified cut sandstone bedrock forming an internal wall	Local
			Concrete stairs	Local
			Concrete floor surfaces	Local
			Evidence of use associated with marks in the sandstone wall	Local
6	Evidence associated with the construction of Sydney Opera House	Post-1963	Various fills	Nil

4.2.1 Lift 36—Statement of Historical Archaeological Significance

Sydney Opera House is an item of Outstanding Universal Value. However, the site's potential and identified archaeological remains have no direct association with Sydney Opera House itself, nor with this significant phase of the site's history.

The identified archaeological resources (in the location of Lift 36) are associated with two phases in the site's historical development that have influenced its current form. The archaeological evidence identified is associated with Fort Macquarie and Tramcar House.

The archaeological remains associated with Fort Macquarie, including the structural remains and associated deposits or features, have archaeological significance for their ability to contribute to our understanding of this major period in the historical development of Bennelong Point. These remains can be considered rare, notably in the context of the consequent site development.

The archaeological remains associated with Tramcar House have limited potential to provide new information relating to the development of Sydney's public transport system. These remains are of historical value in the course and patterning of the place.

4.3 Endnotes

[1] NSW Heritage Office, *Assessing Heritage Significance*, Sydney, NSW Heritage Office, 2001.

[2] Australia ICOMOS Inc, *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance 2013*, Australia ICOMOS Inc, Burwood, VIC, 1–10.

[3] NSW Heritage Branch, *Assessing Significance for Historical Archaeological Sites and 'Relics'*, Heritage Branch of the Department of Planning, 2009, Section 4.4.

[4] NSW Heritage Branch, *Assessing Significance for Historical Archaeological Sites and 'Relics'*, Heritage Branch of the Department of Planning, 2009, p 11.

[5] Bickford, A and Sullivan, S 1984, 'Assessing the Research Significance of Historic Sites', in Sullivan, S and Bowdler, S (eds), *Site Surveys and Significance Assessment in Australian Archaeology,* Proceedings of the 1981 Springwood Conference on Australian Prehistory, Department of Prehistory, Research School of Pacific Studies, Australian National University, Canberra, pp 23–24.

[6] Croker, A, *Respecting the Vision: Sydney Opera House—A Conservation Management Plan*, report prepared for Sydney Opera House Trust, July 2017, Section 3.

5.0 Archival Photographic Recording

Archival photography was taken during both phases of the archaeological work. This section provides a summary of the recording.

A digital archival photographic recording of the Lift 36 trench and its features was prepared on 17 October 2018 (Photographs 1 to 18). A second photographic recording was prepared on 18 January 2019 (Photographs 19 to 28). Photographs were taken of the archaeological features adhering to the requirement of the NSW Heritage Manual *Photographic Recording of Heritage Items Using Film or Digital Capture.*

Photographic recording of the features was difficult due to artificial light and safety rail construction around the trench. Archival photographs were taken by Sharon Johnson (GML), using a Nikon D4S with a Nikkor 16-35mm 1.4 lens. Photographs were taken with the following general settings.

Table 5.1 Archival Photography Camera Settings.

Photographs	ISO	WB	F Stop	Shutter
1 to 6 Overhead shots—outside pit	500	Manual Cool white fluorescent	*f*/22	6s (tripod and remote shutter)
7 to 18 Internal shots—inside pit	500	Manual Cool white fluorescent	*f*/22	10s (tripod and remote shutter)
19 to 28 Phase 2 photography	500	Manual Cool white fluorescent	*f*/22	10s (tripod and remote shutter)

5.1 Photographic Catalogue

Table 5.2 Photographic Catalogue of Archival Photography.

Photograph #	[Context]	Description	Facing
1	Whole trench	To the north face, showing the steps [15], [16], and overlying fills.	NNW
2	Whole trench	To the north face, showing the steps [15], [16], and overlying fills.	N
3	Whole trench	To the north face, showing the steps [15], [16], and overlying fills.	N
4	Whole trench	To the north face, showing the steps [15], [16], wall [9], and overlying fills.	NE
5	7, 8, 9, 20	Along the wall with the fills to the east (left), and concrete floor west (right).	S
6	Whole trench	To the north face, showing the steps [15], [16], wall [9], and overlying fills.	SE
7	1, 2, 3, 5, 6, 7, 8, 9, 20	To the eastern section (refer to eastern section Figure 3.3).	E
8	1, 2, 3, 5, 6, 7, 8, 9, 15, 16, 20	To the northern and eastern sections, showing all main archaeological structural remains and fills.	NE
9	1, 2, 3, 4, 5, 8, 9, 14, 15, 16, 18, 19, 20	To the northern section (refer to eastern section Figure 3.2).	N

Photograph #	[Context]	Description	Facing
10	1, 2, 3, 4, 5, 8, 9, 14, 15, 16, 18, 19, 20	To the northern section (refer to eastern section Figure 3.2).	N
11	1, 2, 3, 5, 6, 7, 8, 9, 20	To the eastern section (refer to eastern section Figure 3.3).	E
12	2, 3, 5, 6, 7, 8, 9, 20	To the eastern section (refer to eastern section Figure 3.3). Close-up of the wall.	E
13	9, 10, 11	To the cuts in the sandstone wall. Showing the cement on the top of the wall.	E
14	8, 9, 10, 11, 15	To the northeast corner and intersection of the wall and steps.	NE
15	2, 3, 8, 9, 10, 11, 15	To the northeast corner and intersection of the wall and steps, wider view.	NE
16	1, 2, 3, 4, 5, 8, 9, 14, 15, 16, 18, 19, 20	To the western side of the steps, and north section.	NE
17	14, 15, 16, 18, 19, 20	The eastern face of the steps (refer to Figure 3.4).	NE
18	1, 2, 3, 5, 6, 7, 8, 9, 15, 16, 20	To the northern and eastern sections, showing all main archaeological structural remains and fills.	NE
19	9, 10, 11	To the eastern wall, displaying all phases associated with the archaeology of this room—Fort Macquarie, with the cut and pecked sandstone bedrock with lime mortar, and Tramcar House, with the re-cut bedrock and adhering concrete.	NE
20	15, 16, 19	To the cut-and-filled area behind the steps, used for concrete preparation of the floor surfaces.	E
21	8, 9, 10, 19,	The interface between the steps and two phases of sandstone bedrock wall.	S
22	Whole trench	The outer norther and eastern walls of the room.	SW
23	9, 15, 16, 19	The steps and eastern wall.	N
24	9, 15, 16	The northeast corner with all final exposed contexts.	NE
25	8, 9, 10, 11, 15, 19	Excavated context external to the room, onto natural bedrock.	N
26	15, 16	Corner of the steps fully excavated.	NE
27	15, 16, 19	Section profile of the steps and area used for cement preparation to the rear of the steps.	E
28	9, 10, 11	The relationship between the lime mortar and cement on the cuts of the bedrock wall.	E

5.2 Photographic Plan Sheet (Phase 1)

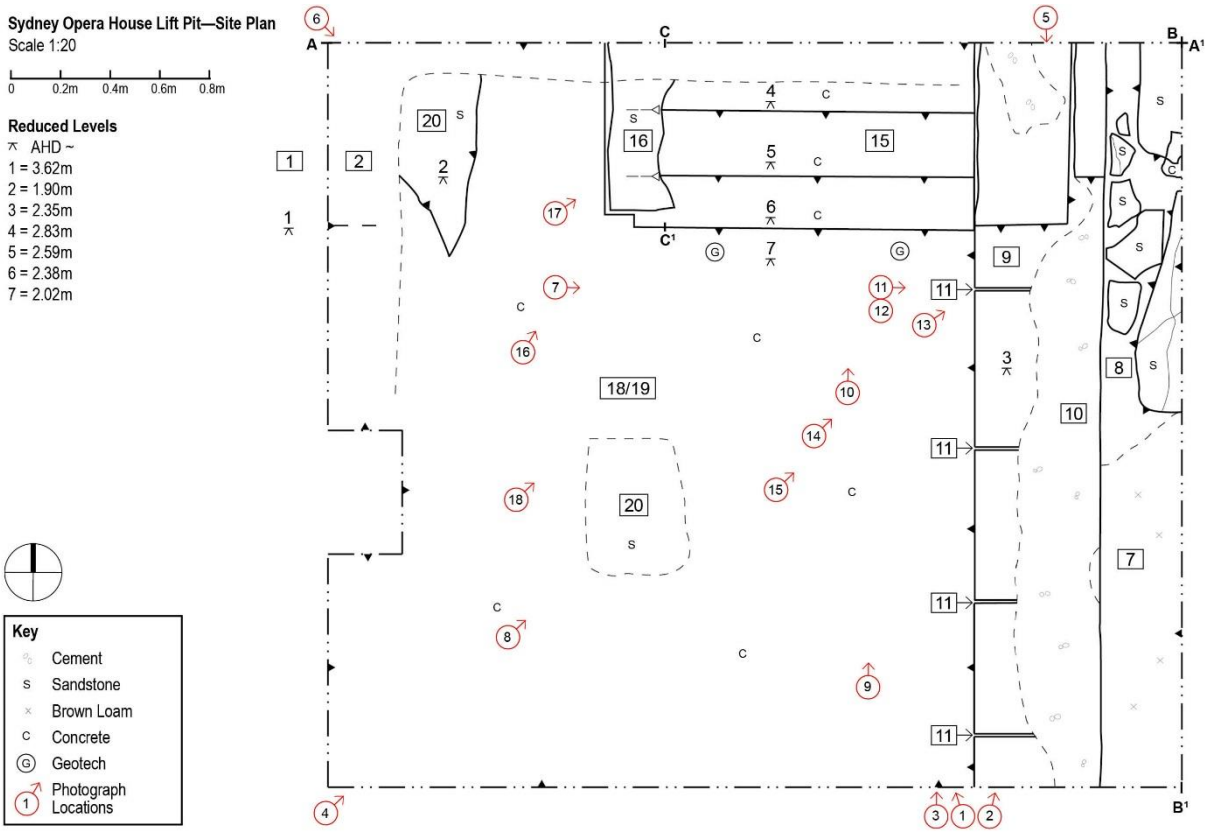


Figure 5.1 Photographic Plan Sheet, showing the extent of excavation following Phase 1. (Source: GML 2018)

5.3 Photographic Thumbnails (Phase 1)

Figure 5.2 Photograph 1. (Source: GML 2018)

Figure 5.3 Photograph 2. (Source: GML 2018)

Figure 5.4 Photograph 3. (Source: GML 2018)

Figure 5.5 Photograph 4. (Source: GML 2018)

Figure 5.6 Photograph 5. (Source: GML 2018)

Figure 5.7 Photograph 6. (Source: GML 2018)

Figure 5.8 Photograph 7. (Source: GML 2018)

Figure 5.9 Photograph 8. (Source: GML 2018)

Figure 5.10 Photograph 9. (Source: GML 2018)

Figure 5.11 Photograph 10. (Source: GML 2018)

Figure 5.12 Photograph 11. (Source: GML 2018)

Figure 5.13 Photograph 12. (Source: GML 2018)

Figure 5.14 Photograph 13. (Source: GML 2018)

Figure 5.15 Photograph 14. (Source: GML 2018)

Figure 5.16 Photograph 15. (Source: GML 2018)

Figure 5.17 Photograph 16. (Source: GML 2018)

Figure 5.18 Photograph 17. (Source: GML 2018)

Figure 5.19 Photograph 18. (Source: GML 2018)

5.4 Photographic Plan Sheet (Phase 2)

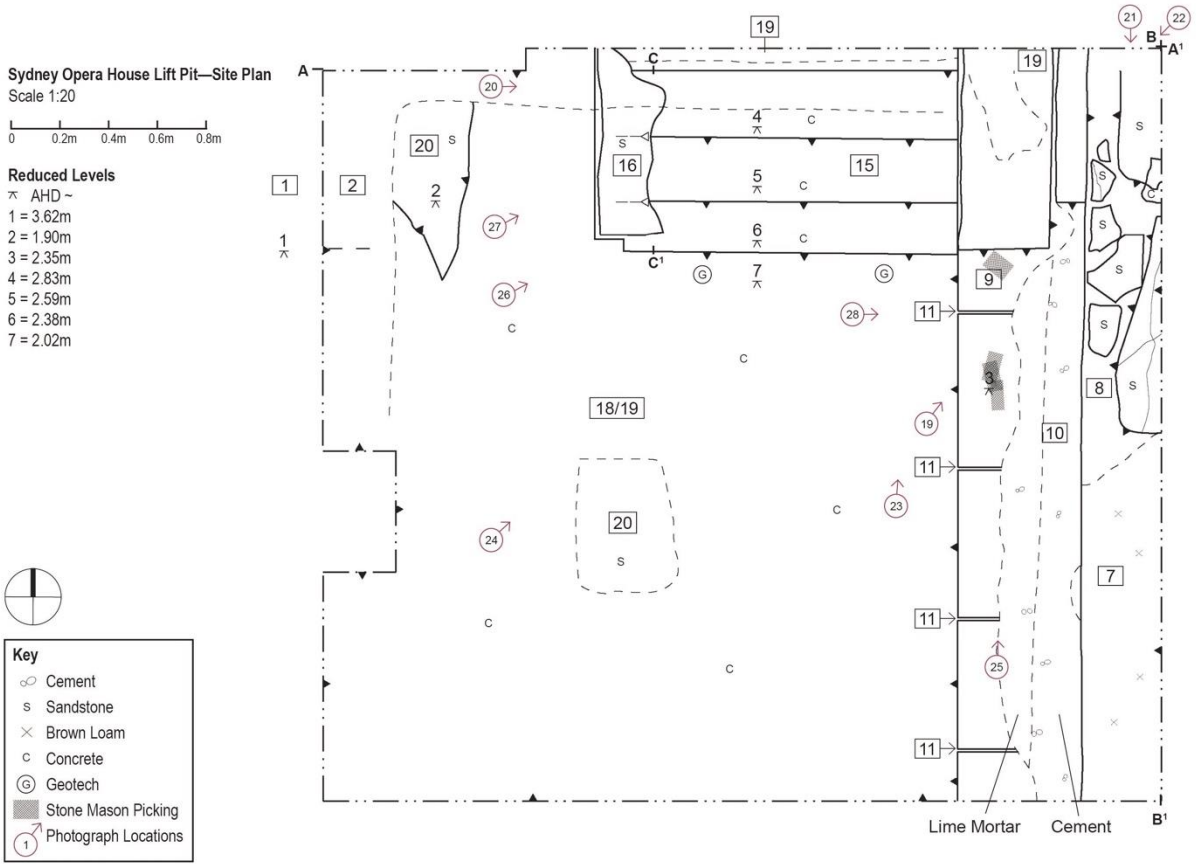


Figure 5.20 Photographic Plan Sheet, showing the extent of excavation following Phase 2. (Source: GML 2019)

5.5 Photographic Thumbnails (Phase 2)

Figure 5.21 Photograph 19. (Source: GML 2019)

Figure 5.22 Photograph 20. (Source: GML 2019)

Figure 5.23 Photograph 21. (Source: GML 2019)

Figure 5.24 Photograph 22. (Source: GML 2019)

Figure 5.25 Photograph 23. (Source: GML 2019)

Figure 5.26 Photograph 24. (Source: GML 2019)

Figure 5.27 Photograph 25. (Source: GML 2019)

Figure 5.28 Photograph 26. (Source: GML 2019)

Figure 5.29 Photograph 27. (Source: GML 2019)

Figure 5.30 Photograph 28. (Source: GML 2019)

6.0 Heritage Recommendations

6.1 The Archaeological Site

Archaeological intervention and mitigation for the works connected with Lift 36 have been completed in line with the S60 approval. The area of works has now been backfilled with a mass concrete pour into the trench and the area returned to its former appearance, with the addition of construction materials for the lift (Figure 6.1).

Figure 6.1 The Lift 36 area, following completion of archaeological works and initial construction to restore floor level to its prior level. (Source: SOH 2019)

Condition 3 of the Section 60 approval has been met. The final archaeological excavation report will be issued to the Heritage Division (Condition 3(h)).

The absence of significant objects (relics) recovered from either context [7] or [8] precludes the need for curation of the three items in line with the 2017 CMP—Policy 18.24 and Condition 3(g).

Under approval for the Lift 36 works, the Heritage Division has identified that future Sydney Opera House archaeological management needs to be planned and implemented. Measures include:

- An update to the 2017 CMP (v4) to 'enable better management and acknowledgement of State significant archaeology' (advisory note).
- The preparation of an archaeological zoning plan (AZP), and policies for the management of state significant archaeology, including long-term artefact management advice and outlining responsibilities for management of these artefacts, if and when salvaged (Condition 4).

These matters are beyond the scope of this report.

7.0 Appendices

Appendix A

Application under S60 of the Heritage Act 1977, Sydney Opera House

Heritage Council of New South Wales

Level 6, 10 Valentine Avenue
Parramatta NSW 2150
Locked Bag 5020
Parramatta NSW 2124

Telephone: 61 2 9873 8500
Facsimile: 61 2 9873 8599
heritagemailbox@environment.nsw.gov.au
www.heritage.nsw.gov.au

File No: SF18/102356
Ref: DOC18/871808

Ms Kya Blondin
SYDNEY OPERA HOUSE TRUST
GPO Box 4274
SYDNEY NSW 2001
Via email: KBlondin@sydneyoperahouse.com

Dear Ms Blondin

APPLICATION UNDER S60 OF THE *HERITAGE ACT 1977* SYDNEY OPERA HOUSE, STATE HERITAGE REGISTER Nº 01685

Site: Sydney Opera House – (Joan Sutherland Theatre)

Proposal: Archaeological salvage of evidence of the former Tram Depot and evidence of Fort Macquarie to install the foundations of Lift 36 for the Joan Sutherland Theatre front of house and safety, accessibility and venue enhancement works (previously approved under 2016/s60/64)

Section 60 application no: s60/2018/227, received 30 November 2018

Information received with the application: As per Condition No. 1

Additional information requested: No

As delegate of the Heritage Council of NSW (the Heritage Council), I have considered the above section 60 application. Pursuant to section 63 of the *Heritage Act 1977*, approval is granted subject to the following conditions:

APPROVED DEVELOPMENT

1. Development must be in accordance with:
   a) Engineering Drawings prepared by Tonkin Zulaikha Greer Architects, dated August 2018, as listed in the table below:

Drawing No.	Title	Date	Rev
29 BR AEC03 EW	Structural Lift 36 Ground Floor General Arrangement Plan & Details, (Building Renewal Program Lift 36), Sheet S010	1.8.2018	C04
49 BR TZG03 EW	Lift Pit 36 Details 1, (Building Renewal Program Lift 36), Sheet A453	24.7.2017	C05
49 BR TZG03 EW	N-S Sections (Building Renewal Program Lift 36), Sheet A200	24.7.2017	C02
49 BR TXG03 EW	Demolition Sections and Elevations (Building Renewal Project Lift 36), Sheet A053	24.7.2017	C02
49 BR TZG03 EW	GF + GM North Demolition Plan (Building Renewal Program Lift 36), Sheet A050	24.7.2017	C01
49 BR TZG03 EW	Site Location Plan (Building Renewal Program Lift 36), Sheet A002	24.7.2017	C01

   b) Sydney Opera House – Lift 36 Historical Archaeological Assessment and Management Plan, Report prepared for Sydney Opera House prepared by GML Heritage, dated November 2018
   c) Dr Tim Owen nominated Excavation Director CV

d) Letter from Sydney Opera House Trust to Heritage Division entitled 'Re: Archaeological find pursuant to works being undertaken under heritage approval 2016/s60/64' dated 26 October 2018

EXCEPT AS AMENDED by the conditions of this approval:

SITE PROTECTION

2. Significant built and landscape elements are to be protected during site preparation and the works from potential damage. Protection systems must ensure significant fabric, including landscape elements, is not damaged or removed.

Reason: To ensure significant fabric including vegetation is protected during construction.

3. HISTORICAL ARCHAEOLOGY

a) All works shall be in accordance with the approved research design and methodology outlined in '*Sydney Opera House – Lift 36 Historical Archaeological Assessment and Management Plan, Report prepared for Sydney Opera House prepared by GML Heritage, dated November 2018'*, except as amended by the following conditions:

b) This archaeological approval allows the salvage of State significant relics associated with Fort Macquarie as well as the Tramcar phase of the Sydney Opera House for construction of Lift Pit 36.

c) **Fieldwork**
The Heritage Council of NSW or its Delegate must be informed in writing of the start of the archaeological investigation at least five (5) days prior to the commencement of, and within five (5) days of the completion of on-site archaeological work.

d) The Applicant must ensure that if substantial intact archaeological deposits and/or State significant relics not identified in '*Sydney Opera House – Lift 36 Historical Archaeological Assessment and Management Plan, Report prepared for Sydney Opera House prepared by GML Heritage, dated November 2018'*, are discovered, work must cease in the affected area(s) and the Heritage Council of NSW must be notified. Additional assessment and approval may be required prior to works continuing in the affected area(s) based on the nature of the discovery.

e) The Applicant must ensure that the nominated Excavation Director, Dr Tim Owen, is present at the site supervising all excavation activity likely to expose relics.

f) The Applicant must ensure that the nominated Excavation Director, Dr Tim Owen, takes adequate steps to record in detail relics, structures and features discovered on the site during the archaeological works in accordance with current best practice. This work must be undertaken in accordance with the NSW Heritage Office guidelines, 'How to Prepare Archival Records of Heritage Items' (1998) and 'Guidelines for Photographic Recording of Heritage Items' (2006).

g) **Analysis and Reporting**
The Applicant is responsible for the safe-keeping of any relics recovered from the site. The Applicant must ensure that the nominated Excavation Director, Dr Tim Owen, or an appropriate specialist, cleans, stabilises, labels, analyses, catalogues and stores any artefacts recovered from the site in a way that allows them to be retrieved according to both type and provenance.

h) **Final report:**
The Applicant must ensure that a final excavation report is prepared by the nominated Excavation Director, Dr Tim Owen, to publication standard, within one (1) year of the completion of the field based archaeological activity unless an extension of time or other variation is approved by the Heritage Council of NSW. Further copies of the report should be lodged with the local library and/or another appropriate local repository in the area in which the site is located.

Reason: To appropriately manage the disturbance and salvage of significant archaeology within the Sydney Opera House site.

REVISION OF THE CONSERVATION MANAGEMENT PLAN REGARDING STATE SIGNIFCANT ARCHAEOLOGY

4. The Conservation Management Plan (v4) prepared for the Sydney Opera House acknowledges the presence of archaeology and recommends applying archaeological finds identified to date as a guide for future work. The CMP should be revised to include policies for the management of State significant archaeology including long term artefact management advice and outline responsibilities for management of these artefacts, if and when salvaged. The revision of this section shall be resubmitted for endorsement of the Heritage Council of its delegate within 12 months of this approval.

Reason: Evidence of Fort Macquarie has been identified on at least three separate occasions. It is assessed as being of State heritage significance. The CMP identifies the site has had a number of archaeological finds which should better inform forward planning. However, there are no policies on the management of State Significant archaeology or to manage associated artefacts recovered from salvage programs undertaken in the past. The CMP requires this advice to clearly outline the responsibilities and management considerations for this complex site.

INTERPRETATION

5. The results of the archaeological program under this approval involving salvage of the state significant Fort Macquarie and locally significant tramcars shall be appropriately incorporated into the existing *Renewal Interpretation Strategy 2017*. The outcomes of this project, including the final excavation report shall be made available to the public as mitigation for the loss of this information.
Reason: This is proposed by the Applicant and is a mitigation for the loss of State and locally significant archaeological evidence at this site. This will result in information of this program and the development of the site being explained to the public both on site and through electronic media.

UNEXPECTED HISTORICAL ARCHAEOLOGICAL RELICS

6. The applicant must ensure that if unexpected archaeological deposits or relics not identified and considered in the supporting documents for this approval are discovered, work must cease in the affected area(s) and the Heritage Council of NSW must be notified. Additional assessment and approval may be required prior to works continuing in the affected area(s) based on the nature of the discovery.

Reason: This is a standard condition to identify to the applicant how to proceed if historical archaeological deposits or relics are unexpectedly identified during works.

ABORIGINAL OBJECTS

7. Should any Aboriginal objects be uncovered by the work which is not covered by a valid Aboriginal Heritage Impact Permit, excavation or disturbance of the area is to stop immediately and the Office of Environment & Heritage is to be informed in accordance with the *National Parks and Wildlife Act 1974* (as amended). Works affecting Aboriginal

objects on the site must not continue until the Office of Environment and Heritage has been informed and the appropriate approvals are in place. Aboriginal objects must be managed in accordance with the *National Parks and Wildlife Act 1974*.

Reason: This is a standard condition to identify to the applicant how to proceed if Aboriginal objects are unexpectedly identified during works.

COMPLIANCE

8. If requested, the applicant and any nominated heritage consultant may be required to participate in audits of Heritage Council of NSW approvals to confirm compliance with conditions of consent.

Reason: To ensure that the proposed works are completed as approved.

DURATION OF APPROVAL

9. This approval will lapse five years from the date of the consent unless the building works associated with the approval have physically commenced.

Reason: To ensure the timely completion of works.

ADVISORY NOTE:

The Conservation Management Plan (v4) prepared for the Sydney Opera House acknowledges the presence of archaeology and *'that archaeological features and material already found on the site to date should serve as a guide for future work'*. The Heritage Division notes that archaeological evidence linked to Fort Macquarie has been identified during ground disturbance works on at least three separate occasions at the Sydney Opera House at varying times. The updating of the CMP to enable better management and acknowledgement of State significant archaeology within the site is important. There needs to be a more proactive approach to managing this significant phase of the Opera House site's history during planning activities by the Sydney Opera House Trust. Early planning mechanisms and applications lodged for assessment, should appropriately address the potential for State significant archaeology to survive at the site (where it is likely) and include appropriate management for these up-front, in order to avoid delays and continuing loss of archaeological resources.

ADVICE

Section 148 of the *Heritage Act 1977* (the Act), allows people authorised by the Minister to enter and inspect, for the purposes of the Act, with respect to buildings, works, relics, moveable objects, places or items that is or contains an item of environmental heritage. Reasonable notice must be given for the inspection.

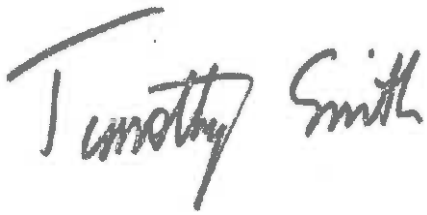
RIGHT OF APPEAL

If you are dissatisfied with this determination appeal may be made to the Minister for Heritage under section 70 of the Heritage Act 1977.

It should be noted that an approval under the Heritage Act is additional to that which may be required from other Local Government and State Government Authorities in order to undertake works.

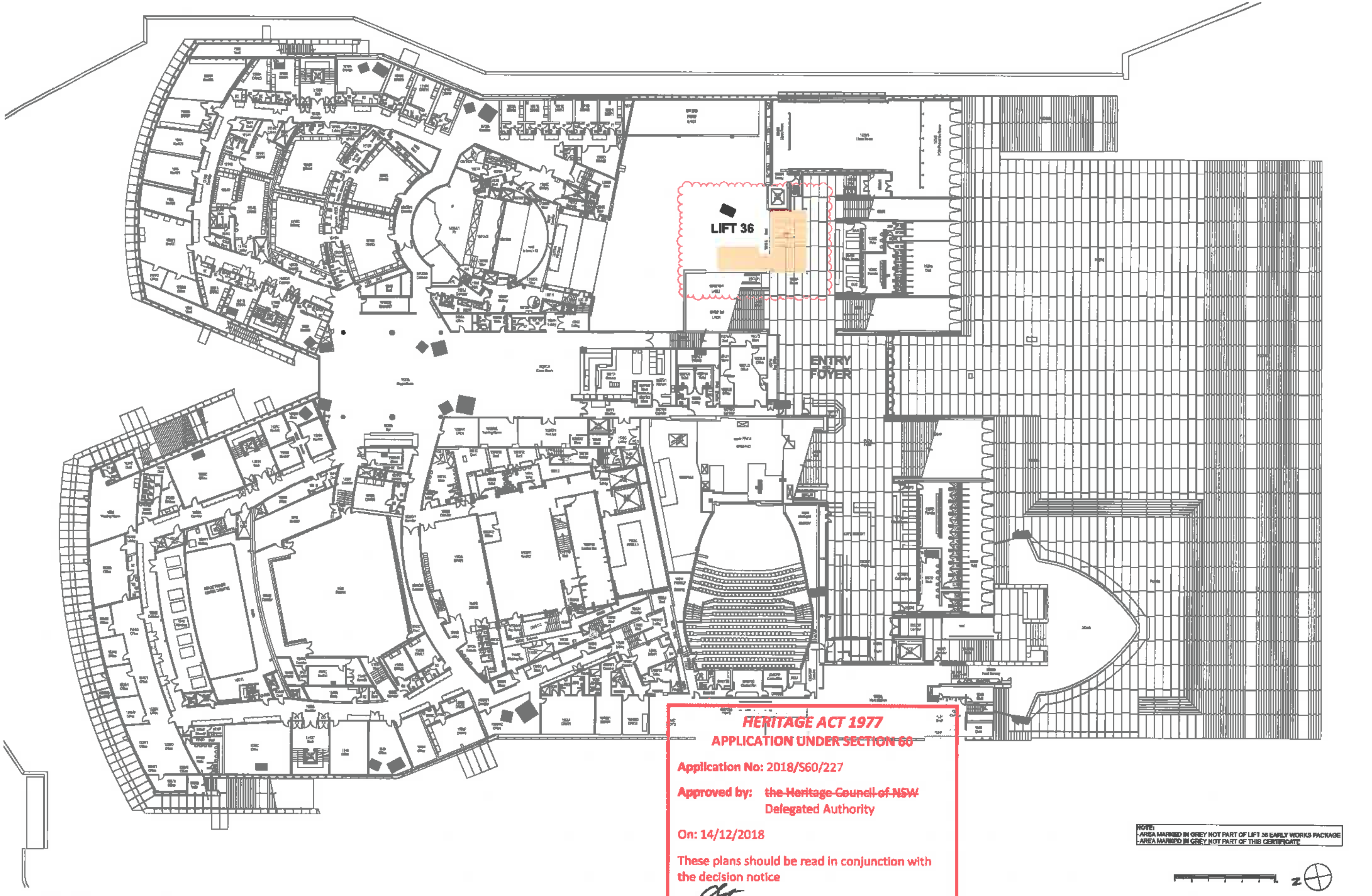
If you have any questions regarding the above approval s60/2018/227 at the SYDNEY OPERA HOUSE please contact Felicity Barry, Senior Historical Archaeologist at the Heritage Division, Office of Environment and Heritage, on telephone 9995 6914 or by e-mail: Felicity.Barry@environment.nsw.gov.au .

Yours sincerely



Tim Smith, OAM
Director, Operations
Heritage Division
Office of Environment and Heritage
As Delegate of the Heritage Council of NSW
14 December 2018

Cc: General Manager, City of Sydney Council, E: council@cityofsydney.nsw.gov.au
Excavation Director – Dr Tim Owen, GML Heritage: timo@gml.com.au
Department of Planning and Environment, Karl Fetterplace E: karl.fetterplace@planning.nsw.gov.au



NOTE:
- AREA MARKED IN GREY NOT PART OF LIFT 36 EARLY WORKS PACKAGE
- AREA MARKED IN GREY NOT PART OF THIS CERTIFICATE

HERITAGE ACT 1977
APPLICATION UNDER SECTION 60

Application No: 2018/S60/227

Approved by: ~~the Heritage Council of NSW~~ Delegated Authority

On: 14/12/2018

These plans should be read in conjunction with the decision notice

(for) Delegate Heritage Council

Status	FOR CONSTRUCTION
Project	BUILDING RENEWAL PROGRAM LIFT 36
Contract	SOH-513
Title	SITE LOCATION PLAN
Location	BX VA
Drawing No:	49 SR T2008 EW
Sheet:	A002
Rev	C01
Size:	A1

ARCHITECT
TONKIN ZULAIKHA GREER ARCHITECTS

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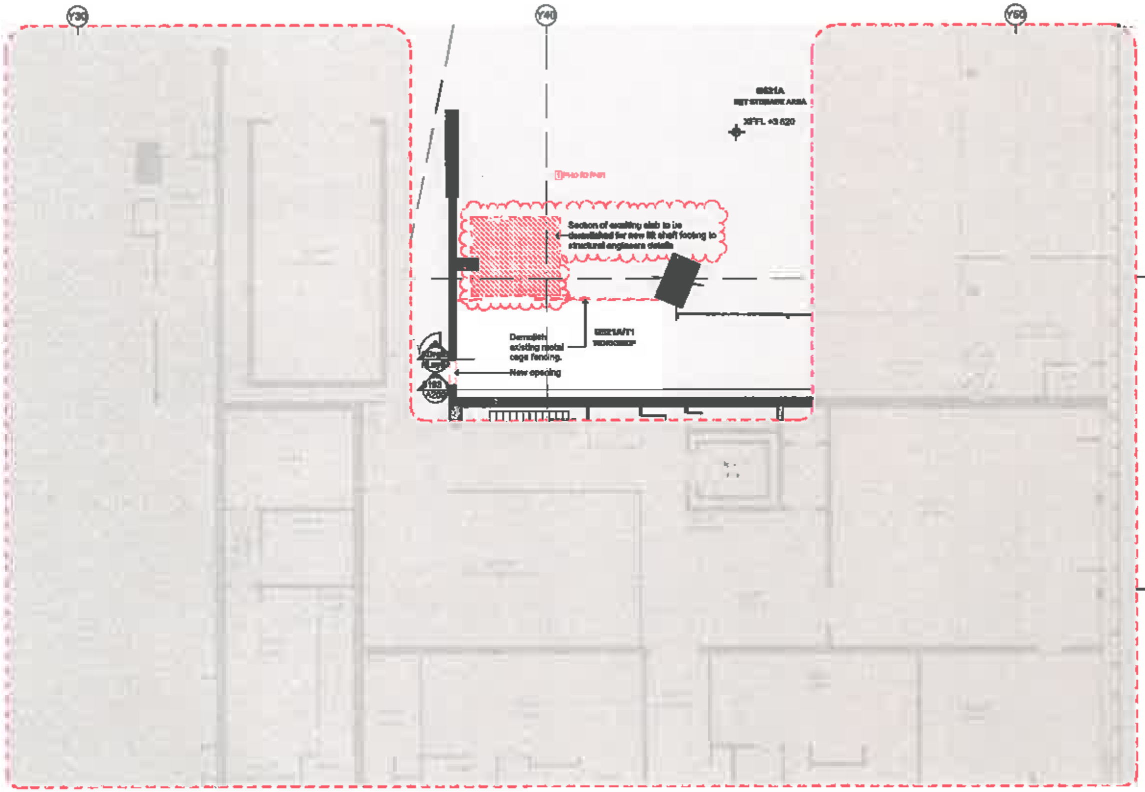
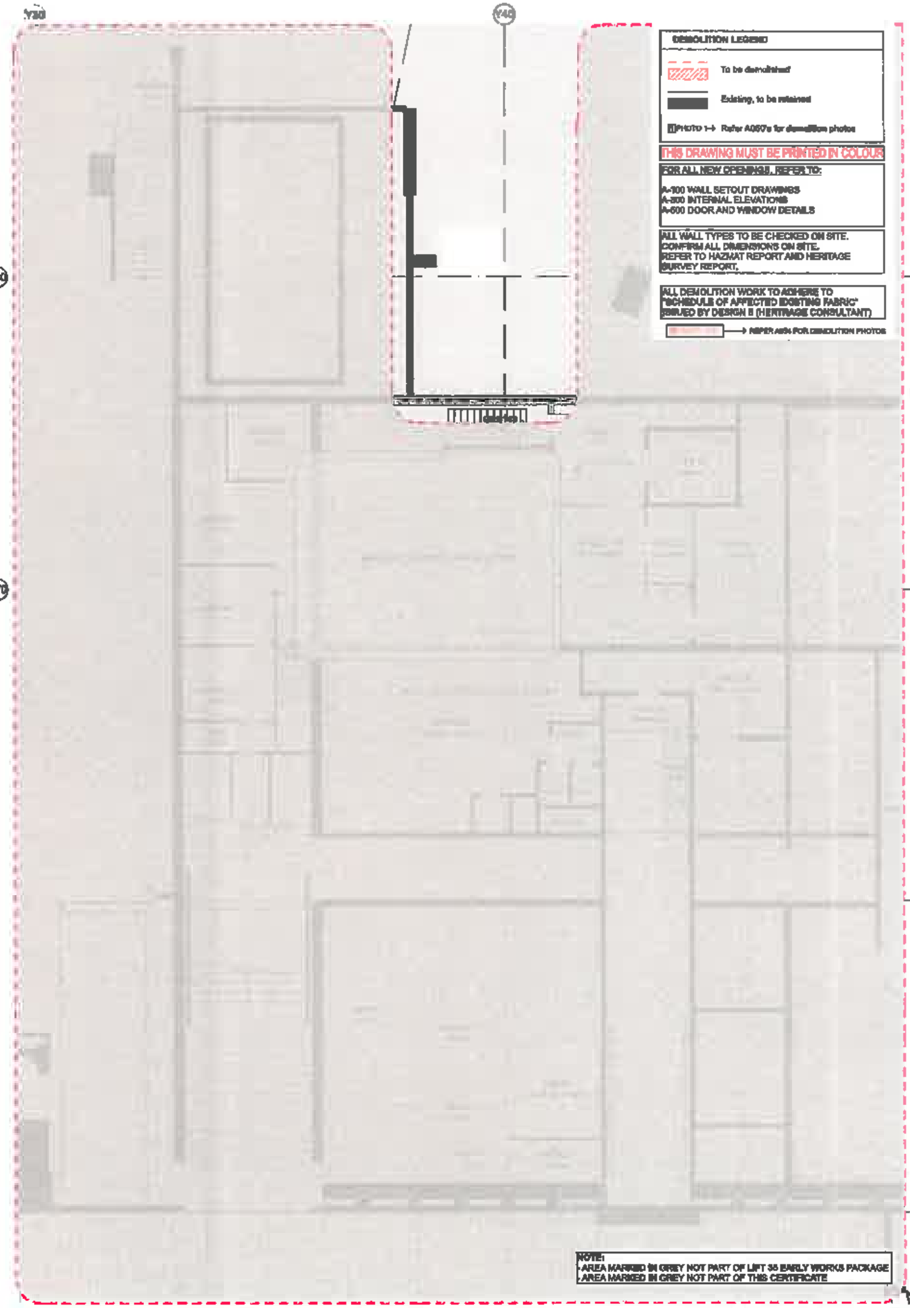


GROUND FLOOR DEMOLITION PLAN
1:100



GROUND MEZZANINE DEMOLITION PLAN
1:100

HERITAGE ACT 1977

APPLICATION UNDER SECTION 60

Application No: 2018/S60/227

Approved by: ~~the Heritage Council of NSW~~
Delegated Authority

On: 14/12/2018

These plans should be read in conjunction with the decision notice

(for) Delegate
Heritage Council

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NOTES:
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ARCHITECT
TONKIN ZULAIKHA GREER ARCHITECTS

Status: FOR CONSTRUCTION

Contract: SOH-513

Project: BUILDING RENEWAL PROGRAM
LIFT 38

Title: GF + GM NORTH DEMOLITION PLAN

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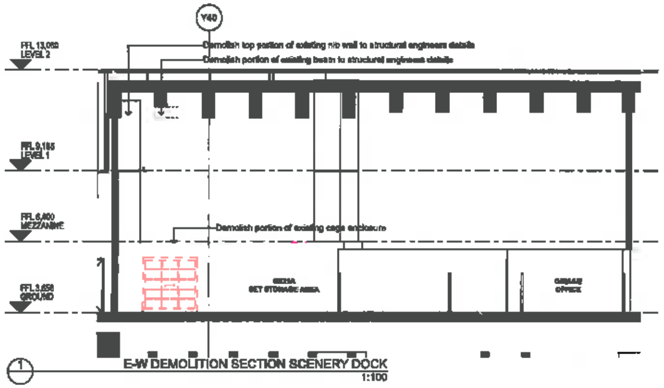
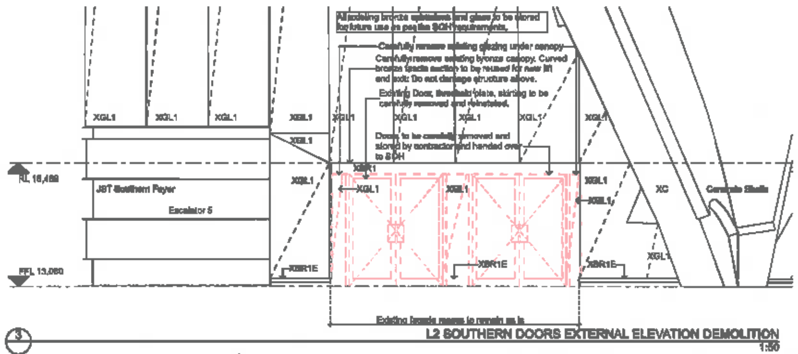
Location	Drawing No:	Sheet:	Rev	Size:
BX VA	49 SR TZG03 EW	A050	C01	A1



1 E-W DEMOLITION SECTION SCENERY DOCK 1:100



3 L2 SOUTHERN DOORS EXTERNAL ELEVATION DEMOLITION 1:50

HERITAGE ACT 1977

APPLICATION UNDER SECTION 60

Application No: 2018/S60/227

Approved by: ~~the Heritage Council of NSW~~ Delegated Authority

On: 14/12/2018

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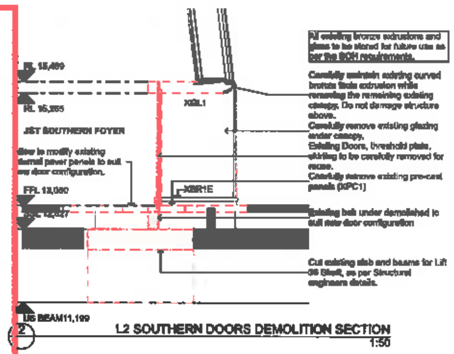
(for) Delegate Heritage Council



2 L2 SOUTHERN DOORS DEMOLITION SECTION 1:50

DEMOLITION LEGEND

To be demolished

Existing, to be retained

PHOTO 1→ Refer A050's for demolition photos

THIS DRAWING MUST BE PRINTED IN COLOUR

FOR ALL NEW OPENINGS, REFER TO:

A-100 WALL SETOUT DRAWINGS
A-300 INTERNAL ELEVATIONS
A-600 DOOR AND WINDOW DETAILS

ALL WALL TYPES TO BE CHECKED ON SITE. CONFIRM ALL DIMENSIONS ON SITE. REFER TO HAZMAT REPORT AND HERITAGE SURVEY REPORT.

ALL DEMOLITION WORK TO ADHERE TO "SCHEDULE OF AFFECTED EXISTING FABRIC" ISSUED BY DESIGN 5 (HERITAGE CONSULTANT)

GENERAL DEMOLITION NOTES:

GENERAL NOTES:

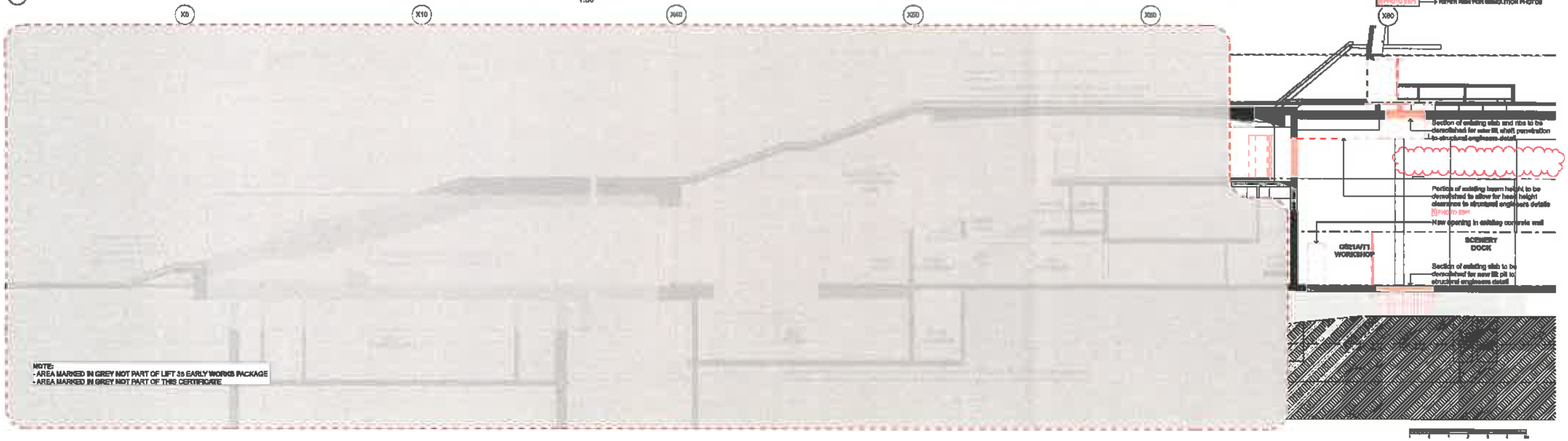
G1. Drawings indicative only - existing conditions to be confirmed on site.

EXISTING SERVICES:

S1. All redundant visible services to be removed - refer to Consultant Drawings and Specifications.
S2. XSC - Existing Service Carriages to be protected during works.

EXISTING FINISHES:

F1. Concrete Columns - Where paint finish, remove existing paint and clean. Refer to XCPS. Where existing concrete finish, clean. Refer XCS.
F2. Concrete Walls - Where paint finish, remove existing paint and clean. Refer to XCPS. Where existing concrete finish, clean. Refer XCS.
F3. Precast Panels - New precast floor and wall panels to match existing. Existing panels to be protected during works. Precast panels shown to be carefully removed to be stored for possible reuse. For reuse of existing wall panels to Utzon Stairs refer to A652.
F4. Terrazzo Floor - Carefully remove existing Terrazzo floor for reference of new TS1 to match existing.
F5. Concrete Beams - Where paint finish, remove existing paint and clean. Refer XCPS. Existing folded concrete beams to be carefully cleaned as per Heritage Schedule. XC.
F6. Existing plenum and grilles above Precast Panels - clean and repaint existing boarding and linear slots. Refer WALL ELEVATIONS.
F7. Generally existing Brushbox Timber to Entry Foyer to be removed carefully and stored to Heritage Schedule requirements.
F8. Also refer LOUNGE DEMOLITION NOTES.
F9. Also refer EXISTING ACC TOILETS DEMOLITION NOTES.



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ARCHITECT
TONKIN ZULAIKHA GREER ARCHITECTS

Status: FOR CONSTRUCTION

Contract: SOH-513

Project: BUILDING RENEWAL PROGRAM LIFT 35

Title: DEMOLITION SECTIONS AND ELEVATIONS

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Location	Drawing No:	Sheet	Rev	Size
BX VA	48 BR TZG93 BW	A053	C02	A1

HERITAGE ACT 1977
APPLICATION UNDER SECTION 60

Application No: 2018/S60/227

Approved by: ~~the Heritage Council of NSW~~ Delegated Authority

On: 14/12/2018

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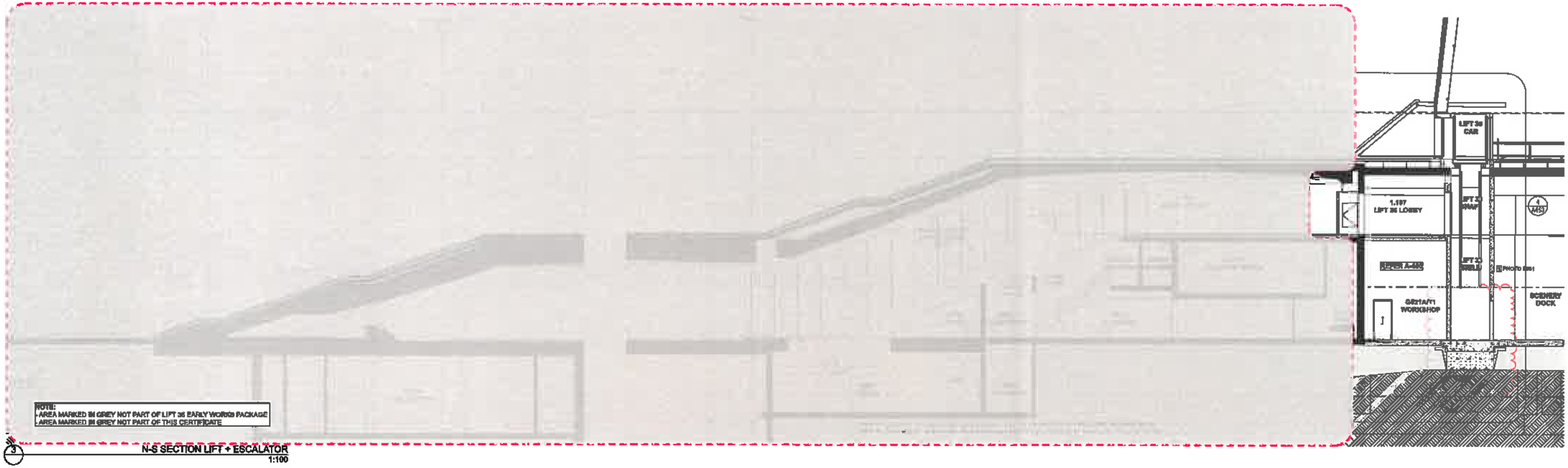
(for) Delegate
Heritage Council



N-S SECTION LIFT + ESCALATOR
1:100

Status: FOR CONSTRUCTION
Project: BUILDING RENEWAL PROGRAM LIFT 36
Contract: SOH-513
Title: N-S SECTIONS
ARCHITECT TONKIN ZULAIKHA GREER ARCHITECTS
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Location: BX VA | Drawing No: 48 BR TZG03 EW | Sheet: A200 | Rev: C02 | Size: A1
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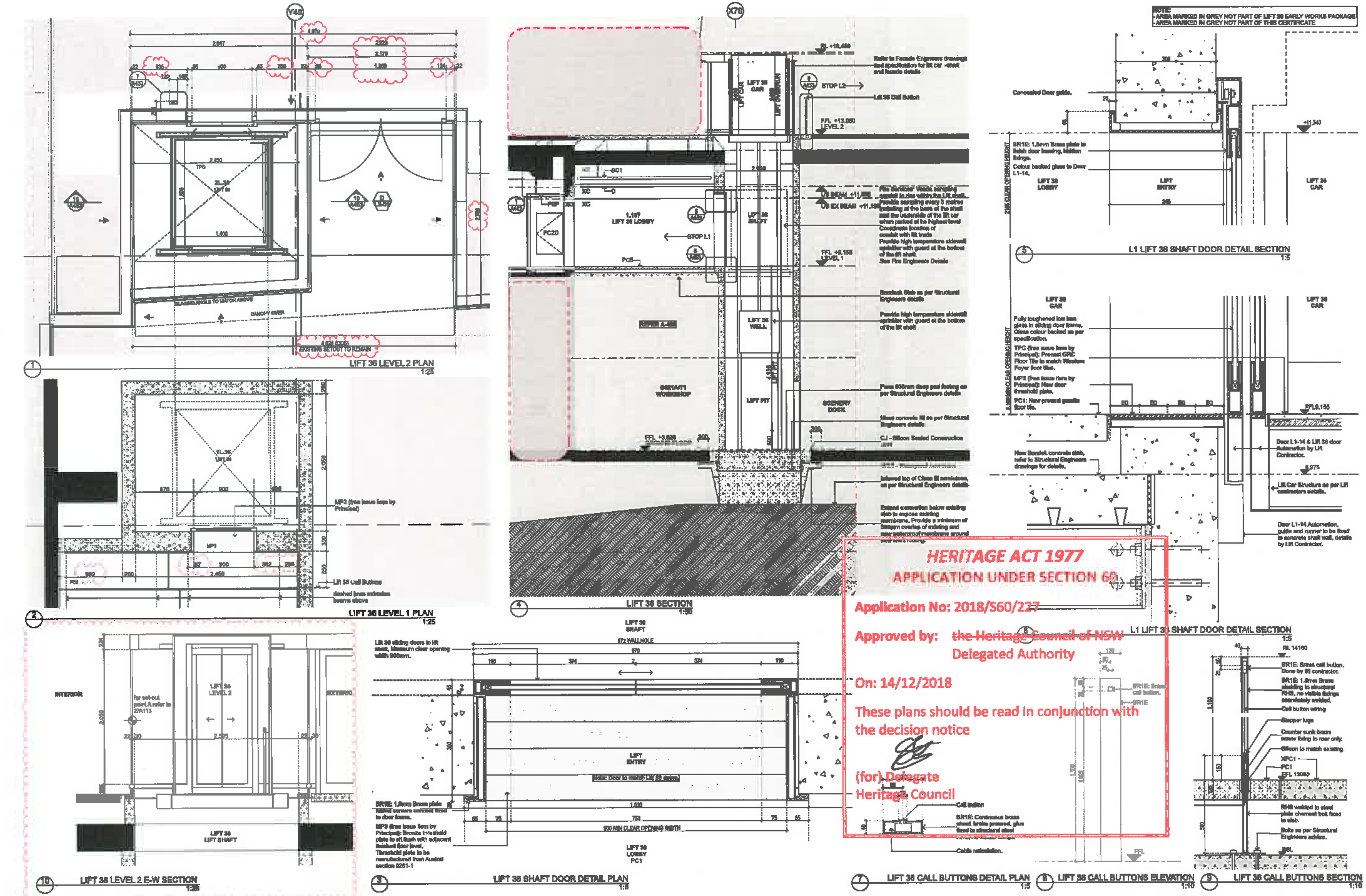


HERITAGE ACT 1977
APPLICATION UNDER SECTION 60

Application No: 2018/S60/227

Approved by: ~~the Heritage Council of NSW~~ Delegated Authority

On: 14/12/2018

These plans should be read in conjunction with the decision notice

(for) Delegate Heritage Council

Status: FOR CONSTRUCTION

Project: BUILDING RENEWAL PROGRAM LIFT 36

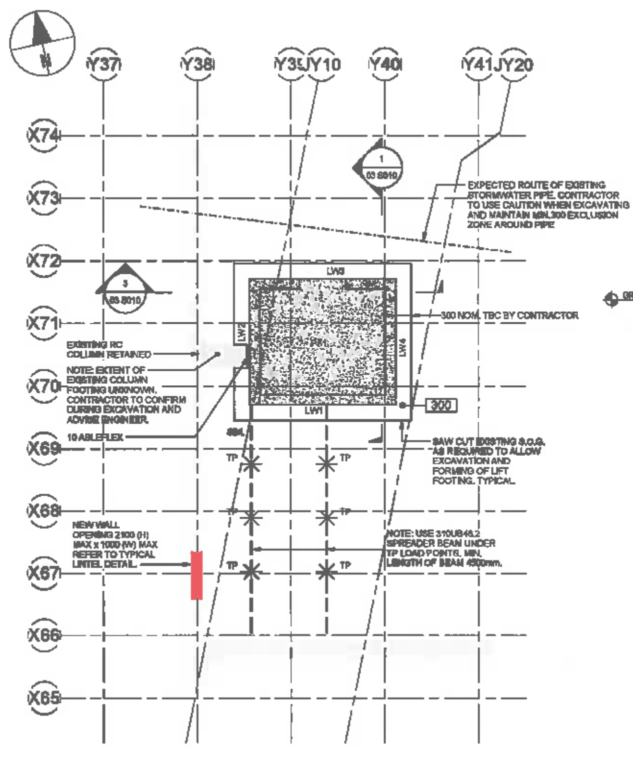
Title: LIFT 36 DETAILS 1

Contract: SOH-513

Architect: TONKIN ZULAIKHA GREER ARCHITECTS

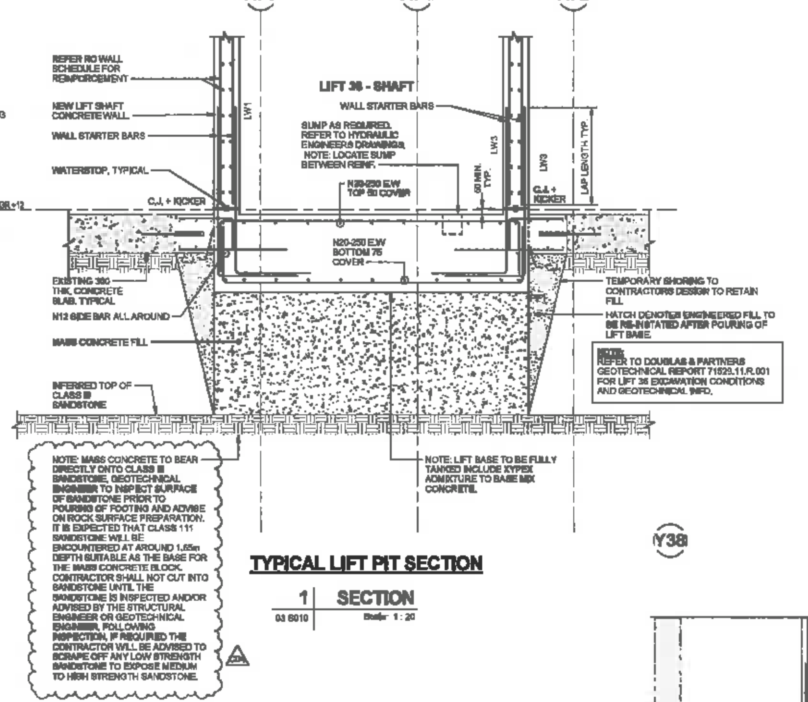
Drawing No: 49 BR TZ083 EW — Sheet: A453 — Rev: C05 — Size: A1

NOTES:
1. REFER DRAWING No. S001 & S002 FOR STRUCTURAL GENERAL NOTES.
2. PLAN GRID AND R.L. DIMENSIONS SHOWN ON THE STRUCTURAL DRAWINGS ARE INDICATIVE ONLY AND REFLECT THE SET-OUT INFORMATION USED DURING DESIGN. REFER GENERAL NOTES AND ARCHITECTS DRAWINGS FOR FINAL SET-OUT.



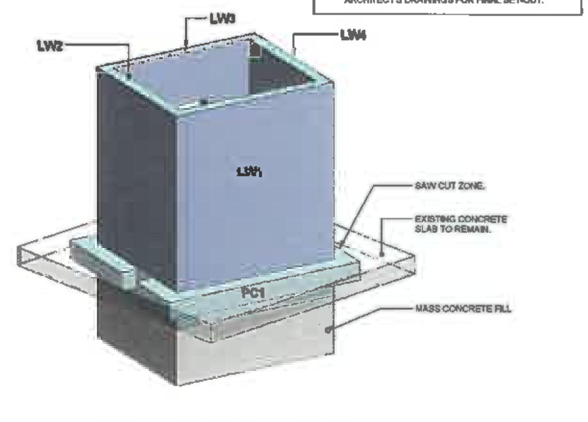
LIFT 36 - GROUND FLOOR GENERAL ARRANGEMENT PLAN

Scale: 1 : 50

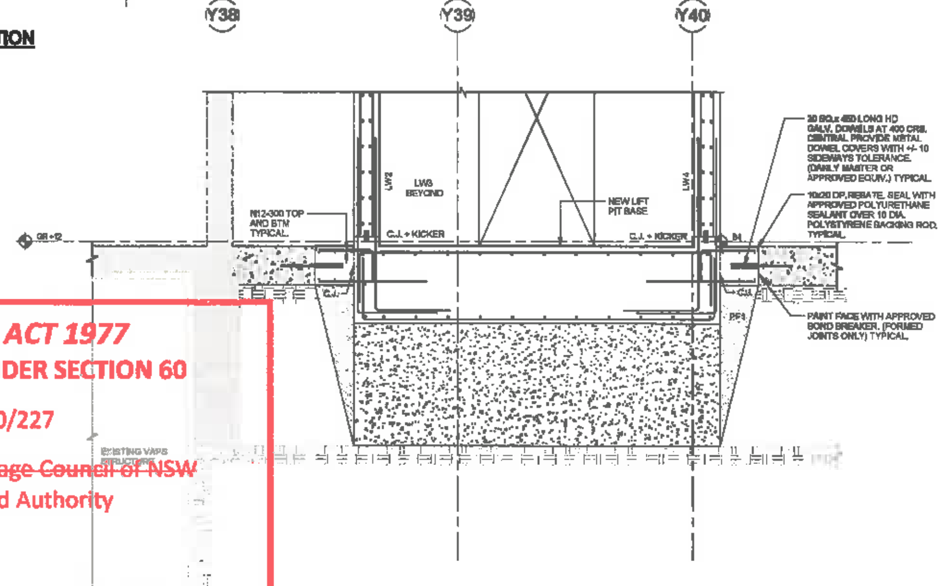


TYPICAL LIFT PIT SECTION

1 SECTION
03 S010
Scale: 1 : 20



3D VIEW ON LIFT AT GROUND LEVEL



3 SECTION
03 S010
Scale: 1 : 20

LIFT 36 - RC WALL SCHEDULE			
MARK	THICKNESS (mm)	REINFORCEMENT	COMMENTS
LW1	200	N12-200 EW EF	32 MPa
LW1A	300	N12-200 EW EF	32 MPa
LW2	200	N12-200 EW EF	32 MPa
LW3	200	N12-200 EW EF	32 MPa
LW4	200	N12-200 EW EF	32 MPa

LIFT 36 PAD FOOTING SCHEDULE				
MARK	SIZE (W)	SIZE (L)	SIZE (D)	CONCRETE STRENGTH
PF1	2650	2450	600	32 MPa

LEGEND

- LW1(U) — DENOTES LOAD BEARING RC WALL UNDER
- LW1 — DENOTES LOAD BEARING RC WALL OVER. REFER TO DRAWING S030 FOR WALL ELEVATIONS AND DETAILS.
- LW1 — DENOTES LOAD BEARING RC WALL UNDER AND OVER
- DENOTES NEW STRUCTURAL RC LIFT WALL SHOWN SHADED FOR CLARITY
- DENOTES EXISTING STRUCTURE
- TP — DENOTES TEMPORARY PROP. REFER TO DRG S012 FOR DETAILS
- DENOTES PENETRATION IN EXISTING RC WALL. AFTER CUTTING PENETRATIONS ALL REINFORCEMENT TO BE CUT BACK BY 20mm FROM FACE AND MADE GOOD TO MATCH EXISTING SURFACE CONDITIONS. EPOXY COAT ENDS OF EXISTING REINFORCEMENT IF REQUIRED. SAW CUT WITH DIAMOND BLADE.

HERITAGE ACT 1977
APPLICATION UNDER SECTION 60

Application No: 2018/S60/227

Approved by: ~~the Heritage Council of NSW~~ Delegated Authority

On: 14/12/2018

These plans should be read in conjunction with the decision notice

(for) Delegate
Heritage Council

0 1250 2500 mm 1:50 — 0 500 1000 mm 1:20

CONSTRUCTION ISSUE

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Issue	Description	Drn	Appd	Date
C04	ISSUED FOR CONSTRUCTION	J.T.	J.D.	06.08.2018
C03	ISSUED FOR CONSTRUCTION	HG	J.D.	22.06.2018
C02	ISSUED FOR CONSTRUCTION	J.T.	J.D.	07.06.2018
C01	ISSUED FOR CONSTRUCTION	HG	J.D.	04.05.2018
C00	ISSUED FOR CONSTRUCTION	JAB	JD	21.07.2017

AECOM
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Status: FOR CONSTRUCTION
Contract: SOH-513
Project: BUILDING RENEWAL PROGRAM ENTRY FOYER
Title: STRUCTURAL
LIFT 36 GROUND FLOOR GENERAL ARRANGEMENT PLAN & DETAILS

Sydney Opera House Trust
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Location	Drawing No	Sheet	Rev	
BX VA	29 BR AECOS EW	S010	C04	A1

ISO A1 594mm x 841mm