

Revised and Updated  
Aboriginal Cultural Heritage Assessment Report

Stage 1 Master Plan Works

Kamay Botany Bay National Park, Kurnell NSW

Sutherland LGA



View south over area proposed for new visitor centre and dancing circle

December 2023

Report prepared for  
NSW National Parks and Wildlife Service

***WARNING: Aboriginal & Torres Strait Islander readers should note that this document discusses the ancestral remains of Aboriginal people***

## Project summary

Kamay Botany Bay National Park is located at Kurnell and La Perouse in Sydney. This report concerns part of the Kurnell section of Kamay Botany Bay National Park. It is a highly significant Aboriginal landscape. Aboriginal people have been camping along this shore for thousands of years, and have left traces of their lives engraved on rocks and in large campsites. Aboriginal ancestors are buried here. It is the location of violent encounters and shared histories over the past 250 years. It is a place that has continued to be visited and used by local Aboriginal community members from the most ancient times to the present day. It is still highly valued by local Aboriginal people, and also has significance for other Aboriginal and non-Aboriginal people.

The NSW National Parks and Wildlife Service (NPWS) has prepared a Master Plan to guide upgrades to the visitor experience of the park, and to tell a more inclusive story of the history that has unfolded there. Stage 1 of that Master Plan includes a new visitor building, improved access and improved interpretation, as well as better picnic and eating facilities for visitors. Among the key principles of the Master Plan are 'respect for all cultures and heritage, respect for landscape and environment' and to 'make evident time past, time present, time future'. In keeping with these principles, the NPWS asked Coast History & Heritage (Coast) to prepare an Aboriginal Cultural Heritage Assessment Report (or 'ACHAR') to ensure that the significant Aboriginal heritage of the park would be protected from impacts as part of Stage 1 of the Master Plan. This ACHAR is a revised and updated version of previous reports produced in 2019 and 2023.

Our aim has been to make sure that significant Aboriginal sites were fully protected. To do this, we first had to work out exactly what had been found previously and see how this overlapped with the Master Plan proposals. Fortunately, Coast Director Paul Irish had done extensive archaeological investigations about ten years ago as part of the last master plan, and some further investigations have been undertaken more recently, so we had good records of what was found where. In May 2023, Coast and the La Perouse Local Aboriginal Land Council completed a test excavation program under AHIP #5072 to investigate elements of the Stage 1 Master Plan works in locations that had not been previously examined - consisting of two sections of the Main Loop Path (Elements 24 & 115), Whale Loop Path (Element 32), and Dancing Circle (Element 104).

The test excavation was conducted to better understand the extent and significance of Aboriginal cultural material in the area, with the results from this excavation to help guide the final design of the Stage 1 Master Plan elements in these areas. We found that many of the areas tested contained either no Aboriginal archaeological remains, or else only occasional shell or animal bone fragments or stone artefacts. We did however also find two areas of midden that had not previously been documented. One of these is part of the large and significant Foreshore Midden (AHIMS #52-3-0219), which contains midden and burials along a section of the park shore. The excavations revealed that this midden extends at least 70m further east than previously documented and contains further ancestral remains. We also documented an additional area of midden about 50m x

20m in size near the recently installed Whale Sculpture along the foreshore, which has been registered as AHIMS #52-3-2163.

Based on our assessment and test excavation, some elements have been removed and others modified to remove or reduce the potential for Aboriginal heritage impacts during construction of the various Stage 1 Master Plan elements. We have also come up with proposed management actions to ensure the protection of Aboriginal cultural heritage during construction works. With three limited exceptions, we have made sure that any intact Aboriginal archaeological deposits will be protected. The first is a 40m section of the proposed Main Loop Path (Element 24) where there is the possibility that intact Aboriginal heritage could be impacted in localised areas during the excavations to construct the path. The second is at the northern five metres of the Whale Loop Path (Element 32) where several small path footings could impact part of the midden in this area. The third is a small area to the east of the stream (Element 108) in which proposed stairs to link the beach to the main loop path will require footings and limited cutting into the disturbed dune at the back of the beach, with some possibility that less disturbed dune deposits may also be encountered. We have found ways to minimise these potential impacts and we have also recommended that any intact Aboriginal heritage that cannot be avoided is carefully excavated so that it can be later reburied in a safe place.

Even in the areas where the proposed works will not impact intact Aboriginal archaeological deposits, there is always the chance that they will uncover or impact single or small numbers of stone artefacts or fragments of shell either in intact soils or more commonly, not in their original position (for example in construction fill). To manage this possibility, we have proposed that any excavation works are monitored. If low densities of faunal remains and/or stone artefacts are found and cannot be protected, they will be collected under an Aboriginal Heritage Impact Permit (AHIP). That permit will not allow any impacts to any Aboriginal human remains. That permit will also not allow any impacts to any intact Aboriginal cultural heritage except in the section of the Main Loop Path (Element 24) discussed above.

Most of the Stage 1 Master Plan works are being assessed by NPWS under a Review of Environmental Factors, but some need to be assessed by Sutherland Shire Council as part of a formal development application. For this reason, two different AHIPs will be sought for these two different areas of works. However both will be subject to the same conditions.

Any stone or shell or animal bone that is collected or excavated under either AHIP will be recorded and reburied at an appropriate place within the park when the work is completed. By doing these things, we are confident that the best protections will be made for Aboriginal heritage, to ensure that it will remain in the park for generations to come.

To make all of this happen, we have proposed the following recommendations:

1. The report should be submitted to Heritage NSW in the Department of Planning and Environment as supporting documentation for both Aboriginal Heritage Impact Permit (AHIP) applications under s90 of the *National Parks & Wildlife Act 1974* to allow the actions outlined in **Section 7.3.2** and in accordance with the methodology outlined in Sections **7.3.3** to **7.3.6**.

2. The proposed Stage 1 Master Plan works that are to be subject to the Aboriginal Heritage Impact Permits in Recommendation 1 should not commence until the relevant AHIP has been issued, along with any approval required under the *Heritage Act 1977*.
3. In addition to the requirements of the AHIPs outlined in Recommendation 1, the general requirements outlined in **Section 7.3.1** relating to construction methods, Aboriginal heritage inductions and unexpected finds should be incorporated into all construction preparation and relevant construction management plans to ensure maximum protection for Aboriginal heritage during all Master Plan works.
4. On completion of the actions under each AHIP referred to in Recommendation 1, a final report should be prepared to fully document the works undertaken.
5. Where archaeological remains are documented during the archaeological monitoring and community collection or archaeological salvage referred to in Recommendation 1, records of these should be submitted to AHIMS.
6. Where archaeological remains (other than human remains) are documented during the archaeological monitoring and community collection or archaeological salvage referred to in Recommendation 1, these should be temporarily stored in the heritage consultant's premises until a suitable location for reburial has been determined with the Registered Aboriginal Parties to the current project.
7. Reburial of the Aboriginal ancestral remains located during the archaeological test excavations that were undertaken under AHIP #5072 (see **Section 5.2.3**) should be undertaken by the La Perouse Local Aboriginal Land Council at their earliest convenience, as outlined in **Section 7.3.6**. On completion of the reburial, the AHIMS record for #52-3-2162 should be updated to reflect the reburial and remains as a Restricted Site.
8. Once finalised, a copy of this report should be forwarded to the Registered Aboriginal Parties and to:

The Registrar  
Aboriginal Heritage Information Management System  
Heritage NSW

#### **DISCLAIMER**

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## 1 Introduction to the project

Coast History and Heritage (Coast) has prepared this Aboriginal Cultural Heritage Assessment Report (ACHAR) to inform a range of works to be undertaken as part of Stage 1 of the 2019 *Kamay Botany Bay National Park, Kurnell Master Plan*. It is a revised and updated version of previous ACHARs prepared in 2019 and 2023 and includes the results of some works undertaken in accordance with the recommendations of those reports and other investigations that have happened in the interim. Specifically, the 2023 ACHAR was submitted to Heritage NSW with an Aboriginal Heritage Impact Permit (AHIP) application to allow test excavation, and AHIP #5072 was issued on the 24 April 2023. Following this, Coast undertook an archaeological test excavation program in May 2023.

The Stage 1 Master Plan works outlined in this report will be implemented in phases as funding becomes available. All proposed works will be assessed by the NSW National Parks Wildlife Service (NPWS) through Reviews of Environmental Factors (REF), except proposed revetment works which require development approval from Sutherland Shire Council under the *Coastal Management Act 2016*. As some of the Stage 1 Master Plan works will require an Aboriginal Heritage Impact Permit (AHIP) under s90 of the *National Parks & Wildlife Act 1974*, this ACHAR has been prepared to assist Heritage NSW in their assessment of any AHIP applications.

Our ACHAR contains an Aboriginal archaeological assessment in accordance with the Heritage NSW *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* ('the Code'),<sup>1</sup> *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*,<sup>2</sup> and documents Aboriginal community consultation in accordance with the *National Parks and Wildlife Regulation 2019* ('the Regulation').<sup>3</sup> It details known and potential Aboriginal heritage ('objects') within the study area, and contains Aboriginal heritage management recommendations in relation to the various elements of the Stage 1 Master Plan.

Kamay Botany Bay National Park, Kurnell, is a highly significant area for Aboriginal people with connections to the Kamay (Botany Bay) area. Many individuals and families have historical or cultural connections to the area which remain of high importance to them. In acknowledgement of this, the Master Plan was developed, in parallel with a new Plan of Management for the park, in close consultation with local Aboriginal community members.<sup>4</sup> Specifically, the development of these plans involved consultation workshops and information sessions as well as interviews, surveys and culture days. The information provided helped shape the principles of the Master Plan and helped determine the individual project elements that ultimately comprise the Master Plan. As a consequence, the elements being assessed, generally speaking, aim to enhance rather than impact upon Aboriginal cultural heritage values. This report is therefore concerned largely with potential

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<sup>1</sup> Department of Environment, Climate Change & Water (DECCW) 2010b.

<sup>2</sup> Office of Environment & Heritage (OEH) 2011.

<sup>3</sup> *National Parks and Wildlife Regulation 2019* (s60), as detailed in DECCW 2010c.

<sup>4</sup> Neeson Murcutt Architects Pty Ltd 2019. *Kamay Botany Bay National Park, Kurnell Master Plan*.

impacts to Aboriginal archaeological heritage (both known and potential) but references other values where relevant.

A Historical Archaeological Assessment and Heritage Impact Statement have been prepared to consider the management of non-Aboriginal heritage in relation to the current proposed works.<sup>5</sup>

These are referred to where relevant in relation to Aboriginal heritage management.

## **1.1 What the report contains**

This report contains:

- a description of the study area, the proposals and the background to our study (**Section 1**);
- an assessment of Aboriginal cultural values (**Section 2** and **Appendix 1**);
- an overview of the environmental, archaeological and historical information we considered (**Section 3** and **Appendix 2**);
- a description of the field inspections we completed (**Section 4**);
- a description of the archaeological test excavations we completed (**Section 5** and **Appendices 4 to 10**);
- our assessment of the Aboriginal heritage of the study area (**Section 6**);
- our assessment of possible impacts from the Stage 1 Master Plan, and an Aboriginal heritage management strategy for the project (**Section 7**);
- our recommendations (**Section 8**); and
- the references used in our report (**Section 9**).

## **1.2 Who contributed to the report**

### *Authorship and acknowledgements*

The report was written by Dr Paul Irish (Director, Archaeologist and Historian), with input from Julia McLachlan and Gina Basile (Heritage Consultants). Information contributed by Registered Aboriginal Parties is acknowledged with thanks, and the assistance of Greg Abbott and Phuong Le (NPWS) and Dominic Steele (DSCA) is also appreciated.

Coast would like to thank the La Perouse LALC, in particular Steven Ella, for participating in the test excavation and for further discussions and advice. We also thank Dr Jennifer Menzies (Lecturer, University of Sydney) for her specialist assistance during the test excavation, Dr Beth White and Diana Tsoulos for their analysis of stone artefacts and faunal bone respectively, and Dr Nina Kononenko of the Australian Museum for usewear and residue analysis. Finally, thanks to Allison

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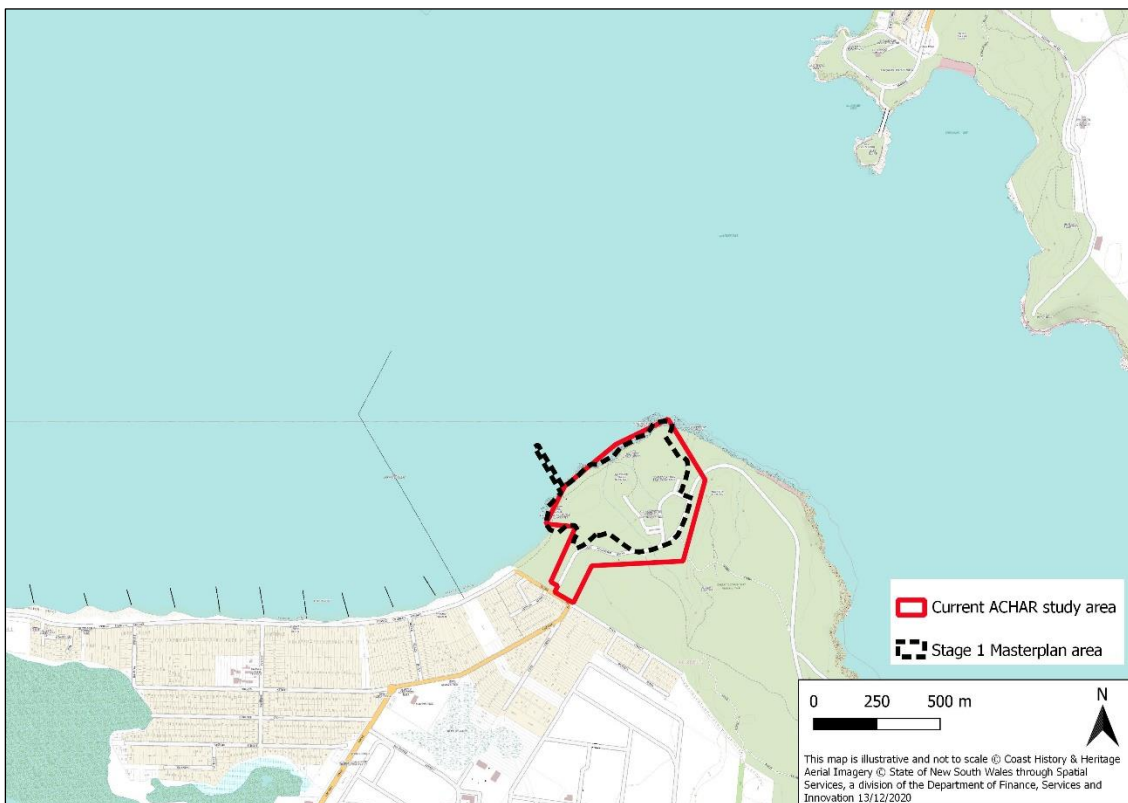
<sup>5</sup> Dominic Steele Consulting Archaeology 2022; John Oultram Heritage & Design 2022

Dejanovic, Steven Ella, Daniel Longbottom and Kiraban Ingrey who undertook shell sorting and recording under the supervision of Paul Irish.

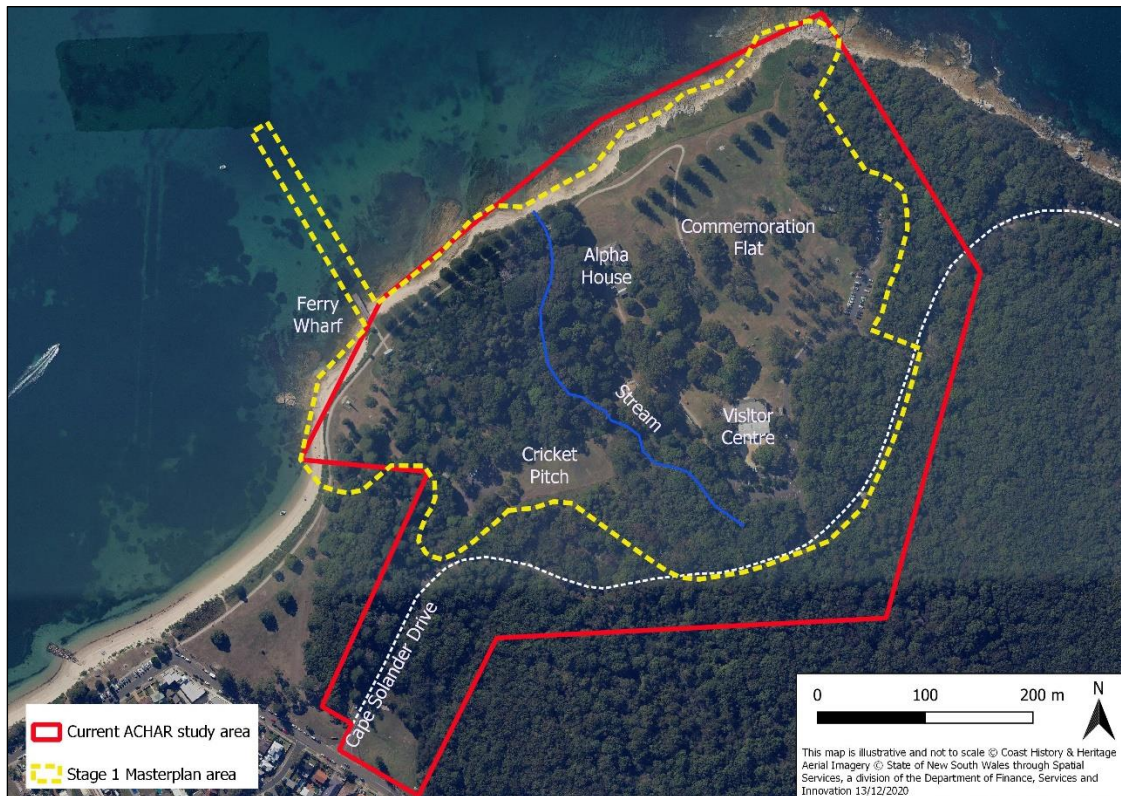
### 1.3 What we are assessing

#### *The property and proposal*

The area we are assessing is within the Kurnell section of Kamay Botany Bay National Park (‘the park’), and includes the lands identified as Stage 1 of the 2019 Master Plan, and along Cape Solander Drive to the park entrance (see **Figure 1**). The study area includes the Stage 1 Master Plan area and immediate surrounds. It is approximately 25.5 hectares and sits between Solander Drive and the southern shore of Kamay (**Figure 2**). It is approximately 15km south of the Sydney CBD and 8.5km north-east of Cronulla, and is situated within the Sutherland Local Government Area, Parish of Sutherland, County of Cumberland, and within the administrative boundaries of the La Perouse Local Aboriginal Land Council.



**Figure 1. The study area in its local context.**



**Figure 2. The current study area and main features of the Stage 1 Master Plan area.**

The park is managed by the NSW National Parks & Wildlife Service (NPWS) who concluded a master planning process in 2019, which reviewed and expanded on the previous and largely delivered 2008 Master Plan.<sup>6</sup> The current Master Plan contains a number of proposals divided into three stages. Stage 1, which is the subject of this assessment, consists of a series of project elements, which are described in more detail below, and which fall within the current study area. Stages 2 and 3 are focused on upgrades to the vehicle entry to the park and a broader upgrade of tracks, trails and facilities across the park. These are outside the scope of our assessment and have not been considered in this report. Since the original ACHAR was produced for these works in 2019, some elements have been added, removed or changed, some works have been completed around Alpha House, and commemorative sculptures have been installed along the foreshore. There have also been archaeological test excavations undertaken by Artefact Heritage for the construction of a new ferry terminal and geotechnical investigations undertaken in 2022 for the new visitor centre and other proposed works.<sup>7</sup>

The various Stage 1 proposals prior to the 2023 archaeological test excavations documented in this report are shown in **Figure 3** and summarised in **Table 1**. These amend, add to and in some cases omit works originally proposed and assessed in the 2019 ACHAR. Works associated with the upgrade

<sup>6</sup> Neeson Murcutt Architects Pty Ltd 2019. *Kamay Botany Bay National Park, Kurnell Master Plan*.

<sup>7</sup> Artefact Heritage 2021b, AssetGeoEnviro 2023 DRAFT.

of the ferry wharf (#4 on **Figure 3**) are being delivered by Transport for NSW and are not part of the current assessment.

Extensive Aboriginal archaeological investigations were undertaken in 2007-2008 by Coast Director Dr Paul Irish and La Perouse LALC in association with the delivery of elements of the 2008 Master Plan.<sup>8</sup> These investigations and others have amassed a significant amount of information in relation to where Aboriginal archaeological remains are known, and are likely, to be found within the study area. The focus of this assessment has been to apply this existing information to the elements listed below and seek to avoid any potential impacts to significant or *in situ* Aboriginal archaeological remains.

**Table 1. Proposed Stage 1 Master Plan works (see Figure 3).**

REF *italics*

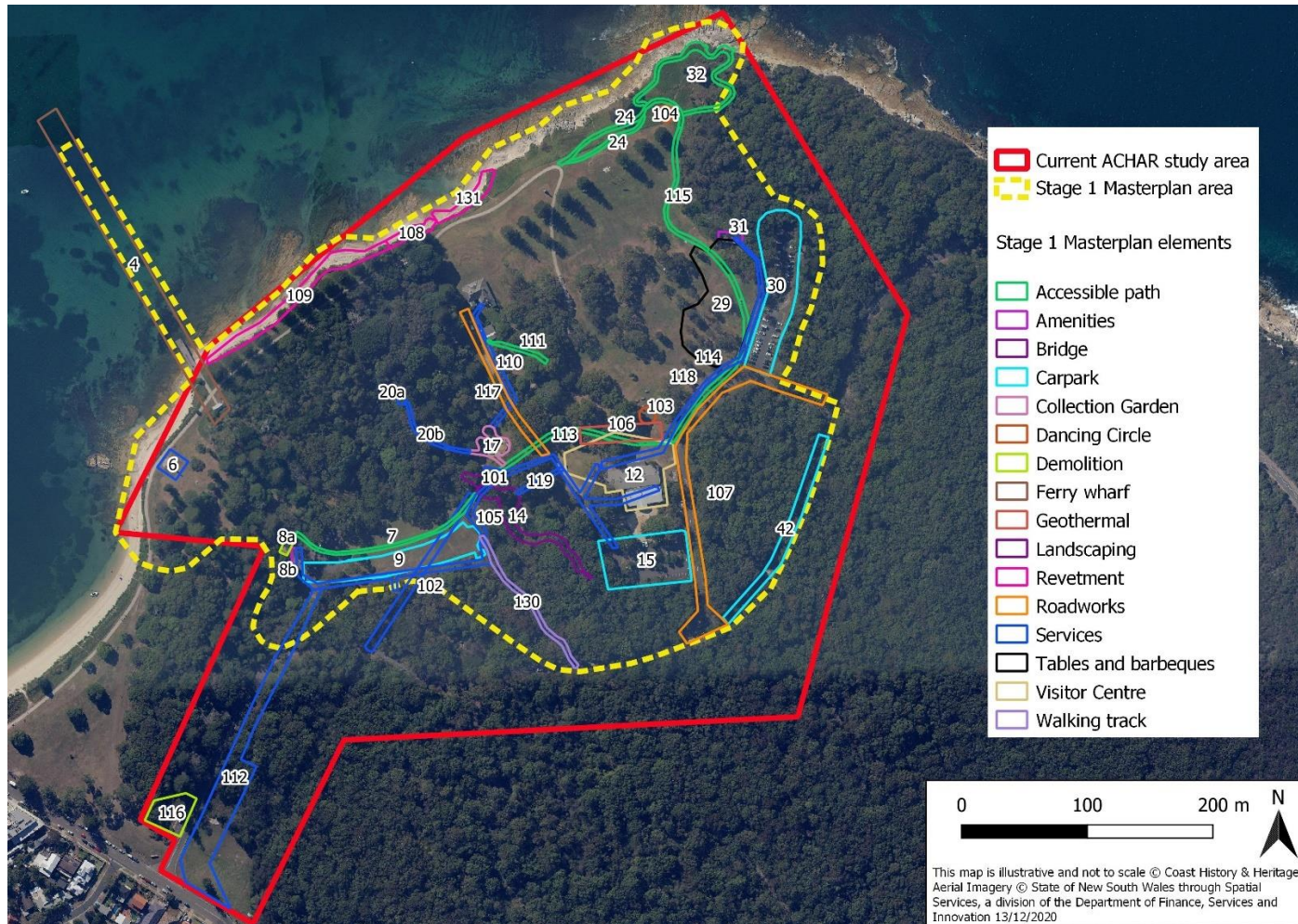
#	Master Plan Element	Brief Description
4	Ferry wharf	New wharf for ferry connection to La Perouse via water ( <i>Not assessed in this study</i> ).
6	Cook Monument	New subsurface drainage around the outer uphill perimeter of the low sandstone wall that surrounds the obelisk, laid along the top surface of the rock shelf.
7	Western Path	Path between boardwalk over upper stream (Element #101) and the Cricket Pitch Carpark and amenities.
8a	Amenities	Removal of existing amenities building and slab, and capping or rerouting of existing services to new building.
8b	Amenities	New amenities block with new sewer connection.
9	Carpark	New bitumen carpark with turning circle, associated landscaping and substation at eastern end.
12	Visitor Centre	Demolition and removal of existing Visitor Centre and construction of a new Visitor Centre and associated amenities, including footings and services.
14	The Stream	Works to restore flow of the stream, including some bank contouring and rock stabilisation, planting, construction of rock weirs and cascades and opening of existing piped sections.
15	Visitor Centre Carpark	Existing Visitor Centre carpark remains, with localised regrading works to adjust gradients and trenching for lighting, charging stations etc.
17	Collection Garden	Collection Garden to be installed in location of current Meeting Place structure, with some adaptation of that structure. Works will include some irrigation and plantings.
20a	Replacement culvert	Replacement of culvert where Burrawang Walk crosses the stream with a larger culvert to facilitate water flow. Includes localised alterations to path surface and level.
20b	Burrawang Walk	Replacement of existing cabling (where deteriorated) to current soundscape speakers back to the new Visitor Centre.

<sup>8</sup> Irish 2007b, Irish 2010.

#	Master Plan Element	Brief Description
24	Main Loop Path	Accessible pathway east from existing foreshore path to Whale Loop Path.
29	Picnic crescent	Removal of existing picnic tables and installation of new long picnic tables and barbecues suitable for large group gatherings.
30	Carpark	Upgrade of linear parking next to Commemoration Flat with pavements and bicycle racks. Works will be largely within existing carpark footprint.
31	Amenities	Existing amenities block replaced with new amenities block at the same location.
32	Whale Loop Path	Accessible loop path off the main path to viewing area for shoreline and whale sculptures. Constructed from Fibre Reinforced Plastic (FRP) boardwalk with viewing areas and steps to provide access to the shore and the sculptures.
42	Muru trail parking	Parking for Muru trail along Solander Drive including bus parallel parking.
101	Boardwalk over stream	Shared pedestrian and service vehicle bridge, 4m width, spanning the stream to provide a connection between the Cricket Pitch carpark and the new Visitor Centre.
102	Service trench	Undergrounding of existing powerlines involving a trench around 800mm deep, including across the stream.
103	Dancing Circle	New dancing circle involving localised levelling of ground.
104	Dancing Circle	New dancing circle involving localised levelling of ground.
105	Service trench	Services trench connecting the new Visitor Centre to Cricket Pitch amenities. Single trench to contain all services.
106	Geothermal array	Installation of geothermal boreholes adjacent to the new Visitor Centre building. Consists of 14 boreholes of 125mm diameter, bored 100m deep in an array across a 20m x 120m area, and an associated manifold chamber.
107	Road resheeting	Milling and resheeting of the existing road surface.
108	Revetment east of stream	New stone revetment to be constructed comprising 0.5 x 0.5m sandstone logs 1-2m in length and revegetation on the eastern stream bank. Incorporates stone stairs and concrete path following existing desire line. Has been designed to avoid or minimise potential impacts to the adjacent Aboriginal midden. See also element #131 ( <i>To be assessed as a Development Application by Sutherland Shire Council</i> ).
109	Revetment west of stream	Existing sandbag wall to be replaced to provide better protection from erosion. The new stone wall comprises 0.5 x 0.5m sandstone logs 1-2m in length and has been designed to avoid impacts to the adjacent Aboriginal midden. Some localised plantings are proposed behind the new revetment and revegetation on the western stream bank. See also element #131 ( <i>To be assessed as a Development Application by Sutherland Shire Council</i> ).
110	Service trench	New electrical service connection between Alpha House and the new Visitor Centre. Includes decommissioning and removal of existing electrical connection from Alpha House to external switchboard.
111	Footpath	New concrete footpath from the rear of the Alpha House complex to join into the existing concrete accessible path.
112	Service trench	Electrical and water service trench from Cricket Pitch amenities along Solander Drive, including new fire hydrant pump room.



#	Master Plan Element	Brief Description
113	Main Loop Path	Installation of an accessible concrete path from the new Visitor Centre to the stream.
114	Main Loop Path	Installation of an accessible concrete path from the new Visitor Centre to Commemoration Flat amenities.
115	Main Loop Path	Installation of an accessible concrete path from Commemoration Flat amenities to the Whale Loop Path.
116	Demolition works	Removal of existing anchor and wall.
117	Road resurfacing	Upgrade of existing track using either PV05 permeable pavement or stabilised granite treatment.
118	Service trench	Shared services trench along the alignment of the existing roadway and carpark.
119	Stormwater trench	Stormwater overflow line from new Visitor Centre to the stream.
130	Walking track	A new walking track connecting the extended Cricket Pitch carpark to the trailhead of the Yena Track on Cape Solander drive
131	Revetment repairs	Repair of existing revetment including removal of some blocks and installation of others. See also element #108 and #109 ( <i>To be assessed as a Development Application by Sutherland Shire Council</i> ).



**Figure 3. Stage 1 Master Plan works assessed.**

The numbered Master Plan elements are listed in Table 1

## 1.4 What we have considered

### *Legislative and policy requirements*

This report has been prepared to assess the potential Aboriginal heritage impacts of the various elements of the current proposal in consultation with Registered Aboriginal Parties in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*,<sup>9</sup> the *Code of practice for archaeological investigation of Aboriginal objects in New South Wales* (the ‘Code of Practice’),<sup>10</sup> and the *Aboriginal cultural heritage consultation requirements for proponents 2010. Part 6 National Parks and Wildlife Act 1974*.<sup>11</sup> We have met these requirements by producing an Aboriginal Cultural Heritage Assessment Report which also documents Aboriginal community consultation in accordance with Clause 60 of the National Parks and Wildlife Regulation 2019 (‘the Regulation’).

In preparing this report and its recommendations, we are guided by the legal protections provided to Aboriginal heritage under the NPW Act. The NPW Act is administered by Heritage NSW, Department of Planning and Environment, and gives statutory protection to all Aboriginal ‘objects’ and ‘places’ in New South Wales. The NPW Act defines ‘objects’ as ‘*any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains*’ and defines an Aboriginal place as one which ‘*in the opinion of the Minister, is or was of special significance with respect to Aboriginal culture*’.<sup>12</sup> Aboriginal objects are also commonly referred to as Aboriginal sites (e.g. campsites, scarred trees, rock engravings). There are no Aboriginal places registered within or near the current study area, so the protections given to these are not further considered.

Under the NPW Act there are offences for ‘harm’ to Aboriginal objects either knowingly (s86(1)) or unknowingly (s86(2)). *Harm* is defined in s5(1) of the NPW Act to mean any act or omission that:

- (a) *destroys, defaces or damages the object or place, or*
- (b) *in relation to an object—moves the object from the land on which it had been situated, or*
- (c) *is specified by the regulations, or*
- (d) *causes or permits the object or place to be harmed in a manner referred to in paragraph (a), (b) or (c);*

*but does not include any act or omission that:*

- (e) *desecrates the object or place, or*
- (f) *is trivial or negligible, or*

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<sup>9</sup> OEH 2011.

<sup>10</sup> DECCW 2010b.

<sup>11</sup> DECCW 2010c.

<sup>12</sup> NPW Act Section 5(1) and Section 84 respectively,

(g) is excluded from this definition by the regulations.

There are defences and exemptions to the offence of ‘harm’, which include damage caused by ‘low impact activities’ (s87(4)) such as routine farm maintenance. It is also a defence to unknowingly harm if you undertook a Due Diligence assessment that meets Heritage NSW standards and concluded that the proposed activity would not result in harm.<sup>13</sup> It is also not an offence to investigate Aboriginal objects through archaeological test excavations, but only if the methods used are strictly in accordance with the Code of Practice. Of relevance to the current study is that fact that archaeological test excavations of Aboriginal middens (as documented in this report) cannot be undertaken under the Code of Practice and therefore had to be undertaken under the legal sanction of an Aboriginal Heritage Impact Permit (‘AHIP’) under s90 of the NPW Act.

The most common way that harm to Aboriginal objects takes place is under the legal sanction of an Aboriginal Heritage Impact Permit (‘AHIP’) under s90 of the NPW Act. AHIPs are issued by the Chief Executive of Heritage NSW based on a valid application and an accompanying ACHAR. The ACHAR must document Aboriginal community consultation in accordance with the Regulation. This involves seeking registrations of interest in the project from Aboriginal people who hold cultural knowledge relevant to the application, through public notices and by contacting people identified through notices to Local Aboriginal Land Councils and government agencies who deal with Aboriginal communities in the area. People or organisations can register as ‘Registered Aboriginal Parties’ which provides them with a right to review and comment on project information and draft reporting, and to provide advice on Aboriginal cultural and historical significance.

The *Environmental Planning & Assessment Act 1979* (the ‘EP&A Act’) sets out the way that NPW Act protections for Aboriginal heritage are considered in relation to proposed developments. There are three main parts of the EP&A Act which outline how Aboriginal cultural heritage is to be considered. Part 3 governs the preparation of planning instruments such as Local Environmental Plans, Part 4 relates to development assessment and consent and Part 5 considers infrastructure and environmental impact assessment, including activity approvals by governing (determining) authorities, such as the NSW National Parks & Wildlife Service. The Stage 1 Master Plan works considered in this report will be assessed by the NPWS through a Review of Environmental Factors with the exception of the proposals involving the revetment, which are to be the subject of a Development Application to Sutherland Shire Council in accordance with the *Coastal Management Act 2016*.

The study area is part of State Heritage Register and National Heritage List listings, in part for its Aboriginal heritage values, however these listings do not have any practical implications for the management of Aboriginal heritage within the study area. The current Conservation Management Plan (CMP) for the Meeting Place Precinct (which includes the current study area) policy is for all Aboriginal heritage investigations to be dealt with under the *National Parks & Wildlife Act 1974*, as this assessment proposes, rather than in relation to potential provisions of the *Heritage Act 1977*

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<sup>13</sup> DECCW 2010a or an equivalent standard.

that might otherwise apply to State Heritage Register listed items.<sup>14</sup> The CMP also notes that archaeological test excavations undertaken in 2007 (by Coast Director Paul Irish) are a good example of how such investigations should be undertaken in accordance with CMP provisions, and a similar approach is proposed in this assessment.

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<sup>14</sup> Context 2008: 132.

## 2 Assessing Aboriginal cultural values

### *Aboriginal cultural assessment*

In this section we outline the Aboriginal community consultation that has taken place in order to assess the Aboriginal cultural significance of the study area and Aboriginal objects within it. This has been undertaken in accordance with Section 60 of the *National Parks & Wildlife Regulation 2019* [‘the Regulation’]. Each step in the consultation is described in order, starting with determining Registered Aboriginal Parties, and the information provided to, and received from, them.

### 2.1 *Who we spoke with*

#### *Aboriginal community consultation*

The NPWS has been in discussions with members of the local Aboriginal community over several years in relation to the current Master Plan and Plan of Management. Through those discussions, the NPWS has compiled a list of Aboriginal stakeholders. It was decided that it would be appropriate for these stakeholders to be consulted as Registered Aboriginal Parties in relation to the current assessment. As a result, we notified these people and organisations as outlined below, in addition to further notifications in accordance with the Regulation.

We note that the Office of the Registrar, *Aboriginal Land Rights Act 1983*, is currently undertaking a Kamay Botany Bay Aboriginal Owners Project to identify Aboriginal people to be registered as Aboriginal Owners for the Kamay Botany Bay National Park in accordance with Part 9, Division 3 of the *Aboriginal Land Rights Act 1983*. The project commenced in 2019 and is ongoing. No preliminary or final findings have yet been made in relation to the identification of Aboriginal Owners relevant to the park. However, many of the individuals and families most likely to seek registration under this process have already been consulted by the NPWS in relation to the Master Plan, and therefore also in relation to the current assessment.

#### 2.1.1 **Who we notified**

Initially we sent direct notifications about the project on 11 June 2019 to the agencies listed in **Table 2** and asked them to provide us with the contact details of any Aboriginal people they were aware of who may hold cultural knowledge relevant to the study area and any Aboriginal objects or places within it by 26 June 2019 (see **Appendix 1A**). Their responses are shown in **Appendix 1B** and summarised in **Table 2**. Darug Land Observations contacted us directly after being contacted by one of the listed agencies and was listed as a Registered Aboriginal Party (see **Table 4**).

We also sent letters on 7 August 2019 to all the Aboriginal people and organisations whose details were provided by the NPWS about the project (see example in **Appendix 1A**). We advised them that they would be listed and consulted as Registered Aboriginal Parties to the project, unless they chose to opt out. No opt outs were received, however Mr Glen Timbery contacted us and asked to be registered as an individual and as a representative of Wallangang Aboriginal Corporation.

We then placed a public notice in the St George and Sutherland Shire Leader on 14 August 2019 calling for registrations of interest from Aboriginal people with cultural knowledge relevant to the project (see **Appendix 1A**). A deadline of 29 August 2019 was provided for responses.

Finally, we sent notices to all of the Aboriginal people and organisations identified by the agencies listed in **Table 2**, except those already contacted as part of the NPWS consultation list. The list of who was sent these notices, and who responded is shown in **Table 3**, and the responses are also in **Appendix 1C**.

**Table 2. Direct Agency Notices**

Agency Contacted	Notice	Response and Who They Asked Us To Contact
Greater Sydney Local Land Services	11/6/19	Responded on 18/6/19 referring us to the Office of Environment & Heritage for contact lists that may be relevant to the project.
National Native Title Tribunal	11/6/19	Responded on the 12/6/19. There are three non-claimant determinations within the western portion of Sutherland Shire, none of which are relevant or close to the current study. There is one current Native Title claim application (NC2017/003) which extends as far north as Port Hacking and is not relevant or close to the current study area. No further direct notices were therefore considered relevant.
Office of Environment & Heritage	11/6/19	Responded on 12/6/19 providing a list of 'Aboriginal stakeholders known to OEH...who may hold cultural knowledge relevant to a proposal in a region'. Those stakeholders with an expressed interest in the Randwick and Sutherland Shire Local Government Areas are: Ngambaa Cultural Connections, Aragung Aboriginal, Bilinga, Goobah Developments, Gunyuu, Darug Boorooberongal Elders Aboriginal Corporation, Butucarbin Aboriginal Corporation, Didge Ngunuwal Clan, Barking Owl Aboriginal Corporation, A1 Indigenous Services, B.H. Heritage Consultants (Nola and Ralph Hampton), Biamanga Cultural Heritage Technical Services, Bilinga Cultural Heritage Services, Callendulla Cultural Heritage Technical Services, Dharug, Ginninderra Aboriginal Corporation, Goodradigbee Cultural and Heritage Aboriginal Corporation, Gulaga, Gunyuu Cultural Heritage Technical Services, Munyunga Cultural Heritage Technical Services, Mura Indigenous Corporation, Murramarang, Murrumbul Cultural Heritage Technical Services, Nerrigundah Cultural Heritage Services, Thauaira Cultural Heritage Services, Thoorga Nura, Walgalu Cultural Heritage Services, Wailwan Aboriginal Group, Wingikara Cultural Heritage Technical Services, Jerringong, Ken Foster, Kuwal Cultural Services, Matthew and Andrew Coe, Minnamunning, Munyunga, Murrumbul, Nundagurri, Pemulwuy, Tocomwall, Wingikara, Wullung, Yerramurra Walbunia, Tharawal Local Aboriginal Land Council
Registrar of Aboriginal Owners	11/6/19	Responded on 24/6/19 to inform that there are no Registered Aboriginal Owners under the <i>Aboriginal Land Rights Act 1983</i> relevant to the project and suggesting contact with the La Perouse LALC.
Sutherland Shire Council	11/6/19	No response received
NTS Corp	11/6/19	No response received
La Perouse LALC	11/6/19	No response received

**Table 3. Additional direct Notices and responses.**

Person/Organisation Contacted	Date Contacted	Response Deadline	Response Received?	Seeking Registration?
Ngambaa Cultural Connections	12/8/19	26/8/19	No	
Aragung Aboriginal cultural heritage site Assessments	12/8/19	26/8/19	No	
Bilinga	12/8/19	26/8/19	No	
Goobah Developments	12/8/19	26/8/19	No	
Gunyu	12/8/19	26/8/19	No	
Darug Boorooberongal Elders Aboriginal Corporation	12/8/19	26/8/19	No	
Butucarbin Aboriginal Corporation	12/8/19	26/8/19	No	
Didge Ngunuwal Clan	12/8/19	26/8/19	13/8/19	Yes
Barking Owl Aboriginal Corporation	12/8/19	26/8/19	14/8/19	Yes
A1 Indigenous Services	12/8/19	26/8/19	No	
B.H. Heritage Consultants (Nola and Ralph Hampton)	12/8/19	26/8/19	No	
Biamanga Cultural Heritage Technical Services	12/8/19	26/8/19	No	
Bilinga Cultural Heritage Technical Services	12/8/19	26/8/19	No	
Callendulla Cultural Heritage Technical Services	12/8/19	26/8/19	No	
Dharug	12/8/19	26/8/19	No	
Ginninderra Aboriginal Corporation	12/8/19	26/8/19	No	
Goodradigbee Cultural and Heritage Aboriginal Corporation	12/8/19	26/8/19	No	
Gulaga	12/8/19	26/8/19	No	
Gunyu Cultural Heritage Technical Services	12/8/19	26/8/19	No	
Munyunga Cultural Heritage Technical Services	12/8/19	26/8/19	No	
Mura Indigenous Corporation	12/8/19	26/8/19	No	
Murramarang	12/8/19	26/8/19	No	
Murrumbul Cultural Heritage Technical Services	12/8/19	26/8/19	29/8/19	Yes
Nerrigundah Cultural Heritage Services	12/8/19	26/8/19	No	
Thauaira Cultural Heritage Services	12/8/19	26/8/19	No	
Thoorga Nura	12/8/19	26/8/19	No	
Walgalu Cultural Heritage Services	12/8/19	26/8/19	No	
Wailwan Aboriginal Group	12/8/19	26/8/19	18/9/19	Yes



Person/Organisation Contacted	Date Contacted	Response Deadline	Response Received?	Seeking Registration?
Wingikara Cultural Heritage Technical Services	12/8/19	26/8/19	No	
Jerringong	12/8/19	26/8/19	No	
Ken Foster	12/8/19	26/8/19	No	
Kuwal Cultural Services	12/8/19	26/8/19	No	
Matthew and Andrew Coe	12/8/19	26/8/19	No	
Minnamunnung	12/8/19	26/8/19	No	
Munyunga	12/8/19	26/8/19	No	
Murrumbul	12/8/19	26/8/19	No	
Nundagurri	12/8/19	26/8/19	No	
Pemulwuy	12/8/19	26/8/19	No	
Tocomwall	12/8/19	26/8/19	No	
Wingikara	12/8/19	26/8/19	No	
Wullung	12/8/19	26/8/19	No	
Yerramurra	12/8/19	26/8/19	No	
Tharawal Local Aboriginal Land Council	12/8/19	26/8/19	13/8/19	No as outside their LALC boundary
Walbunja	12/8/19	26/8/19	No	

## 2.1.2 Who registered an interest

### *Registered Aboriginal Parties*

In addition to the individuals and organisations listed in **Table 3**, two other organisations also contacted us to register their interest in the project (see **Appendix 1C**). As a result, a total of 45 Registered Aboriginal Parties were registered for the project, as summarised in **Table 4**. The names and contact details of all Registered Aboriginal Parties were provided to the OEH and the La Perouse LALC on 6 September 2019 as per the Regulation.

Coast was later contacted by Mr Ken Foster on 2/10/19 to discuss the project, having not seen the direct notice sent to him on 12/8/19 inviting registrations of interest. Mr Foster was added as a Registered Aboriginal Party and provided with a copy of the information and methodology document on 16/10/19 for comment and was informed that he would also be provided with a copy of the draft ACHAR.

**Table 4. Registered Aboriginal Parties for this project.**

Registered Aboriginal Party	Registered Aboriginal Party
La Perouse Local Aboriginal Land Council	Lizzy Mayers
Kurrunulla Aboriginal Corporation	Deanna Schreiber
La Perouse Youth Haven	Sonny Simms
LAPA Access Point	Uncle Vic Simms
La Perouse Aboriginal Mens group	Gooriwal Elders Group
Gloria Ardler	Yvonne Simms
Theresa Ardler	Ken Foster
Aboriginal Education Consultative Group	Jess Sinnott
Rueben Brown	Randwick Council Aboriginal Advisory Committee
Guriwal Aboriginal Corporation	China Timbery
First Hand Solution Aboriginal Corporation	Esme Timbery
Delma & Uncle Les Davison	Glen Timbery
Randwick City Council – Community programs and partnerships	Wallangang Aboriginal Corporation
Kadoo Tours	Ronnie Timbery
Shallan Foster	Eastern Zone Gujaga Aboriginal Corporation
Galamban	Shayne Williams
Ray Ingrey	Pamela Young
Rodney Kelly	Yulang Aboriginal Education and Training Unit, Randwick TAFE
Sutherland Shire Council Aboriginal Advisory Committee	Darug Land Observations
Ava Longbottom	Didge Ngunuwal Clan
Shaun Longbottom	Barking Owl Aboriginal Corporation
Two Women Dreaming	Wailwan Aboriginal Digging Group
	Murrumbul (Mr Mark Henry)

## 2.2 What we were told

### *Comments from Registered Aboriginal Parties*

So far, no Registered Aboriginal Parties have provided any information directly to this assessment about cultural or other values relating to the current project. This is not surprising given the amount of Aboriginal community consultation that has been undertaken by NPWS and their consultants in recent years in relation to the current Master Plan and Plan of Management.<sup>15</sup> The purpose of these engagements have been to ensure that the Master Plan works promote rather than conflict with

<sup>15</sup> E.g. Context 2018.

Aboriginal cultural values. The level of engagement with these plans, and the strongly expressed desire for them to provide cultural and economic opportunities for the local Aboriginal community, shows the high degree and ongoing cultural and historical significance that the study area has to local Aboriginal people.

### 2.2.1 Responses to the project information and proposed methodology

We sent a document containing project information and our proposed assessment methodology to all Registered Aboriginal Parties on 17 September 2019 with a deadline of 17 October 2019 for responses (see **Appendix 1D**). We invited all Registered Aboriginal Parties to provide us with information or views about:

- any places or objects of cultural value to Aboriginal people which may be relevant to the current proposal;
- appropriate management for any Aboriginal objects that may be collected/retrieved from the study area should the Stage 1 Master Plan works be approved; and
- any other Aboriginal cultural or historical knowledge which is relevant to the Aboriginal cultural assessment of the study area in relation to the current proposal.

All Registered Aboriginal Parties were also asked to identify any information that may be of a sensitive nature so that appropriate protocols could be developed for assessing and discussing it, however no information provided was identified as sensitive in this way.

No responses were received in relation to the information and methodology document (**Appendix 1E**).

### 2.2.2 Comments on the 2019 draft report

A draft of the original report was sent out to all Registered Aboriginal Parties on 21 November 2019. We asked for any comments or information to be provided to us by 20 December 2019 so that they could be considered in the final report and in relation to the proposed Aboriginal Heritage Impact Permit application. Responses received are included as **Appendix 1F** and summarised below in **Table 5**.

**Table 5. Comments received on the 2019 draft report.**

Registered Aboriginal Party	Summary and Discussion
La Perouse Local Aboriginal Land Council	The Land Council responded in support of the recommendations of the draft report and ‘acknowledges and recognises the Gweagal people Dharawal (Tharawal, Turuwal or Thirroul) language group who traditionally occupied the Kurnell Peninsula in which the subject property is located.’

A copy of the finalised report was sent to all RAPs in early 2020, and a copy of the issued AHIP for investigations at Alpha House was provided on receipt in July 2020. A copy of the final Alpha House excavation report was sent to all RAPs on 12 April 2021, and a further email update was sent to all RAPs on 6 October 2021 and 21 November 2022 to inform them that the project was still progressing.

### 2.2.3 Comments on the 2022 draft report

This draft report was sent out to all Registered Aboriginal Parties on 10 January 2023.<sup>16</sup> We asked for any comments or information to be provided to us by 9 February 2023 so that they could be considered in the final report and in relation to the proposed Aboriginal Heritage Impact Permit applications. Responses received are included as **Appendix 1G** and summarised below in **Table 6**.

**Table 6. Comments received on the 2022 draft report.**

Registered Aboriginal Party	Summary and Discussion
Glen Timbery (Wallangang Aboriginal Corporation)	Mr Timbery emailed Coast on 10, 11 and 12 January raising concerns about traditional custodianship and the location of repatriated ancestral remains (see <b>Appendix 1G</b> ). Coast responded on 13 January noting that consultation had been undertaken in compliance with Regulation and policy, and that no repatriation areas are located within the study area ( <b>Appendix 1G</b> ). Over the following two weeks Mr Timbery provided many further emails (available on request) relating to the issue of repatriation and perceived conflicts of interest. Paul Irish responded via email on 31 January to categorically state that the project does not include any impacts or considerations of repatriated ancestral remains and inviting Mr Timbery to discuss further if he wished to ( <b>Appendix 1G</b> ).

A copy of AHIP #5072 was provided to Registered Aboriginal Parties on 28 April 2023.

### 2.2.4 Comments on the 2023 draft report

This draft report was sent out to all Registered Aboriginal Parties on 30 October 2023.<sup>17</sup> We asked for any comments or information to be provided to us by 28 November 2023 so that they could be considered in the final report and in relation to the proposed Aboriginal Heritage Impact Permit applications. No responses were received as noted in **Appendix 1H** and **Table 7**.

**Table 7. Comments received on the 2023 draft report.**

Registered Aboriginal Party	Summary and Discussion
No responses received	

<sup>16</sup> Except for those who had passed away since the earlier project.

<sup>17</sup> Except for those who had passed away since the earlier project.

### **2.2.5 Aboriginal cultural values in relation to this project**

Little information has been provided as part of the current assessment about Aboriginal cultural values of the study area and surrounding areas. However, this is by no means an indication of the absence of these values. Rather, it reflects the extensive and ongoing Aboriginal community consultation being undertaken by NPWS before and in parallel to this assessment which has sought these views and made them part of planning at the site. Specifically, the Master Plan activities which have been examined in this assessment aim to enhance Aboriginal cultural values, protect important places and educate the public about their significance. This is on the basis that the Kurnell section of Kamay Botany Bay National Park is a highly significant Aboriginal landscape; a location of violent encounters and shared histories over the past 250 years; and a place that has continued to be visited and used by local Aboriginal community members from the most ancient times to the present day. It is still highly valued by local Aboriginal people.

## 3 Information we have considered

### *Environmental, archaeological and historical context*

#### **3.1 Environmental context**

##### *Geology, soils and hydrology*

If we want to understand how Aboriginal people may have used the local area in the past, and what traces of that use might still physically remain on and below the ground surface, we need to understand the local environment and how it has changed over time.

The study area is located on the northern side of the southern headland of Kamay (Botany Bay) (**Figure 1**). Kamay came into existence at the end of the last ice age as sea levels rose and flooded this area. Prior to this time the bay was a swampy sand plain and the Georges and Cooks Rivers flowed through the middle of what is now the Kurnell Peninsula, joining the Hacking River before flowing out to sea.<sup>18</sup> With rising sea levels, sand blocked the channel through the Kurnell Peninsula, forming the peninsula, and the Cooks and Georges Rivers combined in Kamay and began to flow out through the heads of that bay. The headland is underlain by Hawkesbury sandstone which outcrops along its eastern and southern margins and in small exposures across the study area. The sandstone is between 0.1m and 2m below the current surface along the foreshore and a variable and largely unknown depth landward of there.

The sandstone bedrock is overlain by dunes of varying ages, forming sandy soils, described as the Kurnell Soil Landscape.<sup>19</sup> These are characterised by a vegetated humic A horizon, usually underlain by a leached B horizon. The fact that midden deposits have been excavated along the foreshore immediately overlying sandstone bedrock indicates that Aboriginal use of this area has occurred concurrent with changes to the landscape such as dune formation and reworking. Sandy beaches are present along the bay shore, whilst rock platform dominates the seashore to the northeast, including one large rockshelter which was used in the past by Aboriginal people (AHIMS #52-3-0220).

The landscape of the study area is dominated by a broadly linear dune ridge, which is about 12m high and runs roughly northeast-southwest immediately behind the foreshore (**Figure 4 & Figure 5**). The northern end of this ridge is incised by the intermittently flowing Cooks Stream which drains the central portion of the study area. The stream was dammed in the early 1900s but re-opened to the bay in 2009 as part of works under the previous master plan (**Figure 6**). The foreshore in front of this dune ridge is relatively flat, cleared of vegetation and up to 25m in width behind a sandy and rocky beach (**Figure 7**). A smaller, less elevated north-south running ridge is present immediately east and above the stream, upon which Alpha House now stands (**Figure 8**). A small, ephemeral drainage line also appears to be present on the eastern side of this ridge, draining the cleared area in front of the Visitor Centre.

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<sup>18</sup> Irish 2017:14.

<sup>19</sup> Hazelton *et. al.* 1990.

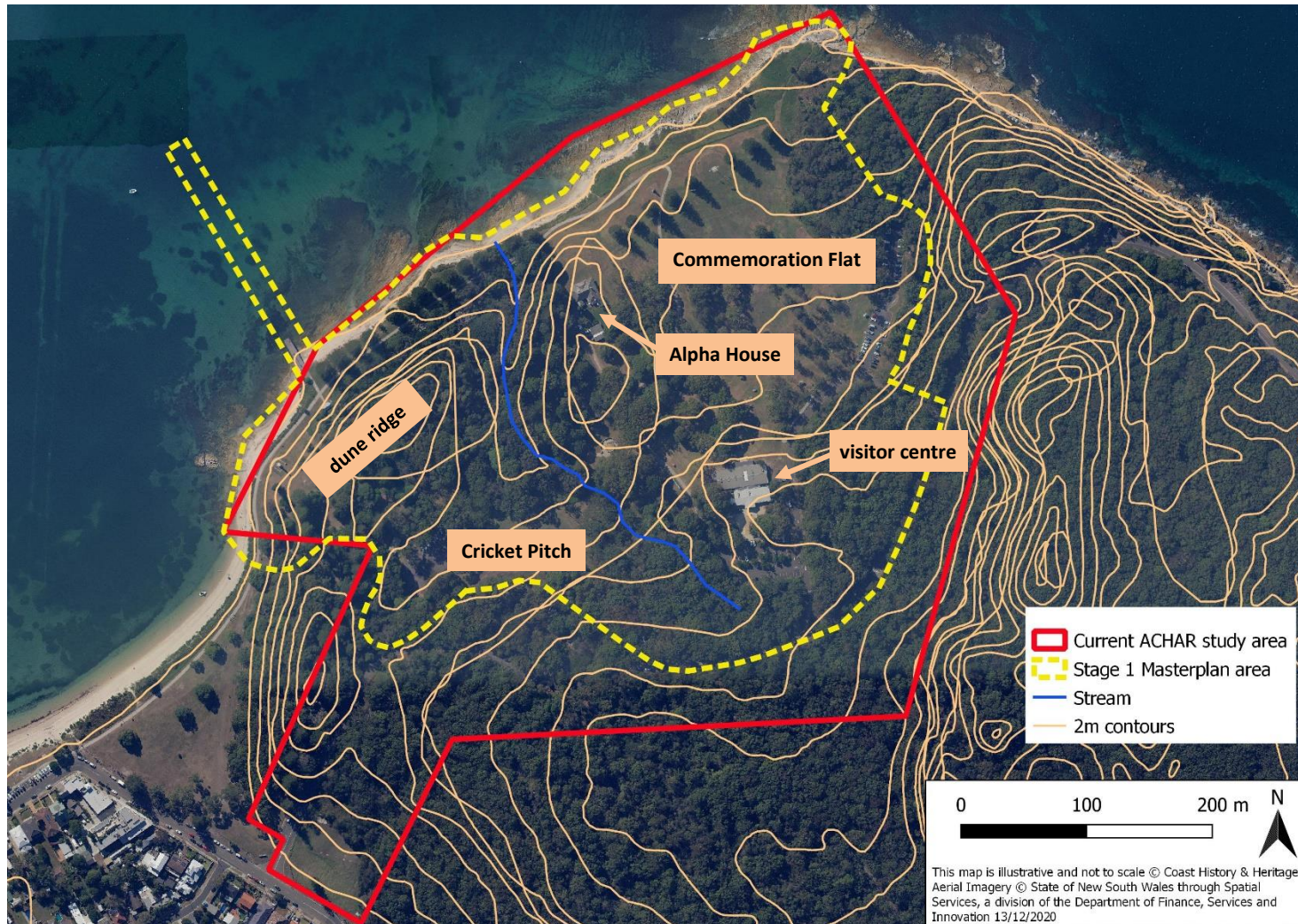


Figure 4. Stage 1 area in relation to natural topography.



**Figure 5. View west to the bay from the western end of the main dune ridge above the Cook Monument.**



**Figure 6. View south up the lower stream adjacent to the foreshore bridge.**



**Figure 7. View north-east along the foreshore in front of the dune ridge.**





**Figure 8. View north along ridge containing Alpha House (roof in background).**

Some more specific information about historical disturbance, natural soil profiles and depth of sandstone bedrock has been obtained from recent geotechnical testing. The testing, undertaken in December 2022 by AssetGeoEnviro and monitored by the La Perouse Local Aboriginal Land Council, examined 4 areas – the visitor centre, upper creek (proposed bridge area), cricket pitch area and commemoration flat.<sup>20</sup> The results of the testing have been considered in this assessment and are referred to below.

Though some of the study area is now cleared or planted with introduced exotic trees and shrubs, almost all this area was originally covered by a variety of plant communities from coastal scrub on the ridges to swamp and littoral forest on lower lying areas.<sup>21</sup>

Based on this information alone, it is clear that a variety of animal, plant and seafood resources would have been available to the Aboriginal people of the area, who had a semi-permanent water supply in the stream, and other freshwater springs in the area. We also know this was the case because of the huge array of food remains that are found within large campsites (middens) along the shoreline (discussed below). The active sand environment of the foreshore can result in damage and destruction of Aboriginal cultural heritage but can also serve to preserve archaeological remains such as middens by quickly covering them after deposition and protecting them from further damage. Sandy soils are also often locations in which Aboriginal people were buried, and many burials have been documented within the area over the last 170 years.

### ***3.2 Non-Aboriginal land use and impacts***

In this section we consider the non-Aboriginal uses of the study area and their potential impacts on Aboriginal archaeological remains. The long and ongoing Aboriginal use of the area is considered in **Section 3.5**. Detailed investigations of the non-Aboriginal use of the study area and their traces and

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<sup>20</sup> AssetGeoEnviro 2023 DRAFT.

<sup>21</sup> Benson & Eldershaw 2007.

impacts were undertaken as part of a heritage assessment of the 'Meeting Place Precinct' – an area roughly equivalent to the current study area – in 2006.<sup>22</sup> This included a detailed historical overview of the area by historian Dr Maria Nugent.<sup>23</sup> For the current study these documents were reviewed, along with more recent current heritage impact assessments<sup>24</sup> and historical aerial photography of the study area, to examine the varying levels of historical disturbance across the location proposed for works under Stage 1 of the current Master Plan.

Brief visits by Cook on the Endeavour in 1770 and the First Fleet in 1788 did not involve the construction of any structures within the study area, though Endeavour crewman Forby Sutherland was buried there. The location of his grave was pointed out by local Aboriginal woman Sally Mettymong in the 1840s which informed the location of the monument that now sits along the shore.<sup>25</sup> The first land grant at Kurnell was made to James Birnie in 1815 and included all of the current study area. By the 1820s Birnie had constructed a cottage on the site of the current Alpha House and a property manager and workers lived in the area. Land was also cleared for grazing and an orchard established. Birnie sold the property to John Connell in 1828 who cleared more land and built another cottage near Birnie's as well as several other sheds (**Figure 9**).<sup>26</sup> In the 1840s Connell's workers excavated shells from the midden near the freshwater stream to burn for lime, and in the process unearthed Aboriginal human remains.<sup>27</sup> In 1861 the Connell property, along with most of the Kurnell Peninsula, passed into the ownership of Thomas Holt. Holt cleared more land to graze cattle, and on the centenary of Cook's visit in 1870 built the current Cook monument, and later a ferry wharf below it (about 90m west of the current wharf location).

In the later nineteenth century, Holt subdivided the land for sale, abandoning Alpha House, which fell into disrepair. The land sales did not occur and coincided with an increasing public push to turn the area into a historic site.<sup>28</sup> In 1899, the Captain Cook Landing Place Reserve was declared as a public park, managed by a board of trustees. In the first decade of the trust a number of significant changes were made to the study area. The cleared but largely original creek outlet (**Figure 10**) was dammed, and was infilled partly with Aboriginal midden from the adjacent creek banks (**Figure 11**). A new wharf was constructed at its current location (**Figure 12**), the current Alpha House building was constructed for visitor accommodation on the footings of the former cottages, picnic shelters were constructed and commemorative and ornamental trees were planted (**Figure 13**).<sup>29</sup>

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<sup>22</sup> Design 5 Architects 2006.

<sup>23</sup> Nugent 2006.

<sup>24</sup> E.g. John Oultram Heritage & Design 2022; Artefact Heritage 2021a.

<sup>25</sup> Macdonald 1928: 286.

<sup>26</sup> Design 5 Architects 2006: Sections 3.5 & 3.6.

<sup>27</sup> Houston 1905:3.

<sup>28</sup> Nugent 2006:65.

<sup>29</sup> Benson & Eldershaw 2007.



**Figure 9. View west across the study area in the 1850s showing the farmhouse in the location of the current Alpha House.**

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**Figure 10. View north-east over the stream and its banks towards La Perouse in the later nineteenth century.**

□□□r□□□□□□ □□□ □□



**Figure 11. The newly dammed stream around 1905.**

□□□r□□□□□□ □□□ □□



**Figure 12. View south in 1905 to the newly constructed wharf and Cook Monument on the right.**

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**Figure 13. View south-east to the newly built Alpha House and dam in 1905.**

□□□□□□□□ □□□□

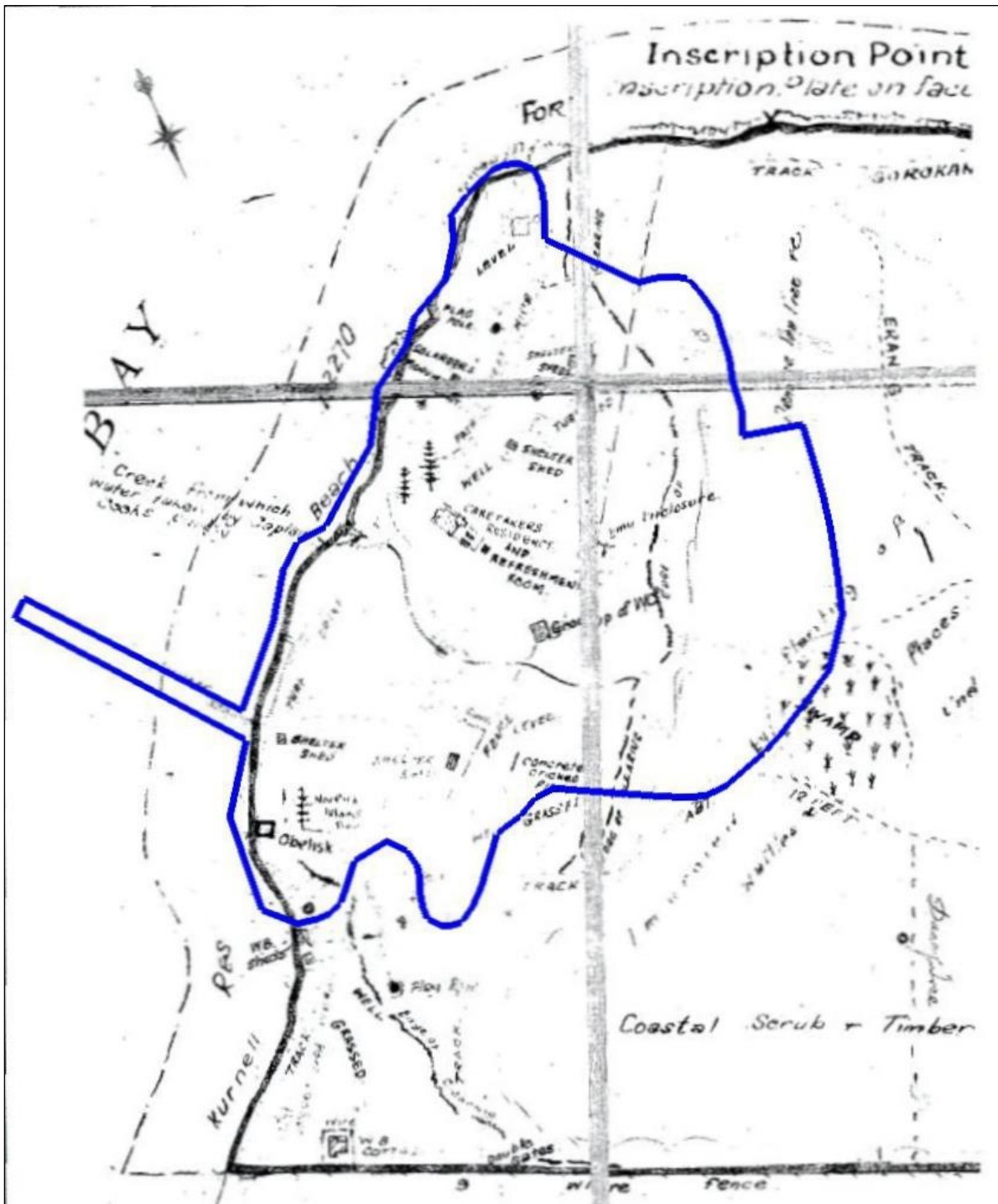
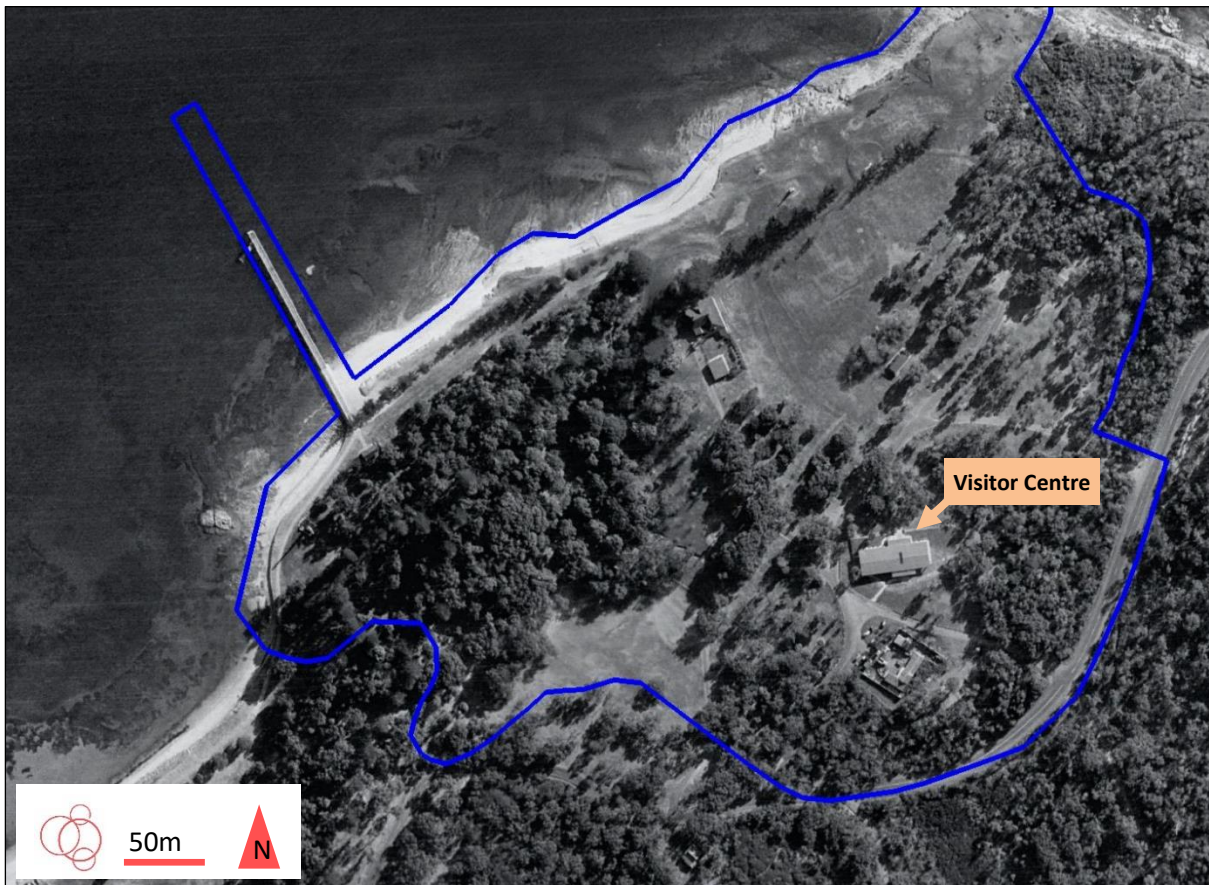


Figure 14. Plan from around the 1920s showing range of structures and plantings.

© 2006 1 M 5 3:10



**Figure 15. Aerial photograph from 1970 showing new visitor centre and roadways.**

[Source: [www.maps.ssc.nsw.gov.au/ShireMaps/](#)]

Over the next century, the study area continued to be used for public recreation, changing to a national park in 1967. Throughout that time a significant number of impacts have occurred across the study area including the construction of visitor and amenities buildings and shelters, commemorative plantings and revegetation, construction of roadways and paths, installation of electrical, sewer and water services, levelling of ground and installation of monuments and plaques. A sense of the range of these impacts can be seen in plans and aerial photographs such as those shown in **Figure 14** and **Figure 15**. These impacts have been comprehensively mapped and considered in past assessments based on detailed archival research.<sup>30</sup>

This research was reviewed for the current study, along with historical aerial photography from 1943, 1955, 1961, 1970, 1978, 1984, 1994, 2001 and 2015 to specifically examine the areas proposed for works under the Stage 1 Master Plan.<sup>31</sup> This review is summarised for the various Master Plan elements in **Figure 16** and **Table 8**.

<sup>30</sup> E.g. Lewczak 2006, Design 5 Architects 206: Section 3.

<sup>31</sup> Many of these aerals were examined on the Sutherland Shire Council Shire Maps website [www.maps.ssc.nsw.gov.au/ShireMaps/](http://www.maps.ssc.nsw.gov.au/ShireMaps/)

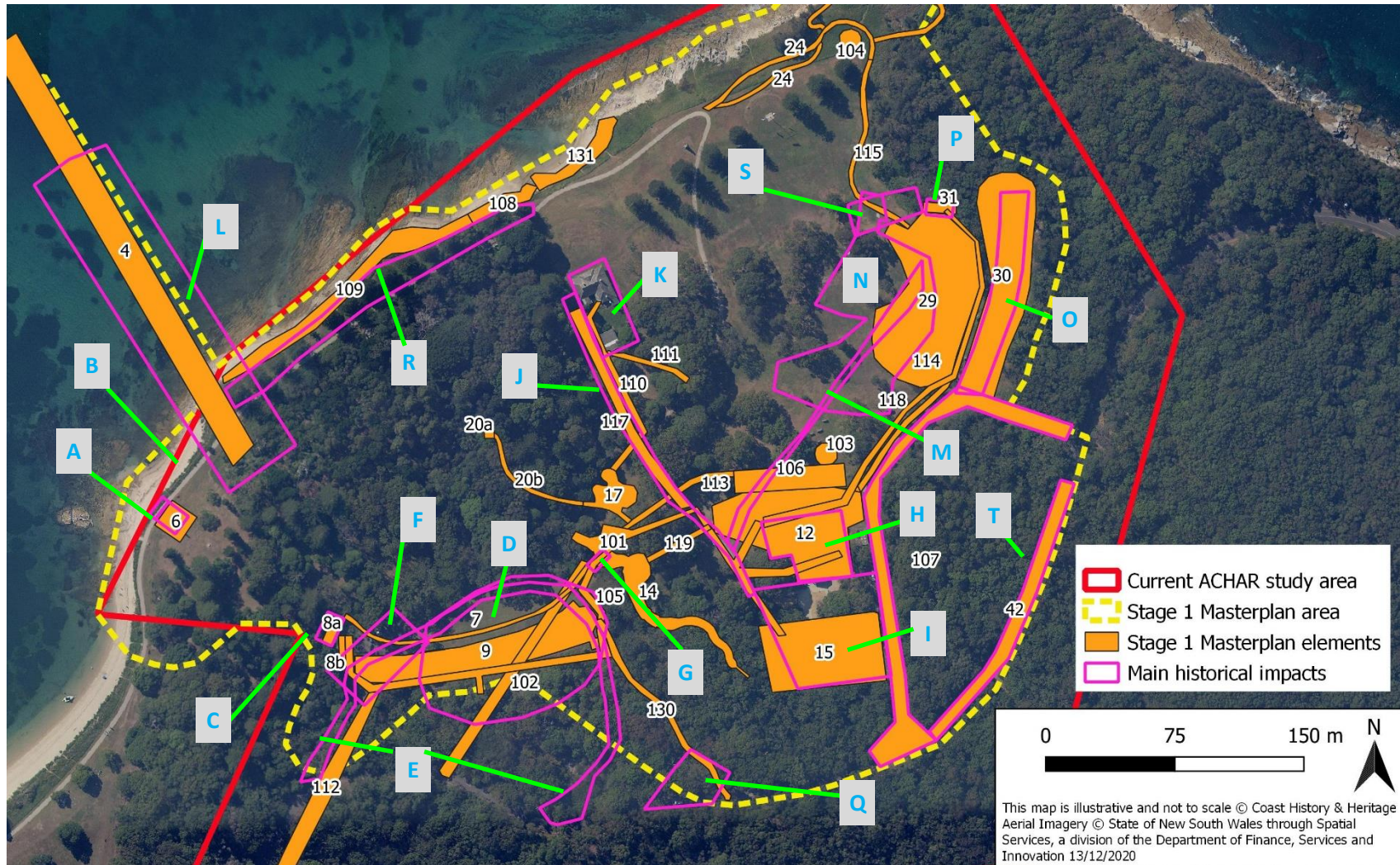


Figure 16. Stage 1 Master Plan elements in relation to specific historical impacts (blue and red outline - see Table 8).

**Table 8. Proposed Stage 1 Master Plan works and historical disturbance.**

#	Master Plan Element		Main Historical Impacts (see Figure 16)
4	Ferry wharf	L	Ferry wharves (since early 1900s).
6	Cook Monument	A	Construction of Cook Monument 1870.
		B	Installation of revetment in 1900s involving filling of land between beach and monument.
7	Western Path	Not shown	Land clearing and localised landscaping.
8a	Amenities	C	Existing amenities building constructed 2008.
8b	Amenities	F	Existing carpark installed in 2000s first as unsealed parking area and then sealed carpark.
9	Carpark	D	Cricket pitch 1900s involving levelling and drainage works.
		E	Establishment of unsealed roadway in 1970s.
		F	Existing carpark installed in 2000s first as unsealed parking area and then sealed carpark.
12	Visitor Centre	H	Existing visitor centre constructed in 1970 on levelled and raised building pad.
		M	Unsealed roadway ca.1950s.
14	The Stream	Not shown	Clearing of stream banks, piping of sections of stream.
15	Visitor Centre Carpark	I	Existing car park and courtyard established in 2000s, (including locations of former roadways and buildings) and drained swamp.
17	Collection Garden	Not shown	Construction of current Meeting Place structure in 2008.
20a	Replacement culvert	Not shown	Existing culvert
20b	Burrawang Walk	Not shown	Existing path and sound hardware installed in 2008.
29	Picnic crescent	M	Unsealed roadway ca.1950s.
		N	Area containing a number of picnic shelters, 1950s.
30	Carpark	O	Existing carpark.
31	Amenities	P	Existing amenities block replaced with new.
42	Muru trail parking	U	Existing roadway.
101	Boardwalk over stream	G	Piping of creek in 1950s and creation of level grassed creek crossing to cricket pitch area.
102	Service trench	D	Cricket pitch 1900s involving levelling and drainage works.
		E	Establishment of unsealed roadway in 1970s.



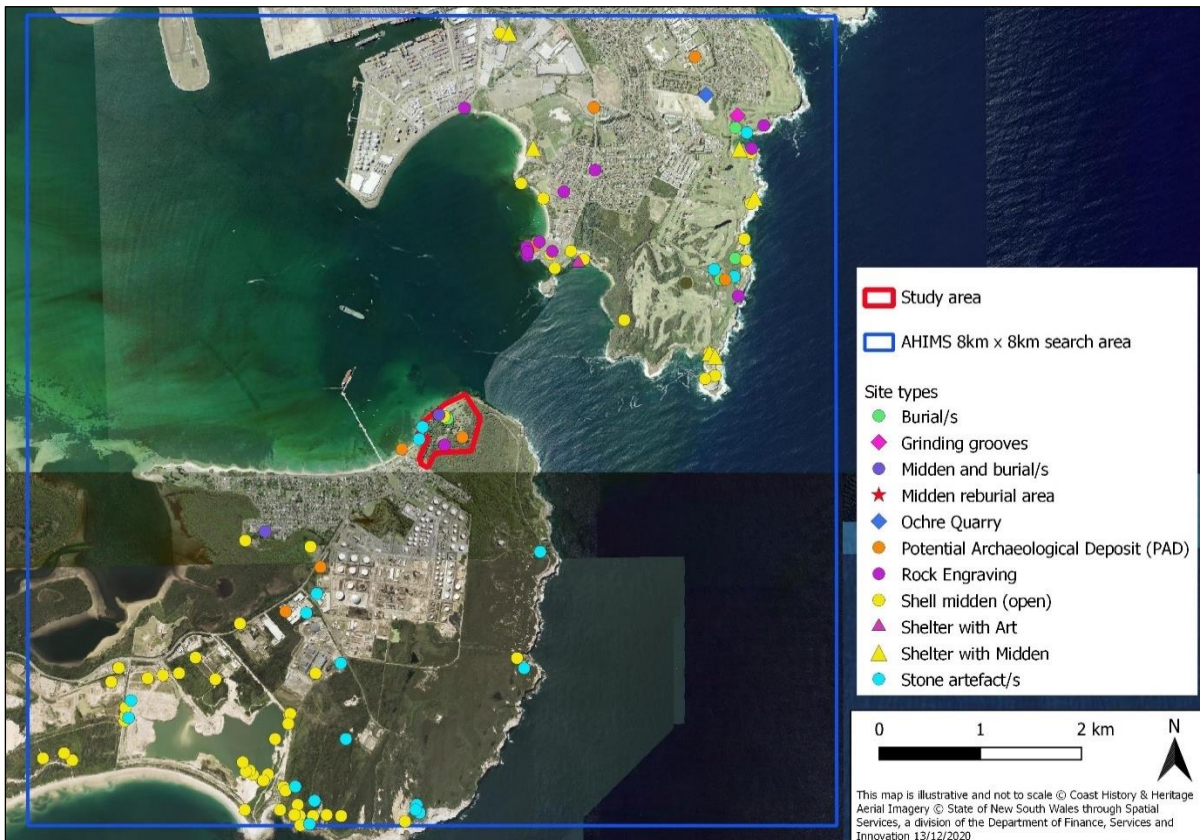
#	Master Plan Element		Main Historical Impacts (see Figure 16)
105	Service trench	D	Cricket pitch 1900s involving levelling and drainage works.
		E	Establishment of unsealed roadway in 1970s.
		F	Existing carpark installed in 2000s first as unsealed parking area and then sealed carpark.
106	Geothermal array	M	Unsealed roadway ca.1950s.
107	Road resheeting	T	Existing roadway.
108	Revetment east of stream	R	1930s planting of auracarias at back of beach.
109	Revetment west of stream	R	1930s planting of auracarias at back of beach.
110	Service trench	J	Existing access road to Alpha House from carpark and buried electrical services. Lined with historical plantings and includes possible location of 19th century workshop and stables.
		K	Former Alpha Farm outbuildings and foundations of previous cottages (under existing building).
111	Footpath	K	Former Alpha Farm outbuildings and foundations of previous cottages (under existing building).
113	Main Loop Path	J	Existing access road to Alpha House from carpark and buried electrical services. Lined with historical plantings and includes possible location of 19th century workshop and stables.
		Not shown	Existing pathways
115	Main Loop Path	N	Area containing a number of picnic shelters, 1950s.
		S	Shelter sheds and structures.
116	Demolition works	Not shown	Existing anchor and wall.
117	Road resurfacing	J	Existing access road to Alpha House from carpark and buried electrical services. Lined with historical plantings and includes possible location of 19th century workshop and stables.

### 3.3 Heritage register records

Archaeological investigations have been undertaken within the study area for more than a century, leading to the recording of a number of Aboriginal sites and Aboriginal human remains (burials). In addition, further Aboriginal human remains and artefacts have been uncovered in the course of agricultural and other activities for over 150 years. The full suite of recordings is considered further below, not all of which are listed on official heritage registers.

For this assessment we checked the main Aboriginal heritage database for New South Wales, the Heritage NSW Aboriginal Heritage Information Management System (AHIMS). We searched AHIMS over a 8km x 8km area centred on the study area and found that there are 119 registered Aboriginal ‘sites’ (see **Figure 17** and **Appendix 2**).<sup>32</sup> This followed an earlier search in January 2019 for the original ACHAR in which 110 sites were recorded. The additional nine sites all relate to archaeological investigations undertaken in the interim within the Kurnell and La Perouse precincts of Kamay Botany Bay National Park and none are within a kilometre of the current study area.

The type of sites recorded is summarised in **Table 9**, and their frequency is particularly influenced by underlying geology, with contrasting patterns on the headlands of the bay. The sandstone outcropping around the eastern edge of the Kurnell headland is largely exposed to ocean winds and currents and contains few overhangs in sheltered locations. Consequently, there are few sites around this headland, compared to the more incised northern headland which contains a number of small coves. Most of the sites around the Kurnell headland and sandy peninsula on the southern side of the bay are middens along the sandy shore, which can sometimes include burials.



**Figure 17. Registered Aboriginal sites in 8km x 8km search area.**

Figure 17 is a map showing the distribution of 119 registered Aboriginal sites within an 8km x 8km search area centered on the study area. The sites are categorized by type, as detailed in the legend. The map shows a high concentration of sites along the northern and southern headlands of the bay, with a notable presence of shell middens and mounds. The legend includes symbols for various site types: Burial/s (green circle), Grinding grooves (purple diamond), Midden and burial/s (blue circle), Midden reburial area (red star), Ochre Quarry (orange diamond), Potential Archaeological Deposit (PAD) (yellow circle), Rock Engraving (purple circle), Shell midden (open) (yellow circle), Shelter with Art (purple triangle), Shelter with Midden (yellow triangle), and Stone artefact/s (cyan circle). A scale bar indicates 0 to 2 km, and a north arrow is provided. The map is illustrative and not to scale. © Coast History & Heritage Aerial Imagery © State of New South Wales through Spatial Services, a division of the Department of Finance, Services and Innovation 13/12/2020

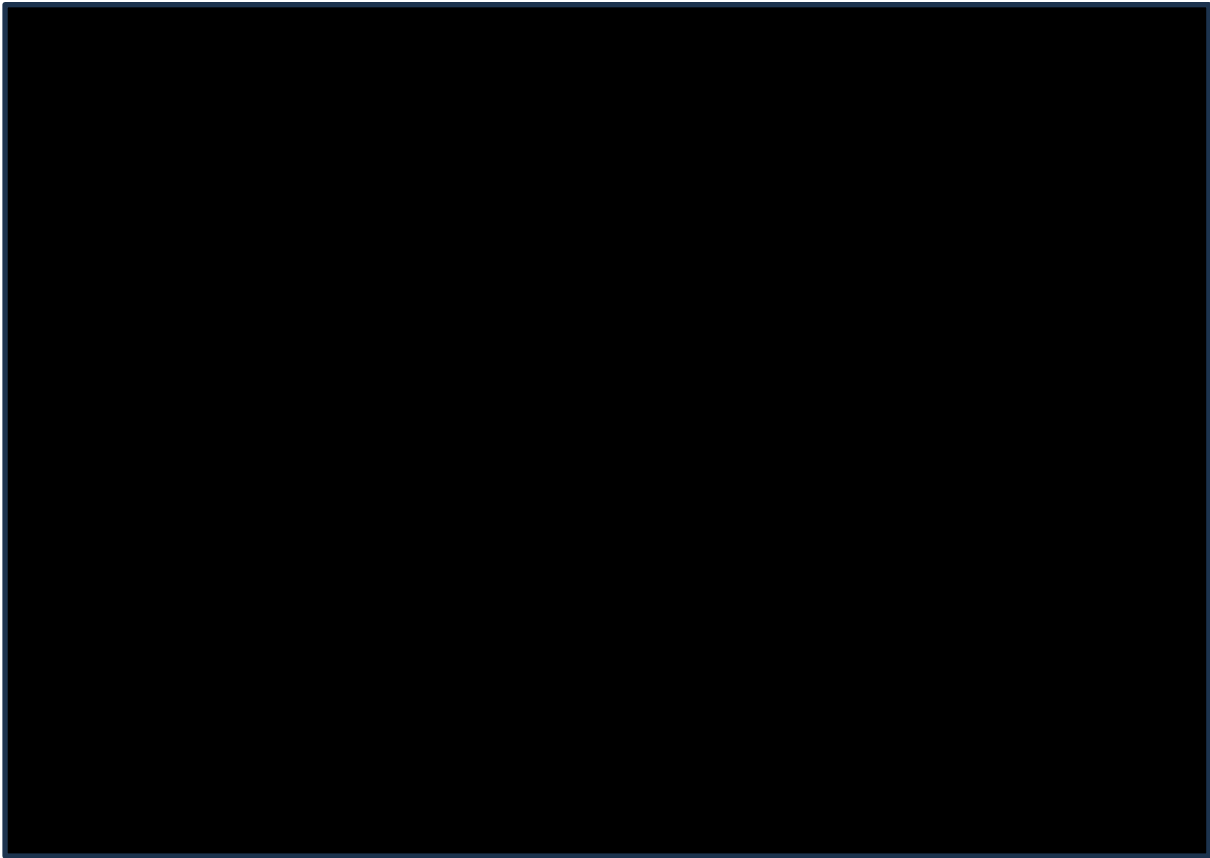
<sup>32</sup> AHIMS Extensive Search on 13/6/2022 of MGA Coordinates in Zone 56 E331500 - 339500, N6232000 - 6240000, ID 691445. This includes three restricted sites. A further AHIMS Basic search on 14/9/2023 using the same coordinates confirmed that no additional Aboriginal sites had been recorded in the search area in the interim (see **Appendix 2**).

**Table 9. Site types recorded within the 8km x 8km search area.**

Site type	Number	Percentage
Shell Midden (open)	55	46%
Stone Artefact/s	22	18%
Rock engraving	14	12%
Potential Archaeological Deposit (PAD)	8	7%
Shelter with midden	6	5%
Burial/s	4	3%
Midden and burials	3	3%
Modified tree	2	2%
Midden reburial area	2	2%
Shelter with Art	1	<1%
Grinding grooves	1	<1%
Ochre quarry	1	<1%
<b>Total</b>	<b>119</b>	<b>100%</b>

AHIMS contains several recordings that are located within or in close proximity to the study area. These can be summarised as follows (and see **Figure 18**):

- AHIMS #52-3-0219 (*Foreshore Midden*) is an extensive midden site with burials along the foreshore, which is discussed further below;
- AHIMS #52-3-0221 (*Kurnell Engraving*) is a rock engraving site which is discussed further below;
- AHIMS #52-3-1381 (*Cundlemong's Grave*) is the approximate location of the historically recorded burial of senior Aboriginal man Cundlemong in the 1840s, which is discussed further below;
- AHIMS #52-3-1223 (*Kurnell Meeting Place Precinct*) is an area of assessed subsurface archaeological potential, which was registered to facilitate archaeological test excavations in 2004. These excavations found no Aboriginal archaeological remains and this should not be considered an Aboriginal site;
- AHIMS #52-3-1366 (*K PAD1*) is the easternmost end of an area of assessed subsurface archaeological potential extending along the shoreline between the boundary of the national park and around Dampier St, and landward to Torres St. It was registered to facilitate archaeological test excavations and does not indicate an actual Aboriginal site;
- AHIMS #52-3-2078 (*Alpha House Campsite*) is the location of stone artefacts found during archaeological test excavations in 2007 and subsequent monitoring in 2010, and some likely midden shell found during monitoring works in 2020, as discussed further below;
- AHIMS #52-3-2094 (*Alpha House Campsite Shell Reburial*) is where shells collected during the 2020 monitoring of Alpha House works were reburied;
- AHIMS # 52-3-2080 (KMT ISO 01) and AHIMS # 52-3-2081 (KMT ISO 02) are two isolated artefacts found during archaeological test excavations in 2020 as described further below.



**Figure 18. Registered sites within and adjacent to the study area.**

### ***3.4 Documented Aboriginal heritage and previous investigations***

The study area contains a range of Aboriginal archaeological remains of high significance which have been uncovered and recorded over the last 170 years. These have mostly been uncovered as a result of extensive archaeological investigations of the Foreshore Midden in 1968-1970 and across the study area since 2004, but have also come to light through historical land use within the study area. Because Aboriginal archaeological remains have been located in numerous contexts over time, for clarity this section is divided into remains recorded prior to the most recent investigations from 2004, and those recorded during those investigations. All of these recordings are considered together in **Section 3.6**.

#### **3.4.1 Early recordings and archaeological excavations (1840s – 1970s)**

The locations of areas and finds mentioned in this section are shown in **Figure 19**. Further details can be found in an earlier review of these recordings by Coast Director Paul Irish.<sup>33</sup> The most significant investigations in the area were undertaken by archaeologist Vincent Megaw, then Senior Lecturer at Sydney University, in 1968, 1970 and 1971. The excavations aimed to learn about the history of

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<sup>33</sup> Irish 2007a

Aboriginal use of the area before the arrival of Europeans, and to see if there were any archaeological remains that indicated contact between local Aboriginal people and the crew of the Endeavour in 1770.

The 1968 excavations were undertaken with Ronald Lampert (then of the Australian National University) and a team of Sydney University students. They included an excavation within a nearby rockshelter containing midden and burials. This site is not discussed further here as it is culturally sensitive and well outside the study area. The 1968 excavations also included augering and two trenches within the Foreshore Midden to the west of the stream. The remaining two excavations in December 1970 – January 1971 and in May 1971 were undertaken together with Martin Williams, then Lecturer in the School of Earth Sciences, Macquarie University, as well as students from both Sydney and Macquarie Universities. These extensive excavations included seven trenches within the Foreshore Midden to the east of the stream, and a series of auger cores to determine the extent and depth of the midden and the relationship between the midden and surrounding sediments.

### **1. Burial and midden**

Part of a human skeleton was uncovered in 1899 during the erection of a flagpole in time for the dedication of the reserve. The remains, which are most likely of an Aboriginal person, were found about 3' (0.9m) below the surface and were in poor (fragile) condition. It is not recorded if they were associated with midden. The remains do not appear to have been reburied.<sup>34</sup> In 2006 midden was also found at this location during trenching works. The midden appeared to mostly contain mud oyster shells, but large turban shells were also present.

### **2. Burial**

In 1936 a skeleton (or possibly only a skull) was uncovered about halfway between the Forby Sutherland monument and the northernmost of the two pine trees which used to reside in front of Alpha House.

### **3. Stone Artefacts**

Ten stone artefacts were found in 1947 during excavations for the foundations of the Banks Monument. They comprised eight bondi points (stone knives or spear barbs) and two stone flakes.<sup>35</sup> No details were given of the context of the finds, such as their depth or association with midden.

### **4. Burials**

In 1961 two Aboriginal skeletons (an elderly male and a child) were located during the installation excavation of an inspection vault for electrical cabling that had been laid along the foreshore.<sup>36</sup> These remains were reburied at an unspecified location “nearby” by the police.

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<sup>34</sup> Rich 1988:8

<sup>35</sup> Rich 1988:8

<sup>36</sup> Rich 1988:6.



**Figure 19. Aboriginal archaeological remains recorded in and adjacent to the study area 1840s – 1970s.**











**Figure 24. North-western corner of Trench F.**

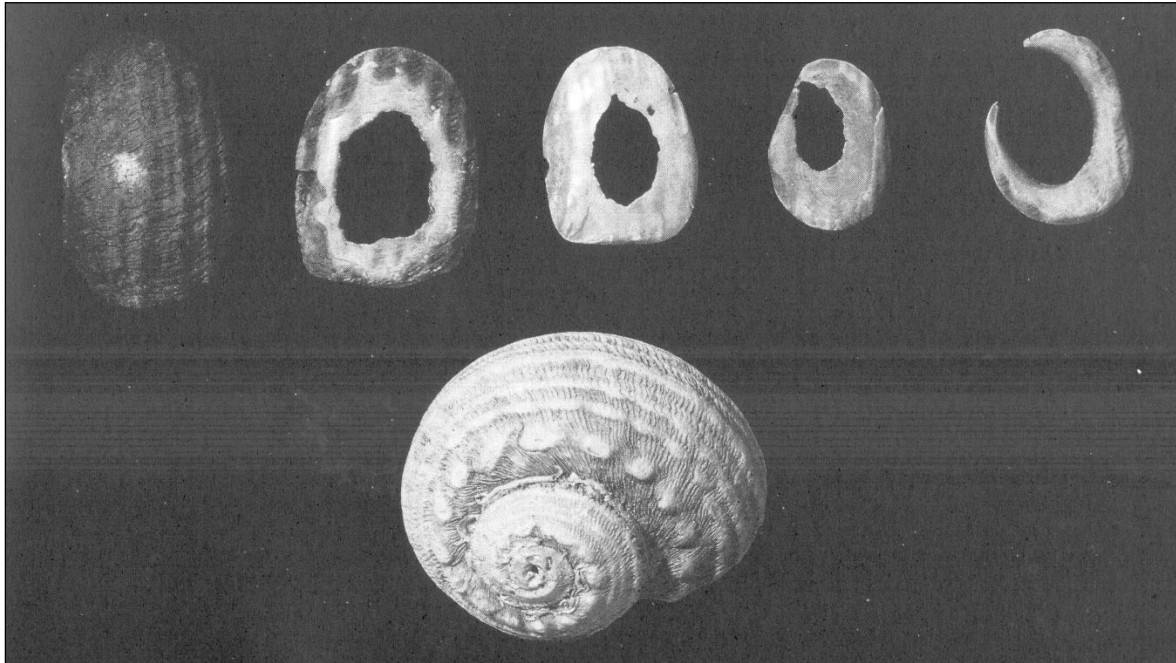
The excavation of Trench F was completed in 1971. The trench was 41m long and 123706m<sup>3</sup> of material was removed for analysis.

In all, the seven large excavated trenches removed over 35m<sup>2</sup> of the midden. Midden was excavated to sandstone bedrock between 0.1 and 1.8m below ground level and comprised the bulk of the excavated deposit. The excavations located some Aboriginal human remains but most of the excavated material consisted of faunal remains (fish, shellfish, land animals), a hearth, bone points, stone artefacts and the largest number of fishhooks and fishhook ‘blanks’ (around 200) yet found in any site in Australia (**Figure 25** and **Figure 26**). A charcoal sample from the northern end of Trench B was dated to between 780-1240 years ago and two charcoal samples from Trench F, one midway through the deposit, the other towards the bottom were dated to between 200-590 and 985-1415 years ago respectively.

Although some short reports and publications were produced, a complete excavation report has not been completed. Most of the midden shells were used to fill in the excavated pits but the Aboriginal archaeological remains that were retained – such as fish and animal bone and tools of shell, stone and bone - were not analysed in detail. Over the past decade Macquarie University archaeologist Diana Tsoulos, has assembled and analysed the excavation records in detail and also undertaken analysis of a significant portion of the faunal remains from the excavation, while Coast Director Paul Irish has analysed the fish-hooks and other shell artefacts.<sup>41</sup> As part of this work, further charcoal

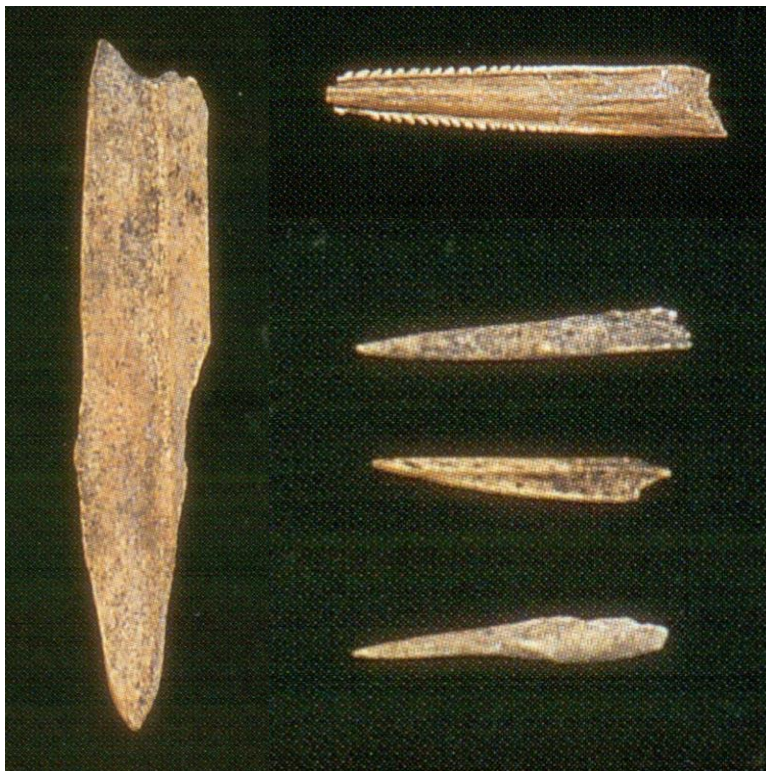
<sup>41</sup> Tsoulos 2007, Tsoulos *et al* 2011, Irish 2012.

samples retained from the excavations were submitted for radiocarbon dating, showing that the midden was up to 2,000 years old, around 500 years more than previously thought.<sup>42</sup>



**Figure 25. Shell fishhooks in various stages of manufacture from BB4 Trench F**

McLennan et al. 2010:119



**Figure 26. Bone artefacts from BB4 Trenches F and G.**

From left to right, pointed "nose" bone  
9  
d  
fr  
2010  
18

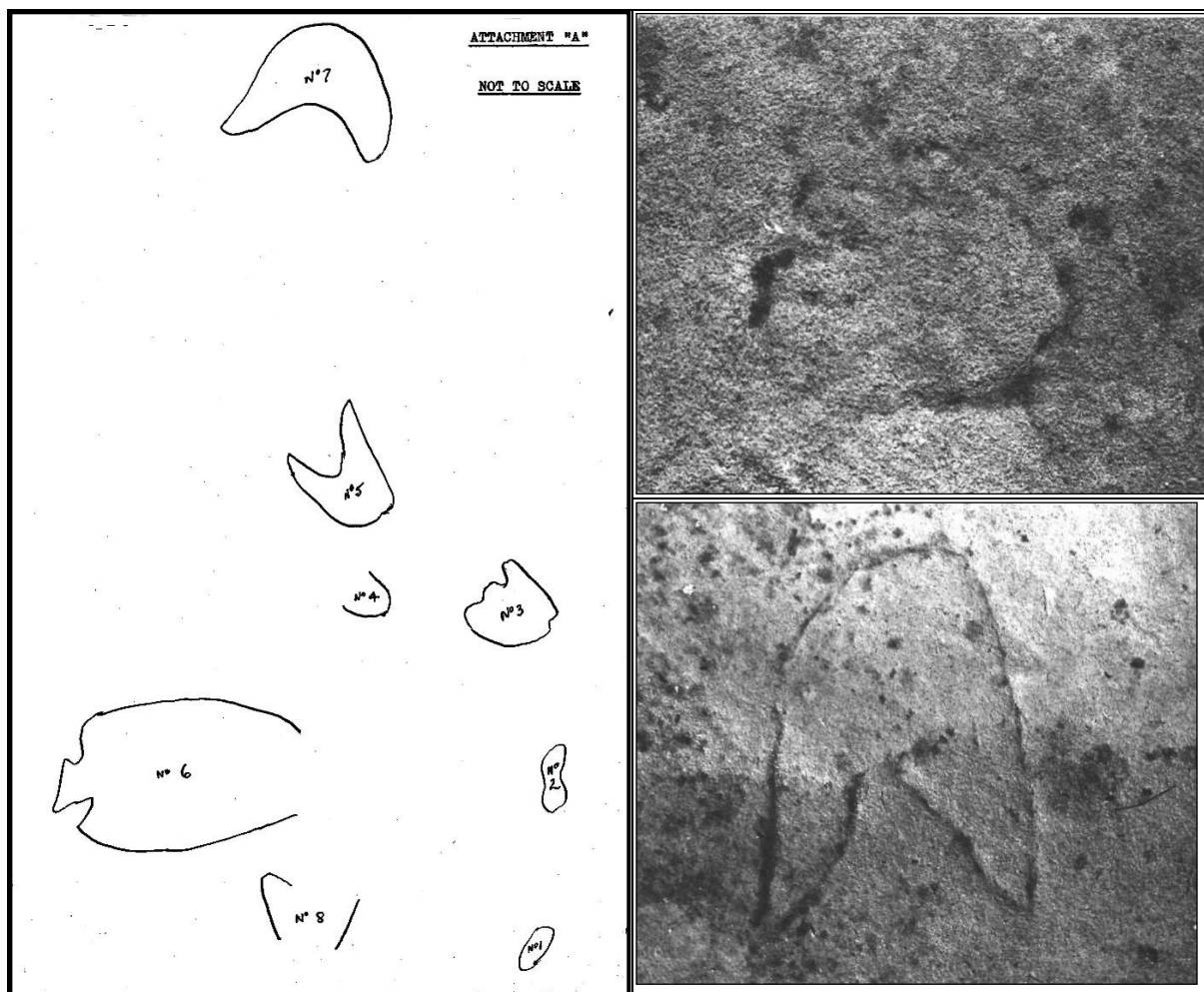
<sup>42</sup> Tsoulos et al 2011.

**7. Rock engravings (AHIMS #52-3-0221)**

An Aboriginal rock engraving site was recorded in 1968 on a rock outcrop north of the main entrance road to the national park. The site was located on an exposed platform of sandstone and consists of at least 8 motifs, including fish, footprints or tracks called mundoes, and other unidentified motifs (Figure 27). The engravings are very faded and have not been seen since the 1980s and are probably covered by vegetation.

**8. Stone axe**

A stone axe was located near the park entrance in 1971 during levelling works adjacent to and associated with the installation of the anchor display.<sup>43</sup> There are no details of the context of this find and it is not recorded on the AHIMS Aboriginal Sites Register.



**Figure 27. Sketch and images of the engraving site.**

Attachment "A" - NOT TO SCALE

<sup>43</sup> Forbes 2006:20, Lewczak 2006:18

### 3.4.2 Previous master plan investigations (2004 – 2010)

Archaeological test and salvage excavations were undertaken in relation to the previous master plan covering the study area (described as the ‘Meeting Place Precinct’) between 2004 and 2008, with archaeological monitoring of master plan works between 2008 and 2010. These investigations are described below and their locations are shown in **Figure 28**. The areas in which Aboriginal archaeological remains were recorded is described further in **Section 3.6** and shown in **Figure 37**.

#### 2004 test excavations (McIntyre-Tamwoy 2004)

McIntyre-Tamwoy oversaw the mechanical excavation of seven 0.7m wide by 2-4m long pits adjacent to current internal roadways and around the Commemoration Flat carpark (SM1 – SM7 in **Figure 28**). All pits contained fill or windblown sand in upper layers and most contained a thin layer of natural sand before reaching sandstone bedrock. Rock was encountered at a metre or less below the surface except in pit SM2 where it was at 2.9m and may represent a former swamp area. No Aboriginal archaeological remains were found.

#### 2007 test excavations (Irish 2007b)

The excavations were undertaken to inform proposed master plan works to upgrade visitor facilities within the ‘Meeting Place Precinct’ (broadly similar in extent to the current study area), such as new walking tracks with interpretive signage (and removing some existing tracks), replanting some areas with the native vegetation, upgrading the ferry wharf, reopening Cooks Stream, burial of a section of overhead powerlines and installation of better visitor facilities such as signs and seating. A thorough review was first undertaken of existing records of Aboriginal sites within the area. Because of their high degree of significance, and the possibility for Aboriginal human remains and other archaeological remains to be present within the area, it was determined that the proposed works would avoid impacts to any *in situ* (in their original location) archaeological remains as much as possible.

To help determine this, archaeological test excavations were undertaken with the La Perouse Local Aboriginal Land Council and ‘Towra Team’ of NPWS Aboriginal workers to provide more information about the location and depth of Aboriginal archaeological remains throughout the Meeting Place Precinct. To minimise the risk of impact, small shovel pits (generally up to 20cm x 50cm) were manually excavated only to the depth of proposed impacts (generally maximum 40cm) or until *in situ* midden or other archaeological remains were found (**Figure 29**). A total of 115 pits were excavated as shown in **Figure 28**. The top of the Foreshore Midden and stone artefacts and loose shells were encountered in a number of pits. This allowed the proposed works to be designed to avoid impacts, for example by raising new paths above the level of the midden. It also helped work out which activities would require archaeological monitoring. As part of the test excavations, an attempt was made to locate the Aboriginal engravings (site #52-3-0221), but they were not found across the largely vegetation-covered sandstone outcrop where they were originally recorded.

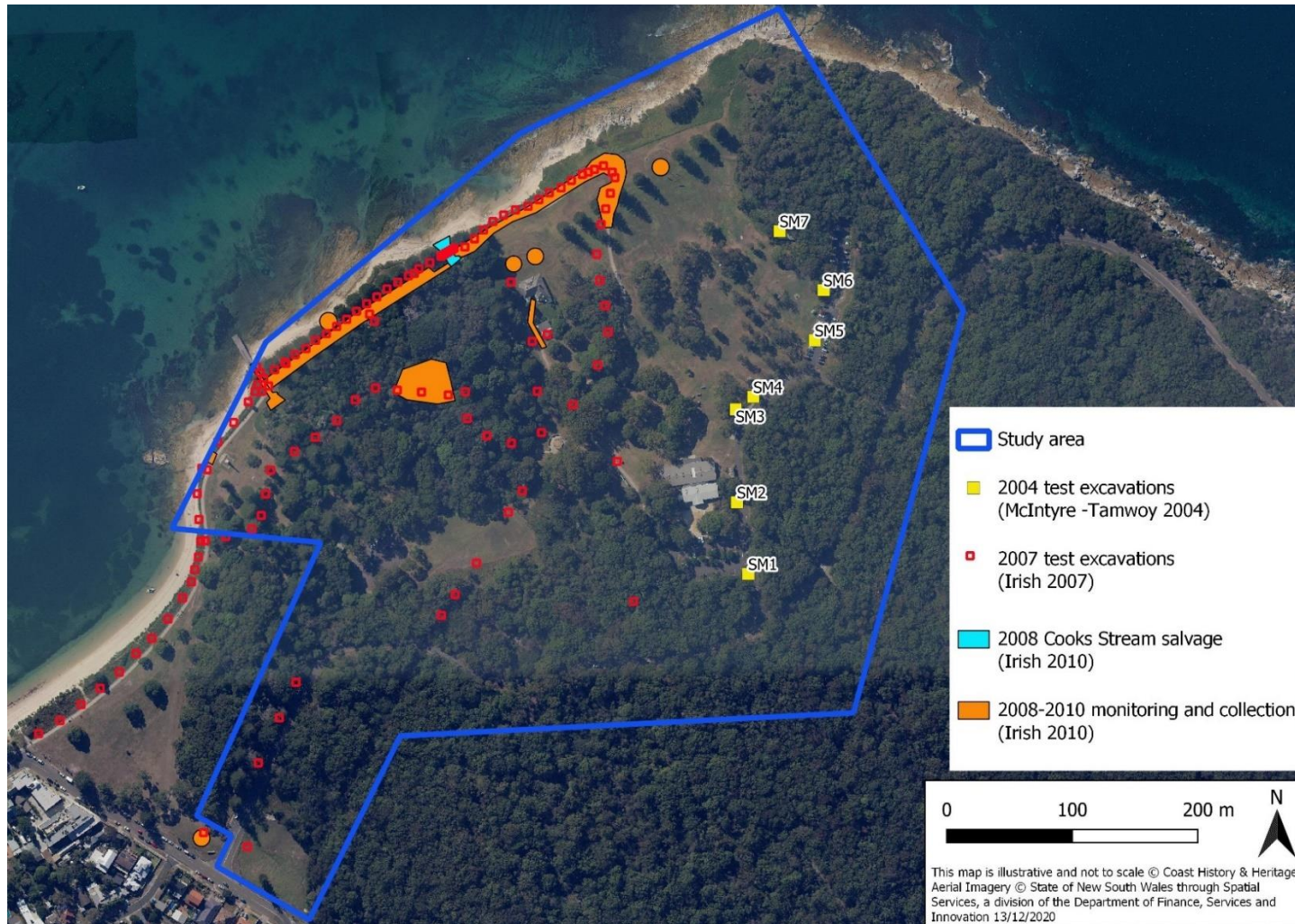


Figure 28. Location of test and salvage excavations (2004-2008) and archaeological monitoring (2008-2010).



Figure 29. One of the shovel pits being excavated during 2007.

**2008 salvage excavations (Irish 2010)**

The 2007 test excavations showed that some of the material used to fill the stream when it was dammed in the early 1900s was midden, probably dug out of the adjacent creek banks. Because this midden was not *in situ*, it was decided that it was acceptable to reopen the stream as proposed, as long as the midden and any other Aboriginal archaeological remains were first completely removed through archaeological salvage excavations. These excavations were undertaken in 2008 by Paul Irish and representatives of the La Perouse Local Aboriginal Land Council and NPWS Towra Team.



Figure 30. Excavation of the redeposited midden used to dam the stream.

Figure 30. Excavation of the redeposited midden used to dam the stream.



**Figure 31. Some of the artefacts found during the excavations in the stream.**

Figure 31 shows a collection of archaeological artefacts. The top-left panel displays eight small, crescent-shaped bone or shell fragments arranged in two rows of four, each with a white label: SW-F1, E6-F3, SW-F5, SW-F7 (top row); P6/180-F2, E6-F4, SW-F6, SW-F8 (bottom row). A scale bar is visible at the top. The top-right panel shows a single, irregularly shaped, light-colored stone artefact on a blue background with a scale bar below it. The bottom-left panel shows several elongated, pointed bone or shell artefacts arranged in three rows, with labels: D8-1, D8-3, C6-1 (top row); E10, E9, SW-5 (middle row); SW, D8 (bottom row). A red and white scale bar is on the left. The bottom-right panel shows a large, dark, pointed stone artefact on a blue background with a scale bar below it.

The mechanical removal of the stream fill was monitored until shell or other archaeological remains were uncovered. These were then manually excavated in 2m x 2m squares (**Figure 30**). There was one main patch of redeposited midden (about 4 metres by 6 metres) about 30cm under the surface as well as several other patches deeper down in the fill. Within the main patch of midden, but also among gravel, glass and concrete some human bones were found. They were determined to be part of the leg bones of a female, which helped rule out that they may be Forby Sutherland, the Endeavour crewman buried along the foreshore in 1770. They are most likely Aboriginal but their exact age and origin could not be determined.

In total around 300kg of midden was excavated from the stream, sieved and sorted. It contained 78 stone artefacts, 4.3 kilos of fish and mammal bone, 26 bone point tools, 14 broken or complete fish hooks and a number of other shell artefacts (**Figure 31**). Microscopic analysis of some of these tools showed that some of the stone artefacts were used for cutting shell, and bone points were used for



piercing skin or hides. Earlier this year, most of the archaeological remains retrieved collected during the works undertaken in 2007-2010 were reburied alongside the stream.

**2008-2010 archaeological monitoring (Irish 2010)**

Based on the results of the 2007 test excavations, the master plan works in locations where remains were known or considered likely to occur were monitored under an Aboriginal Heritage Impact Permit. The permit allowed for any Aboriginal archaeological remains (excluding human remains) in previously disturbed contexts that were exposed, to be recorded and collected if they could not be protected. In most cases they were observed and protected by raising the impact above this level. In these cases they were covered by geofabric and soil and their location recorded (**Figure 32** and **Figure 33**). In other cases, some shells, animal bone fragments and stone were collected.



**Figure 32. Monitoring of pathway installation near the main flagpole east of the stream.**

Figure 32 shows the monitoring of pathway installation near the main flagpole east of the stream. The image captures a construction site with workers, orange survey markers, and a body of water in the background.



**Figure 33. Section of exposed midden near the Solander Monument.**

Figure 33 shows a section of an exposed midden near the Solander Monument. A large white tarp is used to cover the exposed area, and the monument is visible in the background.

### Sharing artefacts and information

In June 2009, after the completion of the 2008 archaeological salvage excavations and analysis, we held an Aboriginal community day at Kamay Botany Bay National Park to share what we had found, and also what had been had been found in the previous 1968-1971 excavations. There had been no Aboriginal community involvement in those excavations, and few community members had been able to see any of the artefacts excavated from the site, except for a handful held in the national park visitor centre. We arranged for the temporary loan of a selection of artefacts from the earlier excavations from the Australian Museum and created a display (**Figure 34**), and invited Vincent Megaw and others involved in the earlier excavations to meet the community and answer any questions. We also presented some of the artefacts and information from the 2007 and 2008 excavations and finished up the discussion over some fresh seafood (**Figure 35**).



**Figure 34. Temporary display of artefacts and photos from the 1968-1971 excavations.**



**Figure 35. Presenting artefacts and information from the 2007 and 2008 excavations.**

### 3.4.3 Current master plan works (2019 – present)

Several projects have been undertaken during and after the development of the current masterplan, including works associated with the associated reopening of ferry services between La Perouse and Kurnell.

#### 2020 Alpha House monitoring (Coast 2019, Coast 2021a)

The initial version of the current ACHAR was finalised in 2019 and used to support an AHIP application in relation to works to restore and repair Alpha House. The works were undertaken in 2020 under Aboriginal Heritage Impact Permit (AHIP) C0005962, issued under the *National Parks and Wildlife Act 1974* and Approval s60/2019/196, issued under the *Heritage Act 1977*. The AHIP allowed for collection of Aboriginal archaeological remains in disturbed contexts and for limited salvage of stone artefacts associated with a small campsite known as AHIMS #52-3-2078 (Alpha House Campsite) to the immediate west of the house if encountered during the monitoring (see **Figure 18**).

No *in situ* Aboriginal archaeological remains were found during the archaeological monitoring and no archaeological salvage was required as the works did not impact the Alpha House Campsite. One *in situ* historical archaeological feature was identified: this was an in-ground concrete tank, probably a cistern or septic tank and probably dating to the second half of the twentieth century. With this exception, the remainder of the excavation works appeared to be contained within the upper, disturbed, part of the soil profile. A small assemblage of historical artefacts was found in this disturbed context, including shell and historical artefacts.

Most, or all, of the shell assemblage is likely to be re-deposited midden material. The provenance of the material is not known. It may have been brought up to the study area from the midden AHIMS #52-3-0219 (The Foreshore Midden) on the foreshore to the north. Or it may represent occupation of the study area itself, on the ridgeline. The small shell assemblage recovered from several contexts consisted of species commonly found in the foreshore midden (e.g. mud oyster, triton, turban, rock oyster and Hercules whelk). It was subsequently reburied by the La Perouse LALC near the stream and registered as AHIMS #52-3-2094 (see **Figure 18**).

What appeared to be the undisturbed natural soil profile was exposed in some locations. This limited evidence suggests that Alpha House was built on the highest and northernmost part of the small ridgeline overlooking the foreshore, and that fill has subsequently been introduced in order to broaden this area. The source of the fill is not known; some material is likely to be spoil from deep excavation within the study area, but material may also have been brought in from elsewhere in the park.

#### 2020 test excavations (Artefact Heritage 2021b)

Aboriginal archaeological test excavations were undertaken to inform Master Plan works specifically for the Kamay Ferry Wharves Project. The project was designated State Significant Development (SSD) and will be delivered by Transport for NSW as part of the Master Plan works. The project

would include the reinstatement of the ferry wharves between La Perouse and Kurnell, the installation of a service route from Captain Cook Drive to the Ferry Terminal, some landscaping, and a new visitor carpark along Captain Cook Drive. Previous investigations within the area had identified highly significant Aboriginal sites, including Aboriginal human remains, redeposited midden and stone artefacts within the Foreshore Midden (AHIMS # 52-3-0219). The study area also included an additional area of Potential Archaeological Deposits (K PAD 1 [AHIMS # 52-3-1366]).

Archaeological test excavation was undertaken with the La Perouse LALC and Registered Aboriginal Parties for the project to provide a better understanding of the deposits below the ground surface. A total of 16 hand-excavated 1m x 1m test pits were excavated to the depth of the proposed impact. Generally this was about 0.9m below the ground surface but in some locations this went to about 1.5m. The test pits were located along the alignment of the southern portion of Monument Track, from Captain Cook Drive to the old ferry wharf location (**Figure 36**). Most of the test pits comprised fill material overlying a coarse yellow marine sand which contained loose fragments of shell and animal bone. The south-eastern test pit (TP02) comprised fill overlying a grey aeolian (wind-blown) sand, indicating that the study area was located on the transition between the foreshore marine sands and aeolian dune deposits. The overlying fill deposits showed that the landscape had been levelled with multiple fill events having taken place. Two isolated stone artefacts (AHIMS # 52-3-2080 and # 52-3-2081) were found in TP16 and TP23 (**Figure 36** and **Figure 18**). These were located within the marine sands above the sandstone bedrock. Because of the close proximity to the foreshore, it was determined that the artefacts were likely redeposited due to wave action.

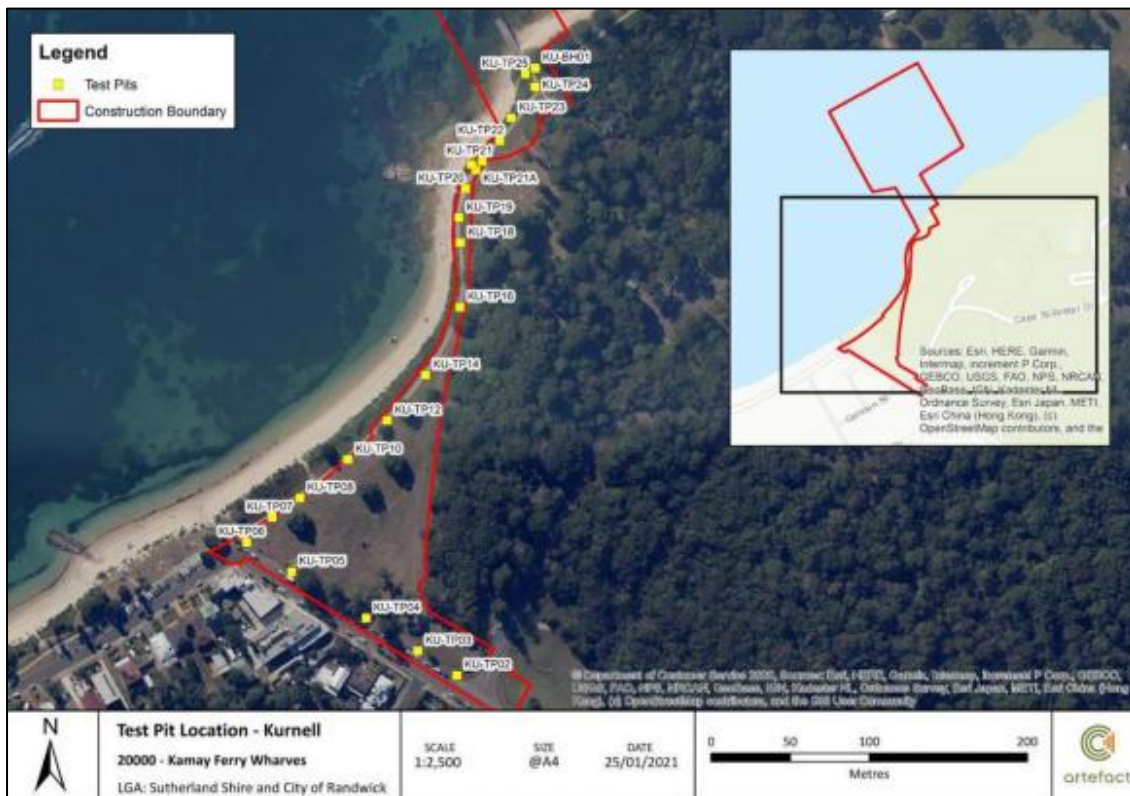


Figure 36. Kamay Ferry Wharves Test Excavation Locations, Kurnell (2020)

The two artefacts (AHIMS # 52-3-2080 and # 52-3-2081) were shown to have low significance and no additional archaeological management was proposed for the majority of the study area given that no other archaeological material was found. Even though no archaeological material was found in the southern portion of the Foreshore Midden (AHIMS # 52-3-0219) during the test excavation, management strategies were put in place as previous investigations (Irish 2007b and 2010) identified a significant Aboriginal site including human remains, redeposited midden and stone artefacts. The archaeological management within the Foreshore midden would include archaeological supervision for any works that would go deeper than 40cm. This is because the upper 40cm contained fill material and the likelihood of Aboriginal archaeological material would be below this level.

### **2021 Visitor Centre geotechnical investigations Due Diligence assessment (Coast 2021b)**

A Due Diligence Aboriginal heritage assessment was undertaken in 2021 by Coast in conjunction with the La Perouse LALC to investigate proposed geotechnical testing in relation to the proposed new Visitor Centre and associated geothermal array, centred around the existing Visitor Centre location (see **Figure 2**). The testing was subsequently undertaken in December 2022 by AssetGeoEnviro and was monitored by Steven Ella of the La Perouse LALC, as discussed above. Within the visitor centre area, four boreholes were excavated, showing up to 1.1m of fill on up to several metres of sandy soil on sandstone bedrock.<sup>44</sup> No Aboriginal objects were observed during the geotechnical testing, and it is noted that the 2004 archaeological testing by McIntyre-Tamwoy showed a similar profile and also did not retrieve any Aboriginal objects.

## **3.5 Aboriginal land use**

Aboriginal people have been living along the shore of Kamay (Botany Bay) at Kurnell for thousands of years. This is the land of the Gweagal people, though it would have been visited and used by other Aboriginal people around Kamay also. The foreshore east from the ferry wharf and on either side of the stream contains an enormous shell midden up to 2,000 years old. The shellfish and animal and fish bones in the midden show that Aboriginal people ate an enormous range of foods. They made many types of tools of bone, stone and shell at the midden, including shell-fish hooks. From this midden Aboriginal people fished the adjacent shallows and mudflats to the west of the park, as well as the deeper waters inside and outside the bay. They also hunted a range of mammals and reptiles and gathered plant foods, which they processed and cooked at the midden camp.

Aboriginal people lived around the park area and across the Kurnell Headland, but the foreshore close to the stream was the most substantial camp over many centuries. Aboriginal people were still camped there when Cook and the Endeavour visited the bay in 1770, when the first fleet arrived 18 years later, and when the first farm was built on the site in 1815. Right through to the 1840s and 1850s, and possibly later, Aboriginal people were camped near the farmhouse on the site of today's Alpha House. In the 1840s, local woman Sally Mettymong was nanny to the young Laycock children.<sup>45</sup> By this time, cross-cultural relationships at Kurnell were into their third generation. The

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<sup>44</sup> AssetGeoEnviro 2023 DRAFT.

<sup>45</sup> Macdonald 1928: 286.

children's grandfather, John Connell, had gotten to know the Aboriginal people living on his Alpha Farm property at Kurnell when he acquired it in the 1820s, and he had petitioned the governor on their behalf.<sup>46</sup> Aboriginal people continued to fish the waters in front of the main residence, and bury their dead in the area.<sup>47</sup> It was still being used for ceremony too. In 1845, visiting Frenchman Eugène Delessert participated in a hunting trip at Kurnell led by a dozen Aboriginal guides. After crossing Kamay from Botany, they set up camp at Kurnell and when the visitors had gone to bed, the Aboriginal men conducted their ceremony.<sup>48</sup>

In the late nineteenth century, Aboriginal people were still coming to Kurnell to fish, and in the early to mid-twentieth century, they crossed the bay from La Perouse to gather shells and mangrove wood, to make tourist artefacts for sale near the mission.<sup>49</sup> The park has also been a place of protest and commemoration. In January 1988, it was the site of an all-night vigil at the end of large protests during the bicentenary of the arrival of Europeans.<sup>50</sup> More recently, the anniversary of Cook's landing in 1770 has been commemorated by Aboriginal and non-Aboriginal participants in the park. The park remains a highly important place to the local Aboriginal community, as a place of heritage, history, teaching and ongoing connection.

### **3.6 What may remain within the study area**

As a result of Aboriginal community knowledge, past archaeological investigations and discoveries and detailed historical research we have a good idea about what kinds of Aboriginal archaeological remains may be present within the study area, and broadly where further remains are likely to occur. The focus of this section is on material (archaeological) remains. This is not because less tangible values are not important, but because there has already been extensive Aboriginal community consultation undertaken by NPWS and their consultants (as discussed above) to accommodate these values in the proposed master plan works. This has concluded that the Stage 1 Master Plan elements are broadly supported in the local Aboriginal community.<sup>51</sup>

**Figure 37** below shows the distribution of the known Aboriginal archaeological remains relevant to the current Stage 1 Master Plan works. This does not represent a complete picture of what is there. Despite the extensive archaeological testing undertaken in 2007, most pits penetrated only around 40cm below the current surface, sometimes only into fill material (e.g. behind revetments). The absence of documented remains therefore does not indicate that they may not be present. Individual records of remains found are noted in **Section 7** in relation to the specific proposals of the Stage 1 Master Plan.

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<sup>46</sup> Connell nd.

<sup>47</sup> Houston 1905: 1-2, 5.

<sup>48</sup> Delessert 1848: 169-170. [translated for Paul Irish by Michael Wotodzo].

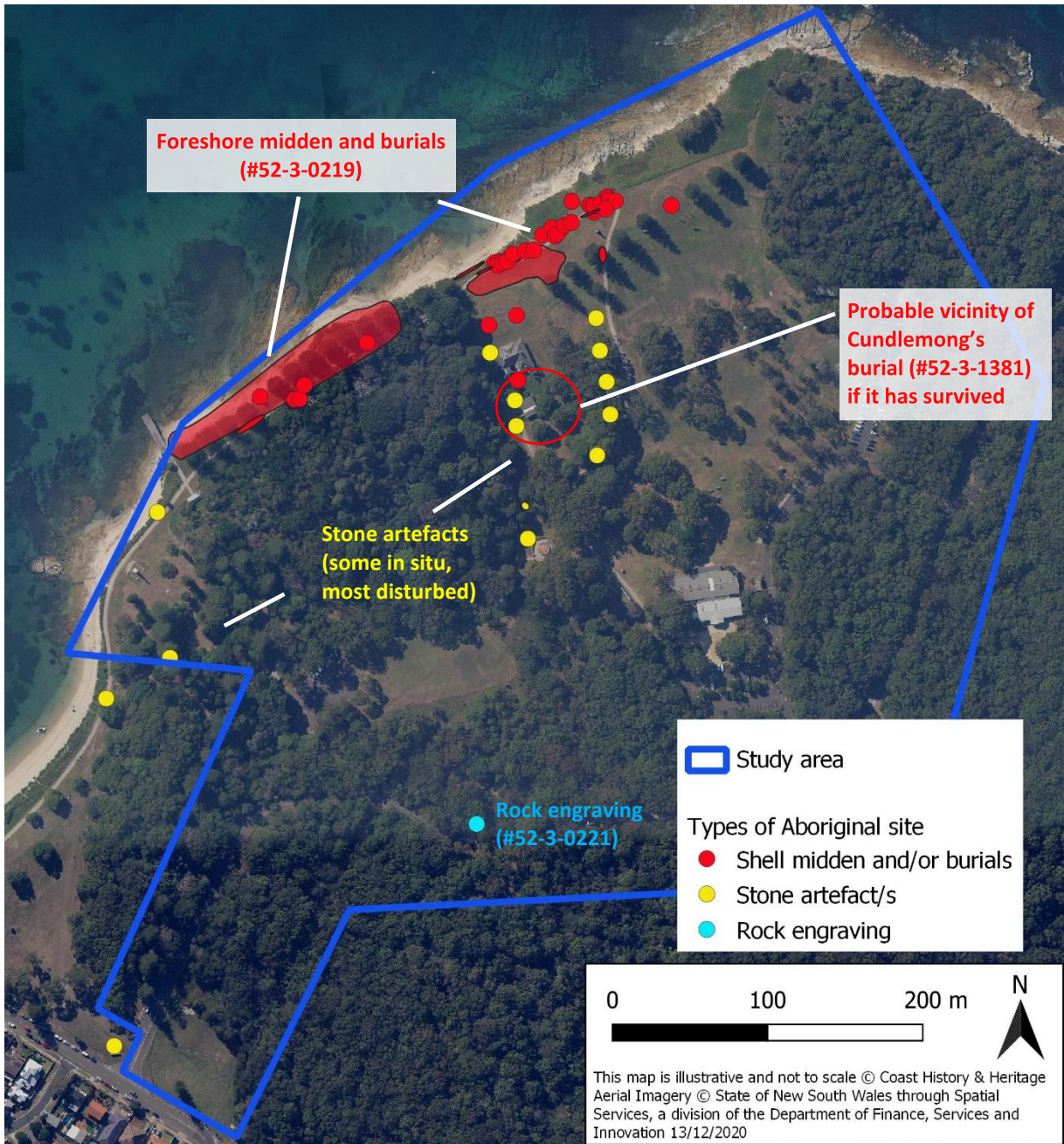
<sup>49</sup> NSW Police, "Botany," *New South Wales Police Gazette* 3/3/1886: 66, Individual Heritage Group 1988:13, 24.

<sup>50</sup> Nugent 2005:185.

<sup>51</sup> Context 2018.

In broad terms though, we can conclude the following from past investigations:

- the Foreshore Midden (AHIMS #52-3-0219) extends along the foreshore at least 150m either side of the stream. It includes midden as well as burials. East of the stream, midden and burials are found up to 70m back from the shore, on both gently and more steeply sloping ground. West of the stream, the midden is documented along the flat shoreline. It does not extend across the top of the dune behind the shoreline, but it might extend below or into the lowest slopes of the dune, which has not been investigated.
- it is unlikely that *in situ* midden will be located much more than around 70m from the current shoreline. Some midden shell in a disturbed context was found behind Alpha House during monitoring works in 2020. While this may represent midden in a more elevated position, no *in situ* midden has been found in this location despite monitoring of a number of trenches over the past 15 years.
- Individual burials could be located more than around 70m from the current shoreline. These will most likely be from before the arrival of Europeans, but there is at least one burial (that of senior man Cundlemong around the rear of Alpha House in the 1840s), which is documented from the nineteenth century.
- on the elevated dunes behind the shore west of the stream and containing Alpha House to the east of the stream, stone artefacts have been found in small quantities. Often they are in disturbed contexts, but several have been found in apparently natural sand horizons, though still in small quantities and low densities (specific finds of relevance to Stage 1 Master Plan proposals are discussed in **Section 6**). It could be expected that more stone artefacts in low densities and/or disturbed contexts may be found elsewhere across the study area, as suggested by the recent find of two isolated artefacts along the shore to the west of the ferry wharf.
- the rock engraving site AHIMS #52-3-0221 is the only documented engraving site in proximity to the Stage 1 Master Plan area. This is not surprising, as there are limited places across this area where sandstone is likely to have outcropped in the past. It is also the only documented engraving site on the Kurnell Headland.



**Figure 37. Known distribution of Aboriginal archaeological remains relative to the Stage 1 area prior to 2023 archaeological test excavation.**

Figure 37. Known distribution of Aboriginal archaeological remains relative to the Stage 1 area prior to 2023 archaeological test excavation.



## 4 What we have observed

### *Site Survey*

An initial archaeological inspection of the study area was undertaken on 10 May 2019 by Paul Irish and Rebecca Bryant of Coast, and La Perouse Local LALC Senior Site Officer David Ingrey. A further inspection was undertaken on 24 January 2022 to include revised or new elements not previously inspected. This was undertaken by Paul Irish, Julia McLachlan and Gina Basile of Coast and La Perouse LALC Site Officer Steven Ella, along with Greg Abbott and Phoung Le of NPWS.

### **4.1 Survey methods**

The main purpose of the site inspections was to examine the general areas proposed for Stage 1 Master Plan works, and to consider each of these in relation to the results of past investigations and documented historical disturbance as the basis for assessing the likelihood of impacts to Aboriginal archaeological remains from those works. In particular, our focus was on those proposals which might involve subsurface impact into potentially undisturbed natural sands.

We did not anticipate that any Aboriginal archaeological remains would be visible on the surface, and detailed survey of the entire Stage 1 Master Plan area was not warranted. For this reason, survey units, sampling or regular transects were not considered to have any investigative value, however our observations are grouped by the general locations of proposed master plan works.

Survey observations were recorded using a combination of written notes and photographs, linked to GDA coordinates obtained using a Garmin GPSMAP 60CSX handheld GPS. We also recorded GPS track logs of where we went. All mature trees within and adjacent to the areas inspected were examined to determine whether any may have scars of Aboriginal cultural origin. Determining whether scars have a cultural or natural origin can be difficult but is evaluated based on attribute guides and knowledge of the specific land use history of the area in question.<sup>52</sup>

Stone artefacts can represent the remains of former Aboriginal living spaces, or the casual or accidental discard of individual artefacts. Though arbitrary it is common practice to define 'open campsites' as being two or more artefacts within 50m of one another, unless they are obviously not related. Single artefacts more than 50m from other artefacts are typically recorded as 'isolated finds', unless we can see that they are somehow related to artefacts further away than this.

This information is recorded about any artefacts we find on our inspections:

- How big the artefact is – its maximum length, width and thickness.
- What it is made from - raw materials such as silcrete, quartzite and quartz.
- The type of artefact - flakes, blades, cores, flaked pieces etc.
- Any other information about its context or perhaps evidence of use such as retouching etc.

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<sup>52</sup> Irish 2004, Long 2005.

As well as recording the archaeological evidence we can see, we also think about whether there is any potential for evidence to survive beneath the surface. This can be determined by thinking about the type of landform, what we know of how Aboriginal people used these types of landforms, the archaeological evidence we can see, and the level of disturbance that is either observed during the inspection or known from historical records. If we think an area might have subsurface archaeological evidence, it is identified as an area of Potential Archaeological Deposit. These areas may not be associated with any surface evidence such as stone artefacts.

## 4.2 Survey observations

The following observations combine those from the 2019 and 2022 inspections, and omit areas inspected in 2019 which are no longer proposed for impact under the current suite of proposals. The survey observations proceed in a roughly clockwise direction around the Stage 1 Master Plan area from the Cook Monument, and refer to the Master Plan elements as shown in **Figure 3**.

Some minor drainage works are proposed around the upper side of the Cook Monument (element 6) the construction of which has cut into the surrounding slope (**Figure 38**). A new path (element 7) was proposed at the time of the survey to extend from the ferry shelter shed to the cricket pitch amenities but is no longer proposed. The ground slope moderately down along the cleared seaward dune face which contains small exposures of loose sand (**Figure 39**). The sections along the top of the dune consist of loose sandy soil and have been impacted by past tree clearance and plantings, and localised cutting and filling for the installation of steps down to the foreshore (**Figure 40**).

Between the ferry wharf and stream an existing sandbag revetment is proposed to be replaced with a new stone log revetment (element 109). The existing revetment is built out from the sand behind the beach, within which is the Foreshore Midden (**Figure 41**). The Foreshore Midden is also present to the east of the stream, where a new section of revetment is proposed to be built out from the existing vegetation and dune (element 108). There is no existing revetment in this area, however the exposed section at the immediate back of the beach contains stone rubble and loose sand rather than compact dune sands, and no midden was observed (**Figure 42**).

Further east, past the Forby Sutherland and Solander monuments, the shoreline is covered in long grass and trees above which is a cleared and undulating grassed slope (**Figure 43**). Test excavations and monitoring have identified midden as far east as the eastern end of the current path, but the area of the proposed extension has not been tested. A new accessible path (element 24 & 115) is proposed to extend around the edges of the cleared area to the east and south to Commemoration Flat. South of the bend in the path, sandstone bedrock is exposed in patches, suggesting that soils in this area are shallow (**Figure 45**). At the bend in the proposed path, a dancing circle is proposed (element 104, **Figure 45**). A Fibre Reinforced Plastic boardwalk loop with viewing areas and steps is proposed to extend east from here to provide access to the newly installed whale sculpture along the foreshore (element 32). The level of historical impact in this area is not clear and it has not been subject to archaeological investigation, however some terracing above the foreshore appears to have taken place (**Figure 46**). Thick scrub prevented access immediately south of the whale sculpture (**Figure 47**), but exposures in the cleared and grassed area immediately behind the foreshore to the

west of the sculpture show shell fragments which appear to be washed in from the adjacent beach, but was found during test excavations to be shell midden (**Figure 48**, and see **Section 5.0**).



**Figure 38. View north to slope above Cook Monument with new sculpture in front.**



**Figure 39. View north-east along alignment of new path (no longer proposed) down dune slope to foreshore.**



**Figure 40. Existing steps across dune behind Cook Monument.**







**Figure 47. Thick scrub along the proposed path alignment immediately south of the whale sculpture.**



**Figure 48. Fragmented shells beneath grass immediately behind the shoreline west of the whale sculpture.**

Commemoration Flat contains the locations of a number of former picnic shelters and other structures associated with the recreational use of the area for more than a century. The felling of trees and the construction, use and demolition of these structures and the adjacent roadways and carpark, has involved the redistribution of sandy soil, leading to an uneven, grassed surface. This can be seen at the levelled location of the existing amenities block proposed for replacement (element 31) and the proposed area of picnic tables and barbeques around the south-eastern corner of the flat (element 29, **Figure 49**). The carpark upgrade (element 30), and proposed path extension (element 114) and service trench (element 118) are all in areas previously tested in 2004, or are on or adjacent to existing sealed surfaces, and recent geotechnical testing suggests sandstone is less than 0.5m below the surface towards the amenities building (**Figure 50**).

The current visitor centre and adjacent amenities sit on a substantial flat pad built up around a metre above the surrounding land in the late 1960s (**Figure 51**). The pad contains sand and sandstone fragments most likely scraped together from adjacent areas (**Figure 52**). As such, this fill may also contain Aboriginal archaeological remains which were present in the areas from which the

fill was sourced, though these would be in a completely disturbed context. The new visitor centre (element 12) and geothermal array (element 106) will sit within this raised pad, with the proposed dancing circle at the base of the slope (element 103).



**Figure 49. View north-east across Commemoration Flat across area of proposed picnic facilities to existing amenities block.**



**Figure 50. View north-east from the current visitor centre across raised terrace next to roadway proposed to contain new path and service trench.**



**Figure 51. View south across area of proposed dancing circle and geothermal array to existing visitor centre.**



**Figure 52. Sandstone fragments in the fill of the building pad adjacent to the visitor centre.**

The driveway between the visitor centre and the newly refurbished Alpha House is proposed to be resurfaced (element 117), and will also be the alignment for a service trench (element 110), with a section of new path connecting this to the existing loop track (element 111) (see **Figure 53**). This is the general area in which senior Aboriginal man Cundlemong was buried in the 1840s, though the exact location is not known, nor whether any remains of the burial have survived. The service trench connects to the existing Meeting Place, which is to be the site for the new Collection Garden (element 17, **Figure 54**) and is disturbed from previous buildings and service trenches.

A track extending west from the Meeting Place to the Cricket Pitch crosses over the stream which is piped above this point (**Figure 55**), and has sandstone bedrock around 0.8m below the surface. A new pedestrian and service vehicle bridge is proposed over the creek (element 101) and the creek above is to be reopened from its pipes, with additional landscaping works to restore its flow (element 14, **Figure 56**). Downstream, a culvert (element 20a) and electrical cabling (element 20b) along the Burrawang Walk are proposed to be replaced. These areas were test excavated in 2007.

Much of the grassed Cricket Pitch area is to be turned into a new bitumen carpark with substation at its eastern end (element 9, **Figure 55**). A combined service trench will wrap around the southern edge of the carpark (element 105) and existing powerlines will be undergrounded (element 102) along an alignment tested in 2007 and found not to contain any Aboriginal archaeological remains (**Figure 57**). The existing amenities block at the western end of the Cricket Pitch which has been cut into the adjacent dune (**Figure 58**). It is proposed for demolition (element 8a) and replacement with a new block nearby (element 8b).

On the southern side of the cricket pitch, between the open ground and current access road, is an outcrop of sandstone (**Figure 59**). This is the recorded location of Aboriginal engraving site (#52-3-0221) though the engravings can no longer be seen. They are most likely substantially eroded and concealed by leaves, soil and vegetation that currently covers most of the outcrop (**Figure 60**). No impacts are proposed in this area.







**Figure 56. View north along piped section of creek existing track and culvert.**



**Figure 57. View south-west along alignment of powerlines to be undergrounded.**



**Figure 58. View south-west across end of proposed loop path to amenities building.**

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**Figure 59. View south to sandstone outcrop most likely containing engraving site #52-3-0221.**



**Figure 60. Vegetation covering much of outcrop that most likely contains engraving site #52-3-0221.**

### **4.3 Survey coverage**

It is a requirement of the Code of Practice to assess the effective survey coverage according to the formula shown in **Table 10** and **Table 11**. These tables are based on summaries of ground visibility and archaeological sampling observed during the survey. Given the nature of our site inspections, and the restricted areas of impact of the proposed works assessed, it is not surprising that there is no visibility and therefore no 'effective survey coverage' across the study area, which might suggest that we do not have sufficient information to extrapolate and assess archaeological potential or potential impacts. However these calculations place undue emphasis on the current observable 'surface' as an indicator of archaeological potential, and overlooks the value of observations of erosional processes, soil type and nature, and historical disturbance, not to mention in this case a high degree of past archaeological investigation.

**Table 10: Summary table of effective archaeological survey coverage for the study area.**

Area (m <sup>2</sup> )	Visibility	Exposure	Effective Coverage Area (m <sup>2</sup> )	Effective Coverage %
255,500	2%	50%	2,555m <sup>2</sup>	1.0%

**Table 11: Landform summary - sampled areas.**

Landform	Landform Area (m <sup>2</sup> )	Visibility	Exposure	Area effectively surveyed (m <sup>2</sup> ) (= effective coverage of area)	% of landform effectively surveyed (= area effectively surveyed/ landform area x 100)	Number of sites	Number of artefacts or features
Foreshore	41,500	2.0%	50%	415m <sup>2</sup>	1.0%	None seen	None seen
Dunes and slopes	214,000	2.0%	50%	2,140m <sup>2</sup>	1.0%	None seen	None seen

## 5 Archaeological test excavation

In April 2023, Coast obtained an AHIP (#5072) to undertake archaeological test excavations in the location of the proposed Main Loop Path (Element 24 & 115), Whale Loop Path (Element 32), and Dancing Circle (104). No previous subsurface investigations had been undertaken in this area and therefore test excavation was required to confirm the presence/absence, extent and significance of Aboriginal cultural material as the basis for final management recommendations in these areas.

The archaeological test excavation was undertaken between 15 May and 30 May 2023 over a period of 11 working days. The excavation was undertaken in accordance with the methodology outlined in the Coast 2023 ACHAR and the approved AHIP (#5072).<sup>53</sup> The excavation was directed by Paul Irish, Julia McLachlan, and Fenella Atkinson (Coast), and undertaken with Steven Ella (La Perouse LALC), and Dean Wilson, and Gina Basile (Coast). Specialist assistance was provided by Dr Jennifer Menzies (Forensic Anthropologist, Lecturer, University of Sydney).

### 5.1 Aims and methods

#### 5.1.1 Aims

The overall aims of the archaeological test excavation were to ensure that the minimum possible impact will be sustained to any intact *in situ* archaeological remains from the Main Loop Path (Element 24 & 115), Whale Loop Path (Element 32), and Dancing Circle (104). The test excavation was guided by the following broad research questions:

- To determine the lateral extent and depth below current surface of any *in situ* Aboriginal archaeological remains within areas proposed for impact.
- To identify any further archaeological requirements (e.g. methods of avoiding further impacts, possible salvage of disturbed material, monitoring).
- To gain a better understanding of how Aboriginal people used the area through observations during excavation and analysis of any retrieved stone, bone and shell tools and faunal remains.
- To understand how long Aboriginal people have used the land by obtaining, where possible, samples for radiometric dating.

By defining the extent of any Aboriginal cultural material across the site, the heritage impacts of the proposed development can be clearly defined and assist in determining final mitigation and management strategies.

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<sup>53</sup> Coast 2023

### 5.1.2 Field methods

The following methodology was guided by previously successful methodologies applied to investigations for similar proposed works constricted to shallow/confined depths (paths, lookouts, etc) in 2007 as part of previous park works.<sup>54</sup>

The alignment of the main loop path, whale loop path and dance circle were initially staked out on the ground surface by a surveyor engaged by NPWS. Following this, an initial series of 50cm x 25cm shovel probes ('probes') were manually excavated at 10-20m intervals along this alignment. The probes were excavated in arbitrary 10cm spits to the depth of potential direct or indirect (e.g. compaction) impacts or to sandstone bedrock or archaeologically sterile deposits, whatever was shallower. Further probes were excavated between initial probes to provide greater testing resolution. In some locations where midden was encountered, the probes were expanded to 50cm x 50cm manually excavated pits to confirm the integrity and depth of these remains and further explore the nature of the soil deposits in which they were found. These larger pits were also excavated in 10cm spits.

Due to the documented presence of midden around the flagpole area, two possible path alignments were investigated to the north of the flagpole to provide options in the event that *in situ* archaeological remains were encountered. As further discussed below, during the excavations the discovery of Aboriginal ancestral human along one of these alignments led to the abandonment of that alignment and the definition of a third alignment, along which further shovel probes were excavated (as shown in **Figure 61**).

All manually excavated sediment was dry or wet sieved onsite through nested 5mm and 3mm sieves. All Aboriginal cultural material identified in the field was bagged and labelled according to provenance and stored in a temporary storage location as per Condition 10 & 11 of AHIP No. 5072.

A record of the excavation was made through photographs, photographic logs, recording sheets and survey data (see **Appendix 3**). All uncovered and excavated features were recorded using Differential GPS with cm accuracy.<sup>55</sup> Additionally, samples for radiocarbon dating were taken.

Where compact/dense midden deposit was encountered during the course of the test excavation program, potential construction impacts were discussed directly with NPWS. Where direct or indirect impacts could be avoided, excavation into the midden was not required. The location and depth of the midden was recorded to guide any necessary amendments to the design of features in these areas to avoid impact. As noted, an additional route was adopted to avoid impact and this was subsequently tested in accordance with the above methodology.

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<sup>54</sup> Irish 2007

<sup>55</sup> Recorded in MGA2020 Zone 56



Access. Each catalogue entry was assigned a catalogue number and this number was written on the respective zip-locked bag and a Tyvek label was placed within each bag. Photographs were taken of selected stone artefacts to record a representative sample. Any stone objects with potential for use wear or residue analysis were noted in the database for further analysis.

The full method of analysis for the stone objects is documented in **Appendix 5**. In summary, it included:

- **Lithic material:** the type of rock, if known, and the amount of cortex present
- **Size and weight:** including maximum size, orientated length, width and thickness.
- **Type:** summarises the reduction and breakage of stone. The identification of flakes, proximal broken flakes, and flake fragments.
- **Category:** summarises the modification or grouped objects of a particular type.
- **Shape:** weather the object is wider than long, longer than wide, equally long as wide, or twice as long as wide.
- **Platform type:** plain, cortex, ridged, scarred, faceted, focal, part crushed.
- **Termination type:** including feather, hinge, step and plunging.
- **Cores:** additional information recorded including whether they were unifacial, bifacial, asymmetric or bipolar.

### Shell analysis methods

The shell was first sorted by species for each excavated context and subjected to the quantitative measurements below. The 3mm sieve residue (consisting of small shell fragments and a mix of charcoal, pumice, rhodoliths, and in some cases historical materials) was weighed and examined to remove bone or stone artefacts but was not sorted. The 5mm sieve fraction was found to be highly fragmented and only about 85% could be identified to species level, or in some cases to family level.

The measurements and counts recorded for the shell samples from each species per excavation unit were; total weight, total weight of fragments, minimum number of individuals (MNI), presence/absence of burnt shell, presence/absence of modified shell, and the total weight of unidentified shell fragments for unit. The assumptions and points of measurement for these are described below:

- **Total weight of shell:** This measurement was the total of all shell from one species per excavation unit to the nearest gram.
- **Total weight of fragments:** The aim of this (subjective) measurement was to provide an approximate indication of the level of fragmentation of each shell species per excavation unit for rough comparisons between units and with comparable data from other sites. All shell fragments from each species which did not constitute more than about 80% of a whole shell (or for bivalves a whole valve) were weighed as fragments. In some cases, the diagnostic portion of shell used for MNI counts was not itself 'whole' and was thus weighed with the fragments. Measurements were to the nearest gram. This information can help to establish post-depositional disturbance.



- **Minimum number of individuals (MNI):** This measurement gives an indication (usually very approximate and minimal) of the number of individual shellfish present in an assemblage and is based on the presence of certain identifying points from each shellfish species. Usually this is either the apex/peak (top of the spiral) or the aperture (opening) for gastropods and the hinge from one valve of a bivalve. In highly fragmented assemblages such as this, it is not a reliable indicator of relative quantities, due to the highly differential rates of fragmentation of different species (leading to over/under-representation of some species), and where significant numbers of small and inedible shellfish are present. However, it can be used together with total weights to more accurately reveal or confirm observed trends in shell species distribution.

For the current shell assemblage, several different identifying points were used. For most gastropods, the aperture was used as this was more often preserved. In the case of Turban (*Ninella torquata*) and Small Turban (*Subninella undulata*), opercula were counted in addition to shell apertures and the greater number used. For all bivalves the number of hinges was counted and divided by two (thus 7 hinges implied 4 individuals). Although this produces a slightly inflated total when spit totals are added together, it is offset by at least an equal number of hinges being fragmented and thus not counted.

- **Presence/absence of burnt shell:** This was included to investigate any evidence of burning which may indicate preparation of shellfish for consumption or use as bait.
- **Presence/absence of modified shell:** The shell may be modified for use as an artefact or as part of food preparation. If present more detailed descriptions were given. Point of measurement were as per those outlined in the nearby 2008 Cooks Stream archaeological salvage excavations as reproduced in **Appendix 6.4**.<sup>56</sup>

### Non-human bone analysis methods

The bone was first identified into classes: fish, mammal, bird, reptile and unidentified taxon. All anatomical elements of mammal, bird and reptile that could be identified were recorded. The main anatomical elements recorded per fish species were as follows:

*Chrysophrys auratus* (Snapper) - frontals & premaxillae

*Acanthopagrus australis* (Bream) – premaxillae

Monacanthidae (Leatherjackets) – dorsal spine

Plotosidae (catfish) – pectoral & dorsal spines as well as dentaries

All Labridae (wrasses, Blue Groper & odacids) – pharyngeal bones as well as mandibles

Diodontidae (portcupinefish) – dermal spines and mandibles

Carangidae (trevallies) – mandibles and scutes

Elasmobranchii (sharks and rays) – teeth & spines

All other fish species – mandibles

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<sup>56</sup> Irish 2010. pp.63-66, 76 and Appendix 7.

Additionally, the quadrates, hyomandibulars, articulars and otoliths were identified where possible. These were recorded with measurements when they could add additional information about the fish species in the midden including size and MNI (minimum number of individuals), otherwise their presence was merely noted in the comments. With some exceptions attempts were mostly not made to identify the maxillae due to the level of fragmentation. A range of other diagnostic elements of less commonly occurring species were also looked out for (eg ultimate vertebra of Flounder, opercular process of Mullet). Any remains with unusual/distinctive morphology were also recorded/photographed.

The accuracy and completeness of the data is reliant especially on reference collections available. The mammal and bird bone was compared to range of mammal and shearwater specimens at the Australian Museum (with thanks given to Sandy Ingleby and Leah Tsang). Photographs taken of a range of mammal, bird, reptile and shark specimens in the collection at the Department of Biological Sciences Museum, Macquarie University, were also referred to.

Fish identifications were based on comparisons with my own collection of disarticulated fish skeletons (35 species - prepared by myself and Len Dyll), and photographs taken in 2013 at the Australian National University Fish collection of mostly the fish mandibles but also some other elements (91 species), and photographs taken at the Australian Museum (4 species). Numerous publications and other web resources were also utilised, those consulted extensively or relied upon for identifications are listed in the references.

The size data is given in millimetres. The measurements of the fish mandibles followed Foss Leach's measurements.<sup>57</sup> The measurements recorded in the spreadsheet are premaxilla length, dentary height, Labridae pharyngeals' total width (recorded in the size column) and tooth plate width (recorded in the comments column), *Chrysophrys*/Snapper frontal width following Owen and Merrick 1994, Monacanthidae dorsal spine width taken just below the process and Plotosidae dorsal spine process width, pectoral spine length of process dorsal articulating surface and the length of the dentary symphysis. An additional measurement – the maximum width of the corpus premaxilla measured at right angles to the lateral ventral edge of the bone – was taken for *Acanthopagrus* (Bream) where possible because of the inherent variability in the shape or proportions of their premaxillae. For all other elements, the dimensions measured are described in the comments column of the spreadsheet.

The '**size**' category shows the actual measurement of the dimension measured whether or not that part of the element is broken. The '**estimated size**' gives an estimate for the size of the complete element or gives the actual measurement if the bone is not broken. The '**complete**' column gives an indicator as to how robust the estimate is likely to be. **Yes** is a complete bone or an estimate robust enough to use for size data analysis. **No** is where a very rough estimate is given. In some cases I have given an error range  $\pm$ xmm that the complete measurement is likely to fall within. The degree of fragmentation is not always a measure of the reliability of the estimate - a robust estimate may be yielded from a small fragment if the size of the element is comparable to another specimen in the

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<sup>57</sup> Leach et al 1995, 1997.

assemblage or in my reference collection, while how confidently a Bream premaxilla can be estimated would depend on which part of the bone is present. The description of the part of the element present is given in the **portion** category and amongst other things is useful for calculating MNIs.

The fish data recorded included the numbers of **vertebrae** centrums, fish spines – mostly based on the numbers of articulating processes, pterygiophores (the internal spine-like structures connected to the spines and rays), rays and ribs. These were recorded to allow comparison of the different parts of the fish present across or between sites and contexts. These were recorded after noticing significant differences in anatomical element representation at a different Sydney site and context. Potential reasons for varying element ratios could include utilisation of particular elements, different values or significance placed on different portions of the fish or may be a function of particular taphonomic processes.

Minimum number of individuals (MNIs) were counted per test pit. For each species counts were based on the greatest number of any one anatomical element from either the left or right side (if relevant). The size data was then compared with any other bones of the species in the test pit and if a bone clearly belonged to a different size individual to the ones counted, then it was added to the MNI count.

The Standard lengths (SL) of the Snapper were estimated from the measurements of the bones used to count the MNIs. In the large assemblages only the frontal bones are used as these have been the most numerous however in this assemblage various anatomical elements were counted. The standard length estimates from the frontal bones were also calculated to check against the MNI dataset in case they produced different graphs or plots, but they were near identical.

SL estimates derived from the frontal widths and premaxilla and dentary lengths were calculated using linear fit equations from Owen and Merrick (1994). Estimates from the maxilla and articular lengths used a power curve fit equation with a further linear regression conversion from fork length to SL using Leach and Boocock's (1995) New Zealand data. Neither of these is perfect. The New Zealand dataset is derived from a genetically and geographically distinct population than those in Kamay so it is unclear how different the anatomical element size to SL ratios would be. Owen et al's study is based on a small sample (42) of Snapper ranging between 13cm and 48cm SL. It has larger standard errors (roughly  $\pm 4.2$ cm for frontals,  $\pm 5.5$ cm for premaxillae and or  $\pm 6.2$ cm for dentaries) than Leach and Boocock's equations and it doesn't necessarily encapsulate the largest size fish in the middens. Additional error is introduced where the size of bone from the midden has been estimated. As such the Snapper SL datasets can only be used as a rough indicator of the sizes or relative sizes of the fish that were caught.

### **Radiometric dating**

Three samples were taken on site for radiometric dating (see **Section 5.2.2** for results). One sample of Mud Oyster shell (*Ostrea angasi*) was collected for C14 dating from Spit 3 of TP27 (sample #01). Two samples from Spit 4 of TP38 were also taken including one sample of Triton shell (*Cabestana*

*spengleri*) (sample #02) and turban shell (*Ninella torquata*) (sample #03). These samples were sent to the University of NSW CHRONOS <sup>14</sup>Carbon cycle facility.

### Other finds

Other finds present during the excavation and analysis includes historical material and natural accumulation of material such as pumice and charcoal. Other finds were noted during shell and faunal analysis, this largely consisted of charcoal, pumice, gravels, construction debris, sandstone fragments, ceramic and glass.

## 5.2 Results

A total of 41 probes were completed as part of the test excavation program, two of which were expanded into 50 x 50 cm pits. The details of each location are summarised in **Table 12** and the locations are shown in **Figure 61**.

**Table 12. Summary of results for each shovel probe**

Test Pit	Easting	Northing	Surface level (m AHD) <sup>58</sup>	TP dimensions	Depth of excavation (mm)	Shell	Stone artefacts
						Frequent (F), sparse (S), no (N)	
TP1	335819	6236068	9.70	50 x 25cm	400	N	N
TP2	335801	6236078	8.64	50 x 25cm	280	N	N
TP3	335789	6236092	7.68	50 x 25cm	300	N	N
TP4	335793	6236110	6.97	50 x 25cm	400	N	N
TP5	335797	6236130	6.30	50 x 25cm	450	N	N
TP6	335796	6236149	5.66	50 x 25cm	290	N	N
TP7	335801	6236168	5.21	50 x 25cm	500	S	S
TP8	335792	6236183	5.03	50 x 25cm	500	S	S
TP9	335773	6236179	4.92	50 x 25cm	500	S	S
TP10	335758	6236167	5.33	50 x 25cm	500	S	S
TP11	See Section 5.2.3		5.43	50 x 25cm	500	F (midden)	Not analysed
TP12	335722	6236151	5.65	50 x 25cm	220	N	N
TP13	335706	6236138	5.43	50 x 25cm	500	S	N
TP14	335722	6236141	6.76	50 x 25cm	500	N	S
TP15	335739	6236150	7.25	50 x 25cm	500	S	F
TP16	335757	6236159	6.15	50 x 25cm	260	F (midden)	F
TP17	335771	6236172	5.28	50 x 25cm	500	S	N
TP18	335765	6236184	5.28	50 x 25cm	290	S	S
TP19	335777	6236197	2.64	50 x 25cm	500	S	N

<sup>58</sup> N.B. Height datum (AHD) taken in the centre each test pit.

Test Pit	Easting	Northing	Surface level (m AHD) <sup>58</sup>	TP dimensions	Depth of excavation (mm)	Shell	Stone artefacts
						Frequent (F), sparse (S), no (N)	
TP20	335785	6236214	1.87	50 x 25cm	500	F (midden)	S
TP21	335794	6236174	5.61	50 x 25cm	500	S	N
TP22	335789	6236172	5.66	50 x 25cm	500	N	N
TP23	335802	6236219	2.14	50 x 25cm	500	N	N
TP24	335820	6236224	2.36	50 x 25cm	500	F (midden)	N
TP25	335810	6236226	2.17	50 x 25cm	500	F (midden)	N
TP26	335837	6236223	2.13	50 x 25cm	300	N	N
TP27	335793	6236217	2.36	50 x 25cm	400	F (midden)	S
TP28	335781	6236203	2.61	50 x 50cm	500	F (midden)	S
TP29	335783	6236184	5.18	50 x 25cm	500	S	S
TP30	335762	6236165	5.97	50 x 25cm	500	N	S
TP31	335744	6236158	6.42	50 x 25cm	550	S	F
TP32	335734	6236154	6.44	50 x 25cm	500	S	F
TP33	335726	6236149	6.39	50 x 25cm	500	S	F
TP34	335717	6236143	6.05	50 x 25cm	500	N	S
TP35	335731	6236145	7.37	50 x 25cm	330	F (midden)	F
TP36	335747	6236156	6.98	50 x 25cm	500	S	F
TP37	335766	6236163	6.12	50 x 25cm	500	S	N
TP38	335753	6236162	6.12	50 x 50cm	700 <sup>59</sup>	F (midden)	F
TP39	335714	6236138	6.25	50 x 25cm	450	N	N
TP40	335846	6236186	5.20	50 x 25cm	500	N	N
TP41	335831	6236209	2.94	50 x 25cm	200	N	N

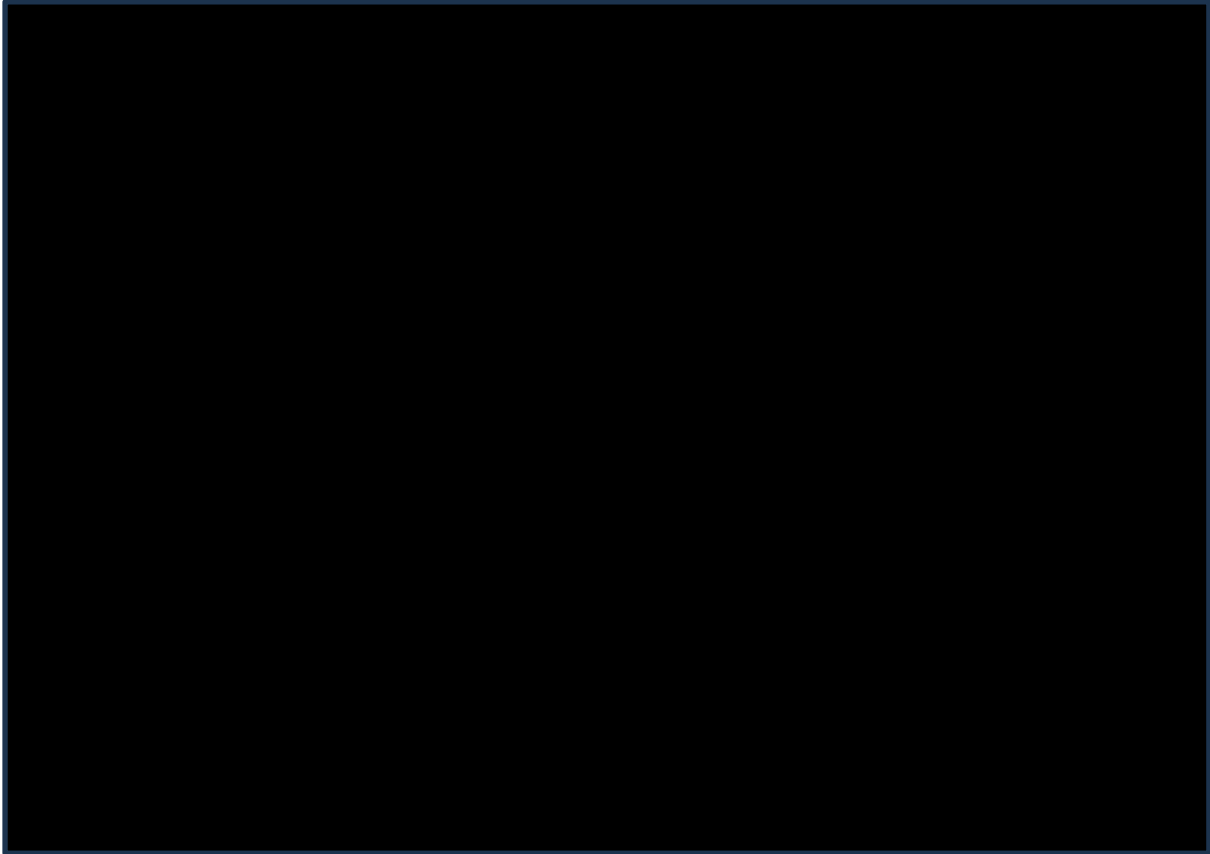
### 5.2.1 Extent of Aboriginal cultural heritage

Based on the results of the test excavation, the investigated portion of the property can be divided broadly into three areas: an upper area of midden, a lower area of midden and other pits with little or no Aboriginal archaeological remains. These are summarised below and shown in **Figure 62**.

Essentially the Lower Midden is lower in elevation and below a sandstone shelf (between TP29 and TP19), around 1,000 years younger in age and contains almost all of the excavated shell but few stone artefacts. By contrast the Upper Midden is older, contains almost all of the stone artefacts but far less shell than the Lower Midden. It can also be considered an extension of the adjacent

<sup>59</sup> (N.b\_ one corner (25cmx25cm excavated to 800mm)

Foreshore Midden (AHIMS #52-3-0219) to the west. The 'boundaries' of these areas are approximate based on test pit finds only.



**Figure 62. Approximate extent of Upper and Lower Midden areas defined during the test excavation.**

### **Upper Midden (older midden)**

- Consists of test pits TP10, TP 11, TP15, TP16, TP30, TP31, TP32, TP33, TP35, TP36, TP37 and TP38 and is located in the footprint of the proposed path alignments to the immediate north, and downslope of the flagpole (**Figure 63 - Figure 70**). Midden material (shells, faunal remains and many stone artefacts) was identified.
- The soil profile across this area is largely consistent with topsoil and naturally accumulated deposits for the first 20cm before coming down onto the midden lens for depths around 30-37cm in black humic soils, before transitioning to brown sand at the base.
- Due to identified presence of midden, further pits were placed in between the original layout and one pit, TP38, was expanded out to 50 x 50cm.
- TP30, TP33 and TP37, while in the estimated boundary of the upper midden area, likely represent diffuse borders of the midden and contain sparse to no Aboriginal cultural material (**Figure 71**).

- In TP11, the soil profile appeared undisturbed with a midden layer present at around 40cm. When human remains were found at the base of this pit (see **Section 5.2.3**) the pit was backfilled and no further excavation or analysis was undertaken.



**Figure 63. View west along Upper Midden area prior to excavation. Yellow and white stakes marking out alternate route for the proposed work**



**Figure 64. TP11, end of excavation west section, showing thin midden lens**



**Figure 65. TP15, end of excavation, south section**



**Figure 66. TP16, end of excavation, plan view showing scattered shell**



**Figure 67. TP31, end of excavation, plan view**



**Figure 68. TP32, end of excavation, east section**





**Figure 69. TP36, end of excavation, N section**



**Figure 70. TP38, end of excavation, east section, showing midden lens in section**



**Figure 71. TP33, end of excavation, east section**

### Lower Midden (younger midden)

- Test pits, TP20, TP24, TP25, TP27, and TP28, contained midden material along the proposed whale loop path (**Figure 72** - **Figure 77**). Due to the presence of shell, further pits were placed in between the original layout and one pit was expanded out to a 50 x 50cm pit, TP28.
- Due to the location of the Lower Midden in close proximity to the shoreline, the possibility of shell being inwashed was considered. Whilst this likely occurred in some instances, the condition and type of shells and presence of faunal bone and evidence of shell fish hook manufacture confirm that this deposit is *in situ* shell midden. The shell was noted to be fragmented and within black humic soil and occurring to depths of around 40cm before transitioning to dark brown sand.
- While TP23, is located within the estimated boundary of the Lower Midden, it likely represents the diffuse nature of the midden. TP23 had little to no shell and other cultural material present with a sandstone base at 50cm (**Figure 78**).



**Figure 72. View east over proposed track alignment in Lower Midden area prior to excavation**



**Figure 73. TP20, end of excavation, plan view (base of pit), showing shell fragments**



**Figure 74. TP24, end of excavation, west section, showing shell in section**



**Figure 75. TP25, end of excavation, south section, showing lens of shell**



**Figure 76. TP27, end of excavation, showing mud oyster sampled for dating**



**Figure 77. TP28, end of excavation, south section, showing lens of midden**



**Figure 78. TP23, end of excavation, plan view, showing sandstone at base**

### Other areas

- All other test pits outside the Upper and Lower Midden extent contained isolated stone artefacts and/or shell fragments or no Aboriginal cultural material, and no evidence that it was once present.
- Test pits TP1 to TP9, were excavated along the southern end of the proposed main loop path alignment (**Figure 79**). The majority of finds were historical in nature, TP7 came down onto sandstone bedrock at around 300mm and encountered ground water seepage in the lower spits due to heavy rain prior (**Figure 80**). There were no other notable finds within these pits.
- Test pits, TP12-TP14, TP17, TP30, TP33, TP34, TP37, TP39 were located along the proposed path alignments to the north of the flagpole and had little to no finds of note, located predominately on the peripheries of the proposed path alignment.
- TP21 and TP22 were laid out with the proposed footprint of the dance circle. Finds in this area were limited to historic material and very sparse shell fragments.

- TP18 at the western end of the whale path loop came down onto sandstone bedrock at around 300mm (**Figure 81**).
- Along the proposed alignment for the whale loop path, test pits, TP19, TP23, TP26, TP40 and TP41 laid out and consisted of little to no finds.



**Figure 79.** Start of proposed route alignment (TP1) as marked out by white stakes



**Figure 80.** TP1, end of excavation, north section, example of ground water seepage



**Figure 81.** TP18, end of excavation, plan view, showing sandstone bedrock

### 5.2.2 The age of the site

Radiocarbon dating of three shell samples was undertaken to work out how old the midden is. These samples were taken from two of the test pits and were submitted to the Chronos <sup>14</sup>Carbon-Cycle Facility at the University of NSW. The results are detailed in **Appendix 4** and summarised in **Table 13** below.

**Table 13. Radiocarbon age determinations for the midden**

Sample type	Location/ Sample #	UNSW Code	Calibrated age BP <sup>60</sup>	Age error (2 standard deviations)	Calendar year range <sup>61</sup> (95% probability)	Years before 2023 (95% probability)
Mud oyster	TP27 (#01)	UNSW-2273	531	±128	1291 – 1547 CE	475 – 730 years ago
Triton shell	TP38 (#02)	UNSW-2274	1561	±172	217 – 561 CE	1460 – 1800 years ago
Turban shell	TP38 (#03)	UNSW-2275	1657	±170	123 – 463 CE	1560 – 1900 years ago

The results from the dating of shell samples from the Upper and Lower Midden represent two different depositional periods, with the Upper Midden dating to 1460 to 1900 years ago (217 AD - 463 AD) and the Lower Midden dating to around 475 to 730 years ago (1291 AD – 1547 AD). This does not mean Aboriginal people used each midden area throughout these periods, but just that the dated shells were collected and eaten somewhere in each time period. We also don't know whether Aboriginal people stayed here for short visits or long visits and for how many times, but the clear distinction in dates suggests that the Upper and Lower midden areas were used in distinct periods which did not overlap in use.

The date range of the Upper Midden is broadly consistent with the Foreshore Midden (AHIMS #52-3-0219) immediately to the west, of which it is most likely an extension. Archaeological investigations of the adjacent Foreshore Midden to the west have shown that the midden was in use from around 2,000 years ago until after the arrival of Europeans in the late eighteenth century (see further discussion in **Section 5.3**).

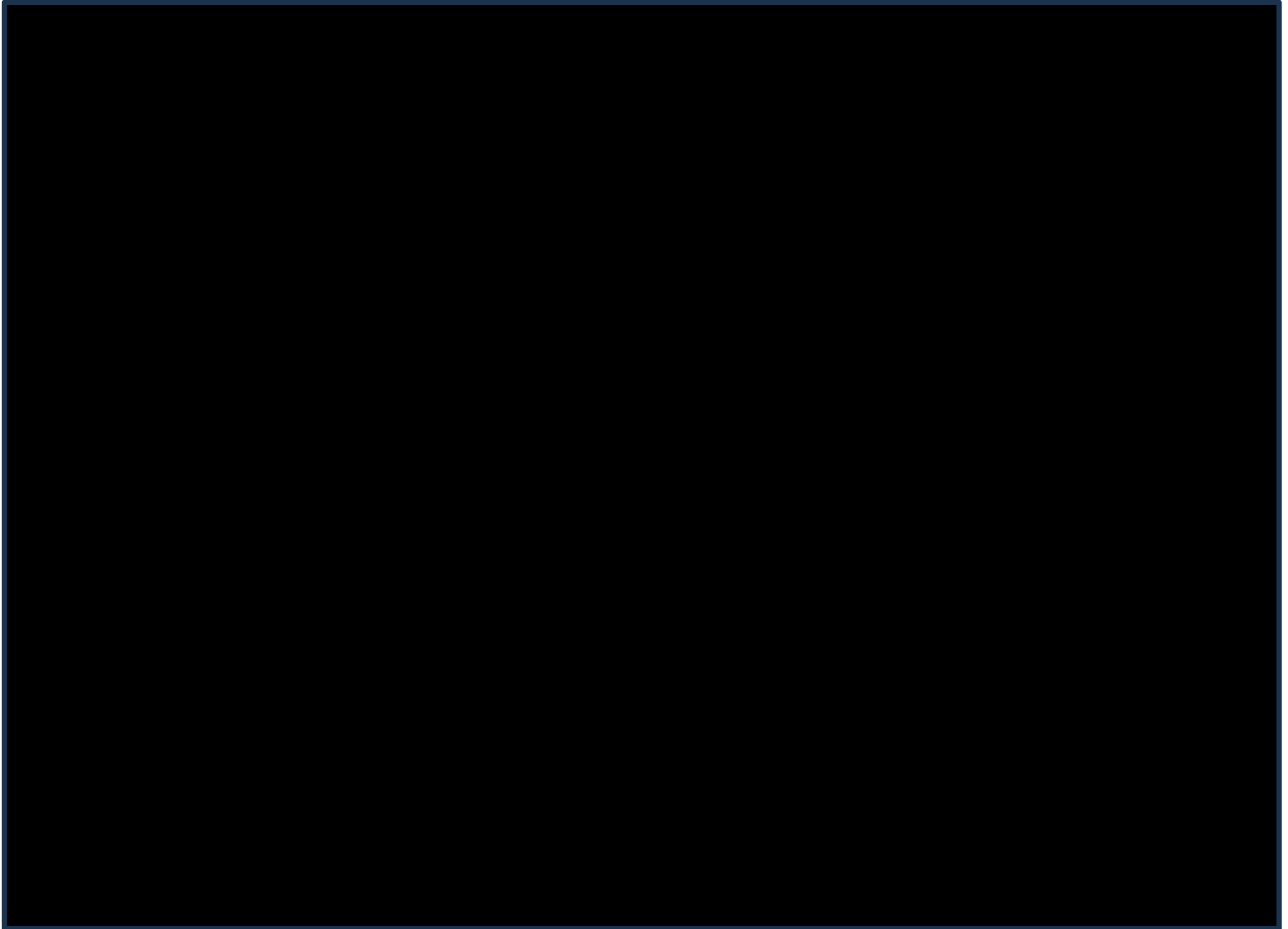
The dating is also consistent with other pieces of information from the site. There is some evidence of shell fish hook manufacture at the site, and these hooks are known to have been used only within the last 1,000 years.<sup>62</sup> This evidence is restricted to the Lower Midden and the radiocarbon dates fall within the known date range of fish hook manufacturing, while there is no definite evidence for the practice in the Upper Midden which dates extend beyond 1,000 years ago (see **Section 5.2.6**).

<sup>60</sup> Marine calibrated age. Before Present (BP) refers to 1950.

<sup>61</sup> Denoted as Common Era (CE)

<sup>62</sup> Attenbrow 2011b.

### 5.2.3 What was found – Aboriginal ancestral remains



### 5.2.4 What was found – shellfish

Around 17.3kg of shell was retrieved during the test excavation from 28 out of the 41 excavated pits.<sup>64</sup> The full shell data can be seen in **Appendix 6**. The majority of the shell (88%) came from six pits along the foreshore (TP20, TP23, TP24, TP5, TP27, TP28), a further 11% from eleven pits in the upper area below the flagpole, and less than 1% from the remaining ten pits. This distribution, supplemented by the findings of the stone artefact and faunal bone analyses, supports the evidence from the radiocarbon dating that there are two spatially distinct clusters of archaeological remains in the test excavation area - the Upper and Lower Midden, with very few finds located in other areas. Looking at **Table 14**, we can see these trends clearly, even adjusting for the total amount excavated in each area.

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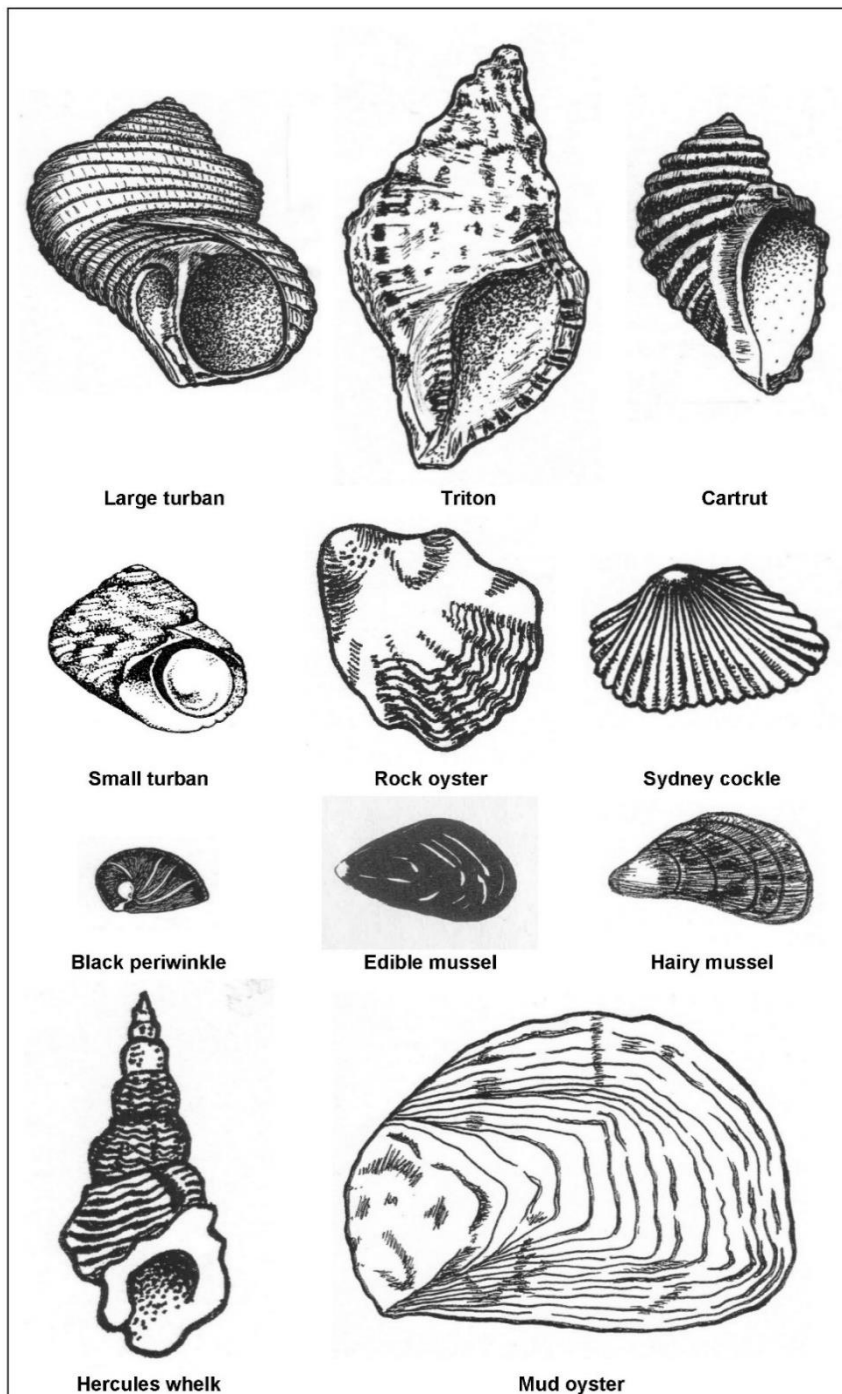
<sup>63</sup> Irish 2023

<sup>64</sup> One of these 28 pits (TP11) contained ancestral remains, and the shell was not analysed and is not further discussed.

**Table 14. Relative shell quantities among the excavated test pits**

Area	# pits	Total Excavated area	Total shell (g)	% total shell	% shell/m <sup>2</sup>
Lower Midden	6	0.875m <sup>2</sup>	15,320	88.4	78.2
Upper Midden	11	1.5m <sup>2</sup>	1,864	10.8	19.0
Other pits	10	1.25m <sup>2</sup>	137	0.8	2.8

**What shellfish were eaten?**



**Figure 82. The most common shellfish species found during the test excavation**

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A wide range of shell species were identified among the shell assemblage as shown in **Table 15**. Most were gathered from the nearby rock platforms, though some such as mud oyster, cockle and scallop come from estuarine environments more than a kilometre further west. A much greater range of species are present in the Lower Midden, however many of the additional species are small shells that are unlikely to have been eaten by Aboriginal people. They were most likely brought to the site attached to other shellfish or among seagrass or other collected materials. Given the close proximity of the lower midden to the shore, they could also have been washed into the midden during the period it was in use.

**Table 15. Identified shellfish species from the test excavation**

Common Name	Scientific Name	Present in			Likely eaten? (y/n)	Environment		
		Upper Midden	Lower Midden	Other pits		Estuary	Rocky shore /reef	Sandy beach
Large Turban	<i>Ninella torquata</i>	x	x	x	y		x	
Small Turban	<i>Subnivalia undulata</i>	x	x	x	y		x	
Rock Oyster	<i>Saccostrea glomerata</i>	x	x	x	y	x	x	
Mud Oyster	<i>Ostrea angasi</i>	x	x		y	x		
Hairy Mussel	<i>Trichomya hirsuta</i>	x	x	x	y	x	x	
Edible Mussel	<i>Mytilus edulis planulatus</i>	x	x		y	x	x	
Black Periwinkle	<i>Nerita atramentosa</i>	x	x	x	y		x	
Triton	<i>Cabestana spengleri</i>	x	x	x	y		x	
Cartrut	<i>Thais orbita</i>	x	x		y		x	
Colourful Limpet	<i>Cellana tramoserica</i>		x	x	y		x	
Scaly Limpet	<i>Patella peronii</i>		x		y		x	
Eight-ray Limpet	<i>Patella chapmani</i>	x	x	x	?		x	
Chiton	<i>Chiton sp.</i>		x		y		x	
Scallop	<i>Pecten fumatus</i>		x		y	x		
Sea urchin	<i>Fam. Echinometridae</i>		x		y		x	
Sydney Cockle	<i>Anadara trapezia</i>	x	x	x	y	x		
	<i>Bembicium nanum</i>		x		y		x	
	<i>Bembicium auratum</i>		x		y	x	x	
	<i>Prothaliota comtessei</i>		x		y	x		x
Pipi	<i>Donax deltooides</i>		x		y			x

Common Name	Scientific Name	Present in			Likely eaten? (y/n)	Environment		
		Upper Midden	Lower Midden	Other pits		Estuary	Rocky shore /reef	Sandy beach
Hercules Whelk	<i>Pyrazus ebeninus</i>	x	x		y	x		
	<i>Veneridae fam.</i>		x		y	x		
	<i>Austrocochlea constricta</i>		x	x	y	x	x	
	<i>Austrocochlea concamarata</i>		x		y	x	x	
	<i>Austrocochlea sp.</i>		x		y	x	x	
Abalone	<i>Haliotis ruber</i>	x	x	x	y		x	
Crab			x		y	x		x
Bell tent shell	<i>Astralium tentoriiforme</i>		x	x	y		x	
	<i>Cuttlefish</i>		x		y			
Rock shell	<i>Cleidothaerus albidus</i>		x		y		x	
	<i>Codakia rugifera</i>		x		y	x		
Elephant Snail	<i>Scutus antipodes</i>	x	x		y		x	
	<i>Clanulus floridus</i>		x	x	n		x	
Barnacle		x	x		n		x	
Oyster borer	<i>Bedevea hanleyi</i>		x		n	x		
Worm tubes			x		n			
	<i>Crepidula aculeata</i>		x		n		x	
	<i>Hiatella australis</i>		x		n		x	
Sand Snail	<i>Fam. Natacidae.</i>		x		n	x		x
	<i>Cardita excavata</i>		x		n		x	
File clam	<i>Lima nimbifer</i>		x		n		x	
	<i>Antisabia foliacea</i>		x		n		x	
	<i>Morula marginalba</i>		x		n		x	
Cone shells	<i>Conidae fam.</i>		x		n		x	
Helmet shells	<i>Cassidae fam.</i>		x		n			x
	<i>Opalia australis</i>		x		n		x	
	<i>Bittium lacertinum</i>		x		n	x		x
	<i>Circe sugillata</i>		x			x		
	<i>Unid'd limpets</i>	x	x	x			x	
	<i>Unid'd shell</i>	x	x	x				

### What were the most common shellfish?

When we analyse shells in a midden, we are ultimately trying to consider the role of molluscs in the diet of Aboriginal people. But since the edible portion is no longer present, we need to consider what their shells actually represent. There are two main ways to determine how much of each species is present with the midden. One is to measure the total amount of weight represented by the various species in each unit and the other is to count the minimum number of individual shellfish per species that are present in each unit. Often a combination of these two measures is helpful to eliminate biases in the other. For example large, heavy shells will dominate by weight, but do they actually represent more food than a higher number of smaller shells? And some species have thin, highly fragmented shells that will be drastically underrepresented by weight, even though the meat weight of the shellfish could be as great as a thicker, heftier shell.

In drawing conclusions from these measures we also need to consider the biases that come from small sample size. This is particularly relevant in the current test excavations. Many test pits contained less than 100g of shell, making comparison of species frequency meaningless (as single large shells can significantly affect these figures). However an examination of the data shows that the range and frequency of the main species does not display a great deal of variation between the pits comprising each of the three areas (lower midden, upper midden, other pits) compared to variation between the areas. For this reason, in the analyses below we focus on comparisons between the three areas, though full data tables for all pits and spits are provided in **Appendix 6.1 and 7.2**.

In **Table 16** is a summary of the weights and minimum number counts for each area for the species in which at least 2% by weight or number were present in the upper or lower midden.<sup>65</sup> To interpret this information, we need to make a couple of allowances. Firstly, while different limpet species are much more frequent by number than weight, many of these individuals were most likely too small to be eaten, as is the case with the tiny but common shellfish *Antisabia foliacea*. Secondly, barnacles were significant by weight but were not counted and also not eaten. If we account for these things, we can see that the weight and number data show similar trends for each species between the areas – those more common by weight in each area are also more frequent. The one clear exception is the black periwinkle (*Nerita atramentosa*), which is small but robust, accounting for its lesser significance by weight than number.

When we adjust for all of those things we can see that the most common shellfish overall are rock platform species as would commonly have been available in close proximity to the midden. Turban shells (large and small) are the most common in both the upper and lower midden, though large turban shells were much more common in the upper midden. Triton and black periwinkle shells are also common in both areas. A notable difference between the areas is that the upper midden contains more Hercules whelk and rock oyster but less mussel (edible and hairy). Hercules whelk is found in mudflats, which were at least a kilometre away to the west. Rock oysters in the upper midden may also have been gathered from mudflats, though are also found on rock platforms. Given

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<sup>65</sup> The 'other' pits were not counted as they included so little weight and minimum numbers.

the age difference between the upper and lower middens, this suggests that mudflats were more frequently visited by Aboriginal people in the early period of use (the upper midden).

**Table 16. Relative frequency of main species by weight and minimum numbers (MNI)**

Table 16. Relative frequency of main species by weight and minimum numbers (MNI)

Species	% Total Weight per area			% Total MNI per area			% Total weight (all pits)	% Total MNI (all pits)
	Lower	Upper	Other	Lower	Upper	Other		
Large Turban	12.4	32.5	20.9	3.4	10.0	9.1	14.7	3.6
Small turban	12.1	1.0	13.8	24.5	4.3	0.0	10.9	24.0
Triton	7.1	27.9	42.4	2.3	25.7	27.3	9.6	2.9
Hairy Mussel	6.4	0.1	0.4	7.7	1.4	0.0	5.7	7.5
Black periwinkle	5.9	0.9	1.2	11.3	18.6	18.2	5.3	11.5
Edible mussel	5.1	0.9	0.0	4.0	1.4	0.0	4.6	3.9
Mud Oyster	3.3	2.8	0.0	0.2	1.4	0.0	3.2	0.2
Bell Tent Shell	2.4	0.0	2.2	2.3	0.0	9.1	2.1	2.3
Hercules Whelk	0.3	14.4	0.0	0.1	21.4	0.0	1.8	0.6
Sydney Rock Oyster	1.0	6.7	3.2	0.6	7.1	18.2	1.6	0.8
Colourful limpet	1.4	0.0	0.2	3.0	0.0	0.0	1.3	2.9
Scaly limpet	1.2	0.0	0.0	13.3	0.0	0.0	1.1	12.9
Sydney Cockle	0.4	2.5	3.5	0.2	7.1	0.0	0.6	0.4
8-rayed Limpet	0.4	0.0	0.1	11.7	1.4	9.1	0.4	11.5
Bembicium nanum	0.2	0.0	0.0	3.3	0.0	0.0	0.2	3.2
<i>Antisabia foliacea</i>	0.2	0.0	0.0	4.0	0.0	0.0	0.1	3.9
Barnacle	15.6	0.1	0.0	Not counted			13.8	0.0
Unid'd and other species	24.7	10.2	12.0	8.2	0.0	9.1	23.1	8.0
<b>TOTAL %</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
<b>TOTAL Weight/MNI</b>	<b>15319g</b>	<b>1864g</b>	<b>137g</b>	<b>N=2911</b>	<b>N=70</b>	<b>N=11</b>	<b>17320g</b>	<b>N=2992</b>

### How were shellfish gathered and eaten?

The excavated portion of the upper and lower middens reveals no direct evidence about where and how shellfish were gathered except what can be inferred from the natural habitat of the shellfish and the known gathering practices amongst Aboriginal people in the Sydney area (as contained in surviving traditional knowledge, and European historical descriptions). Early European visitors to Gamay (Botany Bay) (such as Captain Cook in 1770) described Aboriginal people gathering and consuming shellfish in the mudflats close to the bay shore, and the middens that formed from this practise over the years:

*“On the Sand and Mud banks are Oysters, Muscles, Cockles &c which I believe are the chief support of the inhabitants, who go into shoald water with their little Canoes and pick them out of the sand and Mud with their hands and sometimes roast and eat them in the Canoe”<sup>66</sup>*

*“I landed in two places one of which the people had but just left, as there were small fires and fresh muscles broiling upon them – here likewise lay vast heaps of the largest oyster shells I ever saw.”<sup>67</sup>*

Although shellfish rarely form the major food source amongst Aboriginal people, they are often a regularly gathered food and it is quite common for campsites to be located in proximity to shellbeds or rock platforms. It is quite likely that the only major difference between shell middens and other coastal campsites is the presence of shell due to its location.

Historical and ethnographic evidence suggests that women, children and the elderly would have been largely responsible for the gathering of shellfish. A number of methods were used to gather shellfish from different environments. Sydney rock oysters and Hercules whelks attach to each other or solid objects in the mangrove mud and may have been gathered as individuals or clumps of shell, sometimes attached to roots. Cockles ‘float’ in the mud and were most likely located with sticks and extracted by hand (on foot of from canoes as noted above).

The test excavations at Kamay Botany Bay National Park revealed no direct evidence of methods used to collect and transport shellfish onto the site. However it is likely that shellfish were gathered from rock platforms and mudflats in the manner described above. Transport of shellfish back to the midden may have been by a net bags or bark containers of types known from the Sydney area. No physical evidence of this exists at the site, although Cook observed in Gamay that net bags were taken in canoes to hold gathered foods including shellfish.<sup>68</sup>

Shellfish do not require cooking of any form to be eaten, and often heat is applied to shell merely to make extracting the flesh easier.<sup>69</sup> This is particularly true for bivalves (such as cockles) where a short application of heat relaxes the hinge muscle and opens the shellfish. The absence of heavily burnt shell in most middens (including the current site), suggests that shellfish were not ‘cooked’ for any great length of time. Gastropods such as Hercules whelks are known to have been eaten by Aboriginal people elsewhere in Australia by extracting the flesh through the aperture (opening) with a pin or by breaking the shell open or at the spire (top) and pulling the flesh out, but regular breaks of this nature were not observed in these shells during the test excavations. Several triton shells contained breaks consistent with them being smashed open to extract the shellfish meat (**Figure 83**), however most shells did not contain evidence of such a break (see also **Appendix 6.8**).

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<sup>66</sup> Cook in Beaglehole 1955:312

<sup>67</sup> Cook in Beaglehole 1955:306

<sup>68</sup> Beaglehole 1955:397

<sup>69</sup> e.g. see Meehan 1982:86-9, Isaacs 1997:171-180



Figure 83. Broken/smashed Triton shells from TP20 (left) and TP37 (right) [scale in cm].

### 5.2.5 What was found – animal bones

A total of around one kilogram of animal bone was retrieved during the test excavation from 23 out of the 41 excavated pits.<sup>70</sup> The full shell data can be seen in **Appendix 7**. Like the shell and stone, almost all animal bone was located in the Upper and Lower Midden areas. However unlike shell and stone, which have quite distinct distributions between the Upper and Lower Midden, the animal bones are more evenly distributed between these two areas in terms of total quantities (see **Table 17**). In **Table 18** you can see the range of fish, mammal and bird species identified within the faunal remains retrieved from the site.

Table 17. Relative animal bone quantities among the excavated test pits (weights in g)

Area	Fish	Mammal	Bird/ Reptile	Unid'd Taxa	Total	Fish	Mammal
Lower Midden	447	7	0.2	8	462	97%	2%
Upper Midden	316	151	5	26	498	63%	30%
Other pits	17	0	0	3	20		

<sup>70</sup> One of these 28 pits (TP11) contained ancestral remains, and the animal bone was not analysed and is not further discussed.

### What animals were found?

In **Table 18** you can see the range of fish, mammal and bird species identified within the faunal remains retrieved from the site. Overall, there is around twice as much mammal than fish bone by weight in the Upper Midden and the reverse in the Lower Midden. With the small sample size it is not possible to determine whether this reflects a change in food preference over time towards fish. However the Lower Midden does contain greater diversity in fish species (e.g. Whiting, Kelpfish, Yellowtail, Tailor and Blackfish). As fish scales are only found in the lower midden, this difference in diversity might be explained by preservation factors. These factors may also explain the presence of Horn Shark remains (e.g. Port Jackson Shark) in the Lower Midden only.

**Table 18. Identified animal species from the test excavation**

Common Name	Taxa	Family	Genus-species	Present in		
				Upper Midden	Lower Midden	Other pits
Snapper	Fish	<i>Sparidae</i>	<i>Chrysophrys auratus</i>	x	x	x
Yellowfin Bream	Fish	<i>Sparidae</i>	<i>Acanthopagrus australis</i>	x	x	
Tarwhine	Fish	<i>Sparidae</i>	<i>Rhabdosargus sarba</i>	x		
Blue Groper	Fish	<i>Labridae</i>	<i>Achoerodus viridis</i>	x	x	x
Wrasses (excl. Blue Groper & Odacids)	Fish	<i>Labridae</i>		x	x	
Morwongs	Fish	<i>Latridae</i>	<i>Morwong/Goniistius/Latridopsis</i>	x	x	
Leatherjackets	Fish	<i>Monacanthidae</i>		x	x	
Flatheads	Fish	<i>Platycephalidae</i>		x	x	
Catfishes	Fish	<i>Plotosidae</i>		x	x	
Australian Salmon	Fish	<i>Arripidae</i>	<i>Arripis trutta (A georgianus less likely)</i>		x	
Sergeant Baker	Fish	<i>Aulopidae</i>	<i>Latropiscis purpurissatus</i>		x	
Trevallies	Fish	<i>Carangidae</i>			x	
Silver Trevally	Fish	<i>Carangidae</i>	<i>Pseudocaranx georgianus</i>		x	
Yellowtail etc	Fish	<i>Carangidae</i>	<i>Trachurus</i>		x	
Rock Blackfish	Fish	<i>Kyphosidae</i>	<i>Girella elevata</i>		x	
Kelpfish	Fish	<i>Chironemidae</i>	<i>Chironemus marmoratus</i>		x	
Porcupine Fishes	Fish	<i>Diodontidae</i>		x	x	
Mullet	Fish	<i>Mugilidae</i>			x	
White Ear, Parma	Fish	<i>Pomacentridae</i>			x	
Tailor	Fish	<i>Pomatomidae</i>	<i>Pomatomus saltatrix</i>		x	
Teraglin	Fish	<i>Scianidae</i>	<i>Atractoscion atelodus</i>		x	
Whittings	Fish	<i>Sillaginidae</i>	<i>Sillago sp</i>		x	

Common Name	Taxa	Family	Genus-species	Present in		
				Upper Midden	Lower Midden	Other pits
Wirrah	Fish	<i>Serranidae</i>	<i>Acanthistius sp</i>		x	
Stingrays	Fish	<i>Myliobatiformes</i>			x	
Hornshark	Fish	<i>Heterodontidae</i>	<i>Heterodontus sp</i>		x	
Shark	Fish	<i>Super order Selachimorpha</i>			x	
Bandicoots	Mammal	<i>Peramelidae</i>			x	
Brush-tail possum	Mammal		<i>Trichosurus vulpecula</i>	x		
Kangaroos, Wallabies	Mammal	<i>Macropodinae</i>		x		
Rat species	Mammal		<i>Rattus sp</i>	x		
European rabbit	Mammal		<i>Oryctolagus cuniculus</i>		x	
Shearwater	Bird	<i>Procellariidae</i>		x		
Shearwater	Bird	<i>Procellariidae</i>	<i>Ardenna sp</i>		x	
Snake	Reptile	<i>Ophidia</i>		x		

### Assemblage comparisons

Part of the significance of the vertebrate faunal component of the midden as can be seen in the current analysis not only relates to the animal remains that were found in one place (and the conclusions that can be drawn - what animals were being consumed there, how were animal resources utilised etc) but there are very interesting questions that can be addressed by looking at the relationship of the assemblages across the site and through time. Thus the test excavation assemblage is throughout compared to the extensive areas of the Foreshore Midden excavated in 1968 and 1970-71 by Vincent Megaw (hereafter referred to by its site code **BB/-**), and the redeposited midden used to dam the freshwater stream which was re-opened in 2008 here referred to as **MPP**.<sup>71</sup>

### How the dated layers relate to the **BB/-** foreshore midden and rockshelter

The Lower Midden date from the current test excavation corresponds roughly to the base of the BB4 upper midden layer or the top of the BB4 mud oyster midden layer, located about 100m further west along the foreshore. In the BB4 excavations, fish-hooks and stone files started appearing in the mud oyster layer (around 115 cm depth or 65cm from the top of the midden in Trench F) and were in large numbers in the upper midden. They were found in the dense black shelly layer comprising the top 15cm in Trench A further up the slope (see **Figure 22**). Stone files were in levels 2 to 4 of BB3

<sup>71</sup> Irish 2010.



on the west side of the freshwater stream and both stone files and fishhooks were within the top 21 inches of deposit in the BB1 rockshelter.

Despite its closer proximity to the Foreshore Midden, it is more difficult to match the Upper Midden from the current test excavation to the dated levels of the BB4 Trench F midden as there is some guesswork involved matching the BB4 dates to the BB4 stratigraphic levels. The current Upper Midden might correspond to the basal dark grey sand at around 200cm depth at the south corner of BB4 and 150-170cm depth at the seaward end. It is clearly part of the lowest ie oldest midden layers on the foreshore with the oldest dated to 1850 to 2000 years ago.<sup>72</sup> The Kamay Upper Midden is older than the midden in the BB4 A and B trenches.<sup>73</sup> The faunal assemblage is thus compared to the lowest BB4 foreshore layers and loosely compared with the lowest layers of BB3 (which hasn't been dated) and BB1 rockshelter midden which is probably at least as old as the Upper Midden from the current test excavation.

### **The environment**

The assemblage as a whole is similar to other areas of the Foreshore Midden which is characterised by a striking diversity of fish, mammal and reptile species. While there are also different bird species, the vast majority of bird bone is Shearwater - especially of *Ardena* genus; aside from a penguin bone, the remainder has not yet been identified and thus the range of bird species is to date unknown.

Kamay (Botany Bay) is a marine dominated system with both marine fauna and estuarine species present. The fish fauna within the bay is extremely rich due to a diversity of habitat types including areas suitable for juvenile recruitment of many of the species identified in the midden.<sup>74</sup> The diversity of the species at the entrance of the bay can also be attributed to the highly productive and interconnected rocky reef ecosystems that support a broad range of biota which varies with depth including kelp, sponges, algae and associated microbes and invertebrates etc. Such habitat provides shelter and food to many of the fish species. The boulders around Inscription Point are also important in providing protection for multiple species. Just off Inscription Point the water depth drops dramatically to around 20 metres below sea level where there is an offshore subtidal reef.<sup>75</sup>

Within a few hundred metres of the shoreline closest to the excavated pits, there would have been shallow rocky reefs and likely expansive *Posidonia australis* seagrass beds.<sup>76</sup> There may also have been areas of sandy substrate, such as where the seafloor deepened towards the bay's entrance and perhaps also around the freshwater stream.<sup>77</sup>

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<sup>72</sup> ANSTO 2011.

<sup>73</sup> Polach 1971.

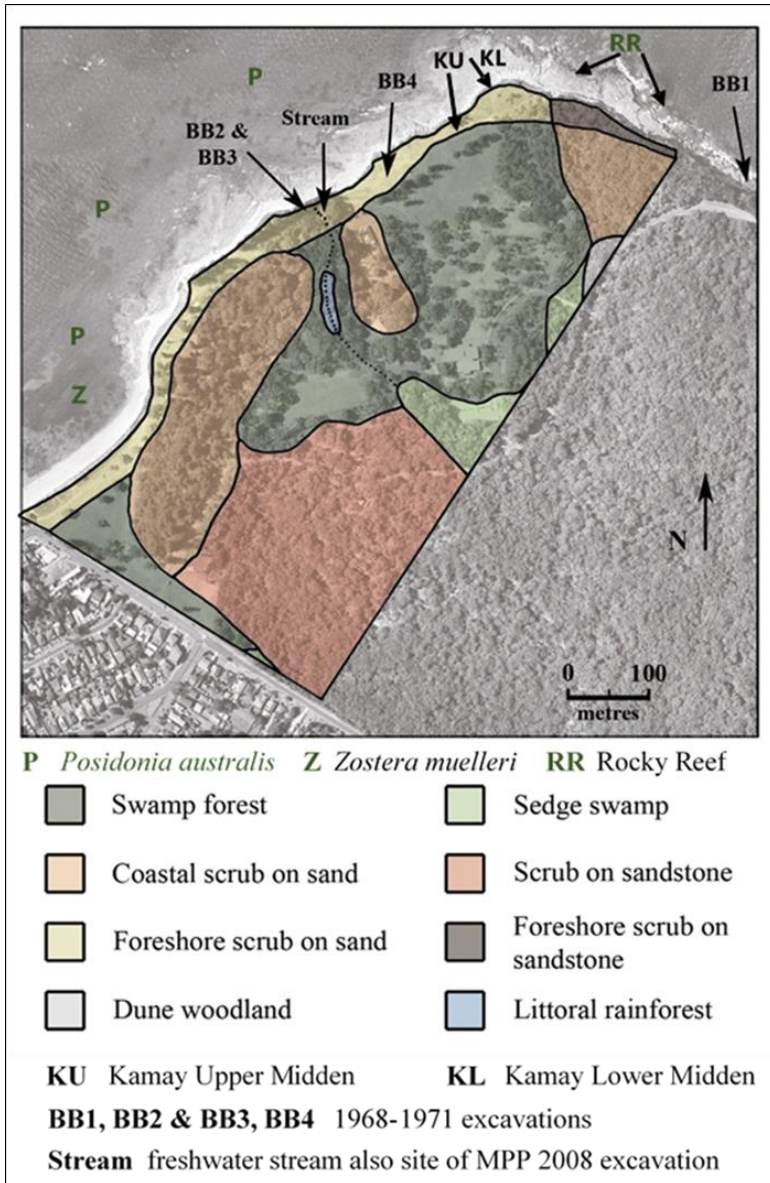
<sup>74</sup> Larkum & West 1990, NPCC 1981.

<sup>75</sup> NPCC 1981. Stelling-Wood *et al* 2023.

<sup>76</sup> Larkum and West 1990.

<sup>77</sup> Larkum and West 1990; ALA accessed 2023.

The rich terrestrial fauna reflected a similarly diverse environment comprising the nearby freshwater stream and associated littoral rainforest, the scrub that grew along the foreshore, the swamp forest and sedge swamp that would have existed above the foreshore to the south and the dune forest to the southeast (**Figure 84**).



**Figure 84. Surmised plant community types in 1770 by Benson and Eldershaw (2007). Position of seagrass cover based on information from Larkum and West 1990 and Middleton et al 1984.**

As with other areas of the Foreshore Midden and Inscription Point rockshelter, fish bone was the most common class by number of bone fragments, by weight and by the minimum number of individual animals identified (MNI). By weight, fish made up 82% of the identified bone, mammal 17%, bird 0.5% and reptile 0.1%.

**Fish**

The fish species identified and their minimum numbers can be seen in

**Table 19.** The table also sets out the habitat types in the area of the bay closest to the test pits and identifies where there's a fish to habitat association (be it residential or visited to forage etc). All but one of the fish taxa are rocky reef associated and/or utilise the *Posidonia* seagrass beds, and thus all could potentially have been caught close to the site in which they were consumed. The whiting could also have been taken from areas of nearby soft sediment (a Sand Whiting was recorded in 2021 on ALA at the outlet of the freshwater stream.) Sand whiting is also associated with *Zostera* beds which have been recorded approximately 600 metres from the site.<sup>78</sup> Many of these species such as whiting, mullet and flathead could also have been caught further away such as around the mangroves and the mudflats (where the whelks were collected).

The species identified is comparable to the BB/- and MPP assemblages (Irish 2010). The only species notably absent from the current test excavation assemblage is Mulloway (*Argyrosomus japonicus*) which was identified in all areas of the BB/- and MPP middens. Rockcods (*Epinephelus* sp) were also found in most areas but their numbers weren't large and their absence from the current assemblage is likely more related to the small sample size.

There were a surprising number of whiting bones: a maxilla and premaxilla fragment from TP20 Spit 4 and 5, a quadrate from TP28A Spit 3 and a premaxilla from TP27 Spit 2. The last one was in a spit with rabbit bones and a small number of fish bones so it is unclear whether it was part of the midden or a more recent or mixed deposit. Because of the quantity of shell in the spit, the whiting has been included with the MNI count as it may have been from the top of the midden but the whole spit was left out of the weights table so as to avoid skewing the data. There were twelve whiting otoliths identified from the redeposited midden in the stream,<sup>79</sup> so it is known that they were caught and consumed on the site, however few if any bones were identified from the BB/- midden (only sciaenid otoliths had been retained) and so it was assumed their absence was due low preservation of their friable bones. This is in part true but most identifications in BB/- were limited to the mandibles because the assemblages were so large. The identifications from the current test pits might be an indication that Whiting are more prevalent than so far recognised and selecting a broader range of elements for identification of fish with small mandibles and more friable bone might produce a more accurate representation of the assemblage.

The other taxa not identified on the foreshore is a shark species (tentatively identified to Wobbegong but requires further investigation) which was found in two test pits of the Lower Midden and one in the Upper Midden. Until now Hornshark was the only shark genus identified in any number but the test excavation assemblage indicates there may have been other shark species caught.

As with other parts of the Foreshore Midden, Snapper was by far the most common species identified. There were 41 MNIs making up 31% of fish MNIs. By weight the proportion of Snapper is likely to be larger with some fairly large size individuals that are represented by numerous large bones. It is possible that the relative abundance of Snapper in the midden is a little inflated as

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<sup>78</sup> Larkum and West 1990.

<sup>79</sup> Irish 2010.

Snapper bones are more durable than other species (such as mullets and scads), yet, Snapper is one of the most abundant fish in Kamay;<sup>80</sup> their large numbers were also observed in 1788.<sup>81</sup> Snapper is also the most commonly identified large fish in the midden and so it is likely to have been of particular dietary and cultural importance.

**Table 19. Fish species and minimum numbers in the Upper and Lower Midden.**

[R = rocky reef, P = Posidonia seagrass, S = soft sediment]

Common name	Genus/family/species	Lower Midden		Upper Midden		R	P	S
Snapper	<i>Chrysophrys auratus</i>	25	31%	16	31%	X	X	X
Bream	<i>Acanthopagrus australis</i>	7	9%	9	17%	X	X	X
Tarwhine	<i>Rhabdosargus sarba</i>			1	2%	X		X
Blue Groper	<i>Achoerodus viridis</i>	3	4%	6	12%	X		
wrasse	Fam. Labridae	2	2%	3	6%	X		
morwong	Fam. Latridae	4	5%	1	2%	X		
leatherjacket	Fam. Monacanthidae	5	6%	5	10%	X	X	
flathead	Fam. Platycephalidae	3	4%	1	2%		X	X
eeltail catfish	fam. Plotosidae	6	7%	8	15%	X	X	X
Australian Salmon	<i>Arripis trutta</i>	1	1%			X	X	X
Sergeant Baker	<i>Latropiscis purpurissatus</i>	1	1%			x		x
trevally	Fam. Carangidae	2	5%			X		
Silver Trevally	<i>Pseudocaranx georgianus</i>	1				X		
Yellowtail, Scads	<i>Trachurus</i>	1				X		
Rock Blackfish	<i>Girella elevata</i>	3	4%			X		
Kelpfish	<i>Chironemus marmoratus</i>	1	1%			X		
porcupine fish	Fam. Diodontidae	3	4%	1	2%	X	X	X
mullet	Fam. Mugilidae	1	1%			X	X	X
Tailor	<i>Pomatomus saltatrix</i>	1	1%				X	X
Teraglin	<i>Atractoscion atelodus</i>	1	1%			X		
whiting	Fam. Sillaginidae	3	4%					X
Wirrah	<i>Acanthistius sp</i>	2	2%			X		X
stingray	O. Myliobatiformes	1	1%			X		X
hornshark	<i>Heterodontus sp</i>	1	1%			X		X
shark	SO.Selachimorpha	2	2%	1	2%	n/a	n/a	n/a
damsel fish??	Fam. Pomacentridae	1	1%			X		
<b>Total</b>		<b>81</b>	<b>100%</b>	<b>52</b>	<b>100%</b>			

<sup>80</sup> Bell 1980, SPCC 1981.

<sup>81</sup> Tench 1998

As the Upper Midden had no evidence of shell fishhook use but the Lower Midden did, it might be anticipated that there would be clear differences between the two faunal assemblages that could be related to the introduction of angling. At the same time fishing continued to be undertaken with multiprong fishing spears (be it in the shoals, from the rocks, thrown from a distance and or from canoes) and that continuity should also be reflected in the fish assemblage.

While there are some quite striking differences in the data between the test pits of the Upper Midden and Lower Midden, determining whether these variances can be related to an introduction of shell fishhook use is less straightforward.

One difference is a considerably greater number of fish species in the Lower Midden than in the Upper Midden with 23 taxonomic identifications compared to 10.

As the shell and bone in the Upper Midden was quite degraded, it is likely that the conditions in the deposit are such that fish species with more friable bones (such as mullet and whiting) are less likely to survive. Thus there would be fewer taxonomic identifications in the Upper Midden than the Lower Midden with a bias towards species with stronger bones.

The identification of a tooth of a hornshark (either Port Jackson or Crested Hornshark) in Spit 3 of TP20 in the Lower Midden is of particular interest. The teeth of these species have only been found in the upper 30cm of the Foreshore Midden in the area of lower elevation closest to the water (with the exception of one higher trench which contained entirely disturbed midden deposit-BB4/E). It is hard to evaluate likely numbers of individuals because of the large numbers of teeth each individual has. This find is further evidence that the Hornshark featured during the more recent period of the midden accumulation with remains present from the eastern most extent of the midden (TP 20) right across to the western side of the freshwater stream (BB3). Curiously Hornshark teeth have not been found in the rockshelter. This is also the case with Porcupinefish and while there is the occasional bone that has been found deep in the midden deposit, the majority of bones have been found in the same levels as the Hornshark, albeit with a slightly different distribution of questionable significance on the foreshore. The appearance of both fish families does not correlate with the earliest period of fishhook use.

Aside from hornshark, mullet, whiting and the tentative identifications of a damselfish, the remaining species only identified in the Lower Midden test pits have all been identified in pre-fishhook levels elsewhere on the foreshore and the rockshelter. In the lowest levels of the BB4 F (southern Squares 1 and 3) midden however, the range of species is restricted to the same species as the Upper Midden from the current test excavation. This is not the case for BB1 and BB3. If BB1 is of the same time frame, it may be that the preservation is better, however this can only be confirmed with further dating. Either way, the larger number of species does not appear to be related to a change in technology. It is possible that the varying proportions of some species or families such as Flatheads are but this can only be assessed on a larger scale.

Snapper Standard lengths

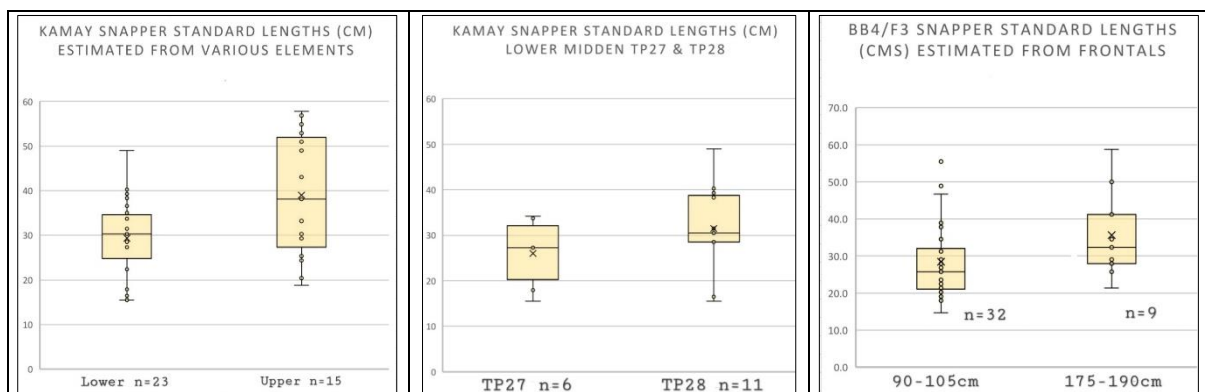
There is also a noticeable difference in the overall Snapper sizes between the Upper Midden (pre-fishhook) and Lower Midden (containing fishhooks).

Standard lengths were calculated and plotted (**Figure 85**) for thirty-eight out of the 41 Snapper individuals recorded in the MNIs. Of the remaining three specimens, two were too fragmented to measure; these belonged to a medium to fairly large Snapper in the Lower Midden and a very large Snapper in the Upper Midden. The third fish from the Lower Midden had a standard length of 7cm which was too small and anomalous to add meaningfully to the Snapper size statistics.

The Snapper lengths are plotted as circles between the highest and lowest values. The mid line and outside of the boxes show the half and quarter divisions of the group of fish. Thus in the Lower Midden half the fish are larger than 30cm and a quarter are larger than 35cm. The largest fish is 49cm and the rest are 40cm or less. These are a lot smaller than in the Upper Midden where the fish in the middle of the range is 38cm SL and the rest are 43cm or larger; a quarter of them are larger than 52cm.

At the smaller end of the scale the fish size at the quarter mark is similar in the Upper Midden and Lower Midden as is its lowest value – both with a 2.4 – 3.3cm difference, however the distribution is different with most of the smallest quarter in the Lower Midden clustered below the minimum size estimate of the Upper Midden.

Despite the problems relating to the amount of error in the Standard length data, as discussed in the methodology section, the size difference between the largest 50% of the Upper and Lower Midden is quite pronounced and a disparate phenomenon to the error.



**Figure 85. Box plot showing the distribution of the Snapper standard length estimates in the Upper and Lower Middens compared with those from BB4. The cross shows the average size of the fish.**

It is interesting to see that the biggest difference in fish size is at the larger end of the size range. If there was a continuity of the spear fishing technology, it is assumed that the largest fish would similarly be targeted and that same size range would stay the same. Perhaps this reflected by the one large fish at estimated length of 49cm. There could however be multiple reasons for the

variations in size distribution. Breaking the numbers down to test pit shows that variability that can occur from one localised sample to another (some 40-50 metres away) where the fish might have been caught at one time from the same location using the same method. Seasonal differences might also be reflected.

A comparison with BB4 F3 data from a broadly similar time frame shows a similar pattern in fish sizes between the older and more recent deposit where the fish size cluster around the mid to smaller size range. This is again similar to BB1 and BB3 frontals (not graphed). In the F3 sample the large size range does overlap and the size difference between earlier and later is more pronounced in the lower size range as might be expected with the introduction of angling into the fishing strategy. In F3 sample the median size of Snapper is smaller than the Kamay 23 sample.

Comparing the Kamay data with the BB/- data highlights the variability in data spatially and temporally across the site. The pattern of distribution shows a complex picture where the introduction of angling is just one factor in the changes that can be seen in the size of fish caught or at least consumed at Kamay.

#### Mammal bone

As mentioned, the mammal identified in BB/- and MPP is diverse. The entire mammal bone assemblage from BB/- has not yet been recorded in detail so information regarding changes through time and across the site is limited. Species include Eastern grey Kangaroo, Red necked and Swamp Wallaby, Wallaroo, Dingo, Long-nosed and Northern brown bandicoots, Brushtail and Ringtail possums, Long nosed Potoroo, Spotted quoll, Brush-tailed phascogale, Brown Antichinus, Swamp, Water and Bush Rats, Mouse – possibly New Holland, Echidna, Fur Seal, Whale and Common Dolphin (Godree 1995, Irish 2010). Fauna that was found at all levels of BB/- include but are unlikely to be limited to whale, Fur seal, Dingo, Swamp Wallaby and Potoroo as, with the exception of dolphin occurring exclusively in the upper layers, there was no clear pattern vertically in species distribution

In the current test excavation assemblage, aside from TP24 Spit 1 and TP27 Spit 2 which include a cut of a domesticate and rabbit bone (which were not counted in the weights table), species identified were Bandicoot (either Long nosed or Northern Brown) in the Lower Midden and Macropod, rat, and Brushtail Possum in the Upper Midden (**Table 20**). There was also a tentative identification of a Seal rib from TP36 in the Upper Midden.

Significantly, just 1.5% of the identified bone in the Lower Midden was mammal compared to 32% in the Upper Midden. A sixth of the weight can be attributed to the left and right femur shafts and teeth of a young kangaroo or wallaby and it is very possible that some of the other shaft fragments from the same test pit are from the same individual. There are additionally several bones from a Brushtail possum.

There were four test pits in the Upper Midden that contained more than 30 pieces of bone. Of the total identified bone from each of these, 17-35% of the fragments were mammal which made up 29-36% of the weight. This compares to percentages of 0 – 3.3 for the numbers of mammal fragments in each of the Lower Midden test pits comprising 0 – 4% of the weight for all but one test pit (TP24)

which had 13% mammal bone. As the Upper Midden test pits are small samples spaced over 50 metres, it seems questionable that the disparity is simply due to one Macropod and a Brushtail possum.

A similar pattern with larger percentages of mammal bone in the lowest layers is not evident in BB1 or BB3 which both contain relatively small numbers of mostly fragmented mammal bone, In BB4/F1 and F3 terrestrial mammal bone makes up a small percentage – just 2% of the entire bone assemblage. There appears to be a little more terrestrial mammal within several spits of the pre-fishhook layers, the lowest of these layers may overlap in time with TP38.<sup>82</sup> As with the fish bone, the interesting distribution of the mammal bone and species identified from the current test excavations also underscores how varied the site is and a thorough whole of site analysis is required to understand the significance of the higher proportions of mammal bone in the older deposit.

Most of the mammal fragments were small with irregular breaks, however there was a small amount of mammal bone that appears to be either broken bone points or debris associated with bone point manufacture eg TP 36. Bone points and broken fragments of worked bone were identified in Test Pits 24, 27, 28, 32, 36 and 38 all of which were mammal bone and broadly characteristic of bone points from other areas of the site (see Appendix 8). There may well have been fish bone artefacts in the present excavation; catfish spines are known to have been used in multi-prong fishing spears including one spear collected from Kamay foreshore in 1790 by Lieutenant Cook and his crew. While usewear and residue analysis enabled the identification of fish bones tools from MPP, such tools are extremely difficult to identify macroscopically (See **Figure 31** – E10, SW, D8).<sup>83</sup>

**Table 20. Mammal, bird and reptile species and minimum numbers in the Upper and Lower Midden.**

Mammals		Lower	Upper
<i>Trichosurus vulpecula</i>	Brushtail possum		1
Peramelidae	Bandicoots	1	
Macropodinae	Kangaroos, Wallabies		1
<i>Oryctolagus cuniculus</i>	European rabbit	1	
<i>Rattus sp</i>	Rat species		2
Bird			
<i>Ardena sp</i>	Shearwater		2
Fam. Procellariidae	Shearwater	1?	
Reptile			
Ophidia	snake		1

<sup>82</sup> Godfree 1995.

<sup>83</sup> Kononenko 2009, Appendix 7 in Irish 2010.



Reptile

The reptile bones in the entire Foreshore Midden and rockshelter have not been studied in detail but they include freshwater turtle, snakes, goanna, skinks including blue tongue lizard and dragons. The overall numbers of bones identified are low and although it is likely some cranial and post-cranial bones have not been identified, the small numbers of the distinctive vertebra indicate that reptile was not a significant part of the assemblage. (One exception is in BB4/B where a snake skeleton contributed 5% of the total bone weight.)

All the identified reptile in the current test excavation assemblage are vertebrae. Those from TP28 Spit 2 are from different parts of the snake skeleton (**Table 20**). The latter vertebra is tiny and appears to be from an Elapid. These have not been identified further and as they have significant differences it is not known if they are the same snake. The remaining vertebrae are too fragmented to identify.

Bird

There was proportionally more bird bone in the Upper Midden than Lower Midden. This trend is opposite to what Godfree (1995) found for the BB4 F1 & F3 assemblage where there was significantly more bird bone in the more recent levels of the midden.

The bird bone was mostly very fragmented and often it was hard to tell whether the bone was from bird or small mammal. As such the proportion of bird bone recorded in **Table 20** might be slightly lower than it actually is. The only bird bones large enough to identify were from Shearwater, which as mentioned earlier is the most common bird found in the middens.

**5.2.6 What was found – stone artefacts**

The stone object analysis was undertaken by Beth White and the specialist report and data is provided in **Appendix 5**. In addition, use wear analysis was undertaken by Nina Kononenko for selected stone objects and this specialist report is provided in **Appendix 8**. The below information has been summarised from both White and Kononenko’s specialist analyses. Their work on this project is acknowledged with thanks.

**Table 21. Total stone artefacts and densities for the Upper and Lower midden.**

Area	# pits	Total Excavated area	Total stone (sum)	Stone/m <sup>2</sup>	% total stone
Upper midden	11	1.5m <sup>2</sup>	1529	1,019	98.1%
Lower midden	6	0.875m <sup>2</sup>	6	7	0.4%
Other pits	10	1.25m <sup>2</sup>	24	19	1.5%

1,559 stone objects were retrieved during the test excavation from 19 of the 41 test pits. In total, 5.375m<sup>2</sup> was excavated, equating to an average density of 285 stone objects per square metre. The majority of these stone objects were located across test pits TP15, TP16, TP31, TP32, TP33, TP35, TP

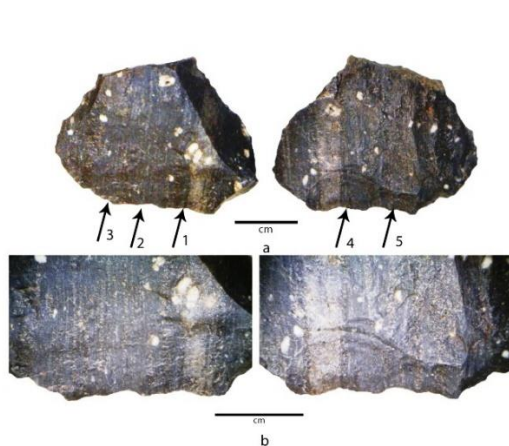
36 and TP38 which are all within the Upper Midden area (**Table 21**). The remaining 11 test pits included sparse stone objects (less than 10 in each pit) including two stone files from TP27 and TP28A that are located within the Lower Midden area.

**What kind of artefacts were found?**

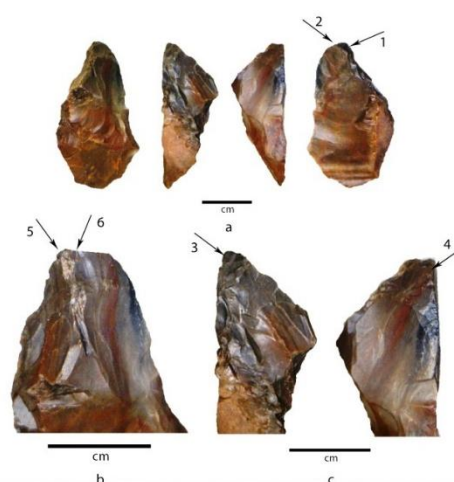
A variety of stone object types were found in varying quantities. The majority of the objects were flake fragments and flake pieces, but there were also a large number of complete flakes. A few of these flakes showed signs of retouching on the margins which is a method used to “touch-up” a piece of stone that would otherwise not be useful for its intended purpose. Other stone objects in lesser quantities included cores, a few backed artefacts, stone files, and some manuports, that is, unworked stone brought from elsewhere.

The assemblage comprised largely of quartz (60%) and Fine/Medium Grained Siliceous (FGS/MGS) materials (36%). Other materials in lesser quantities included silcrete (2%), silicified wood (1%), and sandstone (<1%), and some unidentified material (<1%). There is also a combination of both freehand flakes and bipolar flakes although quartz is notably the most dominant material to be flaked using the bipolar technique, which is more effective on flaking smaller fragment of raw material such as pebbles.

Some of these stone objects were selected for use-wear analysis which demonstrated that there were wood and shell working activities taking place at this site. The wood-working activities included whittling/cutting and scraping woody plants (**Figure 86**). While we cannot say with any certainty what these tasks were, some possibilities include stripping bark, sawing branches, as well as more delicate tasks such as carving. Similarly the shell working included evidence for scraping, sawing, and drilling (**Figure 87**). The two sandstone stone files was exclusively used for shell working, likely for the manufacture of shell fish hooks (**Figure 88**).



**Figure 86. FGS flake (#556) TP36 spit 5 – scale 1cm**



**Figure 87. Silicified wood retouched flake (#173) TP31 spit 5 – scale 1cm**



**Figure 88. Sandstone stone file (#966) TP28A spit 3 – scale 1cm.**

**Can the stone objects be relatively dated?**

The type of flaking technique and the use of certain raw materials can provide some insight into the relative date of the site. The assemblage is largely concentrated in the upper midden and consists predominantly of quartz and fine-medium grained siliceous material. This raw material was flaked both using the free hand and bipolar technique. The use of bipolar flaking coupled with the low proportion of backed artefact indicates the assemblage generally dates to the Post/Late Bondaian period, that is, after c.2,000-1,500 cal BP. This is supported by the radiocarbon dating undertaken for the site that shows that the midden associated with TP38 is between 1,900-1,460 cal BP. In most of the test pits with stone objects, there was no clear stratigraphic distinction between freehand flaking and bipolar flaked artefacts, except for TP36 which showed a marked increase in quartz in the upper spits compared with Fine Grained Siliceous material in the deeper deposits. However given that this an isolated occurrence, we cannot definitely say that this site has a stratified sequence.

**Where was the stone sourced?**

The source of the stone can provide some interesting insights into the social and environmental factors that were present at the time of their manufacture. The two most dominant raw materials included quartz and fine-medium grained siliceous material. The quartz artefacts are mostly derived from quartz pebbles (**Figure 89**). These pebbles can be found on coastal shorelines and river banks but are also embedded in some stratigraphic units of the Hawkesbury sandstone rock. Therefore, it's possible, and likely that the quartz material was locally sourced. The fine-medium grained siliceous materials may derive from a different source. It is possible the local source material is from the Woronora Plateau/Hacking River and/or the northern Illawarra coast.

The assemblage has been dated to 1,900-1,460 cal BP which is known as the Post/Late Bondaian period. This is a period where raw materials shifted from silcretes western Sydney to the quartz and

fine-medium grained siliceous materials that we have found in this assemblage. This shift in raw material has been interpreted as a social shift, whereby Aboriginal people living in coastal Sydney began to interact more with Aboriginal groups to the south of Sydney than those in western Sydney.



**Figure 89. Pink quartz bipolar flake (#738) from TP38 spit 3 – scale 5mm**

Source: White 2023, pp. 19



**Figure 90. FGS bipolar flake (#124) from TP31 spit 4 - scale 5mm**

Source: White 2023, pp. 12

### Differences between the Upper and Lower midden

The stone objects are almost entirely located in the Upper Midden area with just a handful (n=7) in the Lower Midden area, two of which are stone files often associated with the production of shell fish hooks, although they may be used for other purposes too.<sup>84</sup> Use wear analysis showed that both files visible surface levelling with flattened individual rock grains and some fine striations that were generally oriented in the direction of the working motion. In addition shell residue was found to be embedded deep within the fabric one of the files. Together, these findings indicate that the stone files has a single use purpose, that is, for the manufacture of shell fish hooks.

No stone files were found in the upper midden, however some of the stone objects demonstrated evidence of having been used to work shell. This does not necessarily indicate the manufacture of fish hooks but could may indicate the working of shell to extract food, or create other tools (e.g. shell scrapers) or adornments.<sup>85</sup>

<sup>84</sup> Attenbrow et al 1998 Stone files and shell fish-hooks in southeastern Australia

<sup>85</sup> Attenbrow et al 1998; Irish 2010 pp.63-66, 76 and Appendix 7.

### 5.2.7 What was found – bone artefacts

A total of 15 possible bone points were identified during the cataloguing of the faunal remains. All were analysed for traces of wear from manufacture or use and for surviving residues. A full report and images is provided in **Appendix 8**, but in summary, three bone pieces were found to have been modified. The remaining 12 did not show any clear signs of modification. The three bone points are shown in **Figure 91**. They can be summarised as follows:



**Figure 91. Bone points from the test excavation.**

Figure 91 shows three panels of bone points. Panel A shows two small bone point fragments (BP01) with a 1cm scale bar. Panel B shows two small bone point fragments (BP04) with a 1cm scale bar and arrows pointing to features 1, 2, and 3. Panel C shows four larger bone point fragments (BP13) with a 1cm scale bar.

- Point BP01 (**Figure 91A**) from TP24 in the Lower Midden, is a small fragment of mammal bone. There are striations (grooves) which show the bone was shaped into a point by abrasion, probably stone. Although no traces of use were identified, possibly due to damage to the tip, the way the tip was shaped suggested that it may have been used as a prong in a composite tool for actions such as piercing skins.
- Point BP04 (**Figure 91B**) from TP28 in the Lower Midden, is a small fragment of mammal bone. It too was shaped by abrasion. The wear patterns are consistent with it being used for piercing soft

elastic materials (hide and skin). This wear pattern is comparable with bone points found nearby in previous investigations which were also used for this purpose.<sup>86</sup>

Point BP13 (**Figure 91C**) from TP38 in the Upper Midden is a broken and longitudinally split point. It has preserved both wear from abrasives used for shaping the point and wear attributes resulting from use. The observed wear attributes suggest that this bone point was involved in processing relatively soft but highly siliceous and abrasive plants such as grasses and plant parts (woody fibre, leaves or straw). The wear was akin to wear on other bone points from the BB/- excavations,<sup>87</sup> and similar wear patterns have been identified on experimental bone points used for weaving and sewing flax and in basket making activities.<sup>88</sup>

Previous usewear and residue analysis shows that the bone points from the Foreshore Midden and rockshelter were used in association with skins and plants/plant materials and as tips and tips/barbs in fishing spears.<sup>89</sup>

### 5.2.8 What was found – shell artefacts

The test excavation retrieved evidence of shell modification, primarily for the purpose of shell fish hook manufacture, and some sparse evidence of modification of black periwinkle shells. All evidence came from the Lower Midden, with the exception of one possible fish hook blank as discussed below.

#### Shell fish hooks

Historical and archaeological records show that Aboriginal women in Sydney used fish hooks made of large and small turban shells attached to bark string to fish from the shore, shallows and from canoes for the last 1,000 years. Archaeological evidence of the various stages of fish hook manufacture has been found in many midden sites around Sydney, and their manufacture, distribution and the timing of their introduction has been comprehensively reviewed by archaeologist Val Attenbrow.<sup>90</sup>

Hooks were made in several stages (see **Figure 92**). First, a piece (called a blank) of shell was cut from a turban shell with a sharp stone. Using the terminology of stone flaking, the turban shells can be considered 'cores' from which blanks were removed, often several at a time.<sup>91</sup> The shell blanks were then turned into fish hooks by trimming the blank edges, abrading them to remove a central hole (leaving a shell annulus), cutting or breaking the shell into a rough fish hook form, and final filing/smoothing of the hook into its finished form.

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<sup>86</sup> Kononenko 2009, Appendix 7, figures 12-20.

<sup>87</sup> Kononenko 2012.

<sup>88</sup> See Appendix 8, p.8.

<sup>89</sup> Kononenko 2012.

<sup>90</sup> Attenbrow 2010 and see also Attenbrow et. al. 1998.

<sup>91</sup> Irish 2010: 75-78.



**Figure 92. The stages of shell fish hook manufacture**

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The most widespread evidence of manufacture often survives in midden sites close to the rocky shore, where turban shells would have been easily gathered. This can include many broken and complete hooks.<sup>92</sup> The Foreshore Midden to the immediate west of the current test excavation area has among the most extensive evidence of fish hook manufacture on the eastern seaboard. The upper midden is closest to the Foreshore Midden but contains no evidence of fish hook production. This appears to be because that midden area predates the known period of use of fish hooks rather than due to sample size. The lower midden is dated to within the known period of fish hook manufacture over the past 1,000 years and is therefore consistent with that finding.

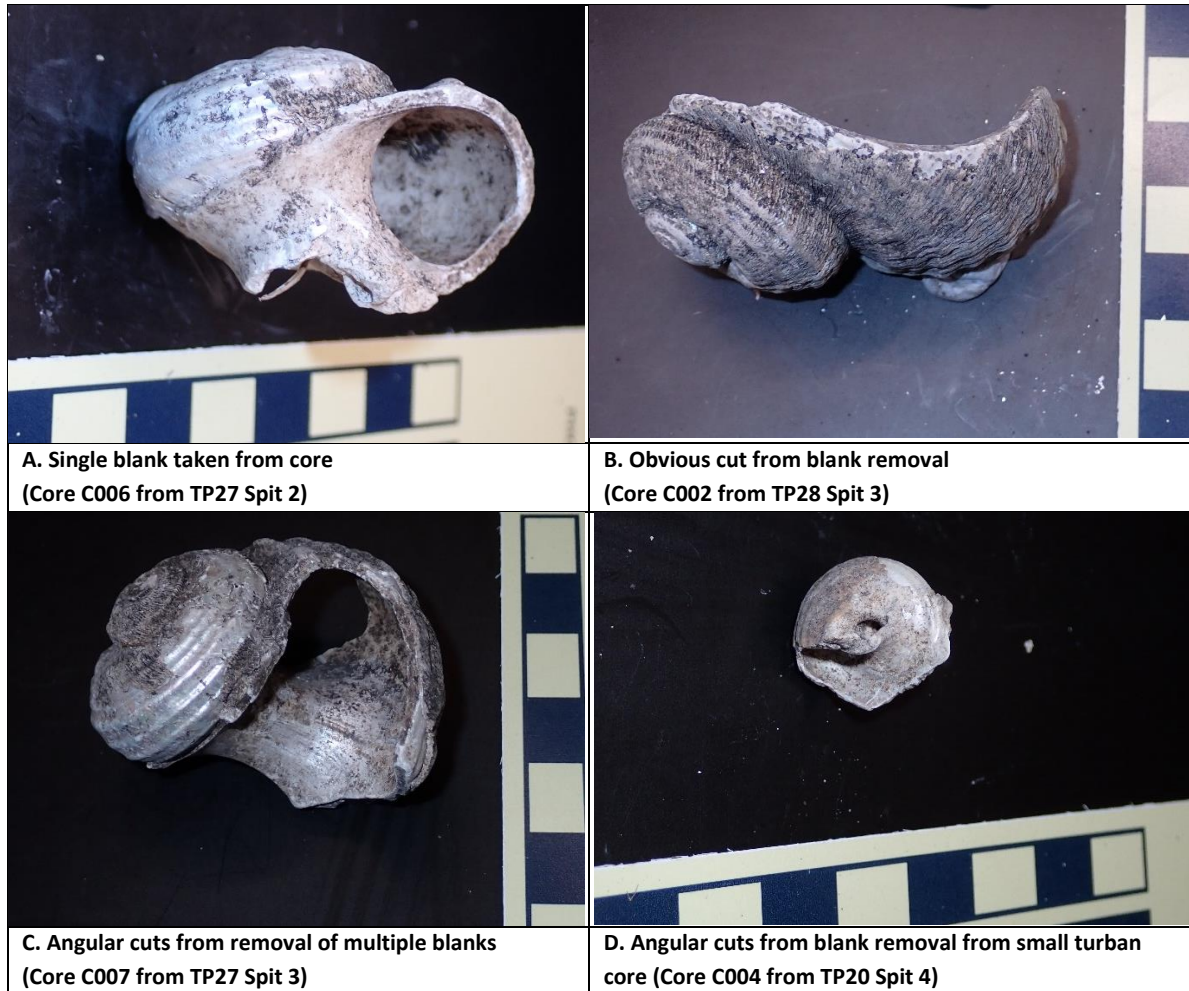
### Removal of Blanks from Shell Cores

The shell “cores” used for the extraction of blanks are generally the large turban shell (*Ninella torquata*) and sometimes also small turban shells (*Subninella undulata*), both of which would have been available in close proximity to the lower midden on adjacent rock platforms. Many turban shells in the lower midden were quite fragmented and degraded, which can make it hard to determine whether the shells have been deliberately cut to remove a blank, or are just broken (including potentially by Aboriginal people to extract the shellfish meat). During initial shell cataloguing four definite and three possible cores of large turban, and nine possible cores of small turban were identified. Use of small turban shells in fish hook manufacture has previously been documented at the Foreshore Midden and other sites in Sydney and Port Stephens.<sup>93</sup> Some examples of cores from the test excavation are shown in **Figure 93**, and full measurement data is contained in **Appendix 6.5**.

<sup>92</sup> E.g. Irish 2010, Dyall 1982, 2004.

<sup>93</sup> Irish 2010, p76, Dyall 2004:84, McDonald 1992

Any shells of either species which appeared potentially to have been broken were put aside during post-excavation sorting of the shellfish assemblage for later analysis. Importantly, the vast majority of shells of both species were unworked (though not necessarily whole). This indicates that selection of suitable specimens for working was unlikely to have occurred as a specialist gathering exercise. Rather, suitable shells were likely to have been picked from the range of shells brought back onsite for consumption, either during food preparation or consumption, or after discard.



**Figure 93. Examples of turban shell cores from the test excavation (scale in cm).**

In most cases blanks were removed starting at the aperture and working around the whorl of the shell. Generally one or two blanks were removed (**Figure 93A & B**), but sometimes three or four blanks were taken by working around the whorl (**Figure 93C**), including on small turban shells (**Figure 93D**). The cuts on the cores suggest that most blanks were broadly oval in shape, but some appear triangular, which matches the evidence from the removed blanks themselves. There were size differences between the blanks from large and small turban cores. The former were on average 26mm x 23mm, while the latter were 15mm x 11.5mm, though sizes overlap at the margins of their ranges.



Two possible cores were selected for usewear analysis to confirm if they were deliberately worked. One (C003) was selected to check if small turban shell was used in the Lower Midden for making fish hooks, as found in previous investigations of the Foreshore Midden. This was found to be deliberately worked (see **Appendix 8, Figure 22**). The other (C001) was selected as it was the only possible core located in the Upper Midden (TP36) and could therefore pre-date the known use of fish hooks by several centuries. On inspection however this was found to be naturally broken.

### Processing of Blanks into Fish hooks

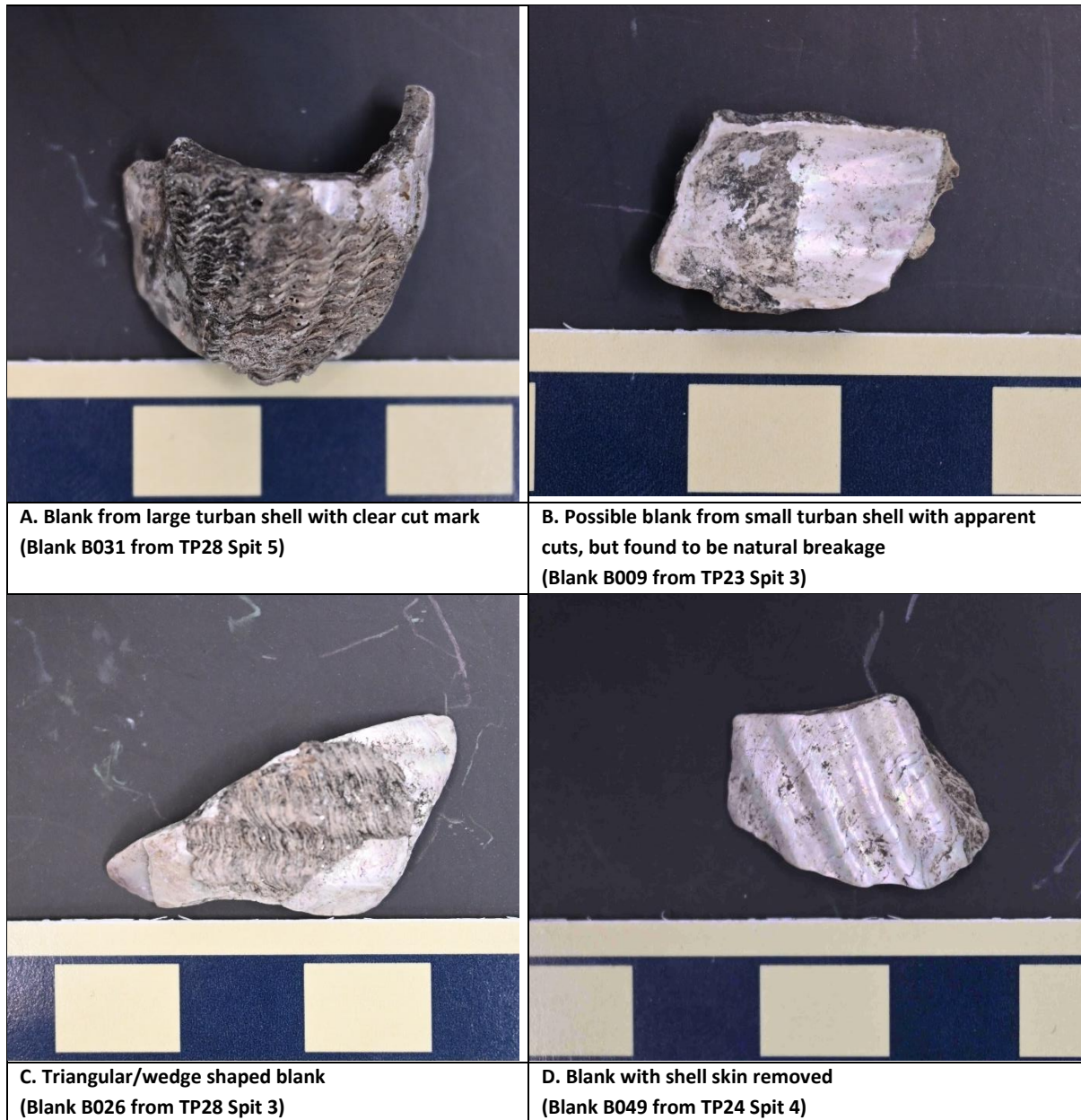
A number of steps are described for the fashioning of shell blanks into fish hooks. These include trimming of blank edges, abrasion to remove a central hole (leaving a shell annulus), cutting or breaking the shell into a rough fish hook form, and final filing/smoothing of the hook into its finished form. Stone files of the type found in the Lower Midden were multipurpose tools that among other things were used to work shell, and at least one is likely to have been used for this task.<sup>94</sup>

A total of 81 possible blanks were examined from the test excavations (see **Appendix 6.6**). As with the cores above, it is likely that some of the examined blanks are the result of natural breakage. This could only be confirmed through microscopic analysis, which was not feasible for all blanks. The blanks analysed were made from both large turban (n=62) and small turban (n=19), and showed a similar distinct difference in average size between the species, but overlapping at the margins of their size range (**Figure 94A**). Most were broadly oval in shape though some were triangular or wedge shaped (**Figure 94C**). Overall the sizes were a little smaller than those evident on the cores – 24mm x 18mm for large turban blanks and 17.5mm x 12.5mm for small turbans, though measurement of blank ‘scars’ on cores is somewhat subjective. All were whole blanks (i.e. they had not yet had a central hole removed) however they contained varying levels of grey shell skin from >95% (n=21) to none (n=27) and averaging around 50% (**Figure 94D**). This suggests that some initial preparation of blanks may have taken place, and that this was prior to cutting the central hole, in contrast to the sequence shown in **Figure 92**.

Four possible blanks were selected for usewear analysis to confirm if they were deliberately worked. Two (B008, B009) were from TP23 in the Lower Midden and were selected to check if small turban shell was used in the Lower Midden for making fish hooks, as found in previous investigations of the Foreshore Midden. Both shell pieces were found to be naturally broken (See **Figure 94B**), however other possible blanks of small turban may be definitely worked.

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<sup>94</sup> Attenbrow et al 1998 Stone files and shell fish-hooks in southeastern Australia; Irish 2010. *Final Report on Aboriginal Archaeological Monitoring and Salvage Excavations Meeting Place Precinct, Botany Bay National Park, Kurnell, NSW* pp.63-66, 76 and Appendix 7; see also Appendix 8 to the current report.



**Figure 94. Selected turban shell fish hook blanks (scale in cm).**

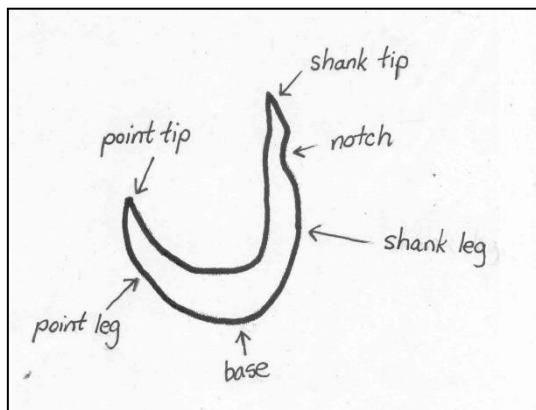
The other two (B006 and B007) were selected as they were the only possible blanks located in the Upper Midden (TP10) and could therefore pre-date the known use of fish hooks by several centuries. On inspection B007 was found to be naturally broken. Blank B006 has spots of abrasion that may indicate deliberate shaping by abrasion but the shell is weathered and therefore this cannot conclusively be demonstrated (See Appendix 8, Figure 21).<sup>95</sup> Further excavation would be required in adjacent areas to confirm that the deposit in TP10 is of the same age to that dated nearby in TP38 and to find further possible blanks that can conclusively be shown to be deliberately worked. At this

<sup>95</sup> Nina Kononenko pers.comm. 14/9/2023.

stage therefore, this finding should be treated cautiously, especially as only two possible blanks were found across the entire Upper Midden area and one of these has been shown to be naturally broken.

### Finished fish hooks

A total of three fish hook fragments of large turban were recovered from the test excavations (see **Appendix 6.7**). Descriptive landmarks of fish hooks are shown in **Figure 95**. The most complete hook (H001) consists of the shank and base, and is missing the point leg (**Figure 96A**). The shank has a clear notch cut into it (**Figure 96B**) which was for attaching a fishing line. The other two fragments consist of a hook base (H002) and point leg (H003) as shown in **Figure 96B & C**. Microscopic analysis of two hooks from the Cooks Stream salvage excavations about 200m west of the test excavations showed evidence of abrasion in shaping the hooks into their final form. The notch of one hook also contained some resin-like residues and starch grains which may relate to the attachment of a fishing line made of fibrous plant material.<sup>96</sup> Microscopic analysis of H001 found no evidence of residues, but did find clear evidence of shaping of the hook and notch through abrasion (see Appendix 8, Figure 24).



**Figure 95. Landmarks commonly used in describing fish hooks.**

During shell cataloguing, ten pieces of scaly limpet (*Patella peronii*) and colourful limpet (*Cellana tramoserica*) were observed to be crescent shaped and potentially worked. The apex (central top) of these shells is commonly found in middens to have detached from the shell, leaving behind a partial or full ring that can resemble a fish hook in shape. As this type of breakage is common and natural, we decided to subject two examples to microscopic analysis to determine whether they had been deliberately worked. H004 of scaly limpet and H009 of colourful limpet (both from TP24) were selected (see **Figure 97**). H004 has fine crossed striations from shaping and smoothing the edges by abrasives, while H009 has a weathered surface but has spots of abrasion suggesting that this artefact was also deliberately trimmed.

The modification of limpet shells and their potential use as hooks has not been observed or demonstrated to date in the Sydney region. While no traces of actual use have been found on the two examples analysed that could prove that they were used as hooks, their hook like form, deliberate working, and location in the same pits and contexts as turban shell hooks, suggests that

<sup>96</sup> Irish 2010:80.

this is likely. Further analysis would be required to determine methods of manufacture, and also criteria that could be used macroscopically to delineate between natural and deliberate breakage.

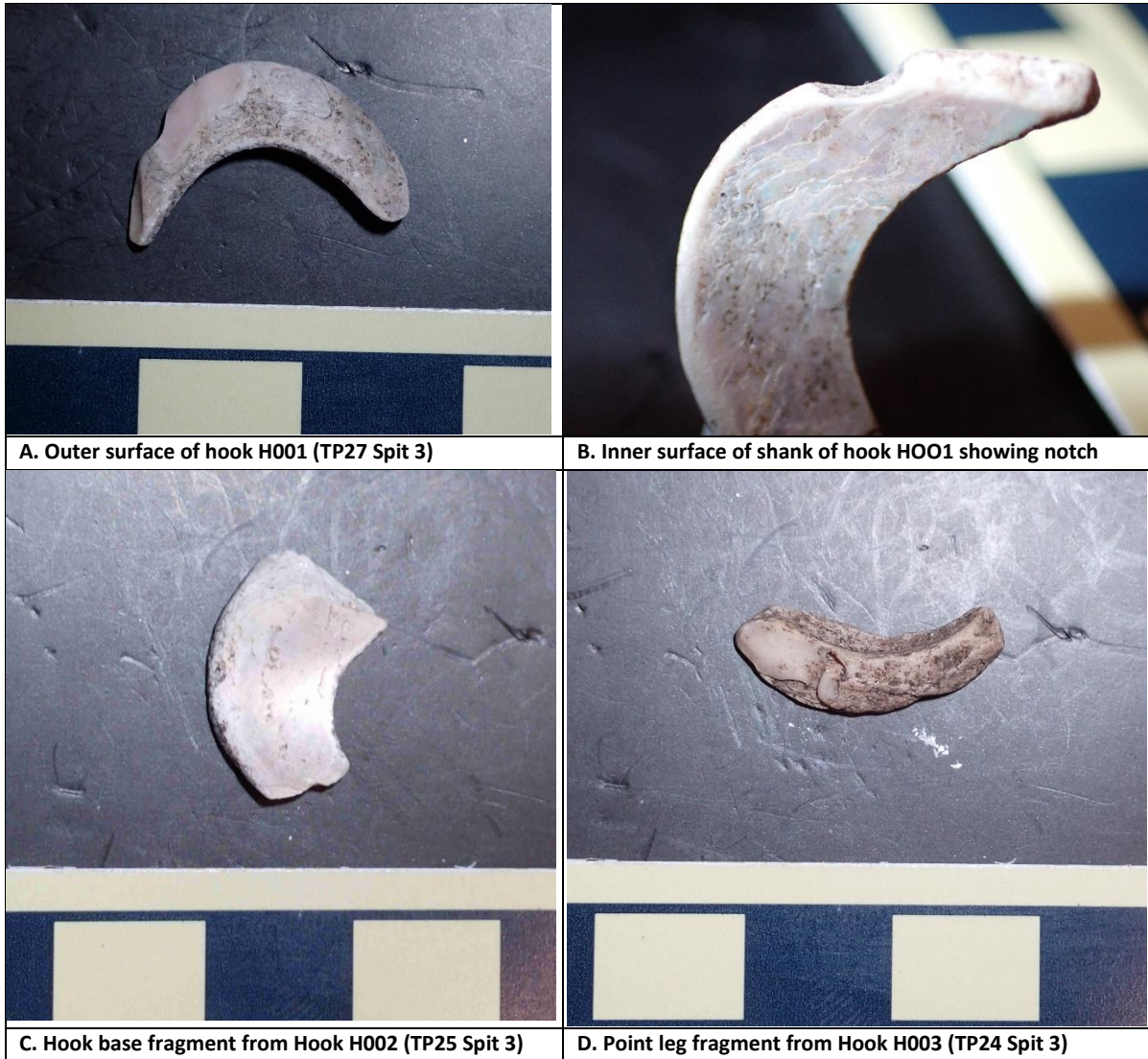


Figure 96. Large turban shell fish hook fragments from the test excavation (scale in cm).



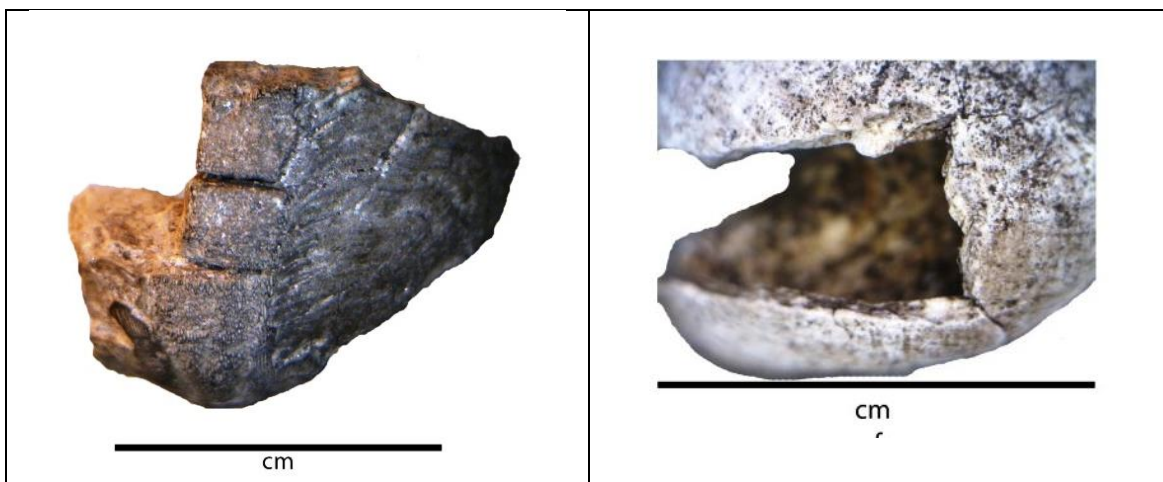
Figure 97. Limpet shell possible fish hooks from the test excavation (scale in cm).

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### Black Periwinkles

The modification of black periwinkle (*Nerita atramentosa*) shells through cutting of a “window” in the upper surface of the shell has been documented at several sites in coastal Sydney, including in Cooks Stream about 200m to the west of the test excavation.<sup>97</sup> As detailed in **Appendix 6.8**, five potentially modified periwinkle shells were retrieved from three test pits (TP20, TP24 and TP27), though the vast majority of shells were unmodified (**Figure 98**). Microscopic analysis of four shells from the 2008 ‘Cooks Stream’ excavation about 200m west of the test excavations showed clear cut marks most likely done with a stone knife, and some flaked stone from the same excavation retained residues from cutting shell.<sup>98</sup> It has been suggested that they may have been used as some type of personal adornment, potentially as beads on a string, though this has yet to be conclusively demonstrated.<sup>99</sup>

Three possible worked periwinkles recovered during the test excavation were subject to usewear analysis. One fragment S010 was found to have two deliberately made deep cuts (**Figure 98**, and see Appendix 8, Figure 26). As this was only a fragment, it is not clear whether the cuts were made with the same intent as the windows previously observed. Two other shells with partial or complete windows that appeared deliberately cut (S005 & S006) were found to be natural breakages (see **Figure 98**), suggesting that caution should be exercised in confirming periwinkle shells as modified on macroscopic analysis only.



**Figure 98.** Cut black periwinkle shell from TP27 (left) and naturally broken shell from TP24 (right).

<sup>97</sup> Irish 2007, Irish 2010.

<sup>98</sup> Irish 2010. *Final Report on Aboriginal Archaeological Monitoring and Salvage Excavations Meeting Place Precinct, Botany Bay National Park, Kurnell, NSW* pp.63-66, 76 and Appendix 7.

<sup>99</sup> Irish 2007.

### 5.2.9 What was found – Other finds

The test excavation retrieved a small quantity of European artefacts, predominantly restricted to the topsoil and upper layers of accumulated deposits which overlies the midden. A catalogue of the material can be found in **Appendix 9**. This material can provide some information on the European occupation of the area. These artefacts were found across this site, they included, fragments of glass, metal pull tabs, domestic ceramic wares, corroded nails, and construction debris. Other naturally occurring materials have been categorised as well, these include charcoal, pumice, sandstone and rhodoliths.

Several glass fragments were found, these included flat window glass and bottle glass. Examples of glass finds include several different types from TP27 including amethyst glass from a carbonated water bottle. A partially intact tinted blue/green bottle neck and rim features a hand applied reinforcing collar / double collar, likely from a hand-blown mould. Additionally, fragments from a dark green bottle were present in Spit 2, this included a partially intact base of a wine bottle, featuring a champagne pontil and rounded base, appearing to be from a hand-blown mould. The majority of the glass finds were relatively undiagnostic, dating to late 19<sup>th</sup> to early / mid 20<sup>th</sup> century as hand blown domestic waste.<sup>100</sup>

Several metal items were uncovered, such as corroded nails, aluminium pull tabs, and a penny. The metal pull tabs from cans date to c.1970s due to their typology as a T-type pull tab, and are likely residual waste from the use of the site for public recreation.<sup>101</sup> Additionally, one bronze penny was found. The penny is embossed with the date of 1911 ('Commonwealth of Australia' inscribed), depicting King George V and was minted by the Royal Mint in either England or India, the circulation of this coin is unknown.<sup>102</sup>

Ceramics, particularly fragmented pieces with minimal diagnostic elements, cannot always provide secure dates for deposits as they can sometimes be passed through generations.<sup>103</sup> The ceramic fragments found include porcelain and glazed blue transfer ware. The pattern on the glazed blue transfer ware has faded significantly but appears to represent the fibre-pattern print which was one of the most common prints in Australia from the early 20<sup>th</sup> century.<sup>104</sup>

A clay smoking pipe fragment was found in Spit 2 of TP29, clay smoking pipes are useful for dating as they have a high discard rate and were produced for a finite period of time. The identified clay smoking pipes were fragmentary and no makers marks or other diagnostic features for dating were retained. Clay pipes were used in Australia from the early colonial period until the introduction of tobacco smoking in the late 19<sup>th</sup> Century, after which, and certainly by WWI, their popularity

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<sup>100</sup> Boow 1991.

<sup>101</sup> <https://pulltabarchaeology.com/>. Accessed: 5 September 2023.

<sup>102</sup> <https://www.perthmint.com/news/collector/coin-collecting/australians-take-pride-in-their-1911-penny/>. Accessed: 28 August 2023.

<sup>103</sup> A broader discussion on this topic can be found in Brooks 2005.

<sup>104</sup> Brooks, 2005.

dwindled.<sup>105</sup> While these items can be found in 20<sup>th</sup> century contexts, they are more commonly found in 19<sup>th</sup> century contexts.

The use of the study area as a public park has resulted in several upgrades and alterations over the years, construction of services, nearby footpaths and modifications to the landform have likely occurred, resulting in the presence of construction debris and naturally accumulated deposits within some of the top layers of the test pits.

Overall, the European artefacts can be generally dated to the late 19<sup>th</sup> and 20<sup>th</sup> century, and largely comprised refuse material. The study area has been used as a public recreation space since the late 19<sup>th</sup> century and has likely resulted in accumulation of discarded material. The majority of historical material is restricted to the first 2-3 spits of the test pits. The European material was not found within the shell midden layer, indicating that the midden likely dates to prior to European contact in the area.

### **5.3 What we found**

#### *The Aboriginal archaeological evidence*

The archaeological test excavation has helped clarify the extent and nature of Aboriginal archaeological remains across parts of the Meeting Place Precinct that have not previously been investigated. The key findings in this area are:

- there are two clear concentrations of Aboriginal archaeological remains within the areas tested. These have been labelled the Upper Midden and Lower Midden. These two areas can be distinguished from each other spatially and also by age and midden content.
- The Upper Midden dates to 1460 to 1900 years ago (217 AD - 463 AD) and the Lower Midden dates to about 1,000 years younger to around 475 to 730 years ago (1291 AD – 1547 AD). This gap is manifest in the type of artefacts found in each. Specifically, the Lower Midden, dating to within the known period of shell fish hook use, contains evidence of shell fish hook production. The Upper Midden predates the use of hooks and contained no definite evidence of fish hook manufacture or use, though some stone artefacts showed evidence of working of shell (e.g. for making scrapers or ornaments).
- the Upper Midden area contains sparse to moderate quantities of shell and bone, but very dense concentrations of stone artefacts. The Upper Midden can be considered an extension of the Foreshore Midden immediately to the west. The Upper Midden also contains Aboriginal ancestral remains, as do the other portions of the Foreshore Midden.
  - The stone artefacts are concentrated in the upper midden and primarily date to the Post/Late Bondaian period, that is, after c.2,000-1,500 cal BP. This is consistent with the radiocarbon dating results.

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<sup>105</sup> Gojak & Stuart 1999, p.40.

- Stone artefacts manufactured from quartz pebbles are the most common material which is likely to have been sourced from the local Hawkesbury sandstone. Other materials may have been sourced from Woronora Plateau/Hacking River and/or the northern Illawarra coast. Use wear analysis shows that some of the activities on site included scraping and cutting wood, and working shell.
- The Upper Midden contained considerably less shellfish in total and less species than the Lower Midden. The Upper Midden contained more large turban shells (though none were made into fish hooks) and also contained more Hercules whelk and rock oyster, which could suggest that mudflats were more frequently accessed in the earlier period represented by the Upper Midden. No modified shell was found in the Upper Midden
- The Upper Midden contained proportionally more mammal bone than fish bone than the Lower Midden, and less fish species, though the small sample size precludes drawing definitive conclusions about this. Few pieces of modified bone were identified in either area but this may be a factor of sample size.
- the Lower Midden is separate from the Upper Midden and is situated about 30m to the north-east and below a sandstone ledge above which the Upper Midden is located.
  - Very few stone artefacts were found in the Lower Midden, but the only two stone files found during the excavations, were located in this area. These are often associated with the manufacture of shell fish hooks, which is consistent with the age of this area of midden.
  - The Lower Midden contained the majority of shellfish remains from the test excavations. It included many small, inedible species that were most likely brought to the site attached to other shellfish or seagrass, but could also have been washed in to the midden, given its close proximity to the shore. Consistent with its age, it contains evidence of shell fish hook manufacture (cores, blanks and hooks), including two possible hooks made of limpet shells. Modified black periwinkle shells were also found in this area, which could have been used as personal adornment.
  - The Lower Midden contains a greater diversity in fish species than the Upper Midden, which could be due to better preservation in the more recent, Lower Midden.
- Outside of the two newly identified areas of midden, little or no Aboriginal archaeological remains were found. This is consistent with previous findings from archaeological test excavations in 2007 and subsequent monitoring works across the Meeting Place Precinct, which showed a clear concentration of Aboriginal archaeological remains along and near the foreshore.<sup>106</sup> The lack of Aboriginal archaeological remains in some pits was due to disturbance of their natural waterlogged state, but others just contained no remains or occasional isolated artefacts or shell fragments, as has been found in previous investigations.

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<sup>106</sup> Irish 2007, Irish 2010.



Both areas of midden can be considered part of a broader complex of Aboriginal archaeological remains along the foreshore in this area. Specifically, the Upper Midden can be considered an extension of the Foreshore Midden (AHIMS #52-3-0219) which extends several hundred metres to the west, and while the Lower Midden is spatially separate, it should be considered part of this broader complex because the timing of its use overlaps completely with that documented for the Foreshore Midden. Despite the differences in age between the Lower Midden and the Upper Midden, it is important to note that the broader Foreshore Midden was used across both of these periods and in between. This suggests that the foreshore has been continuously occupied by Aboriginal people over at least 2,000 years but that Aboriginal people used different areas within the midden site as focal points for occupation at different times.

Comparison between the Upper and Lower Midden and the broader Foreshore Midden is hampered by the fact that there is no comprehensive report from the large excavation of the site in 1969/1970, though the faunal remains have subsequently been subject to analysis.<sup>107</sup> Nonetheless we can make some observations about the nature of the Aboriginal archaeological remains in these locations:

- The faunal assemblage as a whole is similar to other areas of the Foreshore Midden and is characterised by a striking diversity of fish, mammal and reptile species. Some possible differences (e.g. among bird species) may be due to these remains not yet being identified within the Foreshore Midden assemblage. Fish are the most common taxa, and snapper the most common fish, across the Upper and Lower Midden and Foreshore Midden.
- The shell species appear to be similar across the Upper and Lower Midden and Foreshore Midden, however very little of the excavated shell and turban shell fish hook cores were retained, and other shell implements now recognised (e.g. shell scrapers, periwinkle 'beads') were not known or considered at that time. For this reason, we cannot be sure if the possible limpet shell 'hooks' found during the test excavation are also found within the broader Foreshore Midden, as these are unlikely to have been recognised or retained during the 1969/1970 excavations
- Many stone artefacts were also recovered during the 1969/1970 excavations, but no comprehensive analysis of them has been undertaken. However looking more broadly, we can see that the Upper Midden has a very high average density compared with other stone artefact sites in the local area, and the highest on the Kurnell peninsula. There is some variation in raw material between the Upper Midden and other sites on the Kurnell peninsula which may reflect a change in material procurement, flaking and discard.

Overall the test excavations have shown that there is important diversity across the broader suite of archaeological remains along the foreshore which warrants preservation of all of these remains to the highest extent possible, as each area contains overlapping but potentially unique evidence of the diverse uses of the foreshore by Aboriginal people.

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<sup>107</sup> Tsoulos 2007, Godfree 1995.

## 6 Our assessment

### 6.1 What is (or may be) present within the study area

The field inspections and test excavation have allowed us to appraise the level of historical disturbance in the areas proposed for activities under the Stage 1 Master Plan, and have further defined some previously unrecorded Aboriginal archaeological remains. Specifically:

- The study area contains the Foreshore Midden, which contains midden and burials along a section of the park shore. The midden is registered as AHIMS #52-3-0219 but is more extensive than the single point listed on AHIMS. Our archaeological test excavations have shown that it includes the Upper Midden, which extends the Foreshore Midden at least 70m further east than previously documented and contains further ancestral remains. An update has been made to the AHIMS register record for #52-3-0219 to reflect this additional area, and a new, restricted registration has been made for the ancestral remains (#52-3-2162).
- An additional area of midden (the Lower Midden), has been identified over an approximately 50m x 20m area immediately behind the beach to the west of the whale sculpture. Its dated age places it within the documented time of use of the larger Foreshore Midden to the west (of which the Upper Midden is part), but it is distinct from that midden. It is about 30m north-east of the Foreshore Midden and sits several metres lower in elevation below a sandstone shelf. Compared to the Upper Midden (the easternmost end of the Foreshore Midden), it is around 1,000 years younger, contains much more shell, and far fewer stone artefacts. For this reason it has been registered as a separate site on the AHIMS (#52-3-2163, the Whale Sculpture Midden).

These newly recorded remains are consistent with those previously found along the foreshore and as such, our assessment of what Aboriginal cultural heritage does, and potentially may, reside within the study area is largely unchanged from that discussed in **Section 3.6** and shown in updated form in **Figure 100**. In summary:

- *In situ* midden and burials forming part of these sites are most likely within 70m of the current shoreline.
- Shell midden may occur further from the shoreline than 70m, though it may not be *in situ*, as suggested by the recent uncovering of disturbed shells behind Alpha House.
- Burials may also occur anywhere else across the sandy soils of the study area.
- Low quantities and densities of stone artefacts (and less likely midden material) could be present anywhere across the study area, as shown by low density scatters (e.g. #52-3-2078) and isolated finds (e.g. #52-3-2080 and #52-3-2081). These will generally be in disturbed contexts due to historical land use but may include some *in situ* material below upper disturbed horizons.
- The registered Aboriginal engraving site #52-3-0221 is located immediately in the south of the study area. The sandstone outcrop on which the recorded engravings, and any potentially



## 6.2 The significance of Aboriginal heritage in the study area

### Significance assessment

The management of a heritage place is based on an understanding of the values of that place. Heritage NSW specifies that heritage significance should be assessed according to four criteria, social or cultural, historic, scientific (archaeological), and aesthetic.<sup>108</sup> These are based on the five criteria outlined in the Burra Charter; aesthetic, historic, scientific, social and spiritual.<sup>109</sup> These criteria are defined in **Table 22**.

In relation specifically to archaeological sites, aspects such as rarity and representativeness and the integrity (sometimes referred to as the intactness) of the site must be considered. The scientific significance, or research potential, of such sites is often assessed in relation to three questions.<sup>110</sup>

- Can the site contribute knowledge that no other resource can?
- Can the site contribute knowledge that no other site can?
- 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 potential social and spiritual significance of any sites can only be determined by Aboriginal community members. No specific information has been provided as part of this assessment, but the entire rationale for the Master Plan works assessed in this study has been to protect the acknowledged high significance of Aboriginal cultural heritage in the park.

**Table 22. Definitions of significance criteria considered in the assessment of the study area.**

Criterion	Definition
Aesthetic	Refers to the sensory and perceptual experience of a place—that is, how we respond to visual and non-visual aspects such as sounds, smells and other factors having a strong impact on human thoughts, feelings and attitudes. Aesthetic qualities may include the concept of beauty and formal aesthetic ideals. Expressions of aesthetics are culturally influenced
Historic	Is intended to encompass all aspects of history—for example, the history of aesthetics, art and architecture, science, spirituality and society. It therefore often underlies other values. A place may have historic value because it has influenced, or has been influenced by, an historic event, phase, movement or activity, person or group of people. It may be the site of an important event. For any place the significance will be greater where the evidence of the association or event survives at the place, or where the setting is substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of such change or absence of evidence.

<sup>108</sup> OEH 2011: 7.

<sup>109</sup> Australia ICOMOS 2013.

<sup>110</sup> Bickford and Sullivan 1984.

Criterion	Definition
Scientific	Refers to the information content of a place and its ability to reveal more about an aspect of the past through examination or investigation of the place, including the use of archaeological techniques. The relative scientific value of a place is likely to depend on the importance of the information or data involved, on its rarity, quality or representativeness, and its potential to contribute further important information about the place itself or a type or class of place or to address important research questions. To establish potential, it may be necessary to carry out some form of testing or sampling. For example, in the case of an archaeological site, this could be established by a test excavation.
Social	Refers to the associations that a place has for a particular community or cultural group and the social or cultural meanings that it holds for them.
Spiritual	Refers to the intangible values and meanings embodied in or evoked by a place which give it importance in the spiritual identity, or the traditional knowledge, art and practices of a cultural group. Spiritual value may also be reflected in the intensity of aesthetic and emotional responses or community associations and be expressed through cultural practices and related places. The qualities of the place may inspire a strong and/or spontaneous emotional or metaphysical response in people, expanding their understanding of their place, purpose and obligations in the world, particularly in relation to the spiritual realm. The term spiritual value was recognised as a separate value in the Burra Charter, 1999. It is still included in the definition of social value in the Commonwealth and most state jurisdictions. Spiritual values may be interdependent on the social values and physical properties of a place.

We have considered the significance of the registered sites, recently recorded Aboriginal archaeological remains in the 2023 test excavation. and other known types of Aboriginal archaeological remains relevant to our assessment of the Stage 1 Master Plan proposals, and these are summarised in **Table 23**.

**Table 23. Significance assessment of recorded and potential Aboriginal archaeological remains.**

Site name	AHIMS No.	Significance assessment
Foreshore Midden	52-3-0219 (and 52-3-2162 - Aboriginal ancestral remains uncovered during test excavations)	This substantial midden extends several hundred metres along the foreshore, and also contains the burials of Aboriginal ancestors. Recent test excavation for this project has shown that it extends further east along the foreshore than previously thought. It is of high scientific and historical significance due to its excellent preservation of a range and quantity of shell, stone and bone implements (including the largest documented number of shell fish hooks in Australia), a wide range of fish and animal bones and shellfish, and evidence of continuing occupation after the arrival of Europeans. It is also aesthetically significant as its location along the shore adjacent to the food sources it contains, and with some original vegetation nearby, evokes the feel of the camp next to Kamay.
Whale Sculpture Midden	52-3-2163	This area of midden documented during recent test excavation sits spatially apart from the Foreshore Midden, but was used within the same period and contains similar Aboriginal archaeological remains to the larger Foreshore Midden further to the west, and also contains the burials of Aboriginal ancestors. Like the Foreshore Midden, with which it is closely associated, it is of high scientific and historical significance. It is also aesthetically significant as its location along the shore adjacent to the food sources it contains, and with some original vegetation nearby, evokes the feel of the camp next to Kamay.

Site name	AHIMS No.	Significance assessment
Alpha House Campsite Midden Reburial	52-3-2094	This location in the eastern bank of the stream has been used by the La Perouse LALC to rebury Aboriginal archaeological remains retrieved during excavation and community collection works in 2007-2010, and archaeological excavations at Alpha House in 2020.
Kurnell engraving	52-3-0221	This rock engraving is unique on the Kurnell peninsula. Though it is highly eroded, and the motifs are largely indeterminate, the site retains high scientific significance as a part of the suite of archaeological remains in this area, including the Foreshore Midden.
Cundlemong's Grave	52-3-1381	Though it is not currently known if this 1840s burial of senior Aboriginal man Cundlemong has survived, the general area in which it may be located retains historical significance as an instance of the ongoing Aboriginal occupation and cultural continuity in the area, long after the arrival of Europeans. Any burial cut, Aboriginal human remains or grave goods that may survive would be culturally significant. Though they would also be of scientific significance for their research potential, there would be no proposal to research these remains unless requested and initiated by the local Aboriginal community e.g. if exposed by erosion or during future works within the study area.
Other burials	n/a	Any further Aboriginal burials located within the study area would be considered culturally significant to the local Aboriginal community. Though they would also be of scientific significance in and of themselves and as part of the broader suite of highly significant archaeological remains in the area, there would be no proposal to research these remains, unless requested and initiated by the local Aboriginal community e.g. if exposed by erosion or during future works within the study area.
Stone artefacts and faunal remains <i>in situ</i>	n/a	Small quantities of stone artefacts, midden shell and animal bone have been found <i>in situ</i> under layers of disturbed sand, particularly along the ridge containing Alpha House (#52-3-2078), and to the east of the Foreshore Midden. By themselves they have moderate scientific significance for their research potential, but they are also significant as poorly documented elements of a broader cultural landscape, including the adjacent Foreshore Midden.
Stone artefacts and faunal remains in disturbed contexts	n/a	Small quantities of stone artefacts, midden shell and animal bone have been found in disturbed contexts at several points around the study area. Only some are registered (e.g. #52-3-2081). They have some scientific significance as part of a broader suite of significant Aboriginal archaeological remains in the area, but can contribute little further understanding of past Aboriginal life by themselves due to their lack of context.

In addition to these archaeological elements within the study area, the entire Stage 1 Master Plan area has long been acknowledged as a place of local, state and national significance for both its Aboriginal cultural and historical values and its broader historical significance. This is reflected in Aboriginal site recordings and listings, and the inclusion of Aboriginal cultural and heritage values in both State Heritage Register and National Heritage List registrations of the Kurnell section of Kamay Botany Bay National Park. It is highly significant to local Aboriginal people around Kamay, demonstrating their ancient links to the bay, their first encounters with Europeans, their ongoing presence in the nineteenth century, and their continuing connections to the area throughout that

time. It is also one of those rare places that is significant to Aboriginal and Torres Strait Islander people across the country for its pivotal role in the history of European exploration and invasion of Australia.

## 7 How Aboriginal heritage could be managed

### 7.1 What impacts are possible to Aboriginal heritage from this proposal?

The proposed Stage 1 Master Plan works are outlined in **Section 1.3**. In this assessment we have considered the possibility for direct impacts to known and potential Aboriginal heritage. The proposed works include a range of elements including demolition of some existing structures, construction of a new visitor centre and amenities blocks, new paths, tracks and services as well as roadworks and landscaping. The works are proposed to be undertaken in phases and this will affect the scope of management actions, as discussed in detail in **Section 7.3**.

The rationale for the Master Plan is to preserve and enhance understanding of the highly significant Aboriginal and other heritage values of the site. The various works in the Master Plan have been devised in consultation with local Aboriginal community members, and are in accordance with the Plan of Management's aim of protecting and valuing Aboriginal cultural heritage for current and future generations. They are also informed by a considerable suite of archaeological investigations over many decades which have identified the extent of Aboriginal archaeological remains across parts of the study area and provide a good basis for predicting the type and condition of unrecorded Aboriginal cultural heritage across the remainder. Essentially this has concluded that while highly significant and *in situ* Aboriginal cultural heritage is largely restricted to within 70m of the foreshore, low density scatters or isolated finds of shell and stone artefacts could be present in disturbed contexts, and occasionally *in situ* contexts, across the study area.

On this basis, all of the proposed elements have the potential to impact Aboriginal heritage. This is summarised in **Table 24** and **Table 25** with reference to **Figure 100**. As outlined in **Section 7.2** though, considerable measures have been taken to investigate each proposed impact in detail and ensure that impacts to *in situ* Aboriginal cultural heritage can be avoided or minimised through design.

### 7.2 Can those impacts be avoided or minimised?

One of the main aims of the proposed Stage 1 Master Plan works is to enhance visitor understandings of the heritage of the site, and the protection of that heritage is paramount. Potential impacts to *in situ* archaeological remains will be avoided as much as possible, but the entire study area may contain isolated or low quantities of stone artefacts or midden material in disturbed contexts and sometimes in *in situ* contexts. The focus of this assessment is therefore on minimising harm.

**Table 24** summarises the potential impacts of the various proposed elements and how these potential impacts could be avoided or minimised. **Table 25** considers the potential for harm to identified Aboriginal cultural heritage within the study area. There are three main approaches used to avoid, minimise or manage the risk of impacts to identified or potential Aboriginal heritage, which are described in more detail in **Section 7.3**.



**1. Avoiding harm:** impacts to documented *in situ* Aboriginal heritage (other than some isolated or low density artefacts or faunal remains) have been avoided either by ensuring proposed elements avoid them, or through further active measures during construction, such as temporary protective fencing. Examples include:

- The proposed loop path near the Whale Sculpture (Element #32) has been amended to be a one-way path and thereby avoiding the loop which would have impacted the Whale Sculpture Midden (AHIMS #52-3-2163) which was identified during the 2023 test excavation.
- The ancestral remains uncovered during the 2023 test excavations (AHIMS #52-3-2162) have also been avoided by amending the design and route of the path in this area such that the path and its associated batter/surface stripping will not impact within several metres of the documented burial.

**2. Limiting harm:** in three small areas, it has not been possible to avoid all potential impacts to *in situ* Aboriginal archaeological remains during path construction, however considerable efforts have been made to minimise and mitigate potential impacts. These areas can be summarised as follows (see **Figure 100**):

- Main Loop Path (Chainage 700m – 740m). This area is on a slope, requiring an earthen batter below the downslope edge of the path. Raising the path to avoid all potential impacts would have required the battered slope to cover the area of TP11 in which Aboriginal ancestral remains are located, as well as surface stripping of a much wider area. Recorded Aboriginal archaeological remains in test pits across this area vary in frequency and become more substantial with greater depth, which will be below the level of impact in most cases. The most potential for impact in most cases, is with less frequent stone artefacts and midden material in upper horizons. On balance, it was decided that the most prudent approach was to minimise and mitigate impacts by the following means:
  - The path has been narrowed from 2.4m to 1.8m in this section to decrease the path and batter footprint, particularly on the upslope side which has the most potential for impacts.
  - Construction methods were developed to minimise direct impact through excavation and indirect impact through compaction required for the concrete path. In particular, a 150mm crushed sandstone layer deposited below the concrete and cement layer to reduce the need for compaction and decrease the overall required depth of excavation.
  - Some flexibility exists during construction to further reduce impacts e.g. where underlying soils are found to be sufficiently compact to reduce the quantity of imported material. In addition, an alternative localised construction method can be implemented using parallel narrow concrete ‘footings’ spaced at several metre intervals perpendicular to the path alignment. This will create a greater but localised impact within the footprint of the footings but will allow impacts to be avoided in the metres between, which may allow more significant or intact archaeological remains to be fully protected.

Extrapolating the findings from test pits at 10m intervals and those on parallel transects, it is likely that harm will be avoided to *in situ* archaeological remains in most cases, particular the side of the path overlying the lower slopes which will need to be raised to accommodate the path. In some areas however it is possible that excavation will be required on the upslope side of the path 100-200mm into areas that contain *in situ* archaeological remains. These are likely to be relatively sparse at the depth of proposed impact. Where impacts cannot be avoided through the means outlined above, limited and targeted archaeological salvage will be used to ensure that no Aboriginal archaeological remains are destroyed by the works and that excavated remains can be analysed to provide further information about the use of the site.

- **End of Whale Path.** As the access path to the whale sculpture viewing platform is no longer a loop, it is necessary to step the end of the path down to the existing grass level. This may involve limited impacts to the eastern end of the Whale Sculpture Midden (#52-3-2163) within an approximately 5m length of the 1680mm wide fibre reinforced plastic (FRP) path. Specifically several sets of 100mm diameter FRP posts are likely to be required depending on local ground conditions. Where posts cannot be positioned to avoid midden, their footprint (max. 200mm x 200mm area to the depth of each footing) will require targeted salvage excavation.
- **Connecting Stairs from beach to Main Loop Path.** These stairs will need to be constructed into the front face of the dune at the rear of the beach to the east of the stream. While this area largely contains mixed sands and other introduced materials, it is also heavily overgrown and it is possible during installation of the stairs that less disturbed dune deposits may be encountered, and that these could contain midden. Where excavation and footings cannot be relocated to avoid any intact Aboriginal archaeological deposits, their footprint (max. 200mm x 200mm area to the depth of each footing) will require targeted salvage excavation.

**3. Monitoring of all works:** the majority of the Stage 1 Master Plan works have only the possibility of encountering isolated or small numbers of stone artefacts or midden material in disturbed or occasionally *in situ* contexts (e.g. to the east of the Foreshore Midden). Though these would retain some significance as part of the highly significant suite of Aboriginal cultural heritage within the study area, that significance is not tied to their current context. It is considered appropriate to undertake these activities and minimise potential impacts by ensuring that works are subject to archaeological monitoring and community collection of Aboriginal archaeological remains in disturbed contexts under an Aboriginal Heritage Impact Permit (AHIP). The monitoring will also allow potential impacts to *in situ* archaeological remains to be identified along a 40m segment of the Main Loop Path (element #24, Chainage 700-740) and Whale Path ending, such that they can be avoided, minimised or mitigated through targeted archaeological salvage excavation.

Monitoring is also important in relation to the possibility that some activities may encounter Aboriginal burials. In particular the possible presence of Cundlemong's burial has been considered. Because of the high degree of historical activity within the potential area of Cundlemong's grave, and across most parts of the study area, any Aboriginal human remains that have survived may be dispersed or disturbed. This means that remote sensing techniques such as ground penetrating radar would be of limited use in delineating graves or isolated/dispersed human remains without

extensive intrusive and potentially harmful excavation to confirm the anomalies identified. Given the very limited footprint of most activities, and that most will take place in previously disturbed soil horizons, it is considered more appropriate to manage this risk through archaeological monitoring.

The Stage 1 Master Plan works will be undertaken using methods based on a very similar approach successfully used in relation to previous master plan works within the same area in 2008 – 2010.<sup>111</sup> By avoiding or minimising impacts to *in situ* Aboriginal heritage and mitigating impacts in other ways (e.g. reburial of retrieved objects), the current works will not have an appreciable cumulative impact on the Aboriginal heritage within the Stage 1 Master Plan area. Maximising preservation of Aboriginal heritage also ensures ongoing Aboriginal community access.

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<sup>111</sup> Irish 2010.

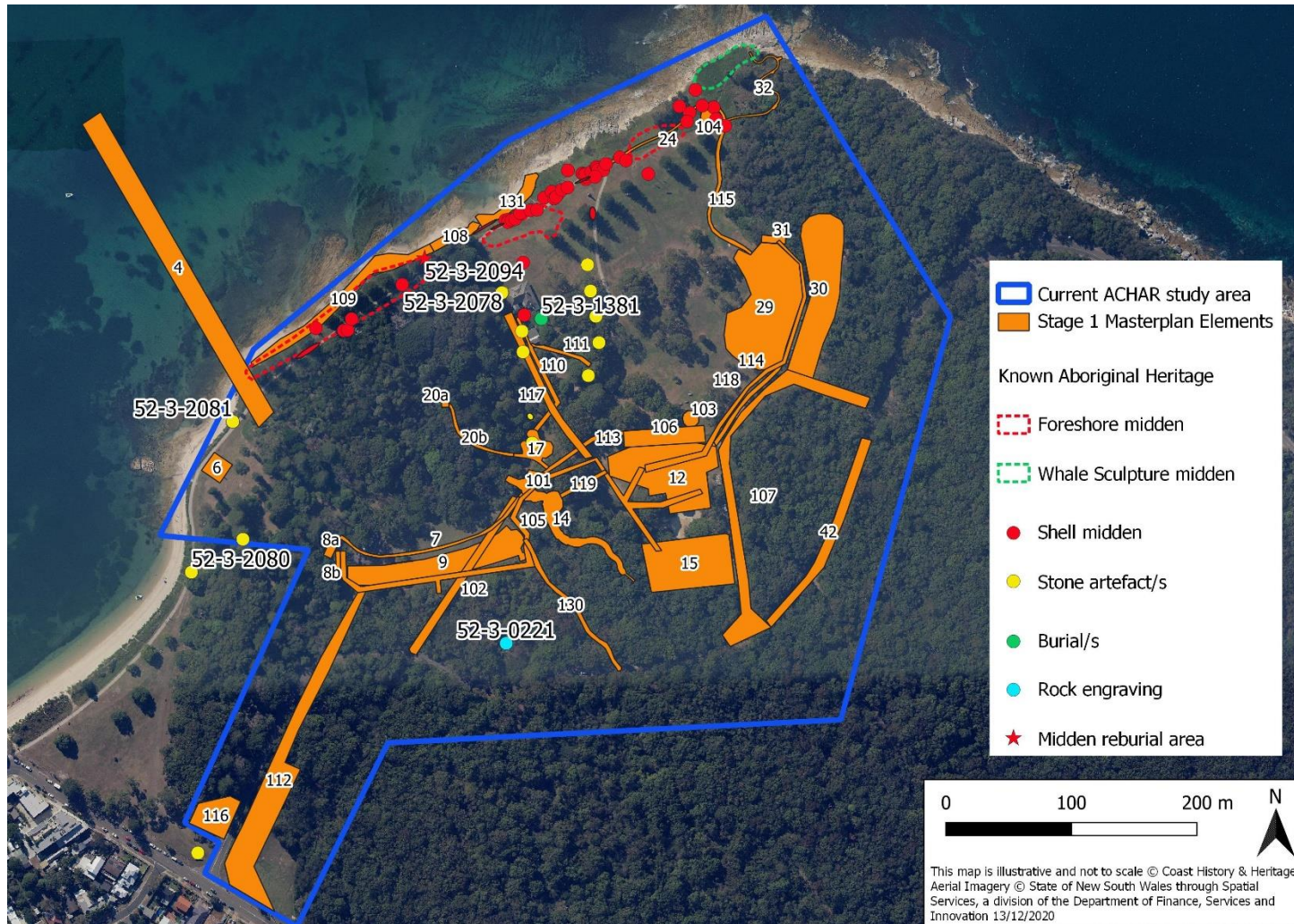


Figure 100. Proposed works in relation to the extent of known Aboriginal heritage.

**Table 24. Project elements and potential Aboriginal heritage impacts (see also Figure 100).**

Element	Description	Previous investigation & known/potential sites in vicinity	Potential impact	Proposed management
6	Cook Monument	The area in front of the monument tested in 2007, monitored in 2008 and further tested in 2020. Found to contain fill sand behind the revetment to at least 400mm depth. No Aboriginal archaeological remains found.	Proposal will not impact any documented Aboriginal archaeological remains and is unlikely to involve impacts to any buried natural shoreline. Drainage works contained within areas of existing disturbance within monument footprint. Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts (fill).	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
7	Western Path	Cricket pitch area tested in 2007 and 2022 geotechnical testing monitored. Fill and disturbance noted on both occasions and no Aboriginal objects found.	Impacts possible to isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
8a	Amenities	Not previously investigated but no Aboriginal archaeological remains yet documented.	Existing block is cut into dune. Removal is unlikely to disturb any <i>in situ</i> Aboriginal archaeological remains, but possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
8b	Amenities	Not previously investigated but no Aboriginal archaeological remains yet documented. Adjacent to low-lying cricket pitch area in which no remains previously found.	Location is existing bitumen carpark and service trench likely to run through low-lying land of cricket pitch. Works are unlikely to disturb any <i>in situ</i> Aboriginal archaeological remains, but possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )

Element	Description	Previous investigation & known/potential sites in vicinity	Potential impact	Proposed management
9	Carpark	No testing done in actual carpark area but several test pits in proximity in 2007 found no remains to 300-400mm.	Unlikely to contain <i>in situ</i> or extensive Aboriginal archaeological remains. Historical aerials suggests upper surface likely to be disturbed. Rock engraving site (AHIMS #52-3-0221) does not extend into this area and can be protected from indirect impacts. Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	<ol style="list-style-type: none"> <li>1. Establish engraving site and buffer zone as a 'no harm' area under Aboriginal Heritage Impact Permit 1 as outlined in <b>Section 7.3.3</b>.</li> <li>2. Erect temporary fencing around the extent of the no harm area for the duration of these works.</li> <li>3. Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b>)</li> </ol>
12	Visitor Centre	Four mechanical test pits in 2004 encountered no Aboriginal cultural material and found natural sand to bedrock at 100cm in two, pipeline in one, and a deep profile to 2.9m in the other. Nearby pit A3 in 2007 also showed no remains to at least 200mm depth.	Impacts restricted to disturbed horizons with no archaeological potential. Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts (fill).	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
14	The Stream	Not previously investigated.	Currently piped sections proposed for opening are all contained within fill. Southern portion mapped historically as swamp. Unlikely to contain <i>in situ</i> remains and probably contained within former creek/swamp corridor. Possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
15	Visitor Centre Carpark	Two mechanical test pits in 2004 found natural sand to bedrock at 100cm in one, and a deep profile to 2.9m in the other. No Aboriginal cultural materials in either.	Impacts restricted to disturbed horizons with no archaeological potential. Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts (fill).	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )

Element	Description	Previous investigation & known/potential sites in vicinity	Potential impact	Proposed management
17	Collection Garden	Nearby pit T3 in 2007 showed no remains to at least 400mm depth.	Impacts likely to be shallow (plantings and signage) and in existing area of disturbance. Low possibility that works could encounter isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
20a	Replacement culvert	Testing in 2007 shows loose sand with no archaeological remains to 200mm. Below this unknown.	Does not appear to be any additional subsurface impacts from this activity. Any minor impacts unlikely to impact Aboriginal cultural heritage. Low possibility that works could encounter isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
20b	Burrawang Walk	Testing in 2007 shows loose sand with no archaeological remains to 200mm. Below this unknown.	Does not appear to be any additional subsurface impacts from this activity. Any minor impacts unlikely to impact Aboriginal cultural heritage. Low possibility that works could encounter isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )

Element	Description	Previous investigation & known/potential sites in vicinity	Potential impact	Proposed management
24	Main Loop Path	2023 test excavations located midden/stone artefacts across this area and Aboriginal ancestral remains in one location (#52-3-2162). Midden and/or stone artefacts largely at depths below 100-200mm. Location of documented Ancestral remains avoided through redesign.	Potential for impacts to <i>in situ</i> midden and unrecorded burials of high significance.  Some areas to the east of the Foreshore Midden contain isolated or low numbers of stone artefacts or faunal remains in disturbed or occasionally <i>in situ</i> contexts	1. Establish location of Aboriginal ancestral remains as a 'no harm' area under Aboriginal Heritage Impact Permit 1 as outlined in <b>Section 7.3.3</b> . 2. Archaeological monitoring and community collection of any isolated Aboriginal archaeological remains in disturbed or <i>in situ</i> contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> ) 3. Along Chainages 700m -740m of the path, targeted archaeological salvage where impacts to <i>in situ</i> Aboriginal archaeological remains cannot be avoided under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.4</b> )
29	Picnic crescent	Test pits across current Monument Path show mixed sands to 400mm, mechanical test pits in 2004 show natural sands to bedrock at 1m, with historical disturbance in upper horizons of some pits, and no Aboriginal archaeological remains.	Excavation for picnic facility footings may encounter isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
30	Carpark	General area investigated with mechanical pits in 2004, showing natural sand to bedrock at 700-1000mm and no Aboriginal archaeological remains.	Works largely within existing carpark footprint and/or highly disturbed ground. Low possibility that works could encounter isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )



Element	Description	Previous investigation & known/potential sites in vicinity	Potential impact	Proposed management
31	Amenities	General area investigated with mechanical pit in 2004 showing gravel fill on mixed sand and gravel to bedrock at 650mm and no Aboriginal archaeological remains.	Works largely within existing building footprint and/or highly disturbed ground. Low possibility that works could encounter isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
32	Whale Loop Path	2023 test excavations located midden to the west of the Whale Sculpture and no Aboriginal <i>in situ</i> Aboriginal archaeological remains along the remainder of the proposed loop.	<p>Potential for impacts to most <i>in situ</i> midden avoided by removing segment of proposed path in location of midden. Possibility for limited impacts from 100mm diameter path footings over 5m length at end of path, in vicinity of TP24.</p> <p>Possibility elsewhere that works could encounter isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.</p>	<p>1. Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b>)</p> <p>2. Along the final 5m length of path, targeted archaeological salvage where impacts to <i>in situ</i> Aboriginal archaeological remains cannot be avoided under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.4</b>)</p>
42	Muru trail parking	Not investigated	Works largely within existing roadway and trail. Low possibility that works could encounter isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
101	Boardwalk over stream	Test Pit T4 nearby in 2007 suggests area boggy and inundated and contained no Aboriginal archaeological remains to 400mm depth	Area of footings likely to be boggy ground associated with creek. Possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )

Element	Description	Previous investigation & known/potential sites in vicinity	Potential impact	Proposed management
102	Service trench	Alignment from Meeting Place to end of Cricket Pitch tested in 2007. Nothing found.	Proposal will not impact any documented Aboriginal archaeological remains but could encounter isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
103	Dancing Circle	General area investigated with mechanical pits in 2004, showing natural sand to bedrock at 700-1000mm and no Aboriginal archaeological remains.	Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
104	Dancing Circle	2023 test excavations located sparse shell fragments in one of two test pits within the Dancing Circle footprint and occasional isolated shells and stone artefacts in disturbed contexts in the vicinity.	Possible impact to isolated or low numbers of stone artefacts or faunal remains in <i>in situ</i> contexts, however limited excavation proposed in this area.	Archaeological monitoring and community collection of any isolated Aboriginal archaeological remains in disturbed or <i>in situ</i> contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
105	Service trench	Some pits at visitor centre and cricket pitch carpark end have been tested in 2007 and found no remains to 300-400mm.	Unlikely to contain <i>in situ</i> or extensive Aboriginal archaeological remains. Rock engraving site (AHIMS #52-3-0221) does not extend into this area and can be protected from indirect impacts. Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	<ol style="list-style-type: none"> <li>1. Establish engraving site and buffer zone as a 'no harm' area under Aboriginal Heritage Impact Permit 1 as outlined in <b>Section 7.3.3</b>.</li> <li>2. Erect temporary fencing around the extent of the no harm area for the duration of these works.</li> <li>3. Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b>)</li> </ol>

Element	Description	Previous investigation & known/potential sites in vicinity	Potential impact	Proposed management
106	Geothermal array	Mechanical test pits nearby in 2004 encountered no Aboriginal cultural material and found natural sand to bedrock. The works are largely contained within the footprint of the existing raised pad associated with the current visitor centre.	Impacts restricted to disturbed horizons with no archaeological potential. Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts (fill).	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
107	Road resheeting	Four mechanical test pits in 2004 encountered no Aboriginal cultural material and found natural sand to bedrock at 100cm in two, pipeline in one, and a deep profile to 2.9m in the other. Nearby pit A3 in 2007 also showed no remains to at least 200mm depth.	Impacts restricted to disturbed horizons with no archaeological potential. Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts (fill).	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )

Element	Description	Previous investigation & known/potential sites in vicinity	Potential impact	Proposed management
108	Revetment east of stream	<p>Known midden in this area at shallow depth but wall is built seaward of the existing dune.</p> <p>Midden reburial area (#52-3-2094) in eastern bank of stream.</p>	<p>Some potential for exposing midden through cutting back of vegetation. As constructed from a large number of sandstone logs, some flexibility with design to avoid potential impacts and no excavation into intact dune required. Wall will provide better protection of midden from erosion.</p> <p>Revegetation works in stream corridor could impact midden reburial area (#52-3-2094)</p> <p>Excavation and footings for stairs largely within disturbed dune deposits but may encountered less disturbed dune portions with potential for midden.</p>	<ol style="list-style-type: none"> <li>1. Archaeological monitoring of revegetation works in vicinity of midden reburial area (#52-3-2094) to ensure that this location is avoided.</li> <li>2. Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 2 (see <b>Section 7.3.3</b>).</li> <li>3. At locations of stair footings and excavation into front face of dune, targeted archaeological salvage where impacts to <i>in situ</i> Aboriginal archaeological remains cannot be avoided under Aboriginal Heritage Impact Permit 2 (see <b>Section 7.3.4</b>)</li> <li>4. In all other areas, localised modification of design if <i>in situ</i> archaeological remains or substantial quantities of archaeological remains in disturbed contexts are exposed.</li> <li>5. Possible presence of Aboriginal human remains to be managed in accordance with procedures in <b>Section 7.3.3</b>.</li> </ol>

Element	Description	Previous investigation & known/potential sites in vicinity	Potential impact	Proposed management
109	Revetment west of stream	Known midden in this area at shallow depth but wall is built seaward of the existing dune.	Some potential for exposing midden through removal of top course of large sand bags, and elsewhere where vegetation cut back. As constructed from a large number of sandstone logs, some flexibility with design to avoid potential impacts and no excavation into intact dune required. Wall will provide better protection of midden from erosion.	<ol style="list-style-type: none"> <li>1. Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 2 (see <b>Section 7.3.3</b>).</li> <li>2. Localised modification of design if <i>in situ</i> archaeological remains or substantial quantities of archaeological remains in disturbed contexts are exposed.</li> <li>3. Possible presence of Aboriginal human remains to be managed in accordance with procedures in <b>Section 7.3.3</b>.</li> </ol>
110	Service trench	Test pits in 2007 mostly show disturbance to at least 400mm and no Aboriginal cultural material. Some stone artefacts found during monitored service trench excavation near Alpha House in 2008 but not during similar monitoring in 2020. In vicinity of possible location of Cundlemong's burial.	Trenching outside of existing alignments may encounter isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	<ol style="list-style-type: none"> <li>1. Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b>)</li> <li>2. Possible presence of Aboriginal human remains to be managed in accordance with procedures in <b>Section 7.3.3</b>.</li> </ol>
111	Footpath	Test pits in 2007 mostly show disturbance to at least 400mm and no Aboriginal cultural material. Some stone artefacts found during monitored service trench excavation immediately north-west in 2008 but not during similar monitoring in 2020. In vicinity of possible location of Cundlemong's burial.	Impacts possible around Alpha House to disturbance archaeological remains to around 400mm depth, potentially <i>in situ</i> archaeological remain below this depth	<ol style="list-style-type: none"> <li>1. Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b>)</li> <li>2. Possible presence of Aboriginal human remains to be managed in accordance with procedures in <b>Section 7.3.3</b>.</li> </ol>
112	Service trench	Three test pits along Solander Drive in 2007 all show absence of Aboriginal archaeological remains to at least 400mm depth.	Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )

Element	Description	Previous investigation & known/potential sites in vicinity	Potential impact	Proposed management
113	Main Loop Path	No testing along exact alignment, but largely within areas of existing disturbance and nearby pit A3 in 2007 also showed no remains to at least 200mm depth.	Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
114	Main Loop Path	General area investigated with mechanical pits in 2004, showing natural sand to bedrock at 700-1000mm and no Aboriginal archaeological remains.	Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
115	Main Loop Path	Testing only at southern end with mechanical pit in 2004, showing natural sand to bedrock at 700-1000mm and no Aboriginal archaeological remains. Remainder of route tested in 2023 and found to contain waterlogged ground and occasional stone artefacts as well as sandstone at shallow depth across some of the area.	Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
116	Demolition works	Test pits nearby in 2007 found no Aboriginal archaeological remains but stone axe found nearby in 1971.	Demolition works only, within previously disturbed footprint. Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
117	Road resurfacing	Several finds of stone artefacts during 2007 testing and 2008-2010 monitoring in the vicinity, but below the surface.	Works will be largely restricted to the current surface. Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
118	Service trench	General area investigated with mechanical pits in 2004, showing natural sand to bedrock at 700-1000mm and no Aboriginal archaeological remains.	Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )

Element	Description	Previous investigation & known/potential sites in vicinity	Potential impact	Proposed management
119	Stormwater trench	Nearby pit A3 in 2007 also showed no remains to at least 200mm depth.	Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b> )
130	Walking track	Some pits in cricket pitch area have been tested in 2007 and found no remains to 300-400mm.	Unlikely to contain <i>in situ</i> or extensive Aboriginal archaeological remains. Rock engraving site (AHIMS #52-3-0221) does not extend into this area and can be protected from indirect impacts. Low possibility of encountering isolated or low numbers of stone artefacts or faunal remains in disturbed contexts.	<ol style="list-style-type: none"> <li>1. Establish engraving site and buffer zone as a 'no harm' area under Aboriginal Heritage Impact Permit 1 as outlined in <b>Section 7.3.3</b>.</li> <li>2. Erect temporary fencing around the extent of the no harm area for the duration of these works.</li> <li>3. Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 1 (see <b>Section 7.3.3</b>)</li> </ol>
131	Revetment repairs	Repair of existing revetment including removal of some blocks and installation of others. See also element #108.	Some potential for exposing midden and dislodging disturbed midden attached to existing sandstone blocks.	<ol style="list-style-type: none"> <li>1. Archaeological monitoring and community collection of any Aboriginal archaeological remains in disturbed contexts under Aboriginal Heritage Impact Permit 2 (see <b>Section 7.3.3</b>).</li> <li>2. Localised modification of design if <i>in situ</i> archaeological remains or substantial quantities of archaeological remains in disturbed contexts are exposed.</li> <li>3. Possible presence of Aboriginal human remains to be managed in accordance with procedures in <b>Section 7.3.3</b>.</li> </ol>

**Table 25. Impact and management summary for known Aboriginal sites (see also Figure 100).**

AHIMS #	Site type	Element	Potential impact/proposed management	Type of harm	Degree of harm	Consequence of harm
52-3-0219	Midden and burials	<ul style="list-style-type: none"> <li>• Revetment east of stream (108)</li> <li>• Revetment west of stream (109)</li> <li>• Revetment repairs (131)</li> </ul>	<ul style="list-style-type: none"> <li>• No works are proposed within the defined extent of the <i>in situ</i> Foreshore Midden with the limited exception of the footprint of any excavation or footings for the proposed stairs east of the stream which could encounter less disturbed dune portions with potential for midden. If <i>in situ</i> midden is encountered and cannot be avoided through localised redesign, targeted salvage of the extent of the areas of impact can be undertaken under AHIP2.</li> <li>• Revetment works could also potentially expose <i>in situ</i> midden but will avoid impacts through redesign. If shells or artefacts associated with the midden are encountered in disturbed contexts and will be harmed, these can be collected under AHIP2.</li> </ul>	Direct	Partial	Partial loss of value (material to be collected) or in the case of the proposed stairs, potential targeted archaeological salvage.
		<ul style="list-style-type: none"> <li>• Main Loop Path (24) except Chainage 700 – 740m</li> <li>• Whale Loop Path (32)</li> <li>• Dancing Circle (104)</li> </ul>	<ul style="list-style-type: none"> <li>• Midden does not extend as far east as Whale Loop Path or Dancing Circle though some areas around these elements contain occasional faunal remains or stone artefacts. Most of Main Loop Path contains similar sparse remains.</li> </ul>	Direct	Partial	Partial loss of value (material to be collected)
		<ul style="list-style-type: none"> <li>• Main Loop Path (24) Chainage 700-740m</li> </ul>	<ul style="list-style-type: none"> <li>• Midden and high densities of stone artefacts in this area below 100-200mm. Path design has minimised impacts but some areas likely to encounter <i>in situ</i> midden or artefacts to the depth of proposed impact. Targeted salvage excavation of limited depth likely to be required where impacts cannot be avoided during construction.</li> </ul>	Direct	Partial	Partial loss of value (material to be archaeologically salvaged)



AHIMS #	Site type	Element	Potential impact/proposed management	Type of harm	Degree of harm	Consequence of harm
52-3-2162	Aboriginal ancestral remains	<ul style="list-style-type: none"> <li>Main Loop Path (24)</li> </ul>	<ul style="list-style-type: none"> <li>Path redesigned to avoid the location of the Aboriginal ancestral remains located during 2023 test excavations.</li> </ul>	None	None	No loss of value
52-3-2163	Whale Sculpture Midden	<ul style="list-style-type: none"> <li>Whale Loop Path (32)</li> </ul>	<ul style="list-style-type: none"> <li>Loop path redesigned to omit path across most of area of Whale Sculpture midden.</li> <li>Northern 5m end of path will require 100mm diameter footings that may extend into Whale Sculpture Midden area. Where these footing locations intersect <i>in situ</i> midden or artefacts, targeted salvage excavation to the depth of proposed impact likely to be required.</li> </ul>	Direct	Partial	Partial loss of value (material to be archaeologically salvaged)
52-3-0221	Rock engraving	<ul style="list-style-type: none"> <li>Carpark (9)</li> <li>Service trench (102)</li> <li>Service trench (105)</li> <li>Walking track (130)</li> </ul>	<ul style="list-style-type: none"> <li>No elements proposed in area of engraving and impacts can be avoided through temporary fencing and specification as No Harm Area on proposed AHIP.</li> </ul>	None	None	No loss of value
52-3-1381	Burial	<ul style="list-style-type: none"> <li>Service trench (110)</li> <li>Footpath (111)</li> <li>Road resurfacing (117)</li> </ul>	<ul style="list-style-type: none"> <li>Location of burial unknown. Service trench following existing trench and road resurfacing largely surface impacts. Footpath unlikely to encounter undisturbed soil horizons but potential for burial to be present cannot be discounted. If encountered, management will need to be determined.</li> </ul>	n/a	n/a	n/a
52-3-2078	Open campsite	<ul style="list-style-type: none"> <li>Service trench (110)</li> <li>Road resurfacing (117)</li> </ul>	<ul style="list-style-type: none"> <li>Works will use existing service trench and other impacts expected to be shallow and encounter only disturbed deposits. Low possibility of encountering isolated or low numbers of stone artefacts in disturbed contexts which may be an extension of site #52-3-2078.</li> </ul>	Direct	Partial	Partial loss of value (material to be collected)

AHIMS #	Site type	Element	Potential impact/proposed management	Type of harm	Degree of harm	Consequence of harm
52-3-2094	Midden reburial area	<ul style="list-style-type: none"> <li>• Revetment east of stream (108)</li> </ul>	<ul style="list-style-type: none"> <li>• All revetment works either side of stream banks and will not impact reburial area.</li> <li>• Revegetation works in this area will be monitored to avoid the location of the midden reburial area</li> </ul>	None	None	No loss of value

### **7.3 What management strategies will be in place to protect Aboriginal heritage?**

The assessment above has concluded that, with appropriate management, all elements of the proposed Stage 1 Master Plan works can avoid impacts to substantial *in situ* Aboriginal archaeological remains, with the exception of three small areas along the Main Loop Path (Element #24), Whale Loop Path (Element #32) and Revetment Stairs (Element #108), where some impacts may occur. In all cases however, impacts to all Aboriginal archaeological remains (*in situ* or not) will be mitigated by retaining any impacted items through collection or excavation.

#### **7.3.1 General requirements during construction**

##### **Construction methods**

- In general, the use of heavy machinery should be minimised within 70m landward of the foreshore between the ferry wharf and the eastern end of the Foreshore Midden (90m east of the Solander Monument), and within the area of the Whale Sculpture Midden. This is due to the potential impacts of compaction and vibration on subsurface archaeological remains and ancestral remains within the Foreshore Midden (#52-3-0219) and Whale Sculpture Midden (#52-3-2163). Only soft-tread light vehicles should be permitted in this area to minimise vibration and surface damage. As many areas quickly become waterlogged in wet weather, access should be limited to dry weather to avoid churning of the ground.
- Construction of the Main Loop Path (Element #24) must proceed within the footprint developed for these works and using the methodologies outlined in **Section 7.2**, and in accordance with the no harm area in this location (see **Figure 102**).
- Movement of vehicles and plant equipment to and from construction areas should be via prescribed routes which avoid as much as possible the area within 70m of the foreshore between the ferry wharf and 90m east of the Solander Monument where the Foreshore Midden is known to be present.

##### **Aboriginal heritage induction**

It is proposed that all excavation works during demolition or construction are subject to archaeological monitoring to enable any Aboriginal archaeological remains or other relevant features to be rapidly identified. However as an additional precaution we recommend that all workers involved in excavation works onsite undertake an Aboriginal Cultural Heritage Induction as part of their overall OH&S induction for the site. This will explain the nature of the dune sands and the types of features that are being looked for, the procedures for archaeological monitoring that are to be followed and procedures in the event of unexpected finds. The induction is to be developed and delivered by a suitably qualified archaeologist in conjunction with the La Perouse Local Aboriginal Land Council.

##### **Unexpected finds procedures**

During any works not subject to archaeological monitoring, if any Aboriginal objects or bones suspected of being human are identified during construction, site workers must:

- Not further disturb or move these remains.
- Immediately cease all work at the location.
- Contact the La Perouse Local Aboriginal Land Council (and a suitably qualified archaeologist if required) for initial advice. This may be in the form of evaluation of a photograph of the encountered material to check if it is of potential Aboriginal cultural origin, or may require a site visit to determine appropriate further actions.

If it is determined that the uncovered materials may be Aboriginal objects or Aboriginal human remains, the following must occur:

- Contact the DPE on 1300 361 967 to notify them of the find.
- Not recommence any work at the particular location until appropriate actions have been undertaken and specific advice has been provided by the DPE in accordance with Part 6 of the *National Parks & Wildlife Act 1974*. Possible actions include:

**In the case of Aboriginal objects**, the project archaeologist and the La Perouse Local Aboriginal Land Council must be contacted to determine appropriate management of the objects, following the procedures outlined in **Section 7.3.3**. The objects are to be registered in the Aboriginal Heritage Information Management System (AHIMS).

**In the case of bone which may potentially be human**, a specialist physical anthropologist will be contacted to determine whether the remains are definitely human, and whether they are likely to be Aboriginal or non-Aboriginal in origin. If they are confirmed as, or likely to be Aboriginal and old, discussions will be held with the La Perouse Local Aboriginal Land Council, other Registered Aboriginal Parties and the DPE to determine the most appropriate way to manage them. In all other cases, such as Aboriginal or non-Aboriginal bone that is potentially less than 100 years old, the Police will be notified as it may be a potential coronial matter.

- Do not recommence any work at the location unless authorised in writing by the DPE.

### 7.3.2 Aboriginal Heritage Impact Permits

It is proposed to manage all Stage 1 Master Plan works through the use of Aboriginal Heritage Impact Permits (AHIP) to allow recovery of any Aboriginal archaeological remains encountered during archaeological monitoring of these works through community collection, and in three cases through targeted archaeological salvage if required. As the works are being assessed under two different approval pathways, two separate AHIPs will be sought as follows. This is summarised in **Figure 102**.

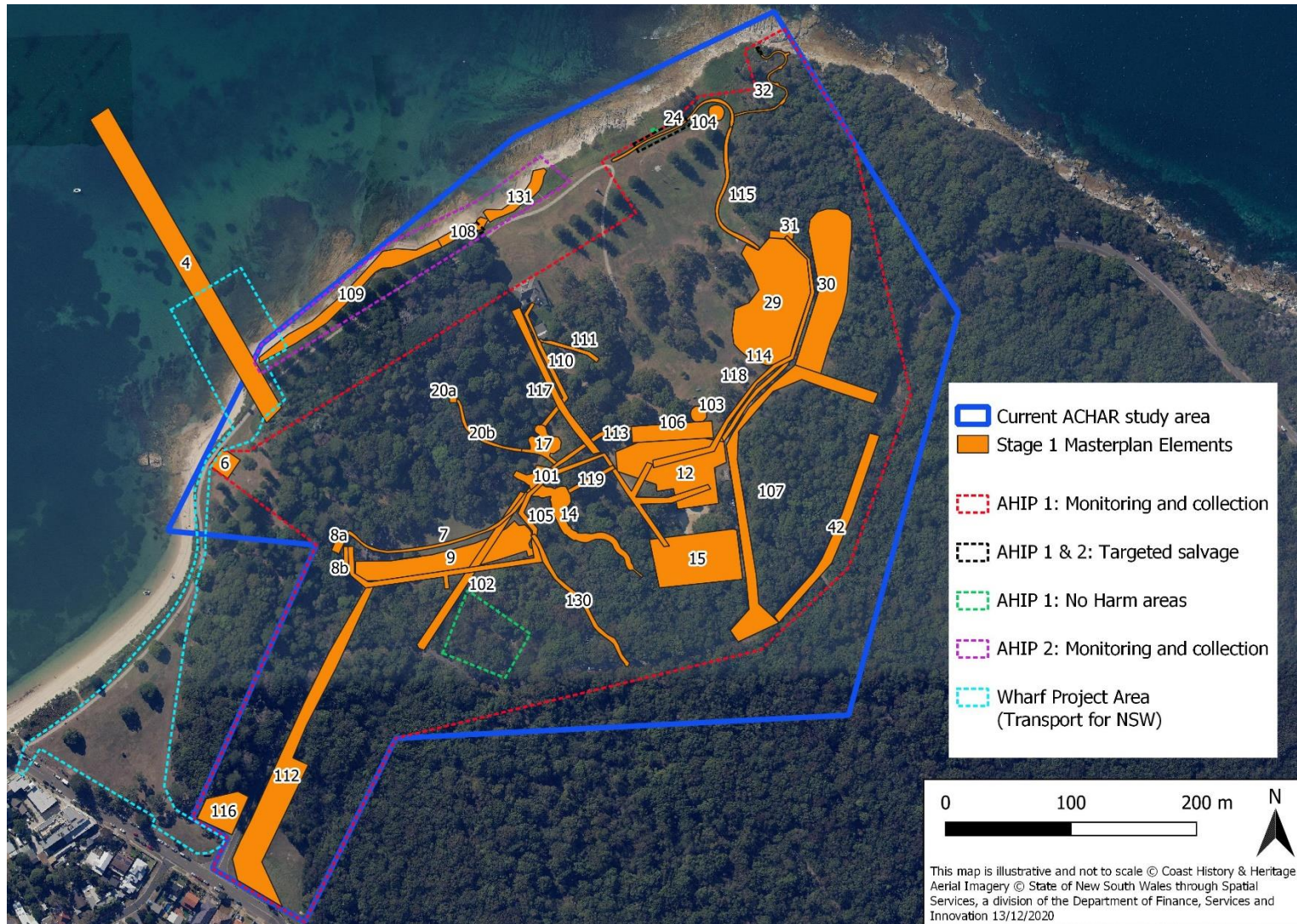


Figure 101. Summary of main proposed management actions.

## AHIP 1

This AHIP will cover all Stage 1 Master Plan works other than the revetment works (elements 108, 109 and 131). The application for this AHIP will be lodged on finalisation of the current ACHAR and completion of the project REF.

The area that AHIP 1 will apply to is shown in **Figure 102** and **Table 26**, **Table 27** and **Table 28**. The AHIP will allow:

- archaeological monitoring and collection of isolated and low density Aboriginal objects during Master Plan works in accordance with the procedures outlined in **Section 7.3.3**. This includes Master Plan elements: demolition and construction of new amenities (elements 8a & 8b), carpark (element 9), new visitor centre (element 12) and geothermal array (element 106), visitor centre carpark (element 15), collection garden (element 17), boardwalk over stream (element 101), service trenches (elements 102, 105 & 112), dancing circles (elements 103 & 104), main loop path (elements 24 & 113), whale loop path (element 32), demolition works (element 116), a stormwater trench (element 119) and new walking path (element 130).
- targeted archaeological salvage excavation in association with the construction of a section of the main loop path (element 24) and the northern end of the whale loop path (element 32) within the areas indicated in **Figure 102** and specified in **Table 28**, and in accordance with the procedures outlined in **Section 7.3.4**.
- analysis and reporting on the works completed under the AHIP, undertaken in accordance with the procedures outlined in **Section 7.3.5**.
- final management of Aboriginal objects and Aboriginal ancestral remains retrieved during the works completed under this AHIP, in accordance with **Section 7.3.6**.

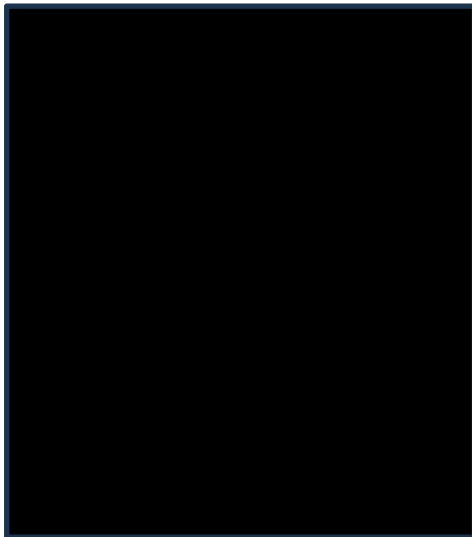
AHIP 1 will be conditioned such that:

- a. no harm will be permitted within the no harm areas shown in **Figure 102** and detailed in **Table 27**, protecting the Aboriginal engraving site #52-3-0221 and location of recently recorded Aboriginal ancestral remains (#52-3-2162). These two areas should be protected with temporary fencing for the duration of nearby works (Master Plan elements #9, #24, #102, and #105), to prevent inadvertent impacts.
- b. no harm is permitted to any Aboriginal human remains. Procedures to be followed in the event that suspected Aboriginal human remains are found are outlined below.
- c. no harm is permitted to any *in situ* Aboriginal archaeological deposits, except in the area indicated in **Figure 102** and specified in **Table 28**. Outside of this area, the only *in situ* archaeological remains are isolated or low density scatters of stone artefacts and/or faunal remains which can be collected under the AHIP as outlined above. A methodology for determining the intact nature of Aboriginal archaeological deposits is outlined in **Section 7.3.3** below.

**Table 26. Coordinates of proposed AHIP 1 (MGA Zone 56). Refer to Figure 102.**

Point	Easting	Northing	Point	Easting	Northing	Point	Easting	Northing
A	335877	6236186	H	335724	6236096	O	335387	6235573
B	335842	6236243	I	335416	6235906	P	335460	6235530
C	335811	6236225	J	335394	6235906	Q	335533	6235677
D	335820	6236195	K	335384	6235894	R	335824	6235747
E	335774	6236189	L	335469	6235831	S	335893	6235812
F	335751	6236166	M	335371	6235613	T	335943	6235951
G	335697	6236137	N	335398	6235597	U	335898	6236153

**Table 27. Coordinates of the proposed no harm areas for AHIP 1 (MGA Zone 56). Refer to Figure 102.**



**Table 28. Coordinates of the proposed targeted archaeological salvage area for AHIP 1 (MGA Zone 56). Refer to Figure 102.**

Point	Easting	Northing
S1	335722	6236151
S2	335763	6236172
S3	335767	6236166
S4	335726	6236145
S5	335821	6236227
S6	335822	6236228
S7	335825	6236223
S8	335823	6236222

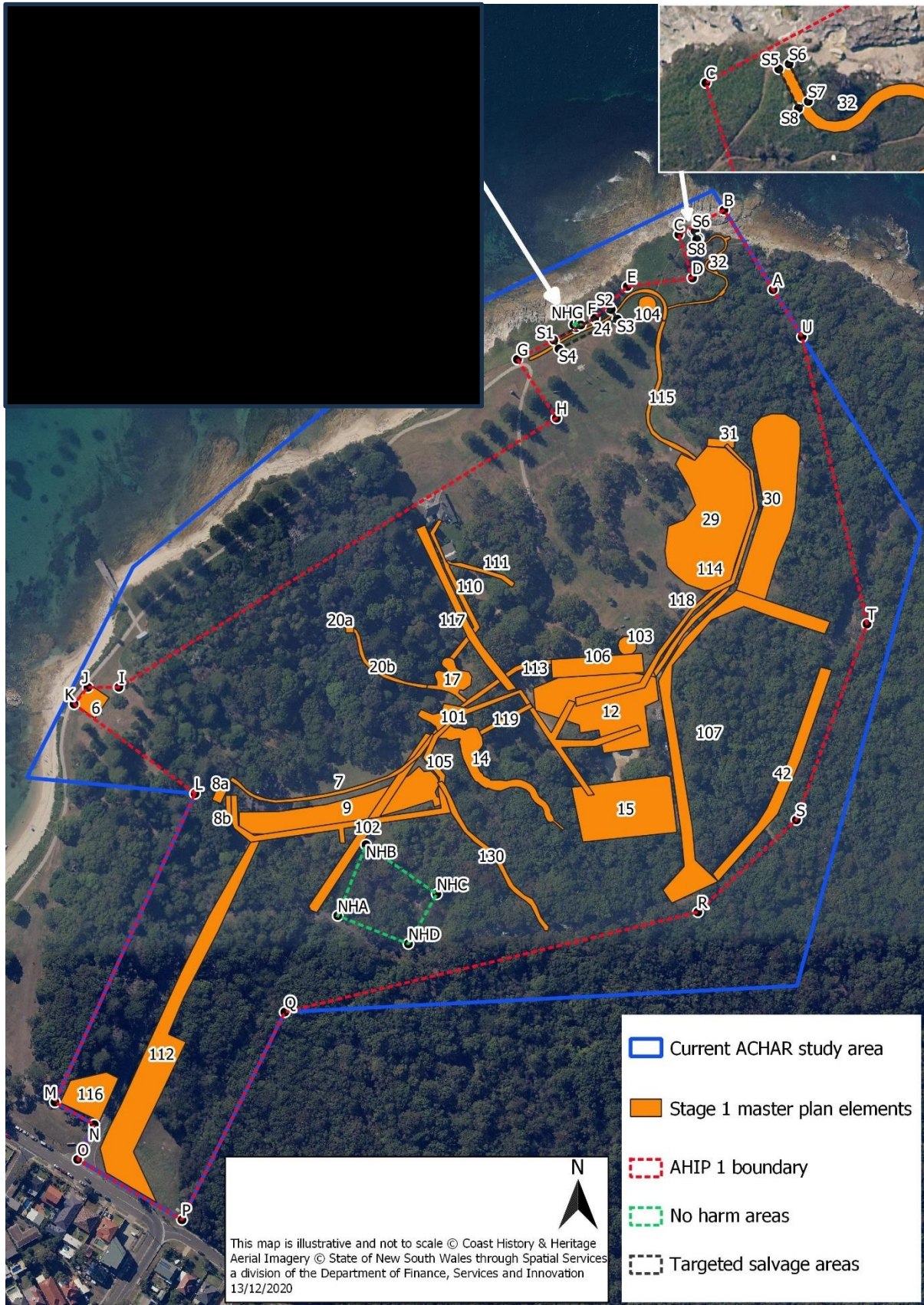


Figure 102. AHIP 1 boundary showing no harm and targeted salvage areas (see Table 26, Table 27 & Table 28).



## AHIP 2

This AHIP will cover the revetment works (elements 108, 109 and 131) as these are not covered by AHIP 1. The application for AHIP 2 will be lodged together with the current ACHAR as soon as DA approval from Sutherland Shire Council is obtained.

The area that AHIP 2 will apply to is shown in **Figure 103** and **Table 29**. The AHIP will allow:

- archaeological monitoring and collection of Aboriginal objects in disturbed contexts during Master Plan revetment works (elements 108, 109 and 131) in accordance with the procedures outlined in **Section 7.3.3**.
- targeted archaeological salvage excavation in association with the construction of the revetment stairs to the east of the stream (element 108) within the area indicated in **Figure 103** and specified in
- **Table 30**, and in accordance with the procedures outlined in **Section 7.3.4**.
- analysis and reporting on the works completed under this AHIP, undertaken in accordance with the procedures outlined in **Section 7.3.5**.
- final management of Aboriginal objects and Aboriginal ancestral remains retrieved during the works completed under this AHIP, in accordance with **Section 7.3.6**.

AHIP 2 will be conditioned such that:

- a. no harm is permitted to any Aboriginal human remains. Procedures to be followed in the event that suspected Aboriginal human remains are found are outlined below.
- b. no harm is permitted to any *in situ* Aboriginal archaeological deposits, including middens and stone artefacts. No *in situ* archaeological remains have yet been documented in the areas in which these works are proposed despite previous testing, and it is considered unlikely that they will be encountered. However a methodology for determining the intact nature of Aboriginal archaeological deposits is outlined in **Section 7.3.3** below.

**Table 29. Coordinates of proposed AHIP 2 (MGA Zone 56). Refer to Figure 103.**

Point	Easting	Northing
AA	335672	6236120
BB	335425	6235967
CC	335419	6235978
DD	335426	6235991
EE	335528	6236072
EE	335598	6236105
FF	335648	6236141

**Table 30. Coordinates of the proposed targeted archaeological salvage area for AHIP 1 (MGA Zone 56). Refer to Figure 103.**

Point	Easting	Northing
S9	335593	6236086
S10	335597	6236088
S11	335604	6236081
S12	335599	6236079



**Figure 103. AHIP 2 boundary for monitoring and collection showing targeted salvage area (see Table 29 and Table 30).**

The Stage 1 Master Plan works will also be subject to a s60 excavation permit under the *Heritage Act 1977* in relation to the State Heritage Register listing of Kamay Botany Bay National Park. The archaeological requirements for these works are outlined in the Historical Archaeological Assessment undertaken for the project.<sup>112</sup>

<sup>112</sup> DSCA 2022.

### 7.3.3 Archaeological monitoring and community collection

**Note: These procedures apply to both AHIP 1 and AHIP 2.**

Archaeological monitoring and community collection is to occur in accordance with the following procedures:

- All initial excavation works associated with the demolition and installation of any of the Stage 1 Master Plan elements outlined in **Table 24** that are within the AHIP areas are to be subject to archaeological monitoring by a representative of the La Perouse Local Aboriginal Land Council (and a suitable qualified archaeologist if required).
- Monitoring will continue until completion of excavation works, or until it is ascertained that further excavation will be restricted to deposit with no Aboriginal archaeological potential.
- All archaeological monitoring is to be undertaken in accordance with the conditions of the proposed AHIP.
- If Aboriginal archaeological remains (other than Aboriginal human remains) are exposed during monitored works, record the location and nature of these remains and determine if the remains represent *in situ* Aboriginal archaeological deposits. The determination will be made on the following basis, as successfully implemented during previous monitoring works within the park in 2008-2010 by Coast Director Paul Irish and the La Perouse Local Aboriginal Land Council:
  - Any dense shell layer that is exposed will be assumed to represent *in situ* Aboriginal archaeological deposit (midden) unless the shells are obviously of non-cultural origin (e.g. historically deposited beach shells).
  - Any continuous scatters of shell and/or stone artefacts exposed during monitoring works that are in compact and undisturbed soil matrixes (generally compact dark humic sand with no recent historical materials) will be assumed to represent *in situ* Aboriginal archaeological deposits.
  - Any sparse or isolated faunal remains and/or stone artefacts exposed during monitoring works that are in compact and undisturbed soil matrixes (generally compact dark humic sand with no recent historical materials) will be assumed to represent a 'background scatter' of objects rather than Aboriginal archaeological deposits.
  - Any sparse or isolated faunal remains and/or stone artefacts or scatters of shell and/or stone artefacts which are in churned, loose or non-humic soil (i.e. not intact original topsoil) or which are mixed with recent historical materials, are considered to represent disturbed contexts.
- Based on the assessed nature of the Aboriginal archaeological remains, the following actions will take place:
  - In the case of *in situ* Aboriginal archaeological deposits, and except in the areas indicated in **Figure 102** and specified in **Table 28** (see **Section 7.3.4**), harm is not permitted under the

AHIP and impacts will need to be avoided e.g. through raising the level of the proposed impact and covering the remains with geofabric, or moving the location of the proposed activity.

- In the case of Aboriginal archaeological remains in disturbed contexts and sparse or isolated 'background scatters' or faunal remains and/or stone artefacts, impact should be avoided where possible e.g. through raising the level of the proposed impact and covering the remains with geofabric, or moving the location of the proposed activity.
- If impacts to Aboriginal archaeological remains in disturbed contexts and sparse or isolated 'background scatters' or faunal remains and/or stone artefacts cannot be avoided, these remains are to be subject to community collection and bagged for analysis in accordance with the proposed AHIP.
- If any bone is found which is thought to be human, all works will immediately cease in that area. A specialist physical anthropologist will be called in to determine whether the remains are definitely human, and whether they are Aboriginal or non-Aboriginal in origin. If there is any doubt about the antiquity of the human remains then the NSW Police will be notified. If bone is found to be of human origin, and to be that of an Aboriginal person not suspected of being buried within the last 100 years, the DPE will be notified, and a determination made in consultation with the La Perouse Local Aboriginal Land Council and other Registered Aboriginal Parties as to the appropriate management of the remains. It is considered likely in most cases that the remains could be recorded *in situ* and covered over for protection. However in some cases, such as to prevent further damage, it may be deemed appropriate to remove the remains. In this case, an application for an additional AHIP will be submitted to the DPE, and excavation/removal and analysis of Aboriginal human remains will proceed in accordance with AHIP conditions and Requirement 25 of the DECCW 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*.

### 7.3.4 Targeted archaeological salvage

**Note: These procedures apply to both AHIP 1 and AHIP 2.**

Targeted archaeological salvage is to be undertaken only within the areas indicated in **Figure 102** and specified in **Table 28**, and in accordance with the procedures outlined below:

#### Main loop path (Chainage 700m – 740m)

- Initial grass and soil stripping will occur within the footprint of the new path alignment and associated batter to a depth of up to 150mm. Along the specific path alignment, further excavation up to 100-200mm below this level is required in some locations along the current upslope (southern) edge of the new path. All of these works are to be subject to archaeological monitoring by a suitably qualified archaeologist and a representative of the La Perouse Local Aboriginal Land Council.
- If Aboriginal archaeological remains (other than Aboriginal human remains) are exposed during monitored works, record the location and nature of these remains and determine if the remains

are *in situ* or in a disturbed context. The determination will be made as per the criteria outlined in **Section 7.3.3**.

- If the Aboriginal archaeological remains are in disturbed contexts, avoid impacts where possible, or else, these remains are to be subject to community collection and bagged for analysis in accordance with the proposed AHIP.
- If the Aboriginal archaeological remains are found to be *in situ*, determine whether localised adjustments can be made to the design to avoid impact e.g. localised raising of impact levels.
- Where impacts to *in situ* Aboriginal archaeological remains cannot be avoided, determine which of the two path construction methods outlined in **Section 7.2** will result in the least impact and require the least archaeological salvage excavation (generally this will be along the current upslope/southern portion of the path and to maximum 100-200mm depth below initial surface stripping).

#### Whale loop path (northern 5m at end of path)

- Initial grass and soil stripping will occur around the proposed location of the 100mm fibre reinforced plastic footings along the northern 5m of the path.
- Manual excavation of footing trenches to be monitored.
- If Aboriginal archaeological remains (other than Aboriginal human remains) are exposed during monitored works, record the location and nature of these remains and determine if the remains are *in situ* or in a disturbed context. The determination will be made as per the criteria outlined in **Section 7.3.3**.
- If the Aboriginal archaeological remains are in disturbed contexts, avoid impacts where possible, or else, these remains are to be subject to community collection and bagged for analysis in accordance with the proposed AHIP.
- If the Aboriginal archaeological remains are found to be *in situ*, determine whether localised adjustments can be made to location of footings.

#### Revetment Stairs (eastern side of stream)

- Initial grass and rubble removal to occur within the footprint of the proposed stair location.
- Manual excavation of footing trenches and any other required earthworks to be monitored.
- If Aboriginal archaeological remains (other than Aboriginal human remains) are exposed during monitored works, record the location and nature of these remains and determine if the remains are *in situ* or in a disturbed context. The determination will be made as per the criteria outlined in **Section 7.3.3**.
- If the Aboriginal archaeological remains are in disturbed contexts, avoid impacts where possible, or else, these remains are to be subject to community collection and bagged for analysis in accordance with the proposed AHIP.

- If the Aboriginal archaeological remains are found to be *in situ*, determine whether localised adjustments can be made to location of footings or the depth or extent of other required earthworks.

#### All targeted salvage areas

- In all cases, where impacts to in situ archaeological remains cannot be avoided, undertake archaeological salvage within the footprint of all areas to be impacted in accordance with the following procedures:
  - all salvage areas will be manually excavated using spits or following stratigraphy as appropriate.
  - where Aboriginal human remains are encountered, the procedures for management of these will proceed as outlined below.
  - where areas larger than 1m x 1m are located, a local grid will be established to allow manual excavations in 1m x 1m manually excavated squares to archaeologically salvage these features.
  - excavation will continue laterally or vertically until the depth and extent of proposed impacts has been reached.
  - all manually excavated material will be manually sieved onsite.
  - all Aboriginal objects and other cultural remains retrieved during the salvage excavations will be bagged and labelled according to provenance, for subsequent specialist analysis.
  - soil pH samples will be taken from all excavated features and manually excavated squares.
  - where possible, samples for radiocarbon and Optically Stimulated Luminescence (OSL) dating will be taken.
  - all uncovered and excavated features will be plotted by GPS, and a full recording of sections, plans and features will be made.
  - a photographic record will be maintained throughout the course of the excavations.
  - the remains will be subject to analysis as per the procedures outlined in **Section 7.3.5**.
- If any bone is found which is thought to be human, all works will immediately cease in that area. A specialist physical anthropologist will be called in to determine whether the remains are definitely human, and whether they are Aboriginal or non-Aboriginal in origin. If there is any doubt about the antiquity of the human remains then the NSW Police will be notified. If bone is found to be of human origin, and to be that of an Aboriginal person not suspected of being buried within the last 100 years, the DPE will be notified, and a determination made in consultation with the La Perouse Local Aboriginal Land Council and other Registered Aboriginal Parties as to the appropriate management of the remains. It is considered likely in most cases that the remains could be recorded *in situ* and covered over for protection. However in some

cases, such as to prevent further damage, it may be deemed appropriate to remove the remains. In this case, an application for an additional AHIP will be submitted to the DPE, and excavation/removal and analysis of Aboriginal human remains will proceed in accordance with AHIP conditions and Requirement 25 of the OEH 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*.

### **7.3.5 Analysis and reporting**

All Aboriginal archaeological remains (apart from human bone) retrieved under the proposed AHIPs (e.g. fish and animal bone and shell; and stone, bone and shell artefacts) will be recorded and bagged prior to specialist analysis. The collected remains will be stored temporarily at Coast History & Heritage office premises.

Collected stone artefacts will be subject to recording and cataloguing by Coast History & Heritage in compliance with Requirement 26 'Stone artefact deposition and storage' of the DECCW 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*.

Analysis of food remains (animal/fish/bird bone and shell) will involve species identification and quantification by weight and number of represented individuals. This will supplement the existing body of data for the study area, and in particular the Foreshore Midden (#52-3-0219).

The results of the archaeological monitoring and collection works, and any targeted archaeological salvage will be fully documented in an Archaeological Excavation Report. If timing allows, this will be in a combined report for AHIP 1 and AHIP 2, otherwise separate reports will be completed for the works under each AHIP. Any Aboriginal archaeological remains uncovered during the investigations will be recorded on AHIMS.

### **7.3.6 Management of Aboriginal objects and remains**

#### **Aboriginal ancestral remains**

As discussed in **Section 5.2.3**, Aboriginal ancestral remains were uncovered during the 2023 archaeological test excavations, and the location registered on AHIMS as restricted site #52-3-2162. The remains are currently stored in a safe and locked location onsite by NPWS. It is proposed that the ancestor's remains, and all other archaeological material recovered from the same test pit are repatriated by the La Perouse LALC back to the pit location in which they were uncovered, and that an updated is made to the AHIMS registration for #52-3-2162 to reflect this on completion of the repatriation.

#### **Aboriginal objects**

Aboriginal objects (shells, animal bones and stone artefacts) were recovered during the 2023 archaeological test excavations. These are currently being stored in at the Coast office in accordance with the conditions of AHIP#5072. It is proposed that these objects, and any further Aboriginal archaeological remains that may be collected during the works outlined above, are managed through reburial by the La Perouse LALC at a suitable location within Kamay Botany Bay National Park. The reburial location will be registered on AHIMS.

## 8 Our recommendations

We have based our recommendations on:

- the research and conclusions of our assessment as outlined in this report;
- the views expressed by the Registered Aboriginal Parties to this project as documented in **Section 2** and **Appendix 1**;
- the legal protections provided to Aboriginal 'objects' and 'places' under s.86 of the *National Parks and Wildlife Act 1974*;
- current policy and regulatory requirements relating to the assessment of Aboriginal heritage, and in particular the DECCW 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*, the OEH 2011 *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*, and the National Parks & Wildlife Regulation 2019;

We recommend that:

1. The report should be submitted to Heritage NSW in the Department of Planning and Environment as supporting documentation for both Aboriginal Heritage Impact Permit (AHIP) applications under s90 of the *National Parks & Wildlife Act 1974* to allow the actions outlined in **Section 7.3.2** and in accordance with the methodology outlined in Sections **7.3.3** to **7.3.6**.
2. The proposed Stage 1 Master Plan works that are to be subject to the Aboriginal Heritage Impact Permits in Recommendation 1 should not commence until the relevant AHIP has been issued, along with any approval required under the *Heritage Act 1977*.
3. In addition to the requirements of the AHIPs outlined in Recommendation 1, the general requirements outlined in **Section 7.3.1** relating to construction methods, Aboriginal heritage inductions and unexpected finds should be incorporated into all construction preparation and relevant construction management plans to ensure maximum protection for Aboriginal heritage during all Master Plan works.
4. On completion of the actions under each AHIP referred to in Recommendation 1, a final report should be prepared to fully document the works undertaken.
5. Where archaeological remains are documented during the archaeological monitoring and community collection or archaeological salvage referred to in Recommendation 1, records of these should be submitted to AHIMS.
6. Where archaeological remains (other than human remains) are documented during the archaeological monitoring and community collection or archaeological salvage referred to in Recommendation 1, these should be temporarily stored in the heritage consultant's premises until a suitable location for reburial has been determined with the Registered Aboriginal Parties to the current project.



7. Reburial of the Aboriginal ancestral remains located during the archaeological test excavations that were undertaken under AHIP #5072 (see **Section 5.2.3**) should be undertaken by the La Perouse Local Aboriginal Land Council at their earliest convenience, as outlined in **Section 7.3.6**. On completion of the reburial, the AHIMS record for #52-3-2162 should be updated to reflect the reburial and remains as a Restricted Site.
8. Once finalised, a copy of this report should be forwarded to the Registered Aboriginal Parties and to:

The Registrar  
Aboriginal Heritage Information Management System  
Heritage NSW

## 9 References

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# Appendix 1A

## *Public and Direct Notice Examples*

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**Café:** This modern fully equipped Café provides coffeetea, light meals, refreshments to residents, staff and the general public.

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**Public Notices**

**PROPOSAL TO UPGRADE THE EXISTING MOBILE PHONE TELECOMMUNICATIONS FACILITIES IN BOTANY**

Vodafone Hutchison Australia (VHA) plans to upgrade the telecommunications services in Botany with the introduction of new equipment to improve coverage in these areas.

The proposal of the upgrade of the existing telecommunications facility at 2-26 Lord Street, Botany NSW 2019 involves:

- The relocation of existing antennas from a height of 20.78m to 21.18m (antenna centreline) on existing mounts;
- The replacement of existing Tower Mounted Amplifiers (TMAs) with new TMAs to be attached to the existing mounting poles behind the existing panel antennas;
- Associated and necessary ancillary works to ensure the proper functioning of the telecommunications facility including cabling, earthing, signage, safe access, electrical works and replacement or strengthening of the existing tower.

The proposed works are defined as "Low-impact Facilities" in accordance with the Telecommunications (Low-impact Facilities) Determination 2018 and "maintenance activity" as defined in Schedule 3 of the Telecommunications Act 1997. The proposed infrastructure complies with the ACMA EMR regulatory arrangements.

Further information can be obtained from Emma Lachlan on (02) 9363 3815 or email to [info@commplan.com.au](mailto:info@commplan.com.au) or from [www.rfnsa.com.au/2019001](http://www.rfnsa.com.au/2019001). Written submissions on the proposals should be addressed to: VHA C/-CommPlan Pty Ltd, PO Box 267, Edgecliff NSW 2027 and received by **30th August 2019**

**Public Notices**

**Registration of Interest - Aboriginal Cultural Heritage Assessment**

The National Parks & Wildlife Service (159 Farnell Ave Audley NSW 2232) are undertaking Aboriginal Cultural Heritage Assessments within the Kurnell section of the park (including Lots 71-76 and 85 in DP908) for proposed works under Stage 1 of the Kamay Botany Bay National Park Master Plan, and potentially also for a proposed wharf and a proposed commemorative installation. These assessments may result in applications for Aboriginal Heritage Impact Permits (AHIPs) under s90 of the National Parks & Wildlife Act 1974. Registrations of interest are sought from Aboriginal people with cultural knowledge relevant to determining the significance of Aboriginal objects at this location. This will assist the proponent in preparing any AHIP applications and the Department of Planning, Industry and Environment (DPIE) in determining any applications.

Registrations must be received in writing by 29/8/2019, include a postal address and contact details and be sent to project consultants Coast History & Heritage at P.O. Box A74, Arncliffe NSW 2205, [admin@coasthistory.com.au](mailto:admin@coasthistory.com.au) or fax (02) 8311 1478. For enquiries call 1800 450 995. Details of Registered Aboriginal Parties will be forwarded to DPIE and the La Prouse LALC unless explicitly requested otherwise.

**PROPOSAL TO UPGRADE EXISTING MOBILE PHONE BASE STATION AT SUTHERLAND EXCHANGE**

Site Address: 40 Auburn Rd SUTHERLAND NSW 2232 (201//DP1110295)

Site Ref: 44179, RFNSA: [www.rfnsa.com.au/2232007](http://www.rfnsa.com.au/2232007)

1. The proposed installation will involve the following:
  - The removal of (6) Six existing panel antennas.
  - The installation of (6) Six new panel antennas.
  - The removal of (6) Six existing remote radio units.
  - The installation of (6) Six new remote radio units.
  - The installation of ancillary equipment.
2. The proposed installation is deemed to be a Low-impact Facility pursuant to the Telecommunications (Low-impact Facilities) Determination 2018 ("The Determination") based on the descriptions above. Consent from council is not required in this instance.
3. Further information including an EME Report can be obtained from Kordia Solutions. Ph. (02) 9856 2614 or Via Email at: [communityconsultation@kordia.com.au](mailto:communityconsultation@kordia.com.au)
4. The proposed infrastructure will be in compliance with the ACMA EMR regulatory arrangements.
5. We invite you to make a submission. Written submissions should be sent to: [communityconsultation@kordia.com.au](mailto:communityconsultation@kordia.com.au) or Kordia Solutions, PO Box 3875 Rhodes NSW 2138 by **5pm Wednesday, 28 August 2019**.

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-Trudy

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11 June 2019

ATTN: Planning Greater Sydney Region  
Office of Environment and Heritage  
P.O. Box 644  
PARRAMATTA NSW 2124

Dear Sir/Madam,

**RE: Notification of Aboriginal People in relation to Aboriginal cultural heritage assessment  
at the Kamay Botany Bay National Park, Kurnell, NSW**

**Proponent:** The National Parks & Wildlife Service [159 Farnell Ave, Audley NSW 2232]

The National Parks & Wildlife Service [159 Farnell Ave, Audley NSW 2232] is undertaking an Aboriginal Cultural Heritage Assessment for proposed works under Stage 1 of the Kamay Botany Bay National Park Master Plan, within the Kurnell section of the park (including Lots 71-76 and 85 in DP908). Coast History & Heritage has been engaged by the proponent to prepare an Aboriginal Cultural Heritage Assessment, undertake Aboriginal community consultation in accordance with the *National Parks and Wildlife Regulation 2009* and (if required) prepare applications for any Aboriginal Heritage Impact Permits [AHIPs] under s90 of the *National Parks & Wildlife Act 1974*.

We are seeking registrations of interest from Aboriginal people with cultural knowledge relevant to determining the significance of Aboriginal objects at this location. This will assist us in preparing the Aboriginal Cultural Heritage Assessment and any AHIP applications (should they be required). It will also assist the OEH in determining any AHIP applications relating to this project.

We are contacting you, as per S80C(2) of the *National Parks and Wildlife Regulation 2009*, to seek the names and current contact details of any Aboriginal people of whom you are aware may hold cultural knowledge relevant to determining the significance of Aboriginal objects at this location, so that we can notify them directly about the project.

Please forward us the details of any such Aboriginal people in writing before 26 June 2019 to:

(Email) [admin@coasthistory.com.au](mailto:admin@coasthistory.com.au)  
(Post) PO Box A74 Arncliffe NSW 2205  
(Fax) 02 8311 1478

Please ensure that you provide us with current postal addresses and contact names. Any enquiries should be directed to our office on 1800 450 995.

Yours sincerely,



Dr Paul Irish

Director

E: [paul@coasthistory.com.au](mailto:paul@coasthistory.com.au)

W: [www.coasthistory.com.au](http://www.coasthistory.com.au)

07 August 2019

[REDACTED]

**RE: Notification of Aboriginal People in relation to Aboriginal cultural heritage assessments  
at the Kamay Botany Bay National Park, Kurnell, NSW**

**Proponent:** The National Parks & Wildlife Service [159 Farnell Ave, Audley NSW 2232]

The National Parks & Wildlife Service [159 Farnell Ave, Audley NSW 2232] are undertaking Aboriginal Cultural Heritage Assessments within the Kurnell section of the park (including Lots 71-76 and 85 in DP908) for proposed works under Stage 1 of the Kamay Botany Bay National Park Master Plan, and potentially also for a proposed wharf and a proposed commemorative installation. These assessments may result in applications for Aboriginal Heritage Impact Permits [AHIPs] under s90 of the *National Parks & Wildlife Act 1974*. Coast History & Heritage has been engaged by the proponent to prepare an Aboriginal Cultural Heritage Assessment for the Stage 1 Masterplan works, and undertake Aboriginal community consultation in accordance with the *National Parks and Wildlife Regulation 2009* and (if required) prepare applications for any Aboriginal Heritage Impact Permits [AHIPs] under s90 of the *National Parks & Wildlife Act 1974*.

We are aware of your prior involvement with planning and Aboriginal heritage matters at Kamay Botany Bay National Park, and have therefore assumed that you will also wish to be consulted in relation to Aboriginal Cultural Heritage Assessment for the Stage 1 Master Plan and also for the proposed ferry wharf and proposed commemorative installation should these be undertaken. For this reason, **we will register you as a Registered Aboriginal Party for these projects** in accordance with the *National Parks and Wildlife Regulation 2009*, and will send you some information about the Stage 1 Masterplan project over the coming weeks. **If you do not wish to be registered** for these projects, please notify us in writing before 15/8/2019 at:

(Post) PO Box A74 Arncliffe NSW 2205

(Fax) 02 8311 1478

(Email) admin@coasthistory.com.au

If you have any enquiries please call us on 1800 450 995.

Yours sincerely,



Dr Paul Irish  
Director

12 August 2019

[REDACTED]

**RE: Notification of Aboriginal People in relation to Aboriginal cultural heritage assessments  
at the Kamay Botany Bay National Park, Kurnell, NSW**

**Proponent:** The National Parks & Wildlife Service [159 Farnell Ave, Audley NSW 2232]

The National Parks & Wildlife Service [159 Farnell Ave, Audley NSW 2232] are undertaking Aboriginal Cultural Heritage Assessments within the Kurnell section of the park (including Lots 71-76 and 85 in DP908) for proposed works under Stage 1 of the Kamay Botany Bay National Park Master Plan, and potentially also for a proposed wharf and a proposed commemorative installation. These assessments may result in applications for Aboriginal Heritage Impact Permits [AHIPs] under s90 of the *National Parks & Wildlife Act 1974*. Coast History & Heritage has been engaged by the proponent to prepare an Aboriginal Cultural Heritage Assessment for the Stage 1 Masterplan works, and undertake Aboriginal community consultation in accordance with the *National Parks and Wildlife Regulation 2009* and (if required) prepare applications for any Aboriginal Heritage Impact Permits [AHIPs] under s90 of the *National Parks & Wildlife Act 1974*.

We have received your details from the Department of Planning, Industry & Environment as someone who may potentially hold cultural knowledge relevant to determining the significance of Aboriginal objects at this location. If this is the case, you are invited to register your interest in these projects to ensure that you are consulted in accordance with the *National Parks and Wildlife Regulation 2009* in relation to the current Stage 1 Masterplan works, possible future assessments for the proposed ferry wharf and commemorative proposed installation, and any possible Aboriginal Heritage Impact Permits arising from these projects.

Please be aware that in accordance with the Regulation, we will forward details of all Registered Aboriginal Parties to Department of Planning, Industry & Environment and the La Perouse Local Aboriginal Land Council. If you do not wish this to occur, please contact us in writing prior to 26<sup>th</sup> August 2019.

IF YOU WISH TO BE REGISTERED as a Registered Aboriginal Party, please notify us in writing by **Monday 26<sup>th</sup> August 2019** at one of the following:

(Post) PO Box A74 Arncliffe NSW 2205

(Fax) 02 8311 1478

(Email) admin@coasthistory.com.au

Please ensure that you provide us with current postal addresses and contact names. Any enquiries should be directed to our office on 1800 450 995.



Yours sincerely,

A handwritten signature in black ink that reads "Paul Irish". The signature is written in a cursive style with a prominent loop at the end of the last name.

Dr Paul Irish

Director

E: [paul@coasthistory.com.au](mailto:paul@coasthistory.com.au)

W: [www.coasthistory.com.au](http://www.coasthistory.com.au)

# Appendix 1B

## *Agency Responses to Direct Notices*



Office of  
Environment  
& Heritage

Our reference: Doc19/496441

Dr Paul Irish  
Director  
Coast History & Heritage  
Suite 9 & 10, 136 Marrickville  
NSW 2204

Dear Paul,

Thank you for your letter dated 11<sup>th</sup> June 2019 to the Office of Environment and Heritage (OEH) regarding obtaining a list of the Aboriginal stakeholders that may have an interest in the proposed development at Kamay Botany Bay National Park, Kurnell, NSW, 159 Farnell Avenue, Audley NSW 2232.

Please find attached the list of Aboriginal stakeholders known to OEH that may have an interest in the project.

As the Department of Planning and Environment is the approval authority for this project, the consultation process should be in accordance with the relevant guidelines as stipulated by the Department of Planning and Environment.

If you wish to discuss any of the above matter further please email [gs.ach@environment.nsw.gov.au](mailto:gs.ach@environment.nsw.gov.au).

Yours sincerely

**Dana Alderson**  
A/Senior Team Leader Planning  
Greater Sydney Branch  
Communities and Greater Sydney Division

Doc19/496441



P: 1800 450 995  
E: admin@coasthistory.com.au  
W: www.coasthistory.com.au

Suite 9 & 10, 136 Marrickville Rd,  
Marrickville NSW 2204  
PO Box A74, Arncliffe NSW 2205

ACN: 625442480

11 June 2019

ATTN: Planning Greater Sydney Region  
Office of Environment and Heritage  
P.O. Box 644  
PARRAMATTA NSW 2124

Dear Sir/Madam,

**RE: Notification of Aboriginal People in relation to Aboriginal cultural heritage assessment  
at the Kamay Botany Bay National Park, Kurnell, NSW**

**Proponent:** The National Parks & Wildlife Service [159 Farnell Ave, Audley NSW 2232]

The National Parks & Wildlife Service [159 Farnell Ave, Audley NSW 2232] is undertaking an Aboriginal Cultural Heritage Assessment for proposed works under Stage 1 of the Kamay Botany Bay National Park Master Plan, within the Kurnell section of the park (including Lots 71-76 and 85 in DP908). Coast History & Heritage has been engaged by the proponent to prepare an Aboriginal Cultural Heritage Assessment, undertake Aboriginal community consultation in accordance with the *National Parks and Wildlife Regulation 2009* and (if required) prepare applications for any Aboriginal Heritage Impact Permits [AHIPs] under s90 of the *National Parks & Wildlife Act 1974*.

We are seeking registrations of interest from Aboriginal people with cultural knowledge relevant to determining the significance of Aboriginal objects at this location. This will assist us in preparing the Aboriginal Cultural Heritage Assessment and any AHIP applications (should they be required). It will also assist the OEH in determining any AHIP applications relating to this project.

We are contacting you, as per S80C(2) of the *National Parks and Wildlife Regulation 2009*, to seek the names and current contact details of any Aboriginal people of whom you are aware may hold cultural knowledge relevant to determining the significance of Aboriginal objects at this location, so that we can notify them directly about the project.

Please forward us the details of any such Aboriginal people in writing before 26 June 2019 to:

(Email) admin@coasthistory.com.au  
(Post) PO Box A74 Arncliffe NSW 2205  
(Fax) 02 8311 1478

Please ensure that you provide us with current postal addresses and contact names. Any enquiries should be directed to our office on 1800 450 995.



**LIST OF ABORIGINAL STAKEHOLDERS FOR THE GREATER SYDNEY BRANCH HELD BY OEH FOR THE PURPOSES OF THE ABORIGINAL CULTURAL HERITAGE CONSULTATION REQUIREMENTS FOR PROPONENTS 2010**

These lists are provided to proponents in accordance with section 4.1.2 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (the "Consultation Requirements") which commenced on 12 April 2010.

The consultation process involves getting the views of, and information from, Aboriginal people and reporting on these. It is not to be confused with other field assessment processes involved in preparing a proposal and an application. Consultation does not include the employment of Aboriginal people to assist in field assessment and/or site monitoring. Aboriginal people may provide services to proponents through a contractual arrangement however, this is separate from consultation. The proponent is not obliged to employ those Aboriginal people registered for consultation. Consultation as per these requirements will continue irrespective of potential or actual employment opportunities for Aboriginal people.

A copy of the Consultation Requirements can be found on the OEH website at: <http://www.environment.nsw.gov.au/resources/cultureheritage/commconsultation/09781AChconsultreq.pdf>.

Under the Consultation Requirements: a proponent is required to provide Aboriginal people who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places as relevant to the proposed project area, with an opportunity to be involved in consultation. Section 3.3.1 of the Consultation Requirements states that Aboriginal people who can provide this information are, based on Aboriginal lore and custom, the traditional owners or custodians of the land that is the subject of the proposed project.

The Consultation Requirements also state that:

- Traditional owners or custodians with appropriate cultural heritage knowledge to inform decision making who seek to register their interest as an Aboriginal party are those people who:*
- continue to maintain a deep respect for their ancestral belief system, traditional lore and custom
  - recognise their responsibilities and obligations to protect and conserve their culture and heritage and care for their traditional lands or Country
  - have the trust of their community, knowledge and understanding of their culture, and permission to speak about it.

Please note: the placement of an organisation's name on any OEH Aboriginal stakeholder list for the Consultation Requirements does not override a proponent's requirement to also advertise in the local newspaper and to seek from other sources the names of any other Aboriginal people who may hold cultural knowledge as required under clause 80C of the National Parks and Wildlife Regulation 2009.

**How to use this list**

1. Determine which Local Government Areas (LGAs) your project area falls into
2. Identify which organisations and individuals on the list have an interest in the LGAs relevant to your project – identified in column 6 of the list
3. Contact the organisations/individuals who have indicated an interest in the relevant LGAs and invite them to register an interest in your project

Do not reproduce the attached list in publicly available reports and other documents. Your report should only contain the names of the organisations and individuals who you have invited to register an interest in your project and those who have registered as stakeholders for your project.

**PLEASE NOTE: THE STAKEHOLDER LIST HAS NOT BEEN UPDATED TO INCLUDE THE RECENT**

**COUNCIL MERGERS AND NAME CHANGES. PLEASE CONSIDER THE PRE-MERGER COUNCIL**

**BOUNDARIES WHEN DETERMINING WHO SHOULD BE INVITED TO REGISTER FOR YOUR**

**PROJECT. Last update is 28th May 2019**

## Paul Irish

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**From:** Margaret Bottrell <margaret.bottrell@lls.nsw.gov.au>  
**Sent:** Tuesday, 18 June 2019 7:56 AM  
**To:** Paul Irish  
**Subject:** Notification of Aboriginal People in relation to Aboriginal cultural heritage assessment at the Kamay Botany Bay National Park, Kurnell, NSW

To Paul Irish,

**RE: Notification of Aboriginal People in relation to Aboriginal cultural heritage assessment at the Kamay Botany Bay National Park, Kurnell, NSW**

Thank you for your letter dated 11 June 2019, requesting assistance with identifying Aboriginal stakeholder groups or persons who may have an interest in your project area.

Greater Sydney Local Land Services (GS LLS) acknowledges that Local Land Services have been listed in *Section 4.1.2 (g)* of the *Aboriginal cultural heritage consultation requirements for proponents 2010*, under *Part 6, National Parks and Wildlife Act 1974* as a source of information to obtain the “names of Aboriginal people who may hold cultural knowledge relevant to determining the significance of Aboriginal *objects* and/or *places*”.

GS LLS is a partner with many Aboriginal communities in the region on many natural resource management (NRM) projects. However, GS LLS is not the primary source for contacting or managing contact lists for Aboriginal communities or persons that may inform or provide comment on planning issues. GS LLS considers cultural heritage issues that relate to land-use planning in general and only considers culture and heritage issues in the context of NRM.

We strongly recommend that you make contact with the Office of Environment and Heritage (OEH), Cultural Heritage Division, for all-inclusive contact lists of persons and organisations that may assist with your investigation.

**Note:** Hawkesbury Nepean Catchment Management Authority (HNCMA) no longer exists. All work previously carried out by HNCMA is now delivered by Greater Sydney Local Land Services (GS LLS).

Regards,

--

**Margaret Bottrell** Senior Strategic Land Services Officer  
(Aboriginal Communities)

Greater Sydney Local Land Service

Level 4, 2-6 Station Street Penrith

PO Box 4515 Penrith Westfields NSW 2750

T: 02 47242111

E: [margaret.bottrell@lls.nsw.gov.au](mailto:margaret.bottrell@lls.nsw.gov.au)

W: <http://www.lls.nsw.gov.au>



## Paul Irish

---

**From:** Geospatial Search Requests <GeospatialSearch@NNTT.gov.au>  
**Sent:** Wednesday, 12 June 2019 12:13 PM  
**To:** Coast History and Heritage  
**Cc:** Rebecca Bryant  
**Subject:** RE: SR5927 - Tribunal Search request for Aboriginal Cultural Heritage assessment at Sutherland NSW - SR5927  
**Attachments:** 20180611\_SR5927\_NSW\_Sutherland-Shire\_LGA\_Overlap\_Report.xlsx

### UNCLASSIFIED

**Native title search – NSW LGA – Sutherland Shire LGA**

**Your ref:** *Kamay Botany Bay* - **Our ref:** SR5927

#### **Change of e-mail address for Geospatial Searches**

To ensure your search requests are received and processed in a timely manner, please forward to [GeospatialSearch@NNTT.gov.au](mailto:GeospatialSearch@NNTT.gov.au) with a *completed search request form*. The form is available from the Tribunal's website at this address: <http://www.nntt.gov.au/News-and-Publications/Pages/Forms.aspx>

Dear Paul Irish,

Thank you for your search request received on 11 June 2019 in relation to the above area, please find your results attached.

#### **Search Results**

The results provided are based on the information you supplied and are derived from a search of the following Tribunal databases:

- Schedule of Native Title Determination Applications
- Register of Native Title Claims
- Native Title Determinations
- Register of Indigenous Land Use Agreements
- Notified Indigenous Land Use Agreements

For more information about the Tribunal's registers or to search the registers yourself and obtain copies of relevant register extracts, please visit our [website](#).

**Please note:** There may be a delay between a native title determination application being lodged in the Federal Court and its transfer to the Tribunal. As a result, some native title determination applications recently filed with the Federal Court may not appear on the Tribunal's databases.

The search results are based on analysis against external boundaries of applications only. Native title applications commonly contain exclusions clauses which remove areas from within the external boundary. To determine whether the areas described are in fact subject to claim, you need to refer to the "Area covered by claim" section of the relevant Register Extract or Schedule Extract and any maps attached.

### Search results and the existence of native title

Please note that the enclosed information from the Register of Native Title Claims and/or the Schedule of Applications is **not** confirmation of the existence of native title in this area. This cannot be confirmed until the Federal Court makes a determination that native title does or does not exist in relation to the area. Such determinations are registered on the National Native Title Register.

### The Tribunal accepts no liability for reliance placed on enclosed information

The enclosed information has been provided in good faith. Use of this information is at your sole risk. The National Native Title Tribunal makes no representation, either express or implied, as to the accuracy or suitability of the information enclosed for any particular purpose and accepts no liability for use of the information or reliance placed on it.

If you have any further queries, please do not hesitate to contact us on the free call number 1800 640 501.

Regards,

### Geospatial Searches

**National Native Title Tribunal | Perth**

Email: [GeospatialSearch@nntt.gov.au](mailto:GeospatialSearch@nntt.gov.au) | [www.nntt.gov.au](http://www.nntt.gov.au)

---

**From:** Rebecca Bryant <[rebecca@coasthistory.com.au](mailto:rebecca@coasthistory.com.au)>

**Sent:** Tuesday, 11 June 2019 10:38 AM

**To:** Enquiries <[Enquiries@nntt.gov.au](mailto:Enquiries@nntt.gov.au)>

**Cc:** Coast History and Heritage <[admin@coasthistory.com.au](mailto:admin@coasthistory.com.au)>

**Subject:** Tribunal Search request for Aboriginal Cultural Heritage assessment at Sutherland NSW

Dear Sir/Madam,

Please see attached request to search the NNTT register. Could you please search the entire Sutherland LGA?

Kind regards,

**Rebecca Bryant**

Archaeologist



**P:** 1800 450 995 / **M:** 0405 236 821

**E:** [rebecca@coasthistory.com.au](mailto:rebecca@coasthistory.com.au)

**W:** [www.coasthistory.com.au](http://www.coasthistory.com.au)

Suite 9 & 10, 136 Marrickville Rd, Marrickville

PO Box A74, Arncliffe NSW 2205

## Disclaimer

This information product has been created to assist in understanding the spatial characteristics and relationships of this native title matter and is intended as a guide only. Spatial data used has been sourced from the relevant custodians in each jurisdiction, and/or the Tribunal, and is referenced to the GDASB datum.

While the National Native Title Tribunal (NNTT) and the Native Title Registrar (Registrar) have exercised due care in ensuring the accuracy of the information provided, it is provided for general information only and on the understanding that neither the NNTT, the Registrar nor the Commonwealth of Australia is providing professional advice. Appropriate professional advice relevant to your circumstances should be sought rather than relying on the information provided. In addition, you must exercise your own judgment and carefully evaluate the information provided for accuracy, currency, completeness and relevance for the purpose for which it is to be used. The information provided is often supplied by, or based on, data and information from external sources, therefore the NNTT and Registrar cannot guarantee that the information is accurate or up-to-date. The NNTT and Registrar expressly disclaim any liability arising from the use of this information. This information should not be relied upon in relation to any matters associated with cultural heritage.

## Please note:

- Calculated areas may not be the same as the legal area of a parcel.
- Where shown, NNTT Tenure Class for a non freehold parcel refers to a tenure grouping derived for the purposes of the Tribunal, and does not necessarily represent the jurisdictional tenure type.
- Overlap results are returned only for the currently active jurisdiction.
- Where shown, overlap results are returned for 'current' future act notices. These are notices within six months of the notification date, notices subject to a current future act application or state deed and those notices where the right to negotiate applies and are within five years of the notification date.
- Where shown, overlap results are returned for Future Act Objections that are currently active, or that have been subject to an NNTT determination.

## Selected Feature from Local Government Area

<b>Name</b>	Sutherland Shire
<b>Full Name</b>	Sutherland Shire Council
<b>Selection Area (sq km)</b>	368.537



## Reporting overlapping features in New South Wales

### Schedule of Native Title Determination Applications

Tribunal No	Name	Federal Court No	Date Lodged	RT Status	Area (sq km)	Overlap Area (sq km)	% Region Overlapped
NC2017/003	South Coast People	NSD1331/2017	03/08/2017	Accepted for registration	16,807.6696	289.1434	78.46%

### Register of Native Title Claims

Tribunal No	Name	Federal Court No	Date Lodged	RT Status	Area (sq km)	Overlap Area (sq km)	% Region Overlapped
NC2017/003	South Coast People	NSD1331/2017	03/08/2017	Accepted for registration	16,807.6696	289.1434	78.46%

### Native Title Determinations

Tribunal No	Name	Federal Court No	Determination Type	Related NTDA	Area (sq km)	Overlap Area (sq km)	% Region Overlapped
NND2009/002	Gangangarra Local Aboriginal Land Council	NSD1839/2008	In effect - Finalised	NN2008/009	0.0096	0.0096	<0.01
NND2011/001	Gangangarra Local Aboriginal Land Council	NSD19/2010	In effect - Finalised	NN2010/001	0.0914	0.0914	0.02%
NND2013/002	Gangangarra Local Aboriginal Land Council	NSD164/2012	In effect - Finalised	NN2012/001	0.3405	0.3405	0.09%

### Native Title Determination Outcomes

Tribunal No	Name	Federal Court No	Determination Type	Outcome	Area (sq km)	Overlap Area (sq km)	% Region Overlapped
NND2009/002	Gangangarra Local Aboriginal Land Council	NSD1839/2008	In effect - Finalised	Native title does not exist	0.0096	0.0096	<0.01
NND2011/001	Gangangarra Local Aboriginal Land Council	NSD19/2010	In effect - Finalised	Native title does not exist	0.0914	0.0914	0.02%
NND2013/002	Gangangarra Local Aboriginal Land Council	NSD164/2012	In effect - Finalised	Native title does not exist	0.3405	0.3405	0.09%

\* Note: Outcomes identified as "Native title extinguished" are generally outside the determination area. Refer to the determination document for more information.



Red hachure indicates conditional determination area

## Indigenous Land Use Agreements

No overlap found

### RATSIB Areas

Name	Organisation	Area (sq km)	Overlap Area (sq km)	% Region Overlapped
New South Wales	NTSCORP Limited	1,719,932.3173	368.5368	100.00%

### Local Government Areas

Name	Full Name	Area (sq km)	Overlap Area (sq km)	% Region Overlapped
Sutherland Shire	Sutherland Shire Council	368.5368	368.5368	100.00%

24 June 2019

By email: [admin@coasthistory.com.au](mailto:admin@coasthistory.com.au)

Dr Paul Irish  
Director  
Coast History & Heritage  
PO Box A74  
ARNCLIFFE NSW 2205

Dear Dr Irish,

**Request - Search for Registered Aboriginal Owners**

We refer to your letter dated 11 June 2019 regarding an Aboriginal Cultural Heritage Assessment for the proposed development at Kamay Botany Bay National Park, NSW. Lots 71 to 76 and 85 in DP 908.

Under Section 170 of the *Aboriginal Land Rights Act 1983* the Office of the Registrar is required to maintain the Register of Aboriginal Owners (RAO). A search of the RAO has shown that there are not currently any Registered Aboriginal Owners in the project area.

We suggest you contact La Perouse Local Aboriginal Land Council on 02 9311 4282 as they may be able to assist you in identifying Aboriginal stakeholders who wish to participate.

Yours sincerely



**Elizabeth Loane**  
**Project Officer, Aboriginal Owners**  
Office of the Registrar, ALRA

# Appendix 1C

## *Registrations of Interest*



**Barking Owl Aboriginal Corporation**  
**ICN: 8822 ABN: 88241973761**  
**2-65/69 Wehlow St MT DRUITT NSW 2770**  
**[barkingowlcorp@gmail.com](mailto:barkingowlcorp@gmail.com)**

---

**14 August 2019**

Dear Rebecca,

**RE: KAMAY BOTANY BAY NATIONAL PARK KURNELL ABORIGINAL CULTURAL HERITAGE ASSESSMENT**

We would like to register interest for full consultation and involvement in the study area.

<b>Registering Aboriginal Party:</b>	<b>Barking Owl Aboriginal Corporation</b>
<b>Contact Person:</b>	<b>Jody Kulakowski</b>
<b>Phone:</b>	<b>0426 242 015</b>
<b>Email:</b>	<b><u><a href="mailto:barkingowlcorp@gmail.com">barkingowlcorp@gmail.com</a></u> (preferred contact method)</b>

Cultural connection - The area is an important part of our culture due to previous generations living in and around the area, we maintain a special connection and responsibility as current generations whom continue to reside nearby and share in stories of our history relating to the location.

We are able to provide fit and hardworking site officers to assist with work that may involve physical labour with current white cards and all PPE equipment.

We can provide copies of relevant certificates of currency for business insurances on request.

Members put forward have experience in a variety of community consultation projects.

Please feel free to contact by email [barkingowlcorp@gmail.com](mailto:barkingowlcorp@gmail.com) if you require any further information.

Kind regards  
Jody Kulakowski  
BOAC





**DARUG LAND  
OBSERVATIONS PTY LTD  
ABN 27 602 765 453**

---

EMAIL: DARUGLANDOBSERVATIONS@GMAIL.COM  
PO BOX 173 ULLADULLA NSW 2539  
MOBILE: 0413 687 279

1<sup>st</sup> July 2019

Paul Irish  
Coast History & Heritage  
PO Box A74  
ARNCLIFFE NSW 2205

**Notification and Registration of ALL Aboriginal Interests**

RE: PROPOSED WORKS OF THE KAMAY BOTANY BAY NATIONAL PARK MASTERPLAN  
(STAGE 1) WITHIN THE KURNELL SECTION OF THE PARK (LOTS 71-76 & 85 IN DP 908)  
Aboriginal Cultural Heritage Assessment

Dear Paul,

Please be advised that Darug Land Observations Pty Ltd is seeking to be involved in any and all consultation meetings and fieldwork.

This office specialises in Aboriginal and community consultations, and has a membership that comprises of Traditional owners from the area in question. Those retain strong story, song lines, oral history and continued contact.

We would also like to state that we do not accept or support any person or organisation that are NOT from the DARUG Nation that comments regarding the said area.

Please also be advised that this Aboriginal organisation does not do volunteer work or attend unpaid meetings. I hope that you advise your client of this so that, 'This Group', will not be discriminated against and refused paid fieldwork. DLO's rate is \$440 half day (less than 4 hours) and \$880 per day (flat rate), including GST.

All correspondence should be emailed to: [daruglandobservations@gmail.com](mailto:daruglandobservations@gmail.com), or mailed to: PO Box 173 Ulladulla NSW 2539, and any further consultation during this project can be directed to Anna O'Hara on mobile 0413 687 279.

Yours sincerely,

Jamie Workman  
Darug Land Observations Pty Ltd

The Late Uncle Gordon Workman  
Darug Elder

## Rebecca Bryant

---

**From:** lilly carroll <didgengunawalclan@yahoo.com.au>  
**Sent:** Monday, 12 August 2019 6:36 PM  
**To:** Rebecca Bryant  
**Subject:** Re: Notification for Aboriginal heritage project at Kamay Botany Bay National P

Hi Rebecca

DNC would like to register an interest into Kamay Botany Bay National Park at kurnell

Kind regards  
Paul Boyd & Lilly Carroll  
Directors DNC

[Sent from Yahoo Mail for iPhone](#)

On Monday, August 12, 2019, 3:17 pm, Rebecca Bryant <rebecca@coasthistory.com.au> wrote:

Dear Ms Carroll and Mr Boyd,

Please find attached to this email a letter requesting details of any Aboriginal people who may have cultural knowledge in relation to the Kamay Botany Bay National Park, Kurnell area to assist with the preparation of an Aboriginal Cultural Heritage Assessment.

If you would like to register please respond by the **26 August 2019**.

Kind regards,

**Rebecca Bryant**

Archaeologist



P: [1800 450 995](tel:1800450995) / M: [0405 236 821](tel:0405236821)

E: [rebecca@coasthistory.com.au](mailto:rebecca@coasthistory.com.au)

W: [www.coasthistory.com.au](http://www.coasthistory.com.au)

Suite 9 & 10, 136 Marrickville Rd, Marrickville

PO Box A74, Arncliffe NSW 2205

## Rebecca Bryant

---

**From:** Rebecca Bryant  
**Sent:** Monday, 2 September 2019 9:53 AM  
**To:** MURRUMBUL MURRUMBUL  
**Subject:** RE: Notification for Aboriginal heritage project at Kamay Botany Bay National Park, Kurnell, NSW

Dear Mr Henry,

Thank you for your email.

I have registered Murrumbul for consultation on the Kamay Botany Bay National Park project and will be in touch shortly with some more information.

Enjoy your week.

Warm regards,

Rebecca

**From:** MURRUMBUL MURRUMBUL <murrumbul@gmail.com>  
**Sent:** Thursday, 29 August 2019 7:38 PM  
**To:** Rebecca Bryant <rebecca@coasthistory.com.au>  
**Subject:** Re: Notification for Aboriginal heritage project at Kamay Botany Bay National Park, Kurnell, NSW

Good evening Rebecca, I apologise for the late reply and response, is it still possible to register for the project, if so can you please register Murrumbul for Consultation for proponents please.

On Mon, Aug 12, 2019 at 3:30 PM Rebecca Bryant <[rebecca@coasthistory.com.au](mailto:rebecca@coasthistory.com.au)> wrote:

Dear Mr Henry,

Please find attached to this email a letter requesting details of any Aboriginal people who may have cultural knowledge in relation to the Kamay Botany Bay National Park, Kurnell area to assist with the preparation of an Aboriginal Cultural Heritage Assessment.

If you would like to register please respond by the **26 August 2019**.

Kind regards,

**Rebecca Bryant**  
Archaeologist



P: 1800 450 995 / M: 0405 236 821

E: [rebecca@coasthistory.com.au](mailto:rebecca@coasthistory.com.au)

W: [www.coasthistory.com.au](http://www.coasthistory.com.au)

Suite 9 & 10, 136 Marrickville Rd, Marrickville

PO Box A74, Arncliffe NSW 2205

--

**Yarma Walaawarnie**

**Regards**

**Shane Saunders**

**Chairperson**

**Murrumbul**

**Murrin Stakeholder**

#### **CONTACT DETAILS**

**Address: C/O Murrin Administrative Services,  
15 Renee Crescent Moruya Heads,  
NSW, 2537**

**Phone: 0432432965**

**Email: [murrumbul@gmail.com](mailto:murrumbul@gmail.com)**

**MURRUMBUL observes, respects, recognises and acknowledges the 13 ANCESTRESSES of the MURRIN NATION namely; DHARUG, GUNDUNGURRA, THARAWAL, EORA, ELOUERA, WANDANDIAN, NGUNAWAL, WALGALU, NGARIGO, WALBUNJA, DJIRINGANJ, THAUAIRA and BIDAWAL as the rightful and truthful APICAL ANCESTORS of all the People's and Descendants of all the Territory and Lands from the Hawkesbury River in the North, the Western Escarpment of the Great Dividing Range to the West, the entrance of the Snowy River to the South and the Tasman Sea to the East.**

**NOTICE – This email is solely for the named addressee and is to be treated with the utmost of email in confidence and confidentiality. You should only read, disclose, transmit, copy, distribute, act in reliance on or commercialise the contents if you are authorised to do so. If you are not the intended recipient of this email, please notify the sender by email immediately and then destroy any copy of this message and any attachments. Except where otherwise specifically stated, views expressed in this email are those of the individual sender. MURRUMBUL does not guarantee that this communication is free of errors, virus, interception or interference.**

## Rebecca Bryant

---

**From:** Phillip Boney <Waarlan12@outlook.com>  
**Sent:** Sunday, 18 August 2019 7:20 PM  
**To:** Rebecca Bryant  
**Subject:** Kamay Botany Bay

Hi Bec,

Phil here, I would like to register my interest in the Kamay Botany Bay project please. The family's doing good I hope your family's doing good as well. Thank you.

With regards, Phil Boney  
Wailwan Aboriginal Group

# Appendix 1D

*Information and Methodology document*

17 September 2019

[REDACTED]  
[REDACTED]  
[REDACTED]

**RE : Aboriginal Cultural Heritage Assessment Report Information and Methodology  
for Stage 1 Master Plan works, Kamay Botany Bay National Park, Kurnell NSW**

Thank you for expressing your interest in this project. You have been recorded as a 'Registered Aboriginal Party' to the project and we are now providing you with further information in accordance with section 80C (6) & (7) of the *National Parks and Wildlife Regulation 2009*. Specifically, this letter contains:

- a description of the works that are proposed under Stage 1 of the Kamay Botany Bay National Park Master Plan;
- a consideration of the types of potential impacts that this may have on Aboriginal objects and places;
- the methodology we propose to use to complete an Aboriginal Cultural Heritage Assessment Report for the proposed Stage 1 Master Plan works; and
- potential management options for identified and potential Aboriginal objects.

The letter also invites you to provide any knowledge or information about the cultural significance of Aboriginal objects or places which you believe should be considered in relation to the potential upgrade works. We also welcome your comments on the proposed methodology and management options. As outlined in this letter any comments you provide will be considered in the Aboriginal Cultural Heritage Assessment Report (ACHAR) for the proposal, which may be used to inform an Aboriginal Heritage Impact Permit and to assist the Department of Planning, Industry and Environment ('DPIE', formerly Office of Environment & Heritage) in their assessment of any permit application.

If you wish to provide us with any comments, please send them to us in writing (or contact us by phone if this is not possible), by **17 October 2019** at one of the following:

(Email) [admin@coasthistory.com.au](mailto:admin@coasthistory.com.au)

(Post) PO Box A74 Arncliffe NSW 2205

(Phone) 1800 450 995

(Fax) 02 8311 1478

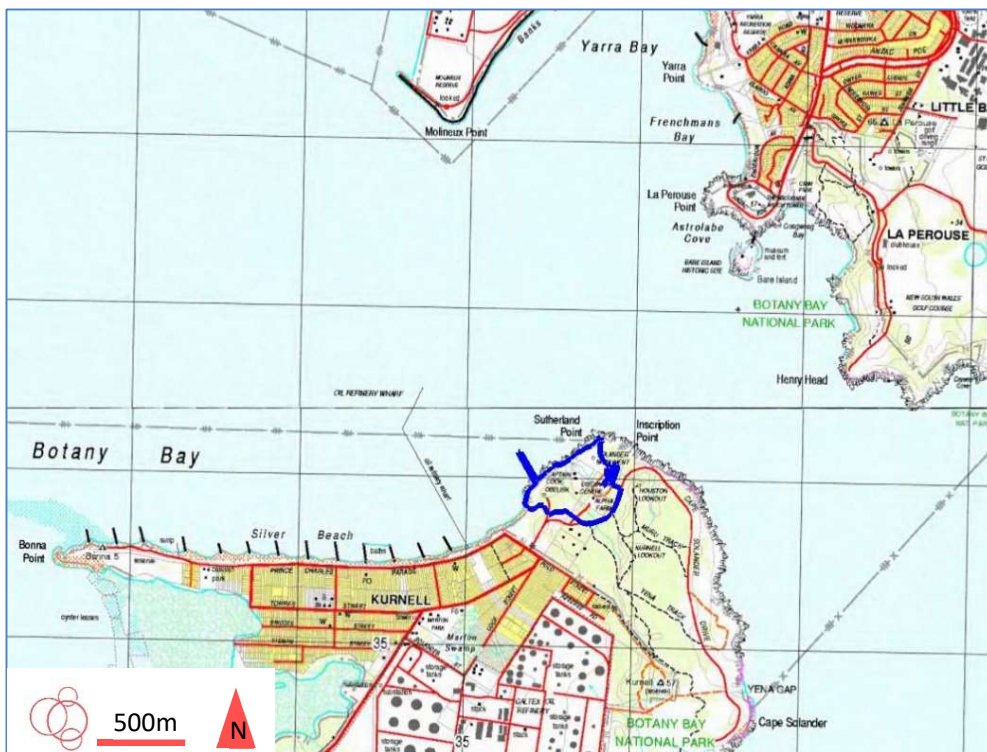
We note that in accordance with current DPIE guidelines<sup>1</sup>, any proposal you may wish to submit for engagement in fieldwork is a commercial matter which the proponent will consider separately from the comment and consultation we are currently undertaking.

## 1 What we are assessing

### *The area and proposal*

The area we are assessing is part of the Kurnell section of Kamay Botany Bay National Park, specifically the portion covered by Stage 1 of the current Master Plan, which includes Lots 71-76 and 85 in DP908 (see **Figure 1 & 2**). The National Parks & Wildlife Service ('NPWS')<sup>2</sup> is currently proposing a series of projects and works as outlined in Stage 1 of the current Kamay Botany Bay National Park Master Plan. These are summarised in the table below. Most are relatively minor in relation to impacts below the current ground surface, but some have the potential to impact Aboriginal cultural heritage, and so require careful consideration in this assessment.

We note that there are separate proposals currently under consideration for a new ferry terminal within the Stage 1 area, and also for a commemorative installation within the Kurnell section of the park (though not necessarily within the Stage 1 area). **Neither of these proposals are being considered in this assessment.**



**Figure 1. The Stage 1 Master Plan area (blue outline shading) and local topography.**

<sup>1</sup> As outlined in Section 3.4 (page 9) of the *Aboriginal cultural heritage consultation requirements for proponents 2010. Part 6 National Parks & Wildlife Act 1974* (DECCW 2010).

<sup>2</sup> 159 Farnell Ave, Audley NSW 2232.





**Figure 2. The Stage 1 Master Plan area (blue outline) and proposed works (numbered circles).**

The main Stage 1 Master Plan works can be summarised as follows (see the numbered circles in **Figure 2** for locations).

#	Masterplan Element	Brief Description
4	Ferry	Connection to La Perouse via water ( <i>Not assessed in this study</i> )
6	Cook's Monument	Form a gathering and pause space at Cook's Monument with a more direct connection to the beach and landing rock. Remove the walls that separate these places, to evoke a sense of this place at the moment of first contact.
7	Loop Path	The principal public path, a concrete fully accessible 'ribbon' connecting the foreshore and monument walk, the visitor building, Alpha House and stream. Retain and upgrade existing Burrawang walk.
8	Amenities	Remove existing amenities block and incorporate new amenities in visitor building.

#	Masterplan Element	Brief Description
9	Road Realignment and Linear Parking	New roadway alignment for improved park circulation and pavements for parking at building entry including bike racks.
12	Exhibition Pavilion	A contemporary museum-grade exhibition space including interactive displays, multimedia, showcases and temporary exhibition spaces. Administration is also included in this area.
13	Education Pavilion	A flexible space for educating school groups, community meetings and functions.
14	The Stream	Restore the creek and meeting of fresh and saltwater.
15	Arrival Via Collection Garden	Linear parking and bus drop off.
16	Existing Visitor Centre	Remove the existing building which is tired and has poor relationship to park generally. Provide interpretation of its social significance as an early example of a visitor-focused centre in a national park.
17	Collection Garden	Showcasing and interpreting the plant specimens collected by Banks and Solander. The garden parallels European and Indigenous ways of seeing and connecting with Country.
18	The Veranda/ Eating Place	A bark-clad roof makes the veranda a public gathering space for all. A long communal picnic table for meeting and eating.
20	Burrawang Walk	Review soundscape hardware.
21	Café Pavilion	Café with seating for 70 inside and 25 outside, with address to Alpha House and views to the Bay.
22	Alpha House	A place for everyone. Removing the boundary fence and 1960s garage of the closed private house to become a place for the community.
24	Loop Path	Accessible pathway creating a Foreshore Loop set above the underlying middens.
26	Foreshore Planting	Underplant Araucarias with Banksias and Tuckeroos: to give a sense of arrival through an Indigenous landscape; to frame the curtilage of Sir Joseph Banks Monument; and to assist with coastal protection. Remove Araucarias at senescence.
27	Banks Monument	Form a gathering and pause space beside the Banks monument within a restored landscape of Banksias - named after Sir Joseph Banks.
29	Picnic Crescent	The new accessible path and planting defines the picnic crescent. New long picnic tables, suitable for large group gatherings, and BBQs.
30	Parking	Linear parking continues around Commemoration Flat with permeable pavements and bicycle racks.
31	Amenities	Existing amenities block replaced with new.
32	Edge	A new path sited above the beach and foreshore scrub line allows views to the water and access to the beach via new stairs at the crescent ends of Commemoration Flat.
34	Outdoor Shower	For divers, snorkellers and swimmers.
41	Yena Track Parking	Relocate parking for Yena track on the southern side of the road for pedestrian safety and install permeable paving and bicycle racks.
42	Muru Train Parking	Parking for Muru trail on the southern side of the road for pedestrian safety. Upgrade trail.

Most of the Stage 1 Master Plan works will be assessed by the NPWS through a Review of Environmental Factors, with some elements potentially to be assessed via a development application with Sutherland Shire Council. The ACHAR may also be used in support of an Aboriginal Heritage Impact Permit and to assist the Department of Planning, Industry and Environment ('DPIE', formerly Office of Environment & Heritage) in their assessment of any permit application.

As part of that assessment, Coast History & Heritage has been engaged by the NPWS to undertake an Aboriginal Cultural Heritage Assessment Report (ACHAR) and Aboriginal community consultation in relation to current regulation and Department of Planning, Industry and Environment (DPIE) policy.<sup>3</sup> The Stage 1 Master Plan area is part of a highly significant Aboriginal cultural landscape, which includes places of cultural and historical significance and extensive Aboriginal cultural heritage in the form of middens, burials, rock engravings and other archaeological remains. The place also has significance for its association with the 1770 visit of the Endeavour, the arrival of the first fleet in 1788, and its local history as a place of recreation and historical commemoration.

The guiding principle of the current ACHAR is to understand the full extent of proposed works in relation to known and potential Aboriginal archaeological remains and to seek to avoid these impacts. However, based on extensive past archaeological investigations (see below), it is known that disturbed or relocated Aboriginal objects such as stone artefacts or shells can occur anywhere within the National Park, and so fully avoiding any impacts to all Aboriginal objects is unlikely to be possible. For this reason, it is likely that an Aboriginal Heritage Impact Permit under s90 of the *National Parks & Wildlife Act 1974* will be required, which would allow Aboriginal objects in disturbed contexts to be collected during monitoring of some works, but would exclude any impacts to any Aboriginal cultural remains that are '*in situ*' (intact in their original location).

The study area is situated on the southern headland of Kamay (Botany Bay). The local landscape includes a 12m high dune ridge running roughly northeast-southwest immediately behind and above the foreshore, which is cut by a stream which drains swampy ground to the south (near the current visitor centre) and flows into the bay. The foreshore in front of this dune has been levelled and cleared and is up to 25m in width behind a sandy and rocky beach. A smaller, less elevated north-south running dune forms the eastern bank of the stream, upon which the historic Alpha House now stands. Underneath the sandy soils along the foreshore is sandstone bedrock between 0.1 and 2m below the surface. Further back the depth of sandstone under the surface is poorly defined, but it outcrops adjacent to the access road in the south-west of the study area, where an Aboriginal engraving is found. Though some of the area is now cleared or planted with introduced exotic trees and shrubs, almost all of it was originally covered by a variety of plant communities from coastal scrub on the ridges to swamp and littoral forest on lower lying areas.<sup>4</sup>

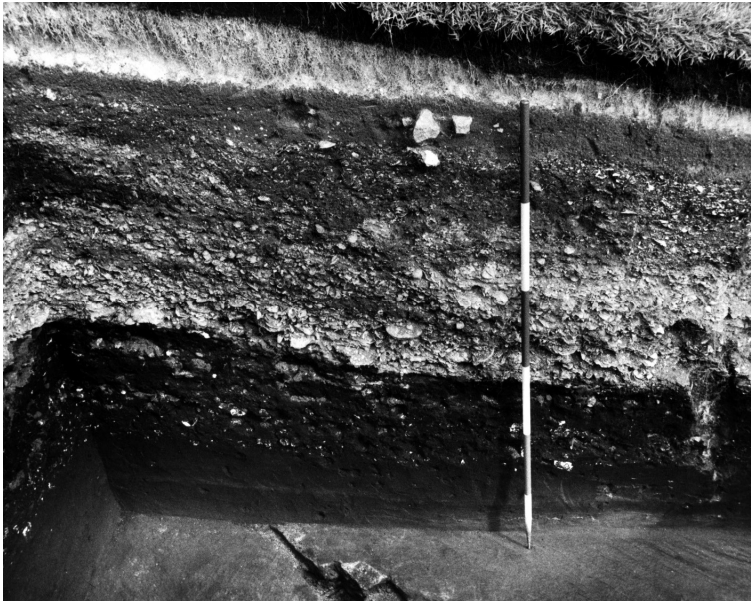
Aboriginal middens, burials and stone artefacts have been uncovered within the area since the 1840s during the digging of holes, ditches and other land use. Archaeological investigations have

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<sup>3</sup> Office of Environment & Heritage (OEH) 2010. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*; *National Parks and Wildlife Regulation 2009* (s80C), as detailed in OEH 2010 *Aboriginal cultural heritage consultation requirements for proponents 2010. Part 6 National Parks & Wildlife Act 1974*.

<sup>4</sup> Benson, D. & Eldershaw, G. 2007. 'Backdrop to encounter: the 1770 landscape of Botany Bay, the plants collected by Banks and Solander and rehabilitation of natural vegetation at Kurnell' *Cunninghamia* 10(1):113-137.

taken place over the past 50 years, leading in particular to the discovery and definition of an enormous and highly significant midden that lies along most of the foreshore of the park (**Figures 3 – 5**). In 2007/2008 Coast director Paul Irish completed archaeological test and salvage excavations and archaeological monitoring within the park in conjunction with the La Perouse Local Aboriginal Land Council and the Towra Team (NPWS Aboriginal trainees).<sup>5</sup> These investigations were in relation to a previous master plan and involved digging many shallow small pits to find – but not disturb – the midden and any other Aboriginal archaeological remains.



**Figure 3. Slice (section) through the foreshore midden during excavations in 1969/70**

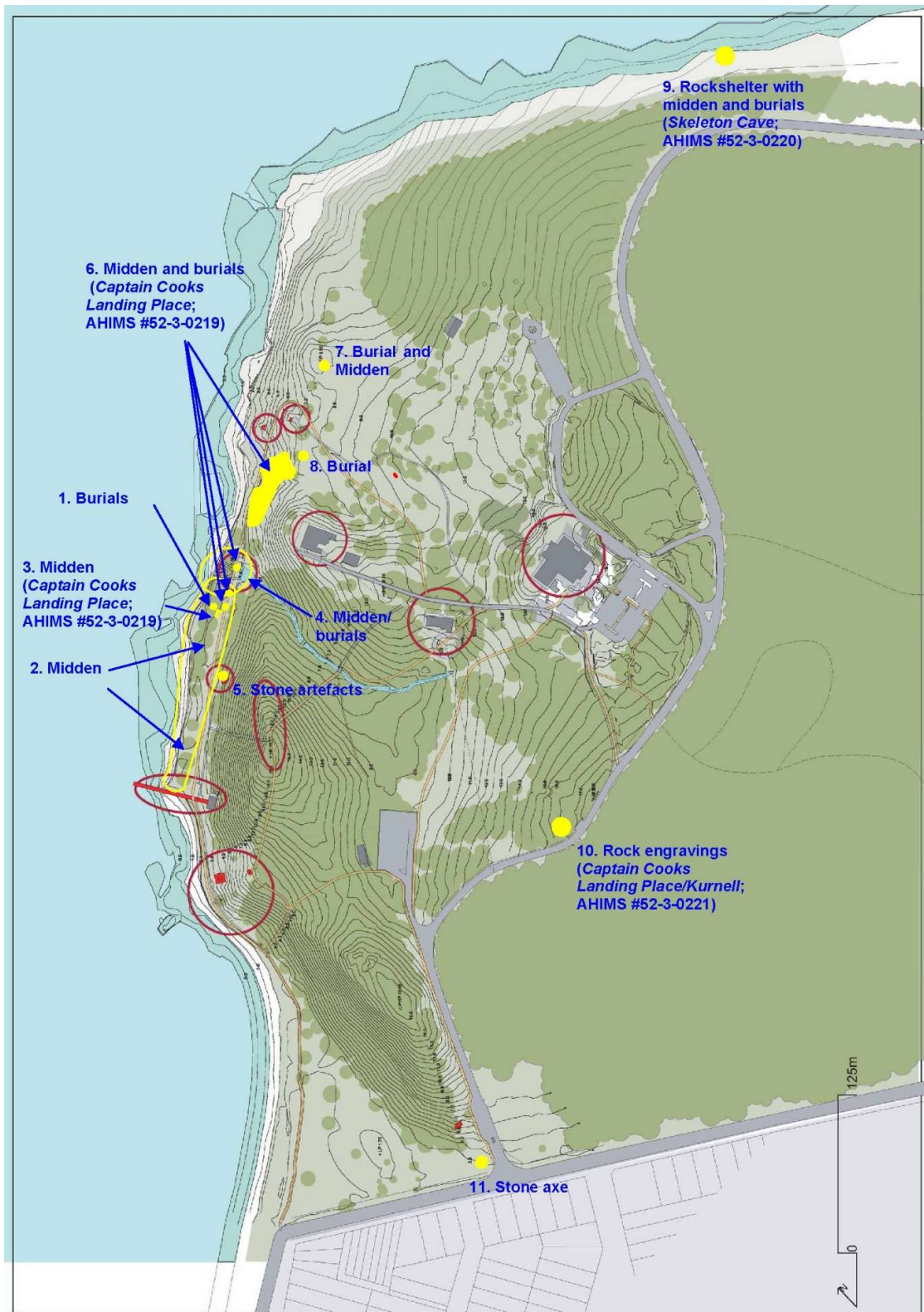
[Source: image courtesy of Vincent Megaw]



**Figure 4. Fish hooks found during archaeological excavations in 2008**

[Source: Paul Irish]

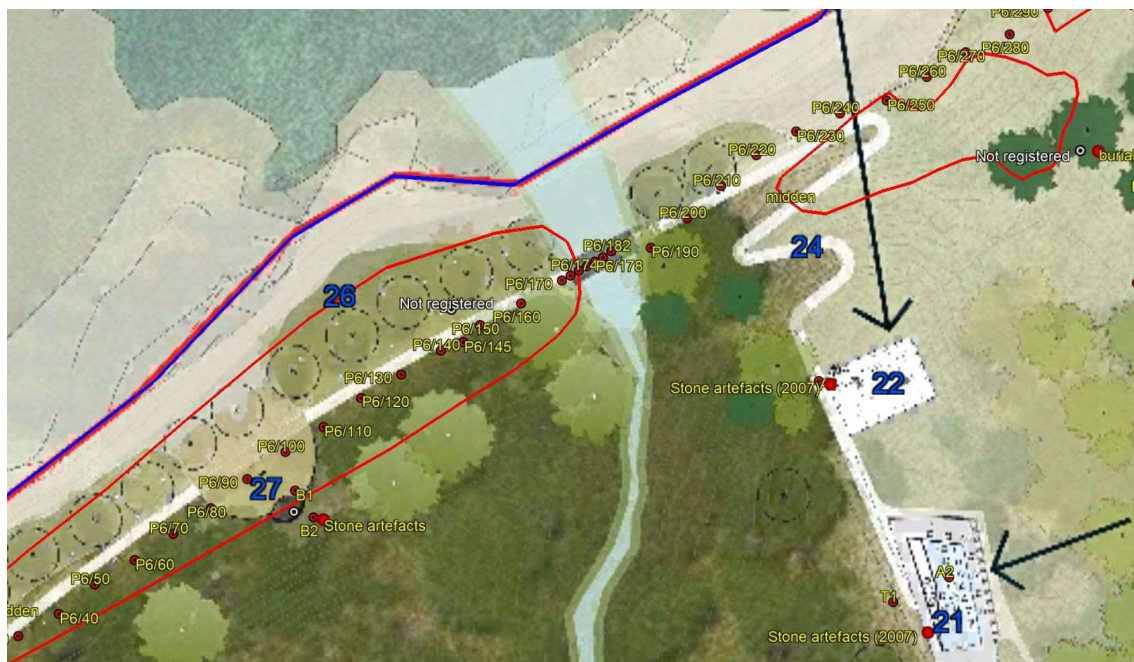
<sup>5</sup> See P. 2007. *Aboriginal Archaeological Test Excavations, Meeting Place Precinct, Botany Bay National Park, Kurnell, NSW* (Report to the NSW NPWS); Irish, P. 2010. *Final Report on Aboriginal Archaeological Monitoring and Salvage Excavations, Meeting Place Precinct, Kamay Botany Bay National Park, Kurnell, NSW*. Australian Archaeological Consultancy Monograph Series, Volume 1;



**Figure 5. Recorded Aboriginal sites and artefacts within the park based on past investigations.**

[Source: Paul Irish 2010]

As a result of all of these investigations we have an informed idea about where Aboriginal archaeological remains are, and where they are likely to be. We have been reviewing these records in detail to understand exactly where Aboriginal cultural heritage has previously been found and comparing that to the proposed Master Plan works. You can see an example in **Figure 6**. We also conducted a site inspection in May 2019 with the La Perouse Local Aboriginal Land Council, to look at these locations on the ground. We are still completing our research to ensure we can avoid impacts to Aboriginal cultural heritage as much as possible. But historical activities like digging pipe trenches and constructing roads and buildings have involved moving sand around the area so it is always possible isolated stone artefacts or shells could be found whenever you dig. For this reason, it is likely that we will recommend an Aboriginal Heritage Impact Permit as a precaution in case such disturbed remains are found.



**Figure 6. Stage 1 works (blue numbers) in relation to recorded sites and location of previous archaeological excavations.**

[Source: Coast History & Heritage, based on NPWS Master Plan map]

## 2 Project Timing and Opportunities for Comment

To meet the Aboriginal community consultation requirements of the Aboriginal Cultural Heritage Assessment Report (ACHAR), Coast History & Heritage has undertaken public and direct Aboriginal community notification on behalf of the proponent in accordance with Section 80C of the *National Parks and Wildlife Regulation 2009*. As a result of this, several Registered Aboriginal Parties to the project have been identified. In addition, the NPWS has undertaken extensive consultation for a number of years with local Aboriginal community members in relation to the Master Plan and a new Plan of Management for the park. All of those people and organisations previously consulted were notified about this ACHAR project and automatically registered as Registered Aboriginal Parties unless they opted out of further consultation.

All Registered Aboriginal Parties have two main opportunities to comment on the proposal and the ACHAR. First being in reviewing this Information and Methodology document and secondly in reviewing the draft ACHAR. All Registered Aboriginal Parties have been sent a copy of this document by email or post on 17 September 2019 and provided 28 days to make any comments. We have asked for any comments you may wish to make in relation to the project including its methodology and any Aboriginal cultural information that may be relevant to assess the potential impacts of the proposal.

These comments will be forwarded to NPWS for their consideration, and will be incorporated into the draft ACHAR which is to be prepared. This draft report will also be provided to all Registered Aboriginal Parties and 28 days given to make any comments. Any comments received will be considered and incorporated into the final report, which will be provided to NPWS and may also be used in support of an AHIP application. A copy of the final ACHAR will also be made available to all Registered Aboriginal Parties.

*Please note that if any information you wish to provide to Coast History & Heritage is culturally sensitive, please let us know so that appropriate protocols of access and use can be developed. If you do not inform us, we will assume that the information you provide can be included and discussed in the Aboriginal Cultural Heritage Assessment report.*

## 3 Proposed Assessment Methodology

We propose to use the following methodology to assess the archaeological and Aboriginal cultural values relevant to the project.

### *Archaeological Assessment*

Our archaeological assessment will be undertaken and documented in the ACHAR that is to be produced for the project. It will consider relevant background environmental, historical and archaeological context, including the results of the field survey and past archaeological investigations already undertaken. It will look in detail at the documented Aboriginal cultural heritage within the study area and seek to avoid any possible impacts to intact archaeological

remains. It will also provide an assessment of the *archaeological* significance of any Aboriginal objects within the study area and provide detailed draft management recommendations which, as outlined already, might include seeking an Aboriginal Heritage Impact Permit.

### ***Aboriginal Cultural Assessment***

The Aboriginal cultural assessment will consider:

1. our knowledge of previously documented Aboriginal cultural and historical associations with the study area, and information previously provided to the NPWS through its past consultation with Aboriginal community members about the study area;
2. any information provided by Registered Aboriginal Parties about:
  - the Aboriginal cultural significance of any identified Aboriginal remains or Aboriginal objects;
  - any other places or objects of cultural value to Aboriginal people which may be relevant to the current proposal;
  - the management of as yet undocumented Aboriginal objects that may be uncovered any Stage 1 Master Plan works; and
  - any other Aboriginal cultural or historical knowledge which is relevant to the Aboriginal cultural assessment of the study area in relation to the current proposal.

Any information you provide us with will be considered and included in the Aboriginal Cultural Heritage Assessment report that is to be produced for the project. And as we noted above, appropriate protocols can be developed for sensitive information if you let us know.

## **4 Proposed Management of Aboriginal Objects**

At this stage we are proposing to avoid impacts to any intact Aboriginal cultural heritage within the study area. But as we have already discussed, it is likely that isolated stone artefacts or shells may be encountered in disturbed contexts, and so we will most likely seek an Aboriginal Heritage Impact Permit to ensure that they can be collected and appropriately managed. In order to develop specific management recommendations for you to consider in the draft ACHAR we need to receive your comments based on this document, and assess the archaeological and cultural values relevant to this project. Specifically, we would like you to inform us which of the following three options you would prefer for the long-term management of any Aboriginal objects that may be uncovered during Stage 1 Master Plan works:

1. objects may be reburied at an appropriate location within the study area or broader national park with the consent of the NPWS. Given the likely small quantities of material to be collected, and the space potentially available to rebury remains within the park, this should be possible for the current project; or
2. transferring the objects to an Aboriginal organisation with appropriate storage facilities under a Care and Control agreement (e.g. the La Perouse Local Aboriginal Land Council). This should be



with the agreement and consent from other Registered Aboriginal Parties, however the DPIE can refuse Care and Control where this cannot be demonstrated; or

3. transferring the objects to the Australian Museum or a local museum with appropriate storage facilities. The Australian Museum is the default repository for Aboriginal archaeological remains but will only take objects which meet a certain threshold of significance.

Any comments you provide on these three possible options will help us to work out a management strategy for you to consider in the draft Aboriginal Cultural Heritage Assessment report.

## 5 Conclusions

This letter has provided you with information about the project, our proposed assessment methodology and proposed management of Aboriginal objects that might be impacted by the current proposal.

We have sought:

- Your comments on the assessment methodology that we have proposed.
- Any information about Aboriginal objects or places of cultural value to Aboriginal people which may be located within the study area, and any other Aboriginal cultural or historical information that you feel is relevant to the current assessment and proposal and should be considered.
- Your views on the possible long-term management of Aboriginal stone artefacts that might be collected during Stage 1 Master Plan works, if an Aboriginal Heritage Impact Permit is sought.

As noted above, where requested and appropriate, protocols can be developed for culturally sensitive information provided to Coast History & Heritage. It is however essential that comments and information, preferably in writing, be received by Coast History & Heritage no later than **17 October 2019** if they are to be considered in the draft Aboriginal Cultural Heritage Assessment Report.

If you have any questions or require any additional information, please contact our office on 1800 450 995 or [admin@coasthistory.com.au](mailto:admin@coasthistory.com.au).

Yours sincerely,



Dr Paul Irish

Director

E: [paul@coasthistory.com.au](mailto:paul@coasthistory.com.au)

W: [www.coasthistory.com.au](http://www.coasthistory.com.au)

# Appendix 1E

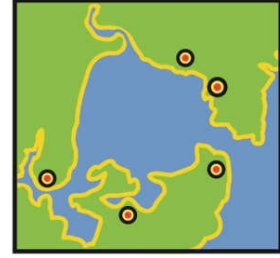
## *Responses to Information and Methodology*

There were NO RESPONSES to the  
Information and Methodology Document

# Appendix 1F

*Responses to 2019 Draft Report*

# LA PEROUSE



LOCAL ABORIGINAL LAND COUNCIL

17 December 2019

Dr Paul Irish  
P.O. Box A74  
ARNCLIFFE NSW 2205

Email: [admin@coasthistory.com.au](mailto:admin@coasthistory.com.au)

PO Box 365, Matraville  
New South Wales, 2036

T: (02) 9311 4282  
E: [admin@laperouse.org.au](mailto:admin@laperouse.org.au)  
ABN: 89 136 607 167

Dear Dr Irish

## Aboriginal Cultural Heritage Assessment Report – Kamay Botany Bay National Park, Kurnell NSW

I write in regards to the above mentioned report dated November 2019. I have reviewed the report provide the following information and recommendations on behalf of the La Perouse Local Aboriginal Land Council (**La Perouse LALC**).

As you may be aware, the La Perouse LALC was established and operates within the provisions of the *Aboriginal Land Rights Act 1983* (NSW) (**ALRA**) and currently represents a membership of approximately 470 Aboriginal persons who reside within or have an association with the La Perouse LALC area. In accordance with Section 52 of the ALRA the La Perouse LALC has a statutory function to *"take action to protect the culture and heritage of Aboriginal persons in the Council's area"*.

The La Perouse LALC acknowledges and recognises the Gweagal people Dharawal (Tharawal, Turuwal or Thirroul) language group who traditionally occupied the Kurnell Peninsula in which the subject property is located. The La Perouse LALC can provide further significance information on request.

Following the review of the report, I can provide the following recommendations:

### Recommendation 1:

The La Perouse LALC agrees with the recommendations as set out on pages 96 and 97 of the draft report.

### Recommendation 2:

The La Perouse LALC advises that if any Aboriginal objects (such as human or animal bone, shell material or stone artifacts) are impacted or unearthed during any activity on the property, the activity must cease and the NSW Office of Environment and Heritage and La Perouse LALC be contacted immediately.

If you would like to discuss this issue further please don't hesitate to contact the La Perouse LALC office on 9311 4282 during business hours.

Yours sincerely,

Chris Ingrey  
Chief Executive Officer

# Appendix 1G

*Responses to 2022 Draft Report*

## Gina Basile

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**From:** glen timbery <glen\_timbery@outlook.com>  
**Sent:** Tuesday, 10 January 2023 11:44 AM  
**To:** Gina Basile  
**Subject:** RE: Aboriginal Community Consultation, Draft ACHAR - Kurnell NSW - Sutherland Shire LGA

Ain't this about culture and our tribe and people the survival of our people.

What comes first your community or our culture.

Why is everybody involved in our the Wallangang Tribes business our cultural business.

The tribe has been devastated of many years and now your just handing it out to what to who. Whom do you acknowledge as the traditional and original people and where do we the Wallangang tribe stand within all your bullshit.

We the Wallangang have real history and cultural connection so what happens you give all of that to who, Community which community. What traditionally belongs to our tribe you still avoid the truth.

We have our own Corporation we by cultural lore are not allowed to except anything off Land Council. So what belongs to us the Wallangang Tribe we want it back.

We are the only surviving people of the original so where does this all this go or are just going to keep ignoring us. Our culture is about blood our people.

This is Wallangang Tribal lands why are you handing our traditional land out and when is it going to handed back to the right people.

Sent from [Mail](#) for Windows

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**From:** [Gina Basile](#)  
**Sent:** Tuesday, 10 January 2023 11:27 AM  
**Cc:** [Coast History and Heritage](#)  
**Subject:** Aboriginal Community Consultation, Draft ACHAR - Kurnell NSW - Sutherland Shire LGA

Dear Registered Aboriginal Parties,

Please find the draft revised ACHAR regarding the Stage 1 Master Plan Works for Kamay Botany Bay National Park, Kurnell NSW, changes have been proposed regarding some of the works, as available at the following link:  
<https://app.box.com/s/opx1qor3wgbqtsfrwf28p5yjevb5ls5>

We invite you to provide any knowledge or information about the cultural significance of Aboriginal objects and/or places which you believe should be considered in relation to the proposed works. We also welcome your comments on the proposed recommendations. Any comments you provide will be considered in the revised Aboriginal Cultural Heritage Assessment Report.

The deadline for response is **Thursday, 9 February 2023** if you could kindly respond by this date.

Kind Regards,

## Gina Basile

---

**From:** glen timbery <glen\_timbery@outlook.com>  
**Sent:** Wednesday, 11 January 2023 4:04 PM  
**To:** Gina Basile  
**Subject:** RE: Aboriginal Community Consultation, Draft ACHAR - Kurnell NSW - Sutherland Shire LGA

Hi Gina

There is a massive problem why have you put our ancestor Pemulwuy who died, killed with his head cut off over 200 years ago as a stake holder.

Please don't ignore me it's a disgrace we need answers.

I see a lot of organisation as stakeholders what connection's do they have.

Where do we the Wallangang Tribe fit in with this I don't see our name anywhere.

Glen Timbery.

Sent from [Mail](#) for Windows

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**From:** [Gina Basile](#)  
**Sent:** Tuesday, 10 January 2023 11:27 AM  
**Cc:** [Coast History and Heritage](#)  
**Subject:** Aboriginal Community Consultation, Draft ACHAR - Kurnell NSW - Sutherland Shire LGA

Dear Registered Aboriginal Parties,

Please find the draft revised ACHAR regarding the Stage 1 Master Plan Works for Kamay Botany Bay National Park, Kurnell NSW, changes have been proposed regarding some of the works, as available at the following link:  
<https://app.box.com/s/opx1qor3wgbqtsfrwf28p5yjevb5ls5>

We invite you to provide any knowledge or information about the cultural significance of Aboriginal objects and/or places which you believe should be considered in relation to the proposed works. We also welcome your comments on the proposed recommendations. Any comments you provide will be considered in the revised Aboriginal Cultural Heritage Assessment Report.

The deadline for response is **Thursday, 9 February 2023** if you could kindly respond by this date.

Kind Regards,  
Gina

**Gina Basile**  
Archaeologist



## Gina Basile

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**From:** glen timbery <glen\_timbery@outlook.com>  
**Sent:** Wednesday, 11 January 2023 4:25 PM  
**To:** Gina Basile  
**Subject:** RE: Aboriginal Community Consultation, Draft ACHAR - Kurnell NSW - Sutherland Shire LGA

We need to know where you repatriated the human remains you know quit well as I have expressed through many emails.

The Wallangang Aboriginal Corporation needs to immediately added to the list of stakeholders as you are on Wallangang Tribal lands.

We do not go under any Land Council or any other council.

It is against Aboriginal Lore to be mentioning and using the names of the dead who is using our ancestor Pemulwuy's name and has registered themselves as stakeholders.

Glen Timbery.

Sent from [Mail](#) for Windows

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**From:** [Gina Basile](#)  
**Sent:** Tuesday, 10 January 2023 11:27 AM  
**Cc:** [Coast History and Heritage](#)  
**Subject:** Aboriginal Community Consultation, Draft ACHAR - Kurnell NSW - Sutherland Shire LGA

Dear Registered Aboriginal Parties,

Please find the draft revised ACHAR regarding the Stage 1 Master Plan Works for Kamay Botany Bay National Park, Kurnell NSW, changes have been proposed regarding some of the works, as available at the following link:  
<https://app.box.com/s/opx1qor3wgbqtsfrwf28p5yjevb5ls5>

We invite you to provide any knowledge or information about the cultural significance of Aboriginal objects and/or places which you believe should be considered in relation to the proposed works. We also welcome your comments on the proposed recommendations. Any comments you provide will be considered in the revised Aboriginal Cultural Heritage Assessment Report.

The deadline for response is **Thursday, 9 February 2023** if you could kindly respond by this date.

Kind Regards,  
Gina

**Gina Basile**  
Archaeologist





## Gina Basile

---

**From:** glen timbery <glen\_timbery@outlook.com>  
**Sent:** Thursday, 12 January 2023 5:53 PM  
**To:** Gina Basile  
**Subject:** RE: Aboriginal Community Consultation, Draft ACHAR - Kurnell NSW - Sutherland Shire LGA  
**Attachments:** e00335\_0031\_c - Copy.jpg; jimmy and joey.jpg; king billy timbrey.jpg; Breastplate.jpg; 1908 jacky wentworth & the timbery family.pdf; 1877 coroners court death at sans souci camp joey timbery.pdf; photo 5.jpg; thumbal.jpg

Dear Gina

This is very serious the remains of Joe Timbrey (King Thumball) King Billy – William Wentworth – Jackie Wentworth.

It is mentioned on page 39 that there are three (3) more sites which the ancestral remains were repatriated. We the Wallangang Aboriginal Corporation need to know where these sites are and who's ancestor's have been discarded within these sites.

Please do not ignore the Wallangang Aboriginal Corporation this is a very serious matter.

As this is criminal to remove the remains without permission and to discard them in the bush while the rest of the family lay to rest within a cemetery.

Joe Timbrey is the grandson of Pemulwuy and the chief of the five islands he was last painted by Herbert Beecroft in 1904 at La Perouse.

We have no choice but to involve police and have this investigated properly, what you have done and continue to do to the Wallangang People is very obvious and can be proven. The way Rodney Kelly was treated throughout the process of the Gwiagal shield, Joe Timbrey is his ancestor.

This will go public and world wide.

Christopher Ingrey and the La Perouse Aboriginal Land Council are not our cultural authority they do not have any permission to act on behalf of the Wallangang People or the Joe Timbrey family.

Glen Timbery.

Sent from [Mail](#) for Windows

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**From:** [Gina Basile](#)  
**Sent:** Tuesday, 10 January 2023 11:27 AM  
**Cc:** [Coast History and Heritage](#)  
**Subject:** Aboriginal Community Consultation, Draft ACHAR - Kurnell NSW - Sutherland Shire LGA

Dear Registered Aboriginal Parties,

## Paul Irish

---

**From:** Julia McLachlan  
**Sent:** Friday, 13 January 2023 10:14 AM  
**To:** glen\_timbery@outlook.com  
**Subject:** RE: Aboriginal Community Consultation, Draft ACHAR - Kurnell NSW - Sutherland Shire LGA

Hi Glen,

Thanks for your emails and for bringing those concerns to our attention, I hope I can address some of these for you. Gina who is assisting with this project has passed this onto me and Paul Irish, who is managing this project is currently on leave, so I'm responding on their behalf. Apologies it's taken a few days to get back to you, I just wanted to make sure I have all the correct information.

Both Wallangang Aboriginal Corporation and you (Glen Timbery) are registered for this project so you would have previously received correspondence from us and will continue to receive all consultation documents related to the project. Regarding the consultation process more generally, we've undertaken Aboriginal stakeholder consultation as guided by Heritage NSW and the *National Parks and Wildlife Regulation 2019*. All Aboriginal parties listed in the report, including yourself, registered themselves to be part of the consultation process and we are required to consult with all registered parties.

With regards to the three repatriated Ancestors (restricted sites) mentioned on Page 39, these are noted to be outside the project area. Given that these are outside the project area and will not be impacted by the proposed works, we have no further information on them.

This project has been going for some time, I believe it started back in 2016. There have been some changes to the designs which is why it has taken a little while to get this report together and out for consultation with the Registered Aboriginal Parties. I'm happy to have a chat to you about the current report but I'm not too familiar with its earlier stages. If you'd rather speak with Paul when he's back from leave, let me know and I can follow up on his return in February.

I hope I've been able to address some of your concerns and if you have any more, please send them through and I'll do my best to answer them.

Thanks,

**Julia McLachlan**

Heritage Consultant



P: 1800 450 995 / M: 0433 984 389

E: [julia@coasthistory.com.au](mailto:julia@coasthistory.com.au)

W: [www.coasthistory.com.au](http://www.coasthistory.com.au)

15/112 McEvoy Street Alexandria NSW 2015

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**From:** glen timbery <[glen\\_timbery@outlook.com](mailto:glen_timbery@outlook.com)>

**Sent:** Tuesday, 10 January 2023 11:44 AM

**To:** Gina Basile <[gina@coasthistory.com.au](mailto:gina@coasthistory.com.au)>

**Subject:** RE: Aboriginal Community Consultation, Draft ACHAR - Kurnell NSW - Sutherland Shire LGA

## Paul Irish

---

**From:** Paul Irish  
**Sent:** Tuesday, 31 January 2023 11:47 AM  
**To:** glen\_timbery@outlook.com  
**Subject:** Aboriginal Community Consultation, Draft ACHAR - Kurnell NSW - Sutherland Shire LGA

Hi Glen,

Thanks for all of your emails and apologies for not responding before now, I have been away for a few weeks and have just got back. I realise that you have concerns about my impartiality but for my part I am happy to speak with you or meet with you if you would like. Let me first though just respond to your main concerns.

### **1. Repatriations of Aboriginal ancestors**

I completely understand your desire to find the resting place of your ancestors and I would be happy to provide information if we had it. However neither myself nor any of my staff at Coast have ever had anything to do with organising the repatriation of Aboriginal ancestors, nor will we in future. As I am sure you would agree – it is none of our business and we have no role, responsibility or authority with respect to these matters.

To the best of my knowledge the repatriations undertaken in Sydney over the past 20 years have only involved the remains of unnamed Aboriginal ancestors held in museum collections (which most probably pre-date the arrival of Europeans in Sydney). I am not aware of any repatriations being carried out of named/known individuals. However as I stated, I have never had any involvement with organising any of these repatriations – for more details you would need to contact the Australian Museum, Heritage NSW or the La Perouse LALC.

The project at Kamay Botany Bay National Park does not involve repatriation of Aboriginal ancestral remains and does not impact any existing repatriation places at Kurnell. Considerable effort has also been made to ensure that impacts to other Aboriginal heritage sites will be avoided. No permission has been sought to impact Aboriginal ancestral remains as part of this project.

### **2. The Kamay Botany Bay National Park project and Aboriginal community consultation**

In terms of consultation, I acknowledge your concerns with the way that Aboriginal community consultation is undertaken in these projects. However we are obliged to follow the Regulations set down by the state government, which involves inviting registrations of interest from a wide range of people. I note your particular concern with a group calling themselves 'Pemulwuy'. This group did not register an interest in the project and have not had any involvement. They are mentioned in the report because they were on a list held by Heritage NSW of potential Aboriginal stakeholders that we were obliged to contact and invite to register their interest if they chose to. I don't have further details about any claims they might have to being descended from Pemulwuy. I suggest that you contact Heritage NSW if you would like to know more as they maintain the list.

You, and the Wallangang Aboriginal Corporation have been Registered Aboriginal Parties to this project since it started in 2019. It has been a complicated project with different parts and stages and therefore there's been a few different reports completed since that time. All of these have been sent to all Registered Aboriginal Parties.

I am happy to meet or call to discuss any of these issues further if you would like so please just let me know.

Kind regards,

Paul Irish

**Dr Paul Irish**

# Appendix 1H

*Responses to 2023 Draft Report*

No responses received

# Appendix 2

## *Heritage NSW Aboriginal Heritage Information Management System Records*

*(Note: Site record for #52-3-2162 restricted and not included )*

Coast History & Heritage

Date: 13 June 2022

15/112 McEvoy Street  
 Alexandria New South Wales 2015

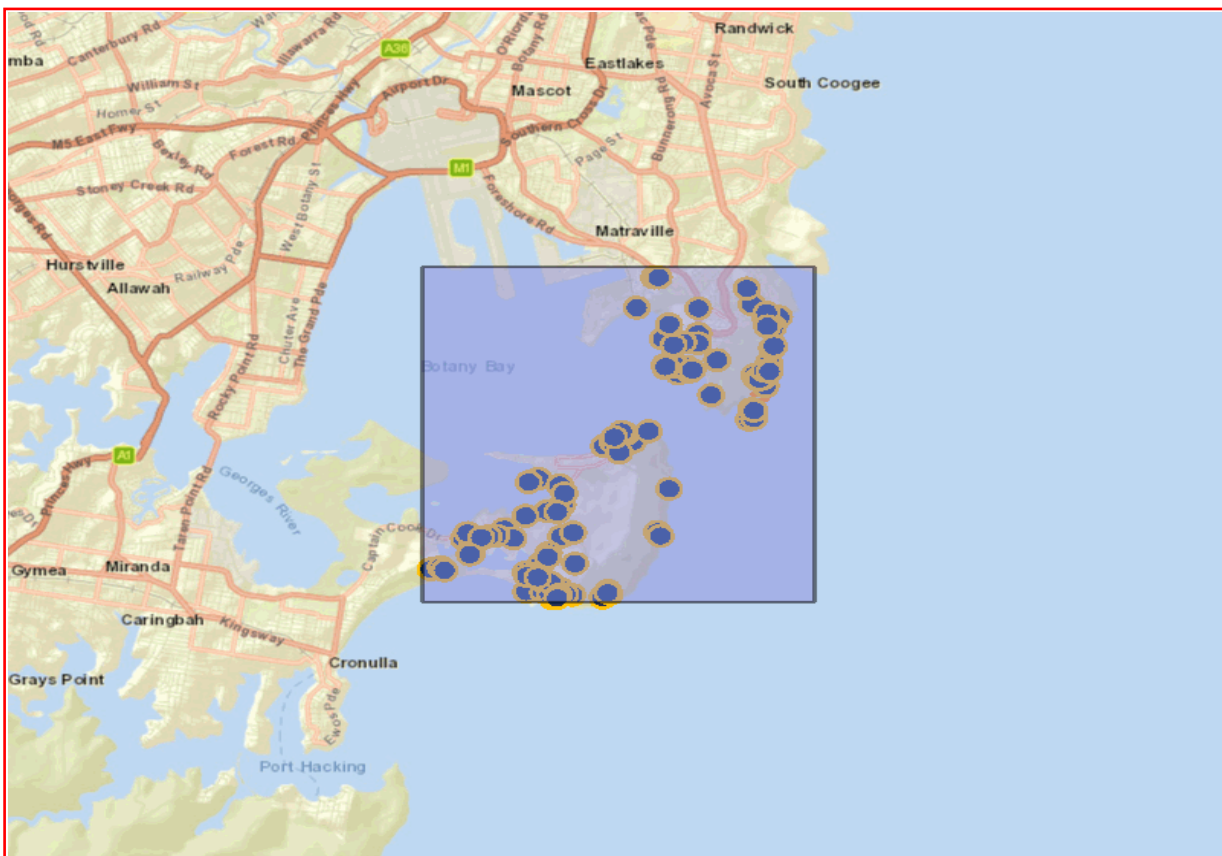
Attention: Paul Irish

Email: paul@coasthistory.com.au

Dear Sir or Madam:

**AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 331500.0 - 339500.0, Northings : 6232000.0 - 6240000.0 with a Buffer of 0 meters, conducted by Paul Irish on 13 June 2022.**

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

<b>116</b>	<b>Aboriginal sites are recorded in or near the above location.</b>
<b>1</b>	<b>Aboriginal places have been declared in or near the above location. *</b>

<u>ID</u>	<u>Aboriginal Place Name</u>
130	Coast Hospital Cemetery Resting Place

### **If your search shows Aboriginal sites or places what should you do?**

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(https://www.legislation.nsw.gov.au/gazette\)](https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

### **Important information about your AHIMS search**

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.



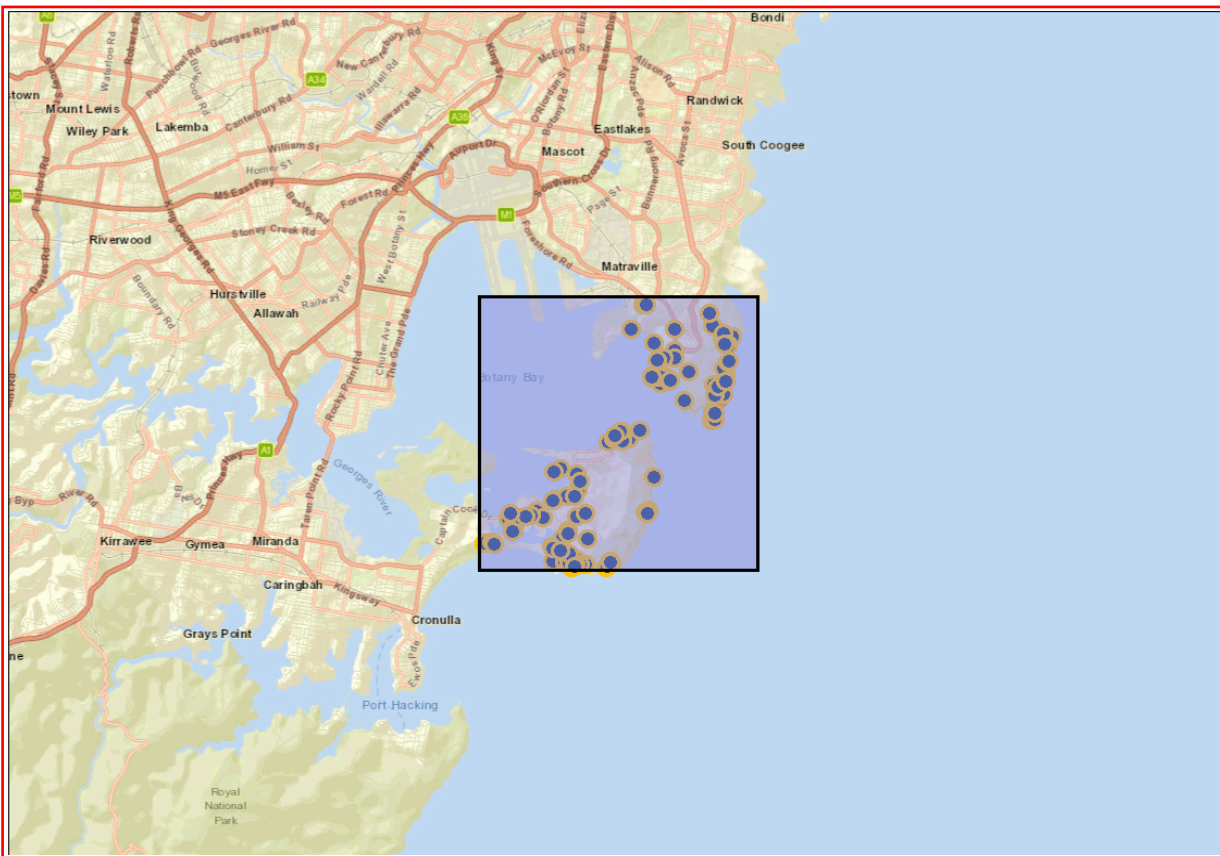
Coast History & Heritage  
 15/112 McEvoy Street  
 Alexandria New South Wales 2015  
 Attention: Paul Irish  
 Email: paul@coasthistory.com.au

Date: 14 September 2023

Dear Sir or Madam:

**AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 331500.0 - 339500.0, Northings : 6232000.0 - 6240000.0 with a Buffer of 0 meters, conducted by Paul Irish on 14 September 2023.**

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

<b>119 Aboriginal sites are recorded in or near the above location.</b>	
<b>1 Aboriginal places have been declared in or near the above location. *</b>	
<b><u>ID</u></b>	<b><u>Aboriginal Place Name</u></b>
130	Coast Hospital Cemetery Resting Place

### **If your search shows Aboriginal sites or places what should you do?**

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(https://www.legislation.nsw.gov.au/gazette\)](https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

### **Important information about your AHIMS search**

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Burials



52-3-0219

Site collection deposited

Associated with

rock engravings  
stone arrangements  
campsite

rock paintings  
axe grooves  
other relics

carved trees  
quarry

Photo record by

Where deposited

Scale chart by

Where deposited

Excavated by

J. V. S. Megaw 1968 + 1970-71.

History

F. P. Dickson N/WS/A 5211 - gives date for site from 1330 ± 120 B.P. (ANU-721) to 360 ± 100 B.P. (ANU-722) (personal communication). - not conclusive.

Aboriginal meaning and name

Published reference

Australian Institute of Aboriginal Studies Newsletter, Vol. 2, No. 9, October 1968, p. 17-20. J. V. S. Megaw "Trial Excavations in Captain Cook's Landing

Remarks

Place Reserve, Kurnell."

Antiquity: Megaw, J. V. S. Capt Cook + Bone Barbs at Betty Bay.  
FILE No A ~~1718~~ 1718

+

(N) (IV) 9129 S1/55-9 WOLLONGONG, 52-3-219  
KURNELL WOLLONGONG 1:250000 SI 56-9 Locality  OPEN (MIDDEN) & BURIAL

Military map/other reference c. 422798. (WOLLONGONG 1:250000)

Pastoral or other property, park Port Hacking 1:63,360 c. 220,980  
CAPTAIN COOK'S LANDING PLACE HISTORIC SITE.

Description of site MR J. V. S. MEGAW has made an extensive excavation survey and an interim report is in the File A 1455.

1967: between Watering Place and the Trust's landing stage tests show scattered midden material under about 6" of modern turf. 2 cuttings laid down at right angles to each other near the P.M.G. inspection vaults during whose construction 2 adult human burials were uncovered in midden deposit.

Uniform deposit of upwards of 3' in depth though probing showed that there is about twice that depth on the (unexcavated) seaward side. Midden had more shell than the Skeleton Cave deposit, now extinct common mud oyster and mussels predominating, artefacts include an edge-ground

Length axe re-used as a hammer stone and more worked stone than in the cave. c. 2 metres  
(fabricators, use-polished and miscellaneous retouched flakes, and a considerable no. fish-hook files though no actual hooks) Bone

Soil and vegetation on and adjacent to site Width Depth bi-and-uni-points. Also a bone button, a square-section hand made iron nail and a fragment of weathered glass

Nearest water supply

Previous excavation or digging 1968 - Trial Excavation - by J. Megaw.  
More extensive during December 1970 - January 1971.

See also corresp. c. 52-3-212 REPORT IN H/O CATALOGUE.

Erosion, cultivation or other works

Assemblages Flaked Stone artefacts, edge-ground axes of igneous rock + a range of 'oyster-picks', hammer-and-for-anvil stones. Bone points + sand-stone fish-hook files associated with +130 finished + partially finished shell fish-hooks.

AHIMS site ID:

Date recorded:

## Site Location Information

Site name:

Easting:  Northing:  Coordinates must be in GDA94 (MGA)

Horizontal Accuracy (m):

Zone:

## Recorder Information

(The person responsible for the completion and submission of this form)

Title	Surname	First name
<input type="text" value="Dr."/>	<input type="text" value="Paul"/>	<input type="text" value="Irish"/>

Organisation:

Address:

Phone:  E-mail:

## Site Context Information

Land Form Pattern:  Land Use:

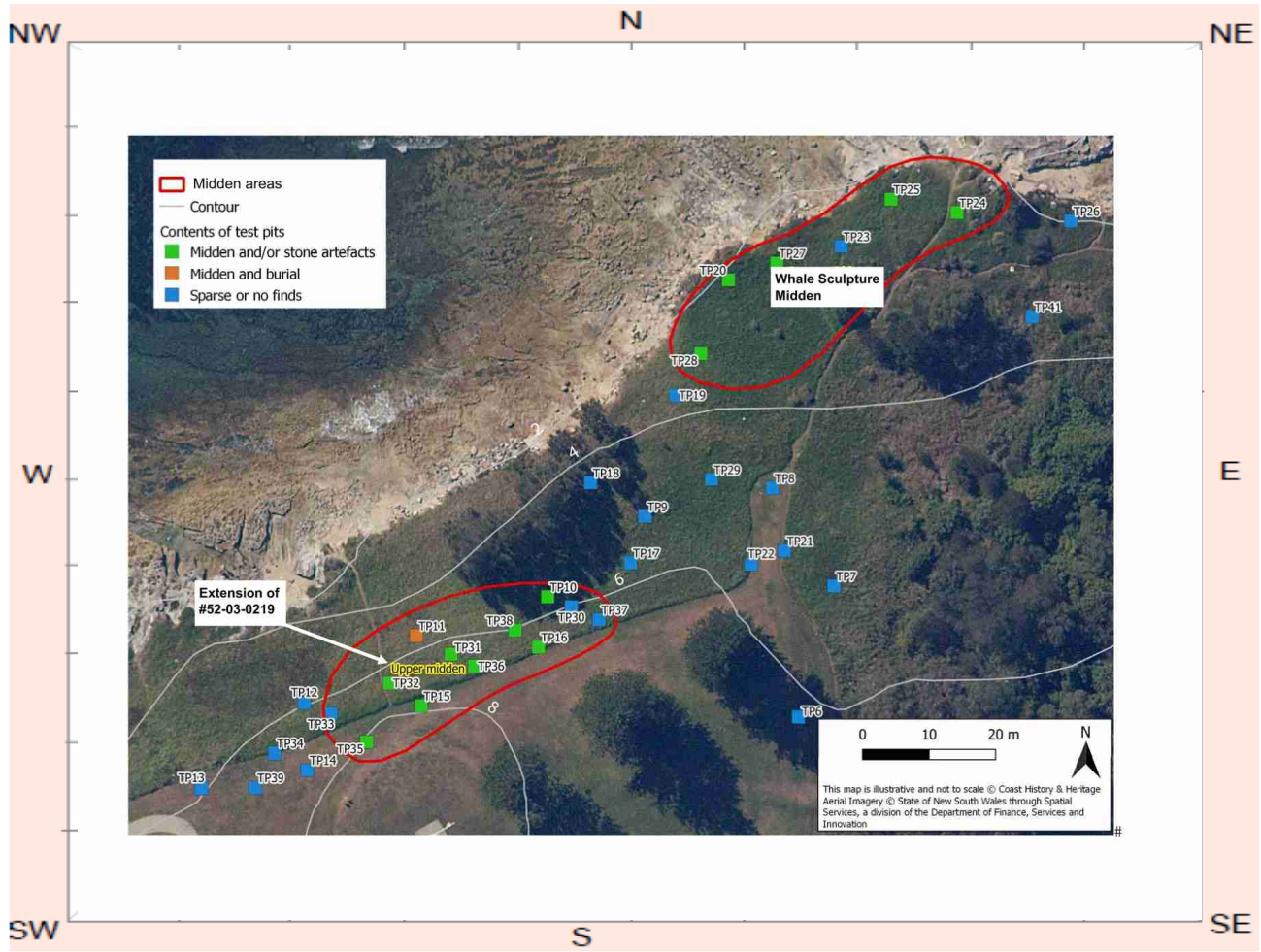
Land Form Unit:  Vegetation:

Distance to Water (m):  Primary Report:

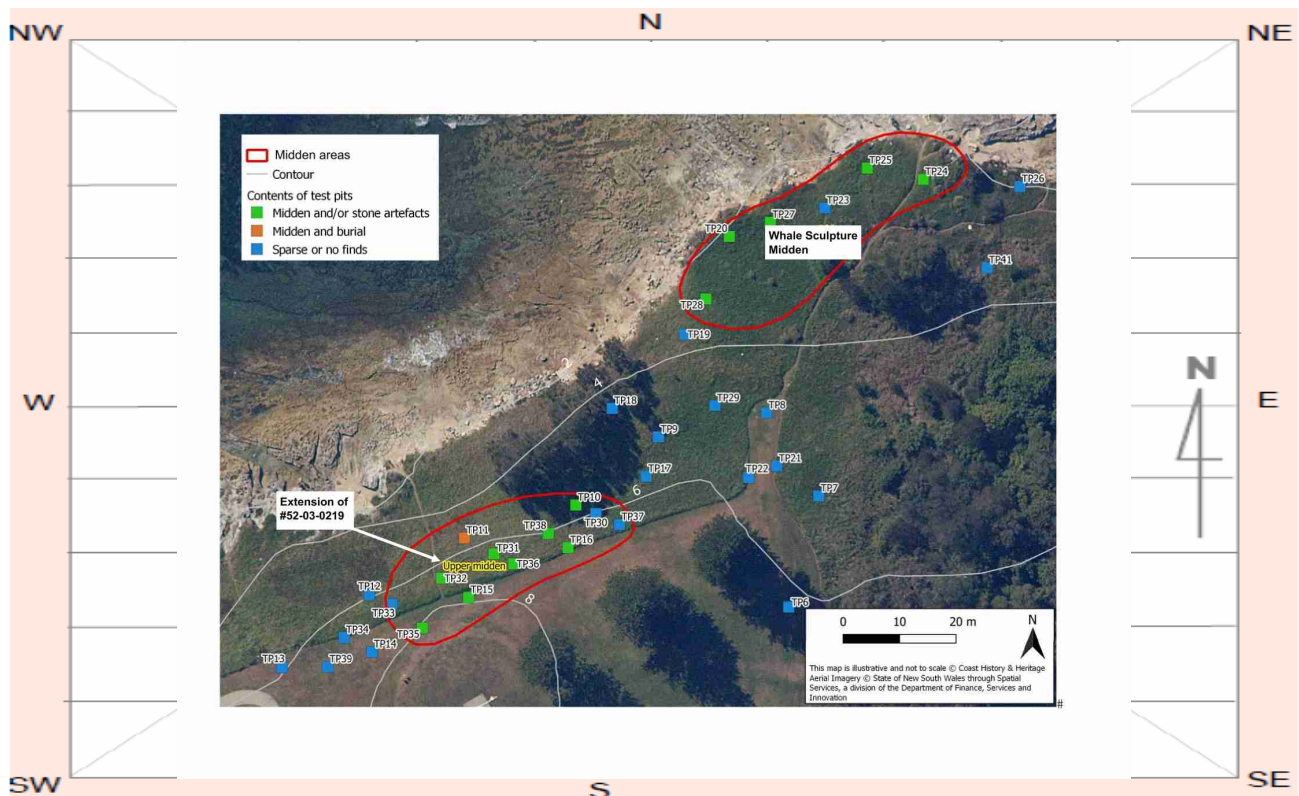
How to get to the site:

Other site information:

# Site location map



# Site plan



# Site contents information

open/closed site:

Site condition:

## Features:

Number of features    Length of feature(s) extent (m)    Width of feature (s) extent (m)

1.            

Feature condition:

Scarred Trees			
Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

## Description:

Archaeological test excavations in 2023 have shown that the previously recorded Foreshore Midden extends about another 70 to the east. This does not appear to be a separate site, though several excavated pits between the Foreshore Midden and its extension were sparse.

## Features:

Number of features    Length of feature(s) extent (m)    Width of feature (s) extent (m)

2.            

Feature condition:

Scarred Trees			
Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

## Description:

## Features:

Number of features    Length of feature(s) extent (m)    Width of feature (s) extent (m)

3.            

Feature condition:

Scarred Trees			
Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

## Description:

**Features:**

Number of features    Length of feature(s) extent (m)    Width of feature (s) extent (m)

4.

Feature condition:

Description:

Scarred Trees			
Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

**Features:**

Number of features    Length of feature(s) extent (m)    Width of feature (s) extent (m)

5.

Feature condition:

Description:

Scarred Trees			
Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

**Site photographs**

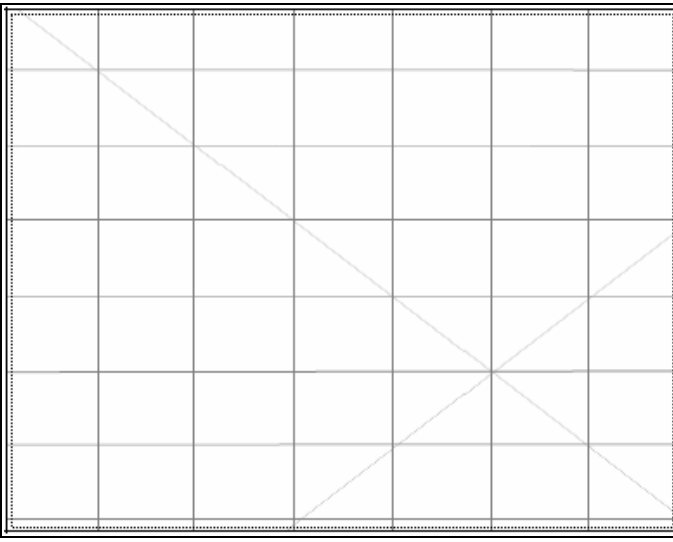


Description:  View west towards previously defined Foreshore Midden across newly identified area

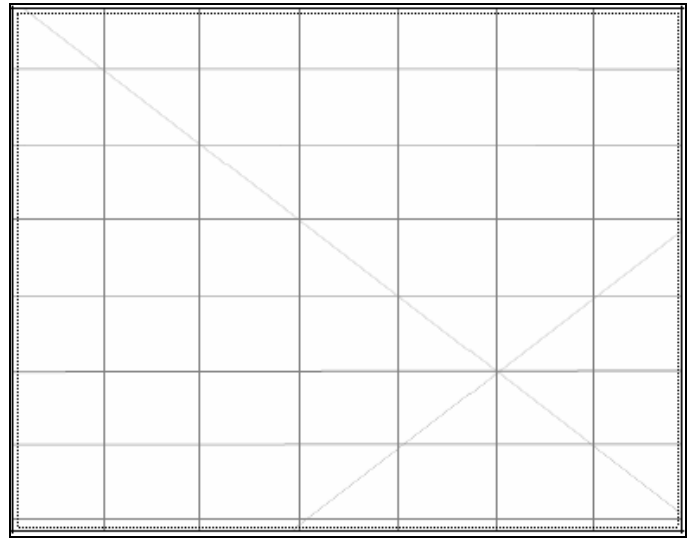


Description:  Shell lens within midden





Description:



Description:

### Site restrictions

Do you want to Restrict this site?:

Restriction type: Gender  General  Location

Why is this site restricted?:

### Further information contact

Title  Surname  First name

Organisation:

Address:

Phone:  E-mail:

### Site interpretation and community statement

As per #52-3-0219

Military map/other reference HS.CAP.2012. (Linen held in plan envelope on A.4094)

Port Hacking 1:63,360 c. 225.991

Pastoral or other property, park Wollongong 1:250,000 c. 4225.7990

Description of site Hawkesbury sandstone shelf, near park vehicl road.

Length of site Rock shelf 33ft.

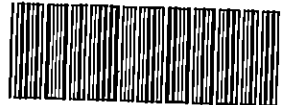
Direction site faces

Width 20ft.

Height

Dimensions of decorated areas

Scale drawing to be supplied



Estimated number of figures

8

52-3-0221

Nearest water supply

Techniques

abraded grooves

conjoined puncture

pecked

Styles

abraded grooves

outline

outline with design

linear

pecked linear

pecked intaglio

combined pecked and linear

Subjects

Fish, others to be identified.

Superimpositions



<u>Associated with</u>	rock paintings	carved trees	stone arrangements
	axe grooves	quarry	burials
	campsite	other relics	

Natural defacement Sandstone badly weathered.

Animal defacement

Human defacement Initials and names carved on rock face.

Photo record by N.Carter, 12.8.73.

Where deposited Archaeological Section  
N.P.W.S., H.O.

Scale chart by N.Carter, 12.8.73,

Where deposited " " " "

History Refer report to trustees by N.Carter, 1st. November 1968. File No. A 4094

Aboriginal meaning and name

Published reference Nil

Remarks These appear to be the only known rock engravings existing on the Kurnell Peninsula and as such should be preserved and further studies carried out.

S2-3-221

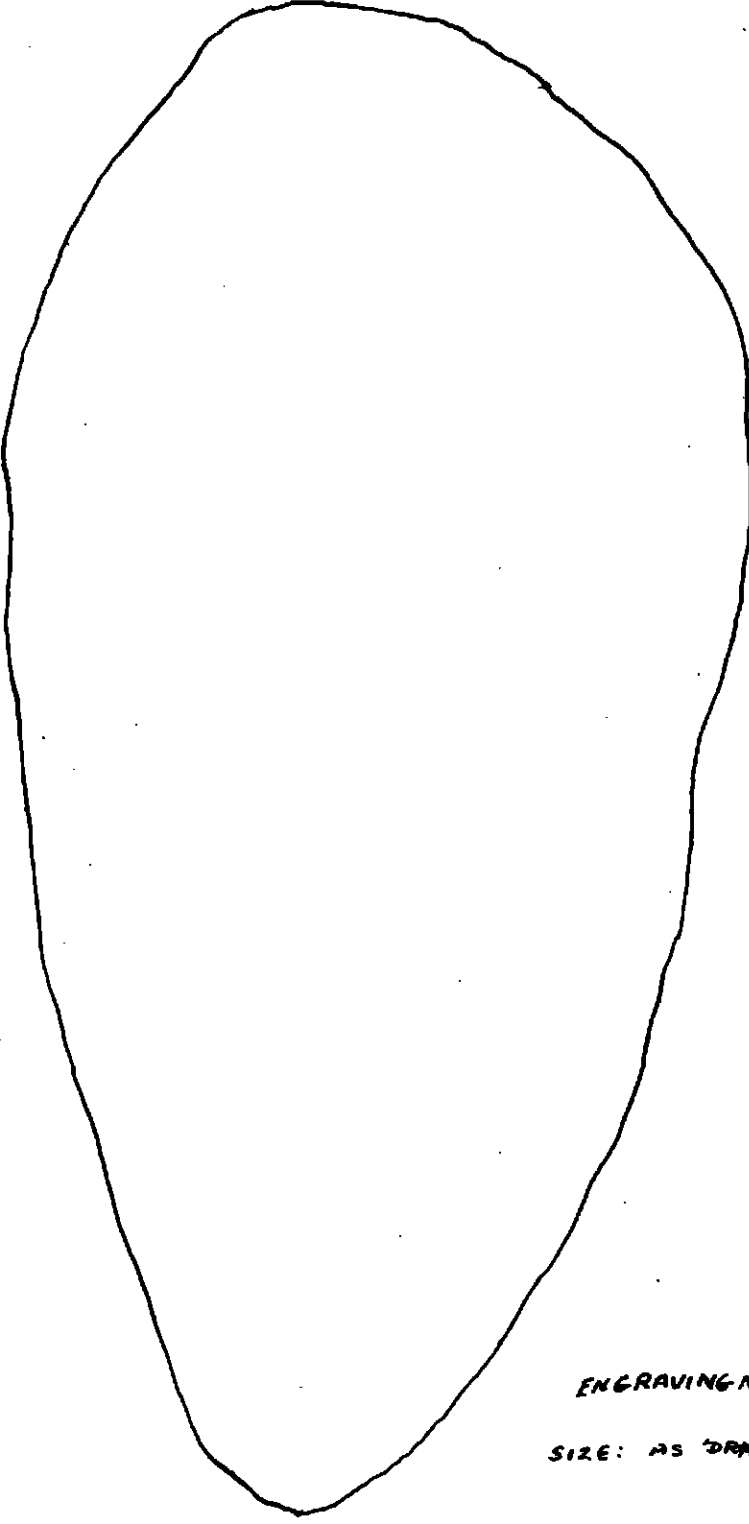
REGISTER COPY



**NATIONAL PARKS AND WILDLIFE SERVICE**

**ABORIGINAL ENGRAVINGS - CAPTAIN COOK'S LANDING PLACE**  
**HISTORIC SITE**

ATTACHMENT "B"



ENGRAVING N° 1

SIZE: AS DRAWN.

0

52-3-221

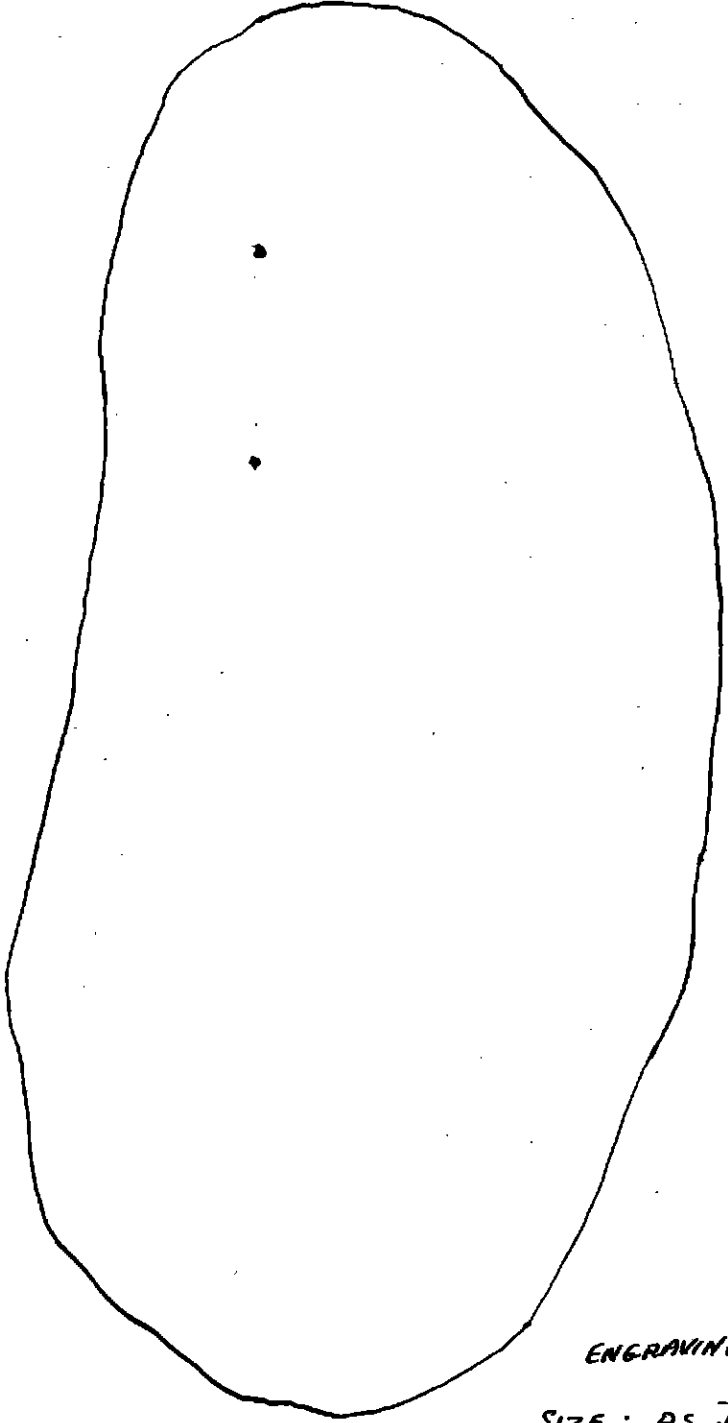
REGISTER COPY



**NATIONAL PARKS AND WILDLIFE SERVICE**

**ABORIGINAL ENGRAVINGS - CAPTAIN COOK'S LANDING PLACE**  
**HISTORIC SITE**

ATTACHMENT "B"



ENGRAVING N°2

SIZE : AS DRAWN



52-3-221

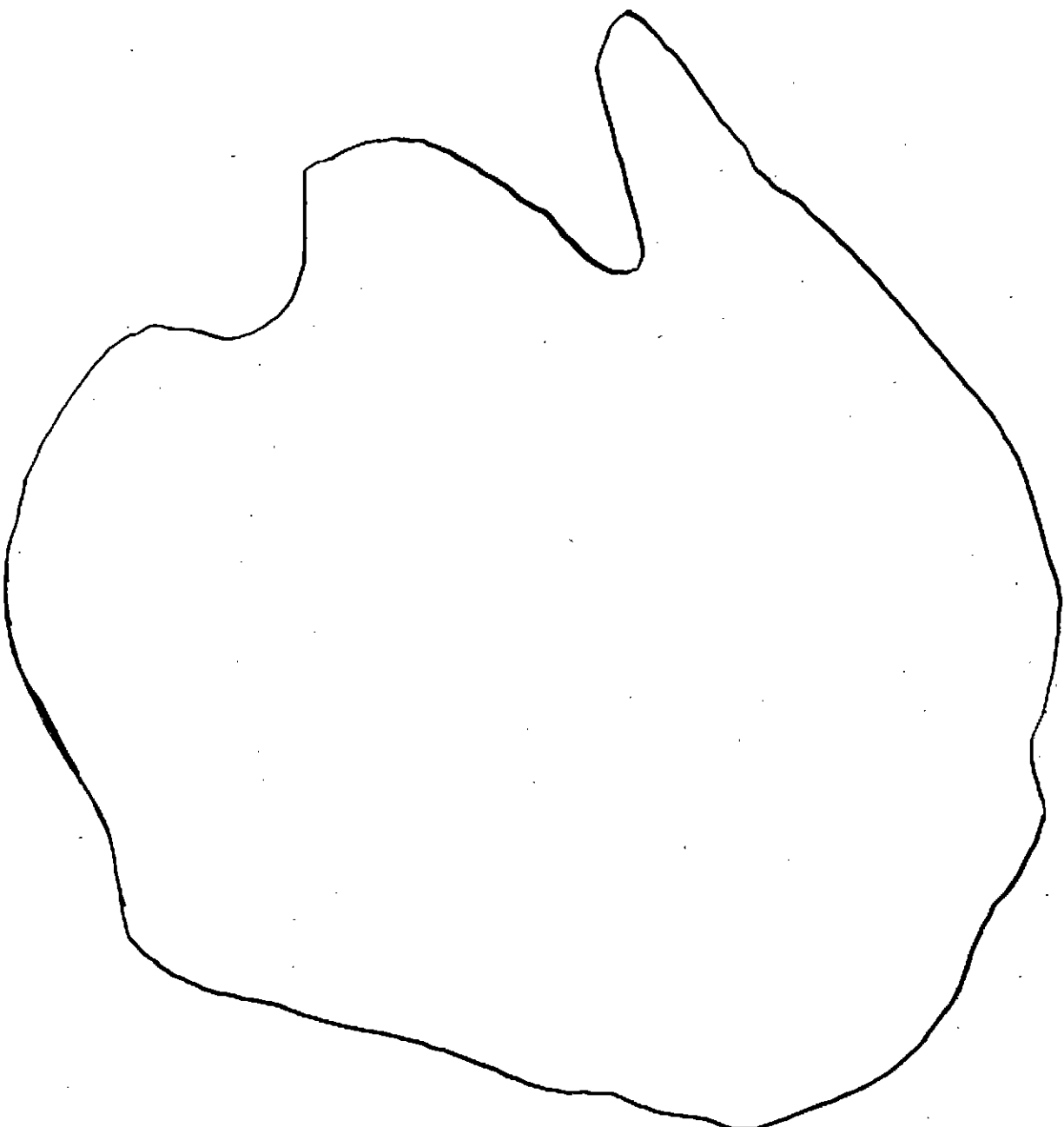


**NATIONAL PARKS AND WILDLIFE SERVICE**

REGISTER COPY

ABORIGINAL ENGRAVINGS - CAPTAIN COOK'S LANDING PLACE  
HISTORIC SITE

ATTACHMENT "B"



ENGRAVING N°3  
SIZE : AS DRAWN

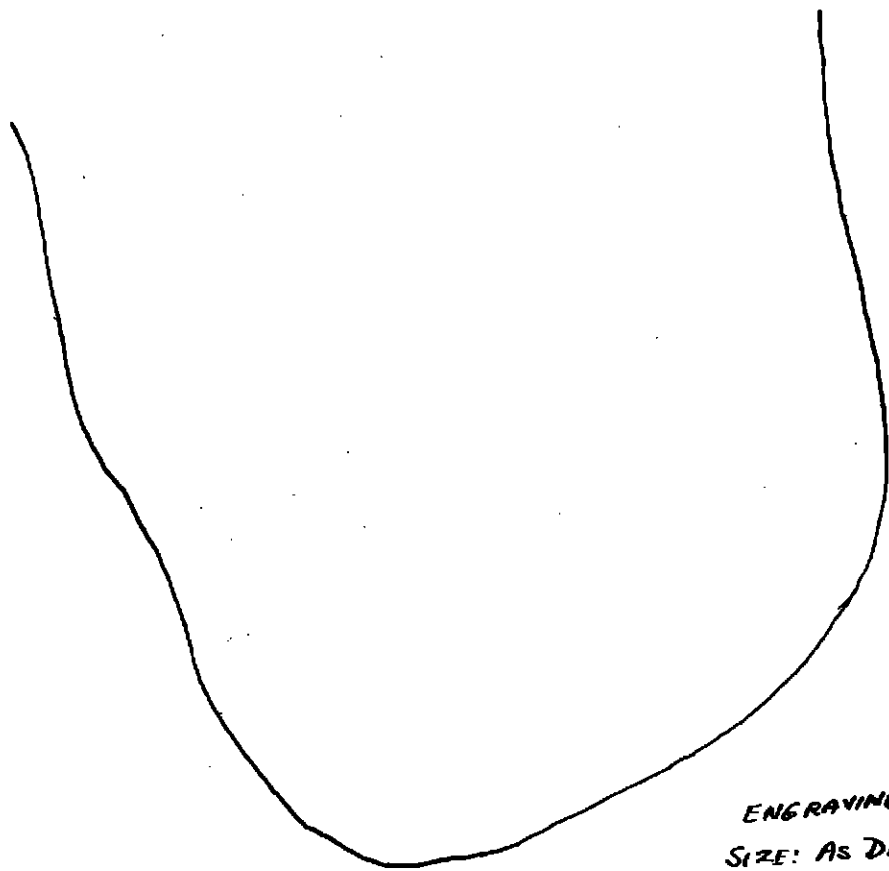
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**NATIONAL PARKS AND WILDLIFE SERVICE**

**ABORIGINAL ENGRAVINGS - CAPTAIN COOK'S LANDING PLACE**  
**HISTORIC SITE**

ATTACHMENT "B"



ENGRAVING N<sup>o</sup> 4  
SIZE: AS DRAWN

A 4094

52-3-221

REGISTER COPY

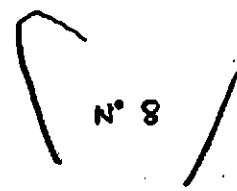
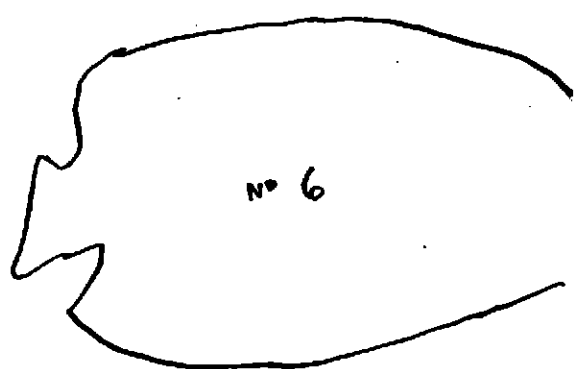
Port Jackson  
c. 225.991



**NATIONAL PARKS AND WILDLIFE SERVICE**  
**ABORIGINAL ENGRAVINGS - CAPTAIN COOK'S LANDING PLACE**  
**HISTORIC SITE**

ATTACHMENT "A"

NOT TO SCALE







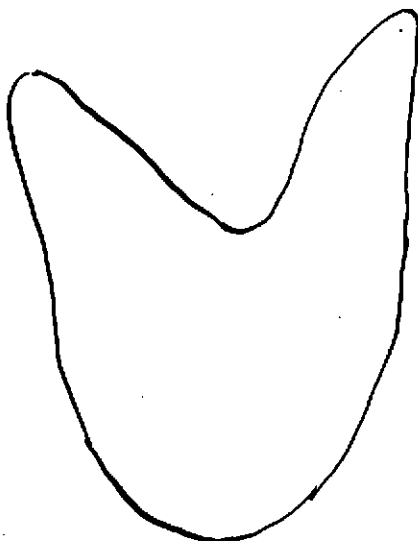
52-3-22 REGISTER COPY

**NATIONAL PARKS AND WILDLIFE SERVICE**

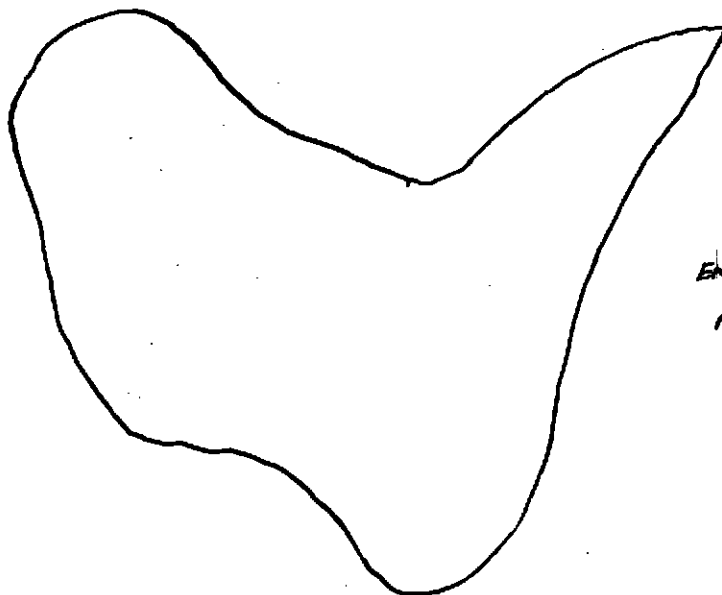
**ABORIGINAL ENGRAVINGS - CAPTAIN COOK'S LANDING PLACE**  
**HISTORIC SITE**

ATTACHMENT "B"

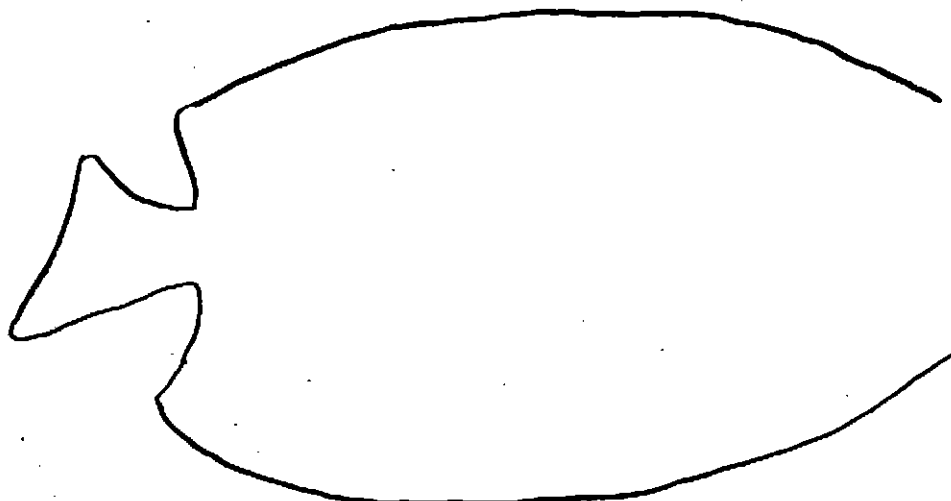
NOT TO SCALE



ENGRAVING N° 5 ✓  
NOT TO SCALE



ENGRAVING N° 7 ✓  
NOT TO SCALE

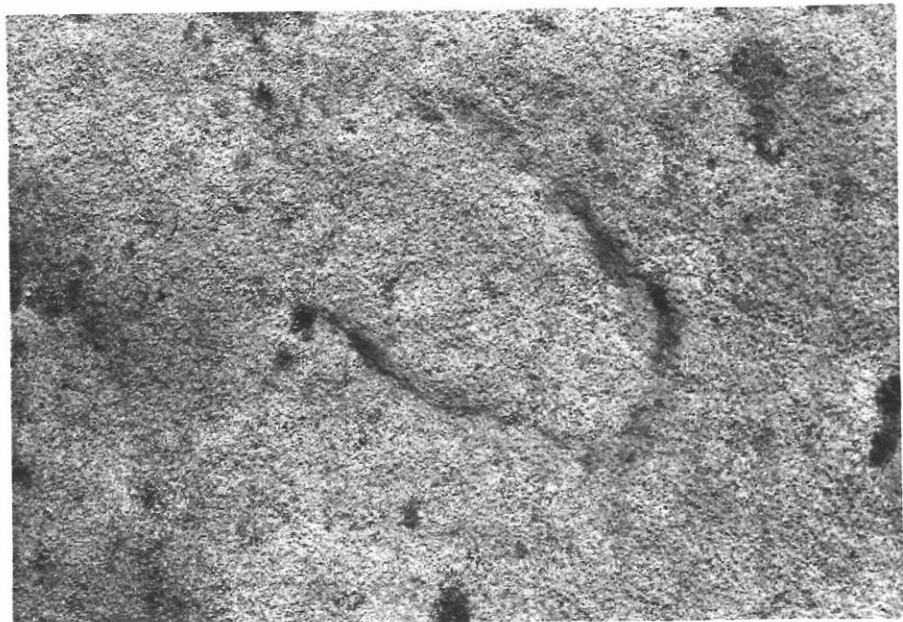


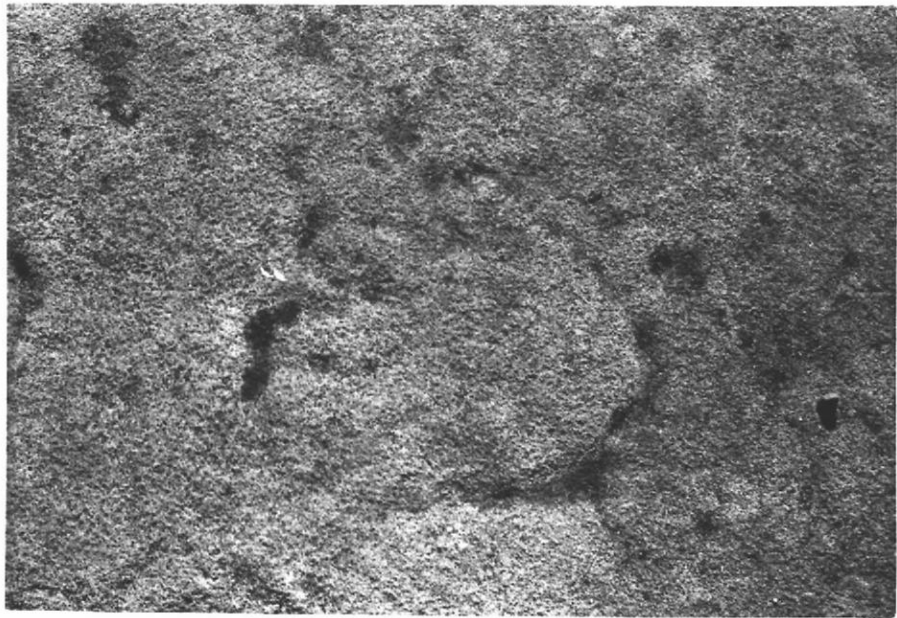
ENGRAVING N° 6 ✓  
NOT TO SCALE

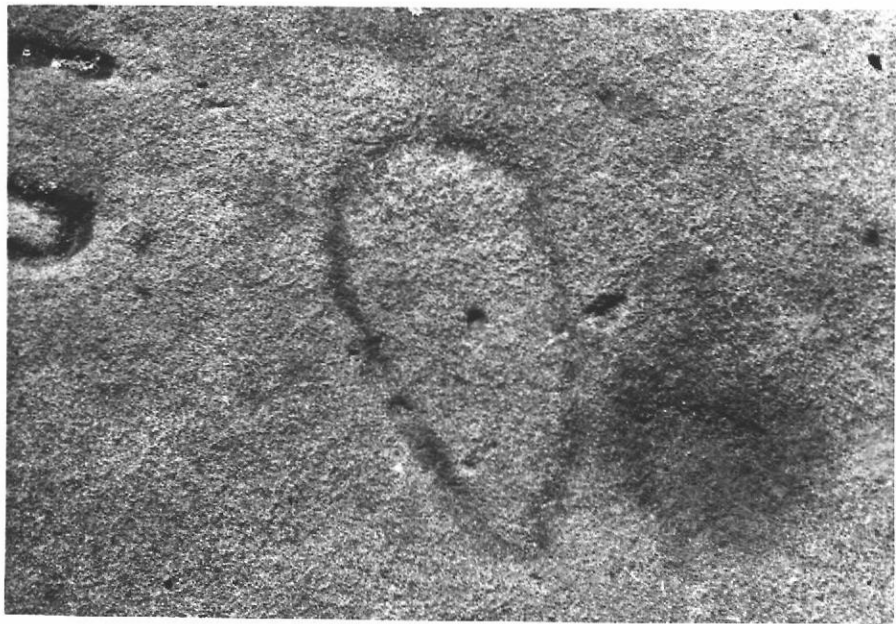
6













# Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

## Standard Site Recording Form

New Recording  Additional information

SITE IDENTIFICATION					
Site name	Cundlemongs grave			NPWS Site Number	52-3-1381
Owner/manager	NPWS				
Owner Address					
LOCATION					
Location	Botany Bay National Park				
How to get to the site	Near onsite cottage near Forby Sutherland monument				
1:250,000 map name				NPWS map code	
AMG Zone	56	AMG Easting	335596	AMG Northing	6235910
Method for grid reference	Map, plan or description from previous report/book	Map scale (if method = map)		Map name	
NPWS District	Central			NPWS Zone	Sydney Zone
Portion no.				Parish	
SITE DESCRIPTION					
Site type(s)	Burial/s			Site type code (NPWS use only)	
<b>Description of site and contents</b> CHECKLIST: eg. length, width, depth, height of site, shelter, deposit, structure, element eg. tree scar, grooves in rock. DEPOSIT: colour, texture, estimated depth, stratigraphy, contents-shell, bone, stone, charcoal, density & distribution of these, stone types, artefact types. ART: area of decorated surface, motifs, colours, wet./dry pigment, engraving technique, no. of figures, sizes, patination. BURIALS: number & condition of bone, position, age, sex, associated artefacts. TREES: number, alive, dead, likely age, scar shape, position, size, patterns, axe marks, regrowth. QUARRIES: rock type, debris, recognisable artefacts, percentage quarried	Mentioned by Rich from historical records. Historical burial. May have been disturbed, destroyed or removed. Site identified from previous archaeological study during research for the Sutherland Aboriginal Heritage Study.				
Attach photographs and sketches, eg. plan & section of shelter. Do NOT dig, disturb or damage site or contents.					

Version: June 1998

Data entered by:

Date entered:



# Aboriginal Sites Register of NSW

NPWS, PO Box 1967, Hurstville NSW 2220

Standard Site Recording Form

SITE ENVIRONMENT				
Are there other sites in the locality	Yes	Are they in the Sites Register	Yes	Other site types include
SITE MANAGEMENT				
Site condition	Unknown			
Management recommendations				
Have artefacts been removed from site		When		
By whom		Deposited at		
Consent applied for	<input type="checkbox"/>	Consent issued		<input type="checkbox"/>
Date of issue		Consent number		
SITE INSPECTION AND RECORDING				
Reason for investigation	<p>This site record was produced by Paul Irish of Mary Dallas Consulting Archaeologists (MDCA) in January 2008, based upon an Aboriginal Heritage Planning study undertaken by MDCA for Sutherland Shire Council of all lands within Sutherland Shire (generally excluding National Park estate). The study has been documented in:</p> <ul style="list-style-type: none"> <li>• MDCA 2002. <i>Sutherland Shire Council Aboriginal Cultural Heritage Study</i> (Report to Sutherland Shire Council )</li> <li>• MDCA 2004. <i>Georges River Aboriginal Heritage Study</i> (Report to Sutherland Shire Council).</li> </ul> <p>It involved a review of original survey reports and associated plans which have lead to the identification of some previously unregistered sites, as well as limited field survey which has also resulted in the recording of some previously unrecorded sites.</p>			
Were local Aborigines contacted or present for the recording	<input type="checkbox"/> Not contacted <input type="checkbox"/> Contacted and present <input checked="" type="checkbox"/> Contacted but not present	Names and addresses	La Perouse Local Aboriginal Land Council PO Box 365 Matraville, NSW 2036	
Is the site important to local Aborigines				
Verbal/written reference sources	Rich, E. 1988. Skeletal material (Archival Research): Captain Cook's Landing Place, Botany Bay National Park. NSW NPWS		ASR report number(s)	
Photographs taken			No of Photos attached	
Site recorded by			Date of recording	
Address/institution				



AHIMS site ID:

Date recorded:

## Site Location Information

Site name:

Easting:  Northing:  Coordinates must be in GDA94 (MGA)

Horizontal Accuracy (m):

Zone:

## Recorder Information

(The person responsible for the completion and submission of this form)

Title	Surname	First name
<input type="text" value="Dr."/>	<input type="text" value="Paul"/>	<input type="text" value="Irish"/>

Organisation:

Address:

Phone:  E-mail:

## Site Context Information

Land Form Pattern:  Land Use:

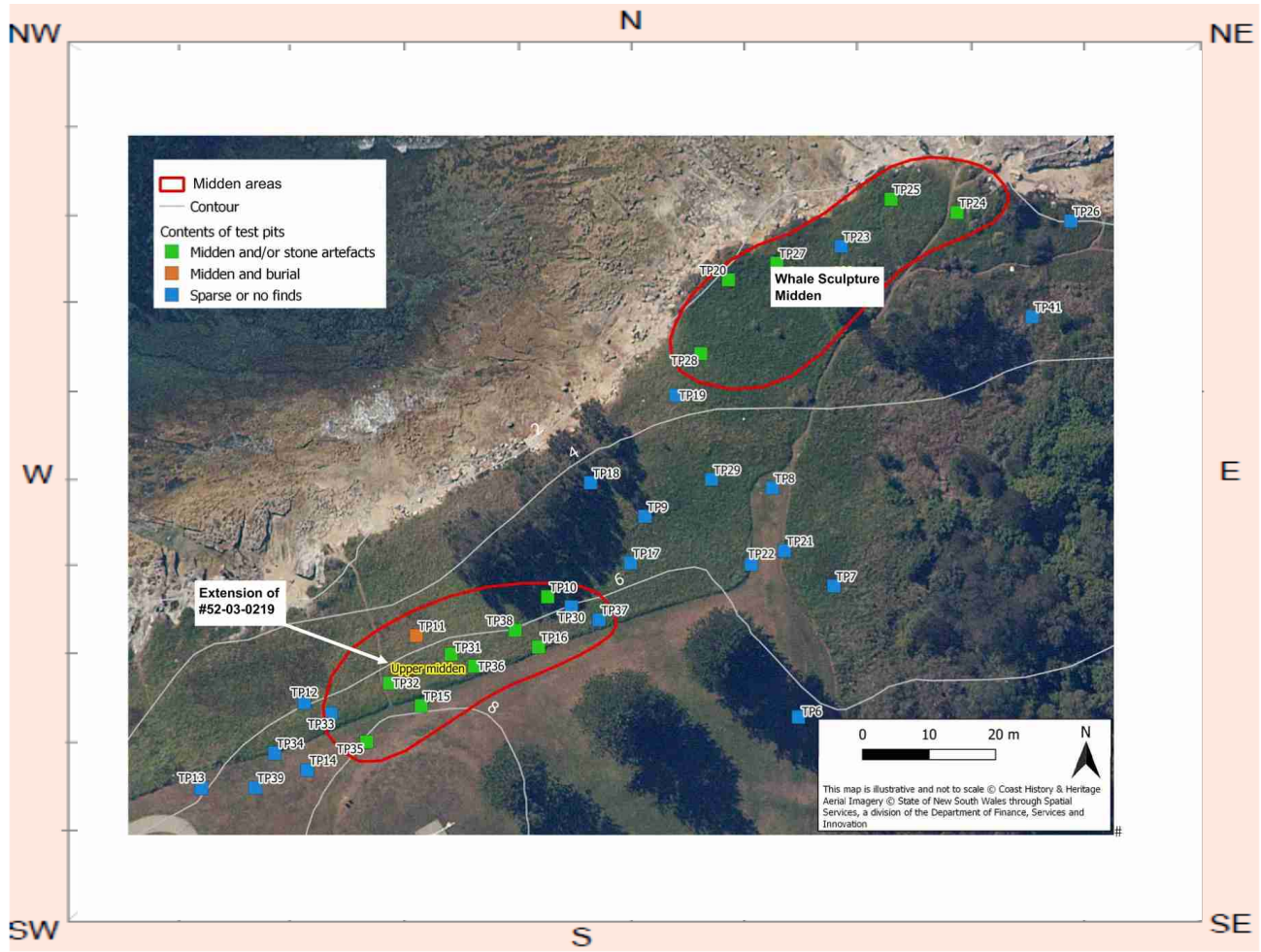
Land Form Unit:  Vegetation:

Distance to Water (m):  Primary Report:

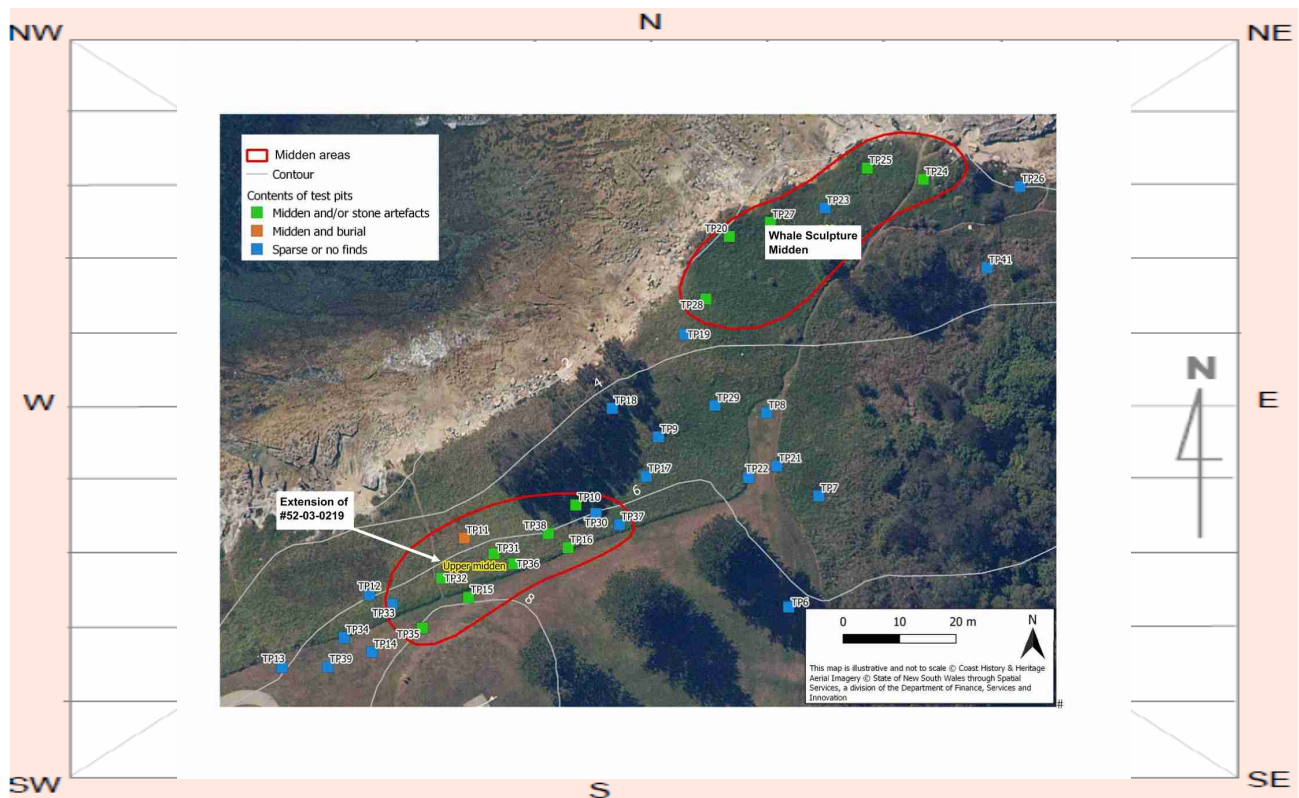
How to get to the site:

Other site information:

# Site location map



# Site plan



# Site contents information

open/closed site:

Site condition:

## Features:

Number of features    Length of feature(s) extent (m)    Width of feature (s) extent (m)

1.            

Feature condition:

Scarred Trees			
Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

## Description:

Shell midden found immediately behind rock platform defined during test excavations in 2023 (labelled the 'Lower Midden'). The midden is spatially separated from the much broader Foreshore Midden (AHIMS #52-3-0219) that sits about 30m to its southwest, at a higher elevation, separated by a low sandstone ledge. Midden dates to around 1290-1550CE

## Features:

Number of features    Length of feature(s) extent (m)    Width of feature (s) extent (m)

2.            

Feature condition:

Scarred Trees			
Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

## Description:

## Features:

Number of features    Length of feature(s) extent (m)    Width of feature (s) extent (m)

3.            

Feature condition:

Scarred Trees			
Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

## Description:

**Features:**

Number of features    Length of feature(s) extent (m)    Width of feature (s) extent (m)

4.

**Feature condition:**

Description:

Scarred Trees			
Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

**Features:**

Number of features    Length of feature(s) extent (m)    Width of feature (s) extent (m)

5.

**Feature condition:**

Description:

Scarred Trees			
Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

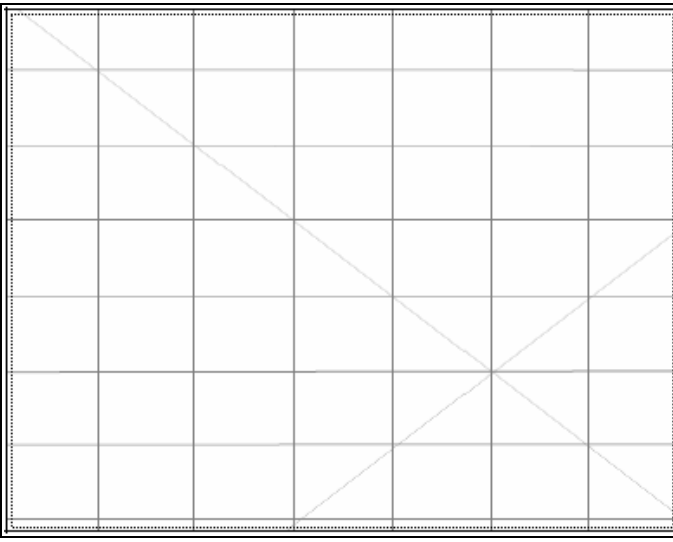
**Site photographs**



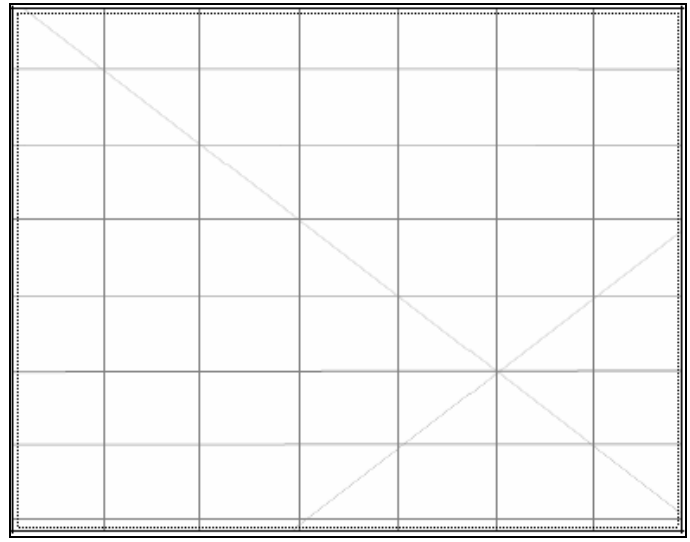
Description:



Description:



Description:



Description:

## Site restrictions

Do you want to  
Restrict this site?:

Restriction type: Gender  General  Location   
N/A

Why is this site restricted?:

## Further information contact

Title  Surname  First name

Organisation:

Address:

Phone:  E-mail:

## Site interpretation and community statement

The midden adds another element to a highly significant cultural landscape across the foreshore area of the national park, which includes midden and Aboriginal ancestral burials.

# Appendix 3

## *Test Excavation Photographs*



DSC\_2235



DSC\_1876



DSC\_1877



DSC\_1878



DSC\_1879



DSC\_1880



DSC\_1881



DSC\_1882



DSC\_1883



DSC\_1884



DSC\_1885



DSC\_1886



DSC\_1887



DSC\_1888



DSC\_1889



DSC\_1890



DSC\_1891



DSC\_1892



DSC\_1893



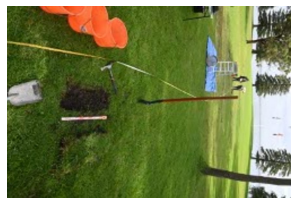
DSC\_1894



DSC\_1895



DSC\_1896



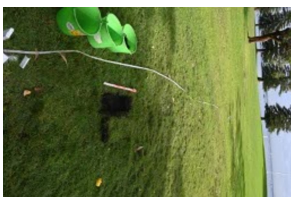
DSC\_1897



DSC\_1898



DSC\_1899



DSC\_1900



DSC\_1901



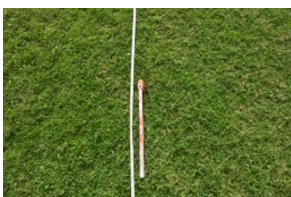
DSC\_1902



DSC\_1903



DSC\_1904



DSC\_1905



DSC\_1906



DSC\_1907



DSC\_1908



DSC\_1909



DSC\_1910



DSC\_1911



DSC\_1912



DSC\_1913



DSC\_1914



DSC\_1915



DSC\_1916



DSC\_1917



DSC\_1918



DSC\_1919



DSC\_1920



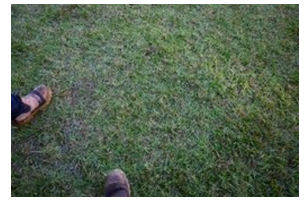
DSC\_1921



DSC\_1922



DSC\_1923



DSC\_1924



DSC\_1925



DSC\_1926



DSC\_1927



DSC\_1928



DSC\_1929



DSC\_1930



DSC\_1931



DSC\_1932



DSC\_1933



DSC\_1934



DSC\_1935



DSC\_1936



DSC\_1937



DSC\_1938



DSC\_1939



DSC\_1940



DSC\_1941



DSC\_1942



DSC\_1943

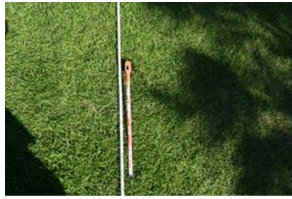


DSC\_1944





DSC\_1945



DSC\_1946



DSC\_1947



DSC\_1948



DSC\_1949



DSC\_1950



DSC\_1951



DSC\_1952



DSC\_1953



DSC\_1954



DSC\_1955



DSC\_1956



DSC\_1957



DSC\_1958



DSC\_1959



DSC\_1960



DSC\_1961



DSC\_1962



DSC\_1963



DSC\_1964



DSC\_1965



DSC\_1966



DSC\_1967



DSC\_1968



DSC\_1969



DSC\_1970



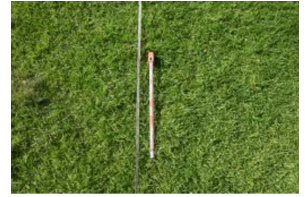
DSC\_1971



DSC\_1972



DSC\_1973



DSC\_1974



DSC\_1975



DSC\_1976



DSC\_1977



DSC\_1978



DSC\_1979



DSC\_1980



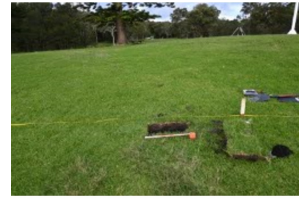
DSC\_1981



DSC\_1982



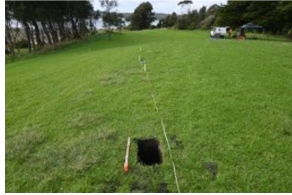
DSC\_1983



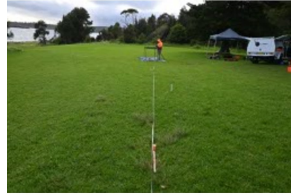
DSC\_1984



DSC\_1985



DSC\_1986



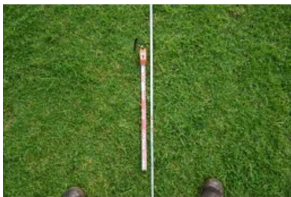
DSC\_1987



DSC\_1988



DSC\_1989



DSC\_1990



DSC\_1991



DSC\_1992



DSC\_1993



DSC\_1994



DSC\_1995



DSC\_1996



DSC\_1997



DSC\_1998



DSC\_1999



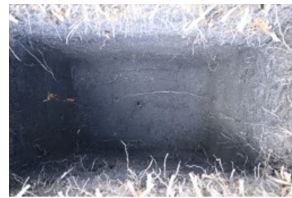
DSC\_2000



DSC\_2001



DSC\_2002



DSC\_2003



DSC\_2004



DSC\_2005



DSC\_2006



DSC\_2007



DSC\_2008



DSC\_2009



DSC\_2010



DSC\_2011



DSC\_2012



DSC\_2013



DSC\_2014



DSC\_2015



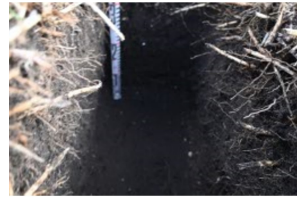
DSC\_2016



DSC\_2017



DSC\_2018



DSC\_2019



DSC\_2020



DSC\_2021



DSC\_2022



DSC\_2023



DSC\_2024



DSC\_2025



DSC\_2026



DSC\_2027



DSC\_2028



DSC\_2029



DSC\_2030



DSC\_2031



DSC\_2032



DSC\_2033



DSC\_2034



DSC\_2035



DSC\_2036



DSC\_2037



DSC\_2038



DSC\_2039



DSC\_2040



DSC\_2041



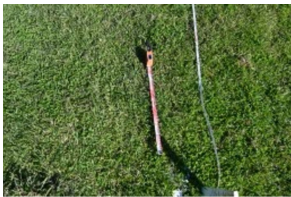
DSC\_2042



DSC\_2043



DSC\_2044



DSC\_2045



DSC\_2046



DSC\_2047



DSC\_2048



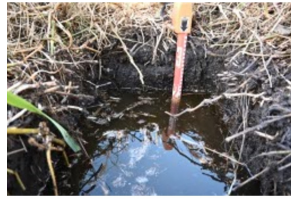
DSC\_2049



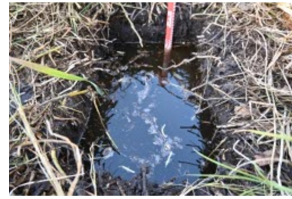
DSC\_2050



DSC\_2051



DSC\_2052



DSC\_2053



DSC\_2054



DSC\_2055



DSC\_2056



DSC\_2057



DSC\_2058



DSC\_2059



DSC\_2060



DSC\_2061



DSC\_2062



DSC\_2063



DSC\_2064



DSC\_2065



DSC\_2066



DSC\_2067



DSC\_2068



DSC\_2069



DSC\_2070



DSC\_2071



DSC\_2072



DSC\_2073



DSC\_2074



DSC\_2075



DSC\_2076



DSC\_2077



DSC\_2078



DSC\_2079



DSC\_2080



DSC\_2081



DSC\_2082



DSC\_2083



DSC\_2084



DSC\_2085



DSC\_2086



DSC\_2087



DSC\_2088



DSC\_2089



DSC\_2090



DSC\_2091



DSC\_2092



DSC\_2093



DSC\_2094



DSC\_2095



DSC\_2096



DSC\_2097



DSC\_2098



DSC\_2099



DSC\_2100



DSC\_2101



DSC\_2102



DSC\_2103



DSC\_2104



DSC\_2105



DSC\_2106



DSC\_2107



DSC\_2108



DSC\_2109



DSC\_2110



DSC\_2111



DSC\_2112



DSC\_2113



DSC\_2114



DSC\_2115



DSC\_2116



DSC\_2117



DSC\_2118



DSC\_2119



DSC\_2120



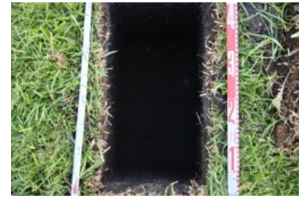
DSC\_2121



DSC\_2122



DSC\_2123



DSC\_2124



DSC\_2125



DSC\_2126



DSC\_2127



DSC\_2128



DSC\_2129



DSC\_2130



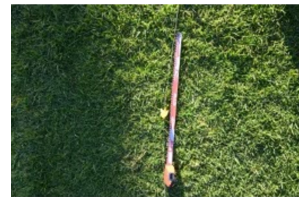
DSC\_2131



DSC\_2132



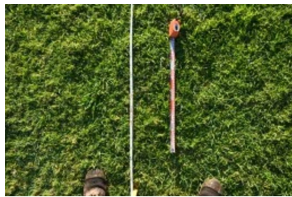
DSC\_2133



DSC\_2134



DSC\_2135



DSC\_2136



DSC\_2137



DSC\_2138



DSC\_2139



DSC\_2140



DSC\_2141



DSC\_2142



DSC\_2143



DSC\_2144



DSC\_2145



DSC\_2146



DSC\_2147



DSC\_2148



DSC\_2149



DSC\_2150



DSC\_2151



DSC\_2152



DSC\_2153



DSC\_2154



DSC\_2155



DSC\_2156



DSC\_2157



DSC\_2158



DSC\_2159



DSC\_2160



DSC\_2161



DSC\_2162



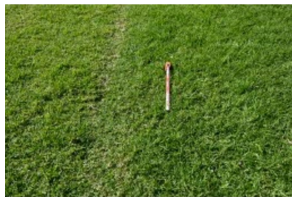
DSC\_2163



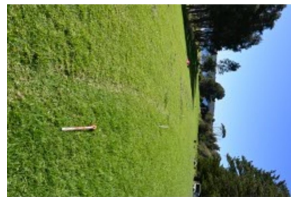
DSC\_2164



DSC\_2165



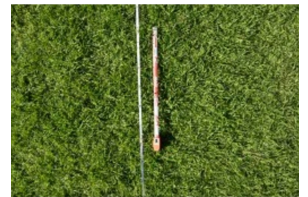
DSC\_2166



DSC\_2167



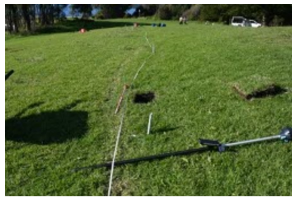
DSC\_2168



DSC\_2169



DSC\_2170



DSC\_2171



DSC\_2172



DSC\_2173



DSC\_2174



DSC\_2175



DSC\_2176



DSC\_2177



DSC\_2178



DSC\_2179



DSC\_2180



DSC\_2181



DSC\_2182



DSC\_2183



DSC\_2184



DSC\_2185



DSC\_2186



DSC\_2187



DSC\_2188



DSC\_2189



DSC\_2190



DSC\_2191



DSC\_2192



DSC\_2193



DSC\_2194



DSC\_2195



DSC\_2196



DSC\_2197



DSC\_2198



DSC\_2199



DSC\_2200



DSC\_2201



DSC\_2202



DSC\_2203



DSC\_2204



DSC\_2205



DSC\_2206



DSC\_2207



DSC\_2208



DSC\_2209



DSC\_2210



DSC\_2211



DSC\_2212



DSC\_2213



DSC\_2214



DSC\_2215



DSC\_2216



DSC\_2217



DSC\_2218



DSC\_2219



DSC\_2220



DSC\_2221



DSC\_2222



DSC\_2223

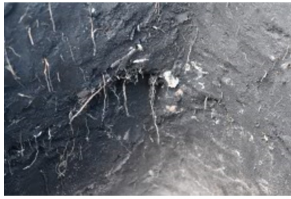


DSC\_2224





DSC\_2225



DSC\_2226



DSC\_2227



DSC\_2228



DSC\_2229



DSC\_2230



DSC\_2231



DSC\_2232



DSC\_2233



DSC\_2234

Photo ID	Date	Description	Aspect	Photographer
1876	15/05/2023	Context, pre-ex along track alignment	NW	DW
1877	15/05/2023	Context, pre-ex along track alignment	N	DW
1878	15/05/2023	Context, pre-ex along track alignment	NE	DW
1879	15/05/2023	Context, pre-ex along track alignment	NE	DW
1880	15/05/2023	Context, pre-ex along track alignment	NE	DW
1881	15/05/2023	Context, pre-ex along track alignment	NW	DW
1882	15/05/2023	Context, pre-ex along track alignment	W	DW
1883	15/05/2023	Context, pre-ex along track alignment	N	DW
1884	15/05/2023	Context, pre-ex along track alignment	NE	DW
1885	15/05/2023	Context, pre-ex along track alignment	NE	DW
1886	15/05/2023	Context, pre-ex along track alignment	NW	DW
1887	15/05/2023	Context, pre-ex along track alignment	NW	DW
1888	15/05/2023	Context, pre-ex along track alignment	NW	DW
1889	15/05/2023	Context, pre-ex along track alignment	NW	DW
1890	15/05/2023	Context, pre-ex along track alignment	NW	DW
1891	15/05/2023	Context, pre-ex along track alignment	NW	DW
1892	15/05/2023	Context, pre-ex along track alignment	NW	DW
1893	15/05/2023	Context, pre-ex along track alignment	NE	DW
1894	15/05/2023	Context, pre-ex along track alignment	NE	DW
1895	15/05/2023	Context, pre-ex along track alignment	NE	DW
1896	15/05/2023	TP1, pre-ex	-	PI
1897	15/05/2023	TP1, pre-ex, context, view to TP2	N	PI
1898	15/05/2023	TP1, pre-ex, plan view, grass removed	-	PI
1899	15/05/2023	TP2, pre-ex	-	PI
1900	15/05/2023	TP2, pre-ex, context	N	PI
1901	15/05/2023	TP2, pre-ex, plan view, grass removed	-	PI
1902	15/05/2023	TP3, pre-ex, plan view	-	GB
1903	15/05/2023	TP3, pre-ex, context	NW	GB
1904	15/05/2023	TP4, pre-ex, context	NE	DW
1905	15/05/2023	TP4, pre-ex, plan view	-	DW
1906	15/05/2023	TP2, post-ex, plan view	-	GB
		TP2, post-ex, plan view, showing sandstone		
1907	15/05/2023	and water seepage	-	GB
		TP2, post-ex, context, showing relation to		
1908	15/05/2023	sandstone outcrop	S	GB
1909	15/05/2023	TP2, South section	S	GB
		TP1, post-ex, plan view, showing ground		
1910	15/05/2023	water seepage	-	GB
		TP1, post-ex, plan view, showing ground		
1911	15/05/2023	water seepage	-	GB
1912	15/05/2023	TP1, post-ex, N section	N	GB
1913	15/05/2023	TP1, post-ex, context	S	GB
1914	15/05/2023	TP3, post-ex, plan view	-	GB
1915	15/05/2023	TP3, post-ex, N-W Section (ground water)	NW	GB
1916	15/05/2023	TP3, post-ex, context	N	GB
1917	15/05/2023	TP4, post-ex, plan view	-	GB

1918	15/05/2023	TP4, post-ex, E Section	E	GB
1919	15/05/2023	TP4, post-ex, context	N	GB
1920	16/05/2023	TP5, pre-ex	N	SE
1921	16/05/2023	TP5, pre-ex	N	SE
1922	16/05/2023	TP5, pre-ex	-	SE
1923	16/05/2023	TP5, pre-ex, plan view	-	SE
1924	16/05/2023	TP5, pre-ex	-	SE
1925	16/05/2023	TP6, pre-ex, plan view	-	SE
1926	16/05/2023	TP6, pre-ex	-	SE
1927	16/05/2023	TP6, pre-ex, context	NE	SE
1928	16/05/2023	TP6, post-ex, plan view	-	GB
1929	16/05/2023	TP6, post-ex, showing cable	-	GB
1930	16/05/2023	TP6, post-ex, plan view	-	GB
1931	16/05/2023	TP6, post-ex, N Section	N	GB
1932	16/05/2023	TP6, post-ex, plan view, showing cable and sandstone outcrop	-	GB
1933	16/05/2023	TP6, post-ex, N Section, showing sandstone	N	GB
1934	16/05/2023	TP5, post-ex, plan view	-	GB
1935	16/05/2023	TP5, post-ex, N section	N	GB
1936	16/05/2023	TP5, post-ex, context	N	GB
1937	16/05/2023	TP7, pre-ex, plan view	-	GB
1938	16/05/2023	TP7, pre-ex, context	N	GB
1939	16/05/2023	TP8, pre-ex, plan view	-	GB
1940	16/05/2023	TP8, pre-ex, context	N	GB
1941	16/05/2023	TP7, post-ex, plan view	-	GB
1942	16/05/2023	TP7, post-ex, N section	N	GB
1943	16/05/2023	TP8, post-ex, plan view	-	GB
1944	16/05/2023	TP8, post-ex, N section	N	GB
1945	16/05/2023	TP9, pre-ex, context	W	DW
1946	16/05/2023	TP9, pre-ex, plan view	-	DW
1947	16/05/2023	TP10, pre-ex, context	W	DW
1948	16/05/2023	TP10, pre-ex, plan view	-	DW
1949	16/05/2023	TP9, post-ex, plan view	-	DW
1950	16/05/2023	TP9, post-ex, W section	W	DW
1951	16/05/2023	TP9, post-ex, plan view	-	DW
1952	16/05/2023	TP10, post-ex, plan view	-	DW
1953	16/05/2023	TP10, post-ex, W section	W	DW
1954	17/05/2023	TP11, pre-ex, context	W	DW
1955	17/05/2023	TP11, pre-ex, plan view	-	DW
1956	17/05/2023	TP11, pre-ex, plan view	-	DW
1957	17/05/2023	TP12, pre-ex, context	W	DW
1958	17/05/2023	TP12, pre-ex, plan view	-	DW
1959	17/05/2023	TP13, pre-ex, context	W	DW
1960	17/05/2023	TP13, pre-ex, plan view	-	DW
1961	17/05/2023	TP13, pre-ex, plan view	-	DW
1962	17/05/2023	TP12, post-ex, E section	E	FA

		TP12, post-ex, showing relation to		
1963	17/05/2023	sandstone	E	FA
1964	17/05/2023	TP12, post-ex, context	N	FA
		TP12, post-ex, S section, showing sandstone		
1965	17/05/2023	(?)	S	FA
1966	17/05/2023	TP11, post-ex, plan view	-	DW
1967	17/05/2023	TP11, post-ex, W section	W	DW
1968	17/05/2023	dud	-	-
1969	17/05/2023	TP11, post-ex, W section	W	DW
1970	17/05/2023	TP11, post-ex, plan view	-	DW
1971	17/05/2023	TP14, pre-ex, context	NE	DW
1972	17/05/2023	TP14, pre-ex, plan view	-	DW
1973	17/05/2023	TP15, pre-ex, context	E	DW
1974	17/05/2023	TP15, pre-ex, plan view	-	DW
1975	17/05/2023	TP13, post-ex, plan view	-	FA
1976	17/05/2023	TP13, post-ex, W section	W	FA
1977	17/05/2023	TP14, post-ex, plan view	-	DW
1978	17/05/2023	TP14, post-ex, S section, showing sandstone	S	DW
1979	17/05/2023	TP14, post-ex, S section, showing sandstone	S	DW
1980	17/05/2023	TP14, post-ex, E section	E	DW
1981	17/05/2023	TP15, post-ex, S section	S	FA
1982	17/05/2023	TP15, post-ex, S section	S	FA
1983	17/05/2023	TP15, post-ex	-	FA
1984	17/05/2023	TP15, post-ex, context	S	FA
1985	17/05/2023	TP15, post-ex, context	N	FA
1986	17/05/2023	TP15, post-ex, context	E	FA
1987	18/05/2023	TP16, pre-ex, context	NE	DW
1988	18/05/2023	TP16, pre-ex, plan view	-	DW
1989	18/05/2023	TP17, pre-ex, context	N	DW
1990	18/05/2023	TP17, pre-ex plan view	-	DW
1991	18/05/2023	TP16, post-ex, plan view	-	DW
1992	18/05/2023	dud	-	-
1993	18/05/2023	TP16, post-ex, W section	W	DW
1994	18/05/2023	TP16, post-ex, plan view	-	DW
1995	18/05/2023	TP18, pre-ex, plan view	-	GB
1996	18/05/2023	TP18, pre-ex, context	N	GB
1997	18/05/2023	TP19, pre-ex, plan view	-	GB
1998	18/05/2023	TP19, pre-ex, context	E	GB
1999	18/05/2023	TP17, post-ex, plan view	-	GB
2000	18/05/2023	TP17, post-ex, plan view	-	GB
2001	18/05/2023	TP17, post-ex, E section	E	GB
2002	18/05/2023	TP17, post-ex, N section	N	GB
2003	18/05/2023	TP17, post-ex, plan view	-	JM
2004	18/05/2023	TP17, post-ex, N section	N	JM
2005	18/05/2023	dud	-	-

TP18, post-ex, plan view, showing

2006	18/05/2023	sandstone bedrock	-	DW
2007	18/05/2023	TP18, post-ex, S section	S	DW
2008	18/05/2023	TP18, post-ex, S section	S	DW
2009	18/05/2023	TP18, post-ex, E section	E	DW
2010	18/05/2023	TP20, pre-ex, context	E	DW
2011	18/05/2023	TP20, pre-ex, plan view	-	DW
2012	18/05/2023	TP19, post-ex, plan view	-	GB
2013	18/05/2023	TP19, post-ex, plan view	-	GB
2014	18/05/2023	TP19, post-ex, W section	W	GB
2015	18/05/2023	TP19, post-ex, W section	W	GB
2016	18/05/2023	TP19, post-ex, W section	W	GB
2017	18/05/2023	TP20, post-ex, plan view	-	GB
2018	18/05/2023	TP20, post-ex, E section	E	GB
2019	18/05/2023	TP20, post-ex, E section	E	GB
2020	18/05/2023	TP20, post-ex, plan view (base of pit)	-	GB
2021	18/05/2023	TP20, post-ex, N section	N	GB
2022	19/05/2023	TP21, pre-ex, plan view	-	GB
2023	19/05/2023	TP21, pre-ex, context (dance circle area)	N	GB
2024	19/05/2023	TP21, post-ex, plan view	-	GB
2025	19/05/2023	TP21, post-ex, plan view	-	GB
2026	19/05/2023	TP21, post-ex, E section	E	GB
2027	19/05/2023	TP22, pre-ex, plan view	-	GB
2028	19/05/2023	TP22, pre-ex, context (dance circle area)	N	GB
2029	19/05/2023	TP22, post-ex, plan view	-	GB
2030	19/05/2023	TP22, post-ex, plan view	-	GB
2031	19/05/2023	TP22, post-ex, E section	E	GB
2032	19/05/2023	TP23, pre-ex, plan view	-	GB
2033	19/05/2023	TP23, pre-ex, context	W	GB
2034	22/05/2023	TP24, pre-ex, context	S	JM
2035	22/05/2023	TP24, pre-ex, plan view	-	JM
2036	22/05/2023	TP24, pre-ex, plan view	-	JM
2037	22/05/2023	TP24, post-ex, plan view	-	GB
2038	22/05/2023	TP24, post-ex, plan view	-	GB
2039	22/05/2023	dud	-	-
2040	22/05/2023	TP24, post-ex, W section	W	GB
2041	22/05/2023	TP23, post-ex, plan view	-	DW
2042	22/05/2023	TP23, post-ex, plan view	-	DW
2043	22/05/2023	TP23, post-ex, N section	N	DW
2044	22/05/2023	TP23, post-ex, plan view	-	DW
2045	22/05/2023	TP25, pre-ex, plan view	-	DW
2046	22/05/2023	TP25, pre-ex, context	W	DW
2047	22/05/2023	TP26, pre-ex, plan view	-	DW
2048	22/05/2023	TP26, pre-ex, context	W	JM
2049	22/05/2023	TP27, pre-ex, context	W	DW
2050	22/05/2023	TP27, pre-ex, plan view	-	DW
2051	22/05/2023	TP26, post-ex, plan view	-	DW

2052	22/05/2023	TP26, post-ex, E section	E	DW
2053	22/05/2023	TP26, post-ex, E section	E	DW
2054	22/05/2023	TP26, post-ex, context	NE	DW
2055	22/05/2023	For website, excavation with views to La Pa	-	JM
2056	22/05/2023	For website, excavation with views to La Pa	-	JM
2057	22/05/2023	For website, excavation with views to La Pa	-	JM
2058	22/05/2023	For website, excavation with views to La Pa	-	JM
2059	22/05/2023	For website, excavation with views to La Pa	-	JM
2060	22/05/2023	For website, excavation with views to La Pa	-	JM
2061	22/05/2023	For website, excavation with views to La Pa	-	JM
2062	22/05/2023	For website, excavation with views to La Pa	-	JM
2063	22/05/2023	For website, excavation with views to La Pa	-	JM
2064	22/05/2023	For website, excavation with views to La Pa	-	JM
2065	22/05/2023	For website, excavation with views to La Pa	-	JM
2066	22/05/2023	For website, excavation with views to La Pa	-	JM
2067	22/05/2023	For website, excavation with views to La Pa	-	JM
2068	22/05/2023	TP28, pre-ex, context	W	DW
2069	22/05/2023	TP28, pre-ex, plan view	-	DW
2070	22/05/2023	TP29, pre-ex, context	W	DW
2071	22/05/2023	TP29, pre-ex, plan view	-	DW
2072	22/05/2023	TP25, post-ex, plan view	-	GB
2073	22/05/2023	TP25, post-ex, plan view	-	GB
2074	22/05/2023	TP25, post-ex, S section, showing lens of shell	S	GB
2075	22/05/2023	TP27, finds from spit 2	-	JM
2076	22/05/2023	TP27, mid-ex, base of spit 2	-	JM
2077	22/05/2023	TP27, mid-ex, base of spit 2	-	JM
2078	22/05/2023	TP27, mid-ex, base of spit 2, W section	W	JM
2079	23/05/2023	TP28(A), post-ex, plan view	-	DW
2080	23/05/2023	TP28(A), post-ex, plan view	-	DW
2081	23/05/2023	TP28(A), post-ex, NE section, showing lens of shell	NE	DW
2082	23/05/2023	TP28(A), post-ex, NE section, showing lens of shell	NE	DW

		TP28(A), post-ex, NE section, showing lens		
2083	23/05/2023	of shell	NE	DW
2084	23/05/2023	TP27, mud oyster, sample #01	-	JM
2085	23/05/2023	TP27, mid-ex, N section	N	JM
2086	23/05/2023	TP28(B), mid-ex, midden, plan view	-	DW
2087	23/05/2023	TP28(B), mid-ex, NE section	NE	DW
2088	23/05/2023	dud	-	-
2089	23/05/2023	dud	-	-
		TP28(B), mid-ex, SE section, showing		
2090	23/05/2023	midden	SE	DW
		TP28(B), mid-ex, SE section, showing		
2091	23/05/2023	midden	SE	DW
		TP28(B), mid-ex, SE section, showing		
2092	23/05/2023	midden	SE	DW
2093	23/05/2023	TP27, mid-ex of spit 4, showing mud oysters	-	JM
2094	23/05/2023	TP27, mid-ex of spit 4, showing mud oysters	-	JM
2095	23/05/2023	TP27, mid-ex (of spit 4), W section	W	JM
2096	23/05/2023	TP27, mid-ex (of spit 4), E section	E	JM
2097	23/05/2023	TP27, mid-ex (of spit 4), E section	E	JM
2098	23/05/2023	TP27, mid-ex (of spit 4), E section	E	JM
2099	23/05/2023	TP27, mid-ex (of spit 4), S section	S	JM
2100	23/05/2023	TP29, post-ex, plan view	-	JM
2101	23/05/2023	TP29, post-ex, plan view	-	JM
2102	23/05/2023	TP29, post-ex, E section	E	JM
2103	23/05/2023	TP29, post-ex, E section	E	JM
2104	23/05/2023	TP29, post-ex, W section	W	JM
2105	23/05/2023	TP28, post-ex, plan view	-	JM
2106	23/05/2023	TP28, post-ex, plan view	-	JM
		TP28, post-ex, S section, showing lens of		
2107	23/05/2023	midden	S	JM
2108	23/05/2023		S	JM
2109	23/05/2023	TP28, post-ex, W section	W	JM
2110	23/05/2023	TP28, post-ex, E section	E	JM
2111	23/05/2023	TP28, post-ex, N section	N	JM
2112	23/05/2023	TP30, pre-ex, context	W	DW
2113	23/05/2023	TP30, pre-ex, plan view	-	DW
2114	23/05/2023	TP27, post-ex, context	W	JM
2115	23/05/2023	TP27, post-ex, plan view	-	JM
2116	23/05/2023	TP27, post-ex, plan view	-	JM
2117	23/05/2023	TP27, post-ex, plan view	-	JM
2118	23/05/2023	TP27, post-ex, W section	W	JM
2119	23/05/2023	TP27, post-ex, W section	W	JM
2120	23/05/2023	TP27, post-ex, E section (blurry)	E	JM
2121	23/05/2023	TP27, post-ex, E section	E	JM
2122	23/05/2023	TP30, post-ex, context	W	DW

2123	23/05/2023	TP30, post-ex, plan view	-	DW
2124	23/05/2023	TP30, post-ex, plan view	-	DW
2125	23/05/2023	TP30, post-ex, W section	W	DW
2126	23/05/2023	TP30, post-ex, W section	W	DW
2127	23/05/2023	TP30, post-ex, W section	W	DW
2128	23/05/2023	New (third) path alignment (yellow pegs)	W	JM
2129	23/05/2023	New (third) path alignment (yellow pegs)	W	JM
2130	23/05/2023	New (third) path alignment (yellow pegs)	W	JM
2131	23/05/2023	New (third) path alignment (yellow pegs)	W	JM
2132	23/05/2023	New (third) path alignment (yellow pegs)	E	JM
2133	23/05/2023	TP31, pre-ex, context	W	DW
2134	23/05/2023	TP31, pre-ex, plan view	-	DW
2135	24/05/2023	TP32, pre-ex, context	E	DW
2136	24/05/2023	TP32, pre-ex, plan view	-	DW
2137	24/05/2023	TP33, pre-ex, context	E	DW
2138	24/05/2023	TP33, pre-ex, plan view	-	DW
2139	24/05/2023	TP34, pre-ex, context	SE	DW
2140	24/05/2023	TP34, pre-ex, plan view	-	DW
2141	24/05/2023	TP32, post-ex, context	E	FA
2142	24/05/2023	TP32, post-ex, context	E	FA
2143	24/05/2023	TP32, post-ex, context	W	FA
2144	24/05/2023	TP32, post-ex, context	N	FA
2145	24/05/2023	TP32, post-ex, context	-	FA
2146	24/05/2023	TP32, post-ex, E section	E	FA
2147	24/05/2023	TP32, post-ex, E section	E	FA
2148	24/05/2023	TP31, post-ex, context	W	JM
2149	24/05/2023	TP31, post-ex, context	W	JM
2150	24/05/2023	TP31, post-ex, context	N	JM
2151	24/05/2023	TP31, post-ex, plan view	-	JM
2152	24/05/2023	TP31, post-ex, W section	W	JM
2153	24/05/2023	TP31, post-ex, E section	E	JM
2154	24/05/2023	TP33, post-ex, context	E	FA
2155	24/05/2023	TP33, post-ex, context	E	FA
2156	24/05/2023	TP33, post-ex, context	W	FA
2157	24/05/2023	TP33, post-ex, context	N	FA
2158	24/05/2023	TP33, post-ex	-	FA
2159	24/05/2023	TP33, post-ex, E section	E	FA
2160	24/05/2023	TP33, post-ex, E section	E	FA
2161	24/05/2023	TP33, post-ex, E section	E	FA
2162	24/05/2023	TP34, post-ex, plan view	-	JM
		TP34, post-ex, plan view, showing large		
2163	24/05/2023	cobble at base	-	JM
2164	24/05/2023	TP34, post-ex, W section	W	JM
2165	24/05/2023	TP34, post-ex, E section	E	JM
2166	24/05/2023	TP35, pre-ex, context	-	FA
2167	24/05/2023	TP35, pre-ex, context	E	FA
2168	24/05/2023	TP36, pre-ex, context	W	DW



2169	24/05/2023	TP36, pre-ex, plan view	-	DW
2170	24/05/2023	TP35, post-ex	-	FA
2171	24/05/2023	TP35, post-ex, context	E	FA
2172	24/05/2023	TP35, post-ex, context	W	FA
2173	24/05/2023	TP35, post-ex, context	N	FA
2174	24/05/2023	TP35, post-ex, N section	N	FA
2175	24/05/2023	TP35, post-ex, E section	E	FA
2176	24/05/2023	TP36, post-ex, plan view	-	DW
2177	24/05/2023	TP36, post-ex, E section	E	DW
2178	24/05/2023	TP36, post-ex, plan view	-	DW
2179	24/05/2023	TP36, post-ex, N section	N	DW
2180	24/05/2023	TP36, post-ex, context	W	DW
2181	26/05/2023	TP37, pre-ex, context	W	DW
2182	26/05/2023	TP37, pre-ex, plan view	-	DW
2183	26/05/2023	TP38, pre-ex, context	W	DW
2184	26/05/2023	TP38, pre-ex, plan view	-	DW
2185	26/05/2023	TP40, pre-ex, plan view	-	GB
2186	26/05/2023	TP40, pre-ex, context	N	GB
2187	26/05/2023	TP40, pre-ex, context	S	GB
2188	26/05/2023	TP40, post-ex, N section	N	PI
2189	26/05/2023	TP40, post-ex, N section	N	PI
2190	26/05/2023	TP37, post-ex, plan view	-	DW
2191	26/05/2023	TP37, post-ex, plan view	-	DW
2192	26/05/2023	TP37, post-ex, W section	W	DW
2193	26/05/2023	TP37, post-ex, W section	W	DW
2194	26/05/2023	TP37, post-ex, context	NW	DW
2195	26/05/2023	dud	-	-
2196	26/05/2023	TP41, pre-ex, plan view	-	PI
2197	26/05/2023	TP41, pre-ex, context	S	PI
2198	26/05/2023	For website	-	-
2199	26/05/2023	For website	-	-
2200	26/05/2023	TP40, post-ex, plan view	-	GB
2201	26/05/2023	TP41, post-ex, plan view	-	GB
2202	26/05/2023	TP41, post-ex, plan view	-	GB
2203	26/05/2023	TP41, post-ex, S section	S	GB
2204	26/05/2023	TP39, pre-ex, plan view	-	GB
2205	26/05/2023	TP39, pre-ex, context	NE	GB
2206	26/05/2023	TP39, post-ex, plan view	-	GB
2207	26/05/2023	TP39, post-ex, plan view, sandstone base	-	GB
2208	26/05/2023	TP39, post-ex, E section	E	GB
2209	26/05/2023	TP39, post-ex, E section	E	GB
2210	26/05/2023	TP39, post-ex, sandstone base	-	GB
2211	26/05/2023	TP38, mid-ex, end of spit 4 showing shell and sandstone	-	PI
2212	26/05/2023	TP38, mid-ex, end of spit 4 showing shell and sandstone	-	PI
2213	26/05/2023	TP38, post-ex, context	SE	PI

2214	26/05/2023	TP38, post-ex, context	SE	DW
2215	26/05/2023	TP38, post-ex, context	SW	DW
2216	26/05/2023	TP38, post-ex, plan view	-	DW
2217	26/05/2023	TP38, post-ex, plan view	-	DW
2218	26/05/2023	TP38, post-ex, W section	W	DW
2219	26/05/2023	TP38, post-ex, S section	S	DW
2220	26/05/2023	TP38, post-ex, E section	E	DW
2221	26/05/2023	TP38, post-ex, SE corner	SE	DW
2222	26/05/2023	TP38, post-ex, N section	N	DW
2223	26/05/2023	TP38, post-ex, plan view	-	PI
2224	26/05/2023	TP38, post-ex, plan view	-	PI
2225	26/05/2023	TP38, post-ex, plan view	-	PI
2226	26/05/2023	TP38, post-ex, SE corner shell layer (sample #02 & #03)	SE	PI
2227	26/05/2023	TP38, post-ex, SW corner, shell and sandstone	SW	PI
2228	26/05/2023	TP38, post-ex, spit 4, 1/3 large sandstone pieces removed	-	PI
2229	26/05/2023	TP38, post-ex, spit 4, 1/3 large sandstone pieces removed	-	PI
2230	26/05/2023	TP38, post-ex, spit 4, 1/3 large sandstone pieces removed	-	PI
2231	26/05/2023	TP38, post-ex, spit 4, 2/3 large sandstone pieces removed	-	PI
2232	26/05/2023	TP38, post-ex, spit 4, 2/3 large sandstone pieces removed	-	PI
2233	26/05/2023	TP38, post-ex, spit 4, 3/3 large sandstone pieces removed	-	PI
2234	26/05/2023	TP38, post-ex, spit 4, 3 large sandstone pieces removed	-	PI
2235	26/05/2023	TP38, post-ex, spit 4, 3 large sandstone pieces removed	-	PI

# Appendix 5

## *Radiometric dating report*









Redwood trees of the same forest in the same region are expected to have similar  $\Delta R$  values. The difference in  $\Delta R$  between two trees is expected to be proportional to the difference in their distance from the coast. The difference in  $\Delta R$  between two trees is expected to be proportional to the difference in their distance from the coast. The difference in  $\Delta R$  between two trees is expected to be proportional to the difference in their distance from the coast.

$\Delta R$  values were calculated from the difference in the  $^{14}\text{C}$  content of wood sampled in 2004 and 2009. The difference in  $^{14}\text{C}$  content is expected to be proportional to the difference in the distance from the coast. The difference in  $^{14}\text{C}$  content is expected to be proportional to the difference in the distance from the coast. The difference in  $^{14}\text{C}$  content is expected to be proportional to the difference in the distance from the coast.

Mean  $\Delta R$  values were calculated for each of the 10 sites. The mean  $\Delta R$  values were calculated for each of the 10 sites. The mean  $\Delta R$  values were calculated for each of the 10 sites. The mean  $\Delta R$  values were calculated for each of the 10 sites. The mean  $\Delta R$  values were calculated for each of the 10 sites.

**Table A2:** A list of 10 sites from the Merino River drainage system. The table provides the map number, longitude, latitude,  $\Delta R$  value, and reference for each site. The sites are located in the Merino River drainage system, and the  $\Delta R$  values are calculated from the difference in  $^{14}\text{C}$  content between 2004 and 2009.

Map No.	Lon.	Lat.	$\Delta R$	$\Delta R \pm$	Reference	Locality
1966	151.2486	-33.847	108	20	D... 2016	...
1967	151.2486	-33.847	122	15	D... 2016	...
1965	151.1111	-34.0738	188	15	D... 2016	...
1474	150.1167	-36.2167	123	85	G... 1979	...
2070	150.0167	-37.7333	116	35	D... 2016	...
2073	148.85	-39.6	73	35	D... 2016	...
2203	153.3171	-27.5342	170	20	U... 2015	Merino River
1582	153.5	-27.5	134	23	U... 2009	Merino River
1583	153.5	-27.5	169	23	U... 2009	Merino River
1475	148.0833	-40.1667	148	120	G... 1983	...
Weighted Mean $\Delta R$			145	35		





# Appendix 4

## *Radiometric dating report*





For purposes of the definition of "covered person" of 14 CFR 11.411(b)(1)(ii)

- The term "covered person" of 14 CFR 11.411(b)(1)(ii) does not include a person who is a member of the public and who is not a member of the FAA's advisory committee.
- The term "covered person" of 14 CFR 11.411(b)(1)(ii) does not include a person who is a member of the FAA's advisory committee and who is not a member of the public.
- The term "covered person" of 14 CFR 11.411(b)(1)(ii) does not include a person who is a member of the FAA's advisory committee and who is not a member of the public.
- The term "covered person" of 14 CFR 11.411(b)(1)(ii) does not include a person who is a member of the FAA's advisory committee and who is not a member of the public.
- The term "covered person" of 14 CFR 11.411(b)(1)(ii) does not include a person who is a member of the FAA's advisory committee and who is not a member of the public.

Appendix A of the FAA's Advisory Committee Report on the Safety of the National Air Transportation System, dated 10/10/2017, is available at [Appendix A](#).

□ The FAA's Advisory Committee Report on the Safety of the National Air Transportation System, dated 10/10/2017, is available at [Appendix A](#).

Dr. [Name] Director, [Agency] [\[Email Address\]](#)

Dr. [Name] [Title] [\[Email Address\]](#)

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Dr. [Name] E. M. [Title] [\[Email Address\]](#)

[Name] [Title] [\[Email Address\]](#)

149 - [Title]

**Reference:**

FAA's E. M. [Title] G. [Title] [Title] (2007) Error and Omission in the [Title] Report on the Safety of the National Air Transportation System, dated 10/10/2017, is available at [Appendix A](#).

FAA's [Title] Report on the Safety of the National Air Transportation System, dated 10/10/2017, is available at [Appendix A](#).

FAA's [Title] Report on the Safety of the National Air Transportation System, dated 10/10/2017, is available at [Appendix A](#).

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Redwood trees of the same forest in the same region are expected to have similar  $\Delta R$  values. The difference in  $\Delta R$  between two trees is expected to be proportional to the difference in their  $\delta^{14}C$  values. The difference in  $\Delta R$  between two trees is expected to be proportional to the difference in their  $\delta^{14}C$  values. The difference in  $\Delta R$  between two trees is expected to be proportional to the difference in their  $\delta^{14}C$  values.

$\Delta R$  values were calculated from the difference in the  $\delta^{14}C$  values of two trees. The difference in  $\delta^{14}C$  values between two trees is expected to be proportional to the difference in their  $\Delta R$  values. The difference in  $\delta^{14}C$  values between two trees is expected to be proportional to the difference in their  $\Delta R$  values. The difference in  $\delta^{14}C$  values between two trees is expected to be proportional to the difference in their  $\Delta R$  values.

Mean  $\Delta R$  values were calculated from the difference in the  $\delta^{14}C$  values of two trees. The difference in  $\delta^{14}C$  values between two trees is expected to be proportional to the difference in their  $\Delta R$  values. The difference in  $\delta^{14}C$  values between two trees is expected to be proportional to the difference in their  $\Delta R$  values. The difference in  $\delta^{14}C$  values between two trees is expected to be proportional to the difference in their  $\Delta R$  values.

**Table A2:** A list of 10 trees from the Merano Redwood Forest. The table shows the map number, longitude, latitude,  $\Delta R$  value,  $\Delta R \pm$  error, reference, and locality for each tree. The  $\Delta R$  values were calculated from the difference in the  $\delta^{14}C$  values of two trees. The difference in  $\delta^{14}C$  values between two trees is expected to be proportional to the difference in their  $\Delta R$  values. The difference in  $\delta^{14}C$  values between two trees is expected to be proportional to the difference in their  $\Delta R$  values.

Map No.	Lon.	Lat.	$\Delta R$	$\Delta R \pm$	Reference	Locality
1966	151.2486	33.847	108	20	D... 2016	...
1967	151.2486	33.847	122	15	D... 2016	...
1965	151.1111	34.0738	188	15	D... 2016	...
1474	150.1167	36.2167	123	85	G... 1979	...
2070	150.0167	37.7333	116	35	...D... 2016	...
2073	148.85	39.6	73	35	...D... 2016	...
2203	153.3171	27.5342	170	20	... 2015	Merano ...
1582	153.5	27.5	134	23	U... 2009	Redwood ...
1583	153.5	27.5	169	23	U... 2009	Redwood ...
1475	148.0833	40.1667	148	120	G... 1983	... ..
Weighted Mean $\Delta R$			145	35		





# Appendix 5

## *Stone artefact analysis report*

**Kamay23 test excavation at Captain Cooks Landing Place, Kurnell  
Peninsula:  
An analysis of cultural stone objects**

September 2023

Report to  
Coast History and Heritage

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## 1.0 Introduction and summary

This report provides an analysis of Aboriginal stone objects from a test excavation conducted in 2023 in the Meeting Place Precinct on Kurnell Peninsula, Sydney. A total 1,559 stone objects were recovered with most objects (n=1,529 or 98%) occurring in the upper midden. Only six stone objects were recovered from the lower midden. The remaining 24 objects were scattered discontinuously between the two middens and west of the upper midden.

Technologically, most stone objects are Late/Post Bondaian in age. This is consistent with the results of radiocarbon calibrated age determinations which take the marine reservoir effect for shell into account (TP27 spit 4 lower midden, 531±64 cal BP UNSW-2273; TP38 spit 4 upper midden 1,561±86 cal BP UNSW-2274 and 1,657±85 cal BP UNSW-2275) (Chronos 2023). The average densities of stone objects within the upper midden are locally high. Direct comparison with densities in the Foreshore Midden immediately west of the study area is not possible but the current assemblage and previous reports from the Foreshore Midden, suggest that this part of the Kurnell Peninsula was a major focus of stone flaking activity.

The difference in the stone object discard rate between the older upper midden, and younger lower midden is substantial. It is notable that two of the six stone objects in the younger lower midden are stone files – a type not present in the older upper midden. The age determination for the lower midden at Kamay23 is consistent with other age determinations for stone files in the coastal region (Attenbrow 2010b). It is also notable that a similar association – few stone objects in shell midden with stone files, and early historic items suggesting recent occupation – occurred at rock shelter site #52-3-220 (Megaw 1968). There may have been a major shift in the organisation of stone technology on Kurnell Peninsula, with stone working common in conjunction with shell consumption at c.1,740-1,475 cal BP, but rare more recently, at c.595-467 cal BP.

High numbers of stone objects in the upper midden allows consideration of intra-site variation (i.e. variation between different locations within the site). Some minor spatial variation in the use of different materials is present, and minor variation in the length of quartz bipolar artefacts between test pits is present. But overall there is a broad similarity in the nature of the assemblages across the upper midden.

Test pit TP36 in the upper midden shows variation in the proportions of quartz and fine grained siliceous (FGS materials) with depth of deposit; FGS is less frequent in upper spits compared to deeper spits. This test pit suggests variation through time in the use of different materials. No other



test pit shows this variation; perhaps the variation was not widespread nor consistent, or perhaps variation is present in deeper, unexcavated deposits in some other test pits.

People used freehand flaking to reduce or retouch some FGS materials, but they also used bipolar flaking; and bipolar flaking was used to reduce quartz pebbles. Bipolar flaking is a technique which enables people to obtain flakes from small cores and pebbles, which would otherwise have been discarded. Hence the technique extends the functionality of stone materials. Variation within the technique also enables people to produce objects with different attributes, potentially suitable for different tasks. In the context of a major site focus, as in the upper midden of the current study area, bipolar flaking could indicate more sedentary occupation as people extracted as many flakes as possible from available stone materials (cf. Hiscock 1996; Nelson 1991; Parry and Kelly 1987). Evidence of recycling previously discarded objects, and a marked paucity of larger objects – only 12 objects (<1%) are more than 35 mm in size – are also consistent with maximising flake production from available stone materials.

An important question, which the current analysis has not been able to answer, is why the stone assemblage is so recent (Late/Post Bondaian in age), when the Greater Sydney Region has such a long history of occupation (at least 35,000 years, see below), and the landscape of the study was highly favourable for occupation (nearby stream, northerly aspect, maritime and terrestrial resources, cf. White and McDonald 2010). One possibility is that higher sea-level prior to c.2,000 cal BP (Lewis et al. 2008; Sloss et al. 2007; Switzer et al. 2010) may have led to the removal of evidence of earlier occupation from the study area.

## 2.0 Archaeological context

### 2.1 Regional context

People have occupied the Greater Sydney Region for at least 35,000 years, based on archaeological evidence from Pitt Town and Parramatta (GML Heritage 2022a; Williams et al. 2014). Prior to c.7,000 cal BP (regional Phase 1) people may have lived within a social group which occupied a large country extending from the coast, westwards across the Blue Mountains (Barry et al. 2021; McDonald 2008). Climate was generally cooler and drier, and occupation may have been focussed along the larger river valleys, especially during the Last Glacial Maximum (coldest part of the Ice Age, Williams et al. 2021). People made most use of indurated mudstone/silicified tuff (IMST) which they probably procured from the Hawkesbury – Nepean – Cocks River gravels. On Kurnell Peninsula site DH1 (#52-

3-0705) dates within this phase (Smith et al. 1990), as may one site (#52-3-0218) at Potter Point (information on site form #52-3-0218).

During the Early Holocene (after c.12,000 cal BP) climate became warmer and wetter. People spread into country away from the major rivers. Rising sea level also inundated coastal country, forcing people to move westwards (McDonald 2008a; Quinn et al. 2023; Williams et al. 2021). In western Sydney people began to use more silcrete, which occurs naturally on the northern Cumberland Plain (western Sydney); silcrete dominates stone assemblages in this country after c.7,000 cal BP (White 2018). In contrast silcrete was rarely carried westward into the Blue Mountains (Appleton 1997, 1999; Kohen 1986; McLaren and Oakes 2023). Less information is available for eastern/coastal Sydney but silcrete is predominant in most larger assemblages dated between c.5,000 and 2,500 cal BP (Attenbrow et al. 2008; JMcD CHM 2008b; White 2018:301). The distribution of silcrete suggests that the large group of people who occupied the Greater Sydney Region during Phase 1 had subdivided into smaller groups, with one group occupying the region spanning western and eastern/coastal Sydney (White 2018) with another occupying the Blue Mountains. During this phase (regional Phase 2) people made many backed artefacts as well as using other stone tools. The proliferation of backed artefacts occurred between c.5,000 cal BP and c.2,000-1,700 cal BP in coastal Sydney and South Coast regions (Attenbrow et al. 2009; Boot 2002; Hiscock 2008; Lampert and Steele 1993). Many backed artefacts (often of silcrete) were discarded amongst the sand dunes on Kurnell Peninsula (Brayshaw et al. 1992; Hughes et al. 1973).

After about 2,300 cal BP people in eastern/coastal Sydney used much less silcrete, making more use of fine-grained siliceous materials (FGS) and quartz. This shift in use of materials may have marked another change in social arrangements with notable quantities of silcrete no longer being carried from western to eastern Sydney. Instead, people in eastern/coastal Sydney (including Kurnell Peninsula) may have obtained FGS pebbles from the Woronora Plateau and/or Illawarra coast (Branagan and Megaw 1969; JMcD CHM 2008b; White 2018:301); the potential sources of FGS materials are discussed below in section 4.3. Change in the use materials was accompanied by change in flaking technology with much more use of the bipolar technique, and the near cessation of backed artefact production after c.2,000-1,700 cal BP (known as the Post/Late Bondaian phase). The shifts in materials and technology after c.2,300 cal BP suggests that eastern/coastal Sydney people may have split socially from people of western Sydney and strengthened ties with people from the Woronora and Illawarra; or perhaps Woronora and Illawarra people expanded their influence northwards. The presence of ties between eastern/coastal Sydney and the Illawarra has

been documented historically and is evident in provenancing studies of edge-ground implements (Donaldson et al. 2017; Stokes 2015).

The overall long-term process of people subdividing and occupying smaller countries and perhaps realigning their social arrangements, is consistent with McNiven's (1999) ideas of regionalization and social fissioning.

## 2.2 Local context

Several excavations have been conducted within the Meeting Place Precinct on Kurnell Peninsula, variously recovering shell, bone and stone objects. The following review focusses on stone objects from these excavations.

Less than 500 m from the current study area, excavations were conducted at a rock shelter (site #52-3-220). Human remains and shell midden was present, as were stone files but it was noted that flaked stone objects were sparse with a number found just above bed rock. Stone objects include bipolar cores (fabricators), flakes from an edge-ground hatchet, and some scrapers. A weathered glass artefact of late 18<sup>th</sup> Century date was found in the upper part of the deposit (Megaw 1968:17).

Along the foreshore west of the "Watering Place" (site #52-3-219) Megaw (1968) found substantial midden and more worked stone than in the rock shelter. Finds include an edge-ground hatchet reused as a hammer stone, bipolar cores (fabricators), use-polished and miscellaneous retouched flakes and a considerable number of stone files. A few items dating to the early historic phase include a square cut nail, a bone button and a bottle fragment – indicating that the site had been occupied during the historic phase (Megaw 1968:18-19). The site form notes two radiocarbon age determinations of  $360 \pm 100$  BP (ANU-722) and  $1,330 \pm 120$  BP (ANU-721); these calibrate between 622 to modern cal BP (ANU-722) and 1,510 to 960 cal BP (ANU-721). In 2011 additional age determinations were obtained for the Foreshore Midden being  $1,200 \pm 40$  (OZN-190) and  $1,980 \pm 40$  (OZN-193) (Tsoulos et al. 2011); these calibrate between 1,266 to 978 cal BP (OZN-190) and 2,037 to 1,754 cal BP (OZN-193). The age determinations suggest that most of the Foreshore Midden and its contents may have accumulated within the last c.2,000 years. The age determinations obtained for the current project (Chronos 2023) fall within this time frame.

Additional test excavation and salvage of redeposited midden has been carried out (Irish 2007, 2010). The objects include retouched and use-wear artefacts, stone files, objects which had been flaked/pecked/ground, a hammer/anvil, flaked and bipolar artefacts, manuports and ochre. Materials are of quartz, fine grained siliceous (FGS), silicified wood, igneous, welded tuff, silcrete,

chalcedony(?) and quartzite. No backed artefacts were recovered. Cortex is present on the majority of objects, suggesting that the materials were obtained as pebbles, including two manuport pebbles. While most objects are quite small, those of FGS tend to be a little larger than those of quartz. Most flaking was carried out using the bipolar technique but unifacial and bifacial flaking were also used (Irish 2007, 2010).

Overall, the types of materials and emphasis on bipolar flaking indicates occupation during the Late/Post Bondaian phase (section 2.1, cf. JMcD CHM 2008a, 2008b; White 2018:301). This interpretation is consistent with the radiocarbon age determinations obtained by Megaw (1968) and Tsoulos et al. (2011) for the Watering Place (noted above) and also consistent with six age determinations obtained for the McCue midden (located about 4 km to the southwest) which range between 1,865 to 1,623 cal BP (Beta-165771), and 419 to modern cal BP (Beta-165767) (MDCA 2005).

### 3.0 Lithics in each test pit

#### 3.1 Introduction

The spatial distribution of stone objects in each test pit is summarised on **Table 1** and **Figure 1**. There is a clear focus of flaking activity in the upper midden, intercepted by test pits #15, 16, 31, 32, 33, 35, 36 and 38. Lower counts occur in other test pits indicate that objects occur beyond this activity focus, but in smaller numbers.

Objects in each test pit are briefly described below, with reference to test pit information provided to the analyst by Coast History and Heritage.

**Table 1 Stone objects in test pits and spits.**

Brown shading indicates unexcavated deposit. The turf layer of spit 1 was not sieved.

Pit	spit 1	spit 2	spit 3	spit 4	spit 5	spit 6	spit 7	Spit 8	Total
7	-			1					1
8	-	2	1						3
9	-				2				2
10	-				1				1
14	-				5				5
15	-			15	17				32
16	-	6	66						72
18	-		1						1
20	-		1						1

27	-		2	1	1					4
28	-			1						1
29	-				1	4				5
30	-				1					1
31	-		4	11	53	181	14			263
32	-			7	23	59				89
33	-		3	9	5	9				26
34	-		1	2	1	3				7
35	-		4	12	23					39
36	-		7	37	180	212				436
38	-		40	218	224	86	2			570
<b>Total</b>	-	<b>0</b>	<b>69</b>	<b>367</b>	<b>528</b>	<b>579</b>	<b>16</b>	<b>0</b>	<b>-</b>	<b>1,559</b>

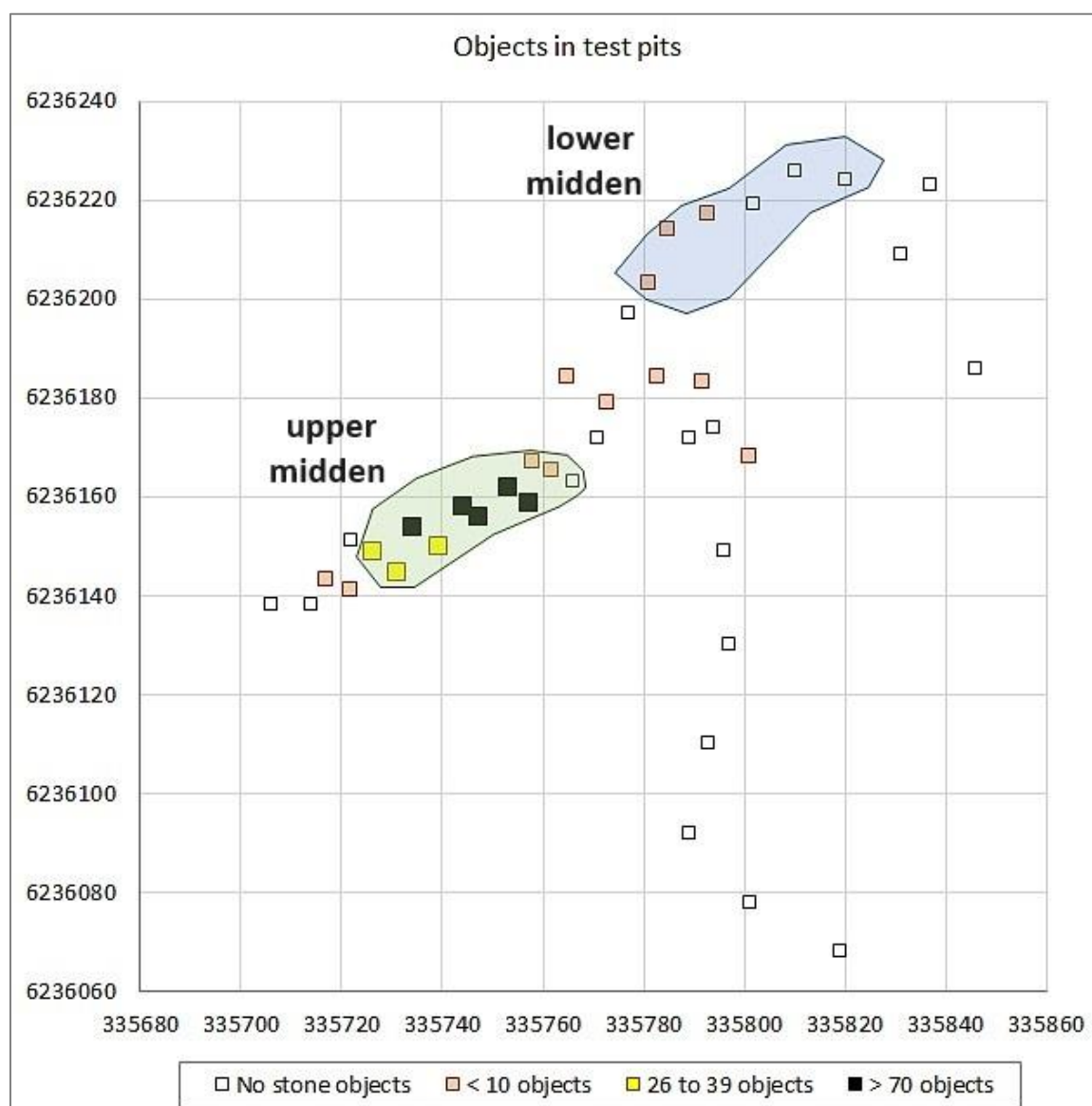


Figure 1 Spatial distribution of stone objects in test pits.

### 3.2 TP7

A single quartz bipolar flake was recovered from spit 4, at least 10 mm above the base of the excavation.

### 3.3 TP8

Three quartz objects were recovered from TP8. These are a quartz bipolar flake and flaked piece in spit 2, and a quartz bipolar pebble core in spit 3. These objects occur at least 20 mm above the base of the excavation.

### 3.4 TP10

A quartz bipolar flake was recovered from spit 5. This object is below a lens of fragmented shell between 25 and 35 cm depth. The stone object occurs in the deepest excavated spit, so additional stone objects could potentially be present in unexcavated deposit.

### 3.5 TP14

Three FGS and two quartz objects were recovered from spit 5. The FGS objects are two flakes and a flaked piece, and the two quartz objects are a bipolar flake and a broken piece. Spit 5 is the deepest excavated spit, although the presence of bedrock in one corner of the pit suggests that only little unexcavated deposit may be present; few (if any) additional stone objects may be present in deposit below the base of excavation.

### 3.6 TP15

Thirty-two (32) objects were recovered from TP15, with 15 in spit 4 and 17 in spit 5; spit 5 was the deepest spit excavated, so additional objects could have been present in deeper unexcavated deposit.

The stone objects are equally of quartz and FGS/MGS with one each of silcrete and silicified wood. The vertical distribution of materials (**Table 2**) does not show substantial variation between spit 4 and spit 5 indicating no evidence of change through time in use of materials.

Objects include a variety of types (**Table 3**). A quartz pebble piece with negative scars along a concave edge was submitted for microscopic analysis for possible use-wear, but the scars were identified as post-depositional damage (Kononenko and White 2023). Platform and bipolar artefacts indicate that FGS/MGS was flaked by both freehand and the bipolar technique, while quartz was flaked predominantly by the bipolar technique. Two quartz manuport pebbles are between 30 and 40 mm

long are of potentially useable sizes but were left unflaked. A large grey quartz flake is also present (Plate 1). Other objects are flaked fragments, flaked pieces, and broken pieces of cultural stone.

**Table 2 Vertical distribution of materials of stone objects in TP15.**

Spit	Quartz	FGS/MGS	Silcrete	S Wood	Total
Spit 4	7	6	1	1	15
Spit 5	8	9			17
<b>Total</b>	<b>15</b>	<b>15</b>	<b>1</b>	<b>1</b>	<b>32</b>

**Table 3 Materials and types of stone objects in TP15.**

Category	Quartz	FGS/MGS	Silcrete	S Wood	Total
Platform object	1	5			6
Bipolar object	4	2			6
FF/FP object	5	4	1		10
Remnant flaked surface		1			1
Broken piece	2	3		1	6
Manuport	3				3
<b>Total</b>	<b>15</b>	<b>15</b>	<b>1</b>	<b>1</b>	<b>32</b>



**Plate 1 Grey granular quartz (quartzite?) flake #26 TP15 spit 5.**

Ventral and dorsal surfaces. Scale 30mm long in 10mm increments.

### 3.7 TP16

Seventy-two (72) objects were recovered from TP16. These occur in spit 2 and spit 3, with excavation halted at c.26 cm depth when a midden layer was encountered. Additional stone objects are likely to be present in deeper unexcavated deposit at this location. The stone objects are predominantly of quartz although many of these are flake fragments and flaked pieces, indicating a high breakage rate (Table 4). Quartz and FGS/MGS were flaked by both freehand and bipolar techniques.

Two objects retain older weathered or worn surfaces and may have been struck from previously discarded stone objects (i.e. indications of recycling). These are #45 (of FGS) from spit 2, and # 51

(of silcrete) from spit 3 (**Plate 2**). A pebble piece (ID #48) with fine parallel striations on one flat surface was submitted for microscopic analysis for possible use-wear but no use-wear was present (Kononenko and White 2023). It is not considered to be a cultural object.

**Table 4 Materials and types of stone objects in TP16.**

Category	Quartz	FGS/MGS	Silcrete	Total
Platform object	4	5	1	10
Bipolar object	8	3		11
FF/FP object	29	6	1	36
Remnant flaked surface			1	1
Broken piece	4	6	1	11
Manuport	3			3
<b>Total</b>	<b>48</b>	<b>20</b>	<b>4</b>	<b>72</b>



**Plate 2 Silcrete proximal broken flake #51 from TP16 spit 3.**

Dorsal surface (right image) is more rounded, worn or weathered than the ventral surface (left image). Scale 5mm long.

### 3.8 TP18

A single proximal broken flake of FGS material was recovered from spit 3. This is the deepest excavated spit but as bedrock appeared in this spit, additional deeper stone objects are unlikely to be present.

### 3.9 TP20

A single small longitudinal cone-split broken flake of FGS material was recovered from spit 3, being two spits above the base of excavation.



### 3.10 TP27

Four objects are present, spread through spit 2 to spit 4, within shell midden. One object in spit 2 is a broken stone file – confirmed by microscopic use-wear analysis (Kononenko and White 2023). The other objects are of MGS and quartz, consisting of two broken pieces and a medial fragment.

### 3.11 TP28-A

A single stone file was recovered from spit 3, being two spits above the base of excavation. Microscopic use-wear analysis confirms the identification of this object (Kononenko and White 2023).

### 3.12 TP29

Five objects were recovered, one in spit 4 and four in spit 5. Additional objects could be present in deeper unexcavated deposit. Three objects are of FGS and are a bipolar flake, a broken retouched fragment and freehand flake. The two quartz objects are distal fragments.

### 3.13 TP30

A single broken piece of silicified wood was recovered from spit 4 of TP30.

### 3.14 TP31

A total of 263 stone objects were recovered, occurring through spit 2 to spit 6. While counts appear to decrease in spit 6, this was only 5 cm thick. Additional objects may be present in deeper unexcavated deposit.

Quartz is the predominant material, followed by diverse FGS/MGS (**Plate 3, Plate 4, Plate 5**), with one silcrete and four silicified wood objects. A bipolar core of FGS (chalcedony, **Plate 6**) has remnant worn/rounded surfaces on both faces, suggesting that it was made on a recycled object. Material types do not vary substantially with depth of deposit (**Table 5**) suggesting that the deposit may not be chronologically stratified or that substantial change in material use did not occur within the time frame of cultural accumulation.

Objects are of a variety of types (**Table 6**). Quartz was flaked predominantly by the bipolar technique, with additional limited use of freehand unifacial flaking indicated by three objects with plain and cortical platforms. FGS/MGS was flaked by both freehand and bipolar techniques. An FGS bipolar flake with edge damage (**Plate 7**) did not have use-wear, but use-wear was found on another (**Plate 8**) and on a retouched artefact (**Plate 9**, Kononenko and White 2023). Two freehand cores are

present, being the only freehand cores recovered by the test excavation. One core has four unifacial platforms (**Plate 10**) and the other has a continuous bifacial platform (**Plate 11**).

**Table 5 Vertical distribution of materials of stone objects in TP31.**

Spit	Quartz	FGS/MGS	Silcrete	S Wood	Total
Spit 2	3	1			4
Spit 3	7	2		2	11
Spit 4	24	27		2	53
Spit 5	105	76			181
Spit 6	5	8	1		14
<b>Total</b>	<b>144</b>	<b>114</b>	<b>1</b>	<b>4</b>	<b>263</b>

**Table 6 Materials and types of stone objects in TP31.**

Category	Quartz	FGS/MGS	Silcrete	S Wood	Total
Retouched object		1			1
Use-wear		1			1
Core		2			2
Platform object	5	29	1	1	36
Bipolar object	29	25			54
FF/FP object	97	46		3	146
Remnant flaked surface		1			1
Broken piece	9	9			18
Manuport	4				4
<b>Total</b>	<b>144</b>	<b>114</b>	<b>1</b>	<b>4</b>	<b>263</b>



**Plate 3 Pale cream-grey FGS bipolar flake #178 from TP31 spit 5.**

Scale 5mm long in 1mm increments.



**Plate 4 Pale grey FGS bipolar flake #179 from TP31 spit 5.**

Scale 5mm long in 1mm increments.



**Plate 5 Black FGS flake #177 from TP31 spit 5.**

Possibly igneous with white quartz crystal inclusions. Scale 5mm long in 1mm increments.



**Plate 6 FGS bipolar core #125 made on a recycled artefact TP31 spit 4.**

Scale 5mm long in 1mm increments.



**Plate 7 FGS bipolar flake with edge damage (not use-wear) #124 from TP31 spit 4.**

Scale 5mm long in 1mm increments.



**Plate 8 FGS bipolar flake with use-wear #172 from TP31 spit 5.**

Scale 5mm long in 1mm increments.



**Plate 9 FGS retouched flake #173 from TP31 spit 5.**

Scale 5mm long in 1mm increments.



**Plate 10 FGS core #170 from TP31 spit 5.**

Scale 5mm long in 1mm increments.



**Plate 11 FGS core #171 from TP31 spit 5.**

Scale 5mm long in 1mm increments.

### 3.15 TP32

Eighty-nine (89) stone objects were recovered from TP32. These occur in spit 3 to spit 5, with the highest count in spit 5; additional objects are likely to be present in deeper unexcavated deposits at this location.

Objects are almost equally of quartz and FGS/MGS with others of silicified wood, silcrete and an unidentified material. Materials do not vary substantially with depth of deposit (Table 7) suggesting that the deposit may not be chronologically stratified or that substantial change in material use did not occur within the time frame of cultural accumulation.

A variety of artefact types are present. Notable is a cobble piece of an MGS material which appears to have bifacial and unifacial flaking along margins (Plate 12). This object was submitted for microscopic use-wear analysis but the surfaces are too badly weathered to show whether it had use-wear or not (Kononenko and White 2023).

Most FGS/MGS may have been reduced by freehand flaking as platform artefacts with 'normal' bulbs outnumber identified bipolar artefacts for this material (Table 8). In contrast, most quartz was probably flaked by the bipolar technique.

**Table 7 Vertical distribution of materials of stone objects in TP32.**

Spit	Quartz	FGS/MGS	Silcrete	S Wood	Unidentified	Total
Spit 3	2	4		1		7
Spit 4	11	8	2	2		23
Spit 5	28	25	1	4	1	59
<b>Total</b>	<b>41</b>	<b>37</b>	<b>3</b>	<b>7</b>	<b>1</b>	<b>89</b>

**Table 8 Materials and types of stone objects in TP32.**

Category	Quartz	FGS/MGS	Silcrete	S Wood	Unidentified	Total
Flaked cobble		1				1
Platform object	1	16	1	3		21
Bipolar object	10	2	1			13
FF/FP object	25	16	1	2		44
Remnant flaked surface		2		2		4
Manuport	5				1	6
<b>Total</b>	<b>41</b>	<b>37</b>	<b>3</b>	<b>7</b>	<b>1</b>	<b>89</b>



**Plate 12 MGS cobble piece with marginal flaking #304 from TP32 spit 5.**

Surface too weathered to identify use-wear (Kononenko and White 2023). Scale 30mm long in 10mm increments.

### 3.16 TP33

Twenty-six (26) objects were recovered from TP33. These occur in low numbers through spit 2 to spit 5. Objects are equally of quartz and FGS/MGS with two of silcrete. Materials do not vary substantially with depth; two silcrete objects occur in spit 5 (Table 9) but this vertical distribution could have arisen by random chance (Fisher exact test  $p=.111$ ).

All three material types were reduced by freehand and bipolar flaking (Table 10). An FGS broken bipolar flake has continuous flaking damage along one lateral margin (Plate 13) but no use-wear was identified by microscopic analysis (Kononenko and White 2023). Two small quartz pebbles (20 mm and 25 mm in size) were carried to this location but not flaked (i.e. manuports).

**Table 9 Vertical distribution of materials of stone objects in TP33.**

Spit	Quartz	FGS/MGS	Silcrete	Total
Spit 2	2	1		3
Spit 3	4	5		9
Spit 4	4	1		5
Spit 5	2	5	2	9
<b>Total</b>	<b>12</b>	<b>12</b>	<b>2</b>	<b>26</b>

**Table 10 Materials and types of stone objects in TP33.**

Category	Quartz	FGS/MGS	Silcrete	Total
Platform object	1	2	1	4
Bipolar object	5	3	1	9
FF/FP object	4	7		11
Manuport	2			2
<b>Total</b>	<b>12</b>	<b>12</b>	<b>2</b>	<b>26</b>



**Plate 13 FGS bipolar broken flake with edge scarring but no use-wear #372 from TP33 spit 5.**

Scale 5mm long in 1 mm increments.

### 3.17 TP34

Seven (7) stone objects were recovered from TP34, occurring through spit 2 to spit 5. These are of quartz, FGS and silcrete, and occur in various spits (Table 11). The silcrete object is from freehand flaking (it has an incomplete plain platform), but the quartz and FGS objects may be from bipolar flaking (Table 12).

**Table 11 Vertical distribution of materials of stone objects in TP34.**

Spit	Quartz	FGS	Silcrete	Total
Spit 2	1			1
Spit 3		1	1	2
Spit 4	1			1
Spit 5	2	1		3
<b>Total</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>7</b>

**Table 12 Materials and types of stone objects in TP34.**

Category	Quartz	FGS	Silcrete	Total
Platform object			1	1
Bipolar object	1	1		2
FF/FP object	3	1		4
<b>Total</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>7</b>

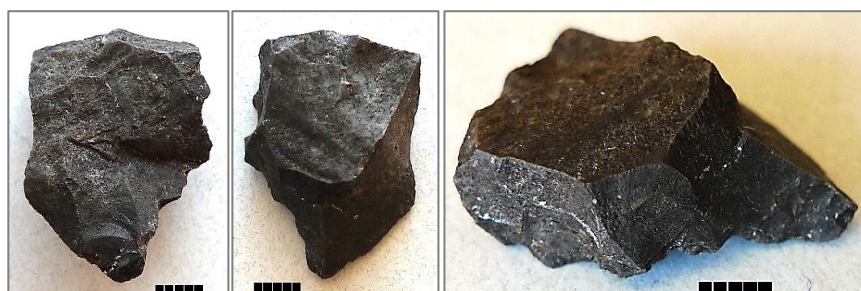
### 3.18 TP35

Thirty-nine (39) stone objects were recovered from TP35, occurring through spit 2 to spit 4. The highest count occurs in spit 4, which was only partly excavated, suggesting that counts may have increased in deeper deposit (**Table 1**).

Quartz is the predominant material, and was flaked predominantly by the bipolar technique; a single small flake of granular quartz was struck during freehand flaking. An FGS broken flake was also struck by freehand flaking. Two FGS artefacts were retouched, with sharp V-shaped notches; the larger (**Plate 14**) was submitted for microscopic use-wear analysis, but no use-wear was detected (Kononenko and White 2023).

**Table 13 Materials and types of stone objects in TP35.**

Category	Quartz	FGS	Silcrete	S Wood	Total
Retouched object		2			2
Platform object	1	1			2
Bipolar object	10	1		1	12
FF/FP object	12	5	2		19
Remnant flaked surface		1			1
Broken piece		1			1
Manuport	2				2
<b>Total</b>	<b>25</b>	<b>11</b>	<b>2</b>	<b>1</b>	<b>39</b>



**Plate 14 FGS broken retouched artefact #389 from TP35 spit 5.**

Scale %mm long in 1mm increments.

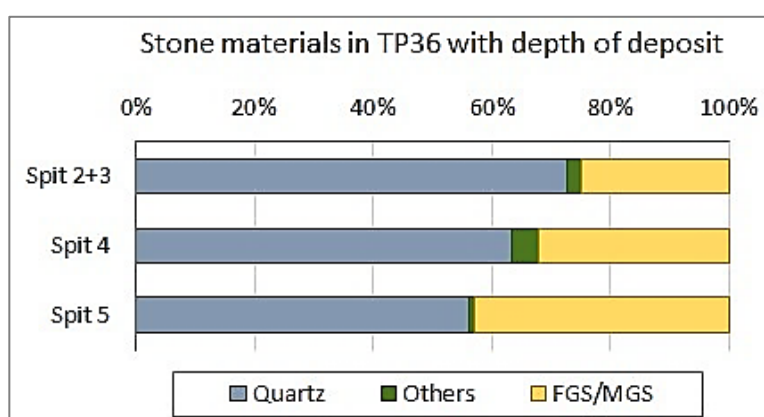
### 3.19 TP36

A total of 436 stone objects were recovered from TP36. Counts increase with depth, indicating that additional objects are likely to be present in deeper unexcavated deposit. Quartz is predominant overall, while the proportion of FGS/MGS decreases towards the upper part of the deposit (**Table 14**, **Figure 2**, chi-squared=7.68, df=2, p=.021, data for spit 2 and spit 3 combined to increase sample size).

This is the only test pit in the current study which has evidence of variation in material use with depth of deposit.

**Table 14 Vertical distribution of materials of stone objects in TP36.**

Spit	Quartz	FGS/MGS	Silcrete	S Wood	Sandstone	Total
Spit 2	5	1	1			7
Spit 3	27	10				37
Spit 4	114	58	4	3	1	180
Spit 5	119	91	1	1		212
<b>Total</b>	<b>265</b>	<b>160</b>	<b>6</b>	<b>4</b>	<b>1</b>	<b>436</b>



**Figure 2 Vertical distribution of stone materials in TP36, by % frequency.**

Notable objects include a fragment of a grey glossy quartz backed artefact (#456) in spit 4. Three FGS objects from spit 5 have use-wear (Plate 15, Plate 16, also ID #578), confirmed by microscopic use-wear analysis (Kononenko and White 2023). The presence of platform and bipolar artefacts of most material types indicates use of both freehand and bipolar flaking. Eight quartz pebbles and broken pebbles, between 15 mm and 28 mm in size, were left at this location without being flaked.

**Table 15 Materials and types of stone objects in TP36.**

Category	Quartz	FGS/MGS	Silcrete	S Wood	Sandstone?	Total
Backed artefact	1					1
Use-wear		2				2
Bipolar with use-wear		1				1
Platform object	15	35	4	2		56
Bipolar object	54	21	1			76
FF/FP object	169	84	1	2	1	257
Remnant flaked surface	2	8				10
Broken piece	16	9				25
Manuport	8					8
<b>Total</b>	<b>265</b>	<b>160</b>	<b>6</b>	<b>4</b>	<b>1</b>	<b>436</b>





**Plate 15 FGS bipolar broken flake with use-wear #555 from TP36 spit 5.**

Scale 5mm long in 1mm increments.



**Plate 16 FGS cone-split broken flake with use-wear #556 from TP36 spit 5.**

Scale 5 mm long in 1 mm increments.

### 3.20 TP38

A total of 570 stone objects were recovered from TP38, spread through spit 2 to spit 6, with highest counts in spit 3 and spit 4. None were recovered from spit 7 nor from the smaller sub-square excavated into spit 8.

Quartz is the most frequent material, making up two-thirds (65%) of the assemblage. Quartz, FGS/MGS and silcrete occur in most spits, and there is very little variation in the proportions of different material types with depth of deposit (**Table 16**, chi-squared=2.66, df=3, p=.447, quartz vs other materials combined, data for spit 5 and spit 6 combined to increase sample size).

The assemblage includes a silcrete backed artefact with chord damage (**Plate 17**); this was submitted for microscopic use-wear analysis but no use-wear was detected (Kononenko and White 2023). This backed artefact was recovered from spit 5, below the radiocarbon age determinations of 1,561±86 cal BP (UNSW-2274) and 1,657±85 cal BP (UNSW-2275, Chronos 2023), obtained for shell in spit 4. As there is no substantial variation in the distribution of stone materials with depth of deposit, it cannot be suggested that the backed artefact is older than the age determinations.

A bipolar broken flake was struck from an implement (**Plate 25**) used to work shell while another object (**Plate 26**) was used to work wood (Kononenko and White 2023).

The presence of platform and bipolar artefacts of quartz and FGS/MGS indicates use of both freehand and bipolar flaking (Table 17, Plate 18 to Plate 24).

**Table 16 Vertical distribution of materials of stone objects in TP38.**

Spit	Quartz	FGS/MGS	Silcrete	S Wood	Sandstone	Unidentified	Total
Spit 2	22	16	1	1			40
Spit 3	143	70	1	3		1	218
Spit 4	150	70	3	1			224
Spit 5	53	31	2				86
Spit 6	1				1		2
<b>Total</b>	<b>369</b>	<b>187</b>	<b>7</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>570</b>

**Table 17 Materials and types of stone objects in TP38.**

Category	Quartz	FGS/MGS	Silcrete	S Wood	Sandstone	Unidentified	Total
Backed object			1				1
Bipolar use-wear		1					1
Bipolar core		6					6
Bipolar artefact	76	26					102
Platform object	6	33		2	1		42
FF/FP object	254	107	4	3			368
Remnant flaked surface		2					2
Broken piece	26	18	2			1	47
Manuport	7						7
<b>Total</b>	<b>369</b>	<b>187</b>	<b>7</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>570</b>



**Plate 17 Silcrete backed artefact #914 from TP38 spit 5.**

Scale 5mm long in 1mm increments.



**Plate 18 White to pink quartz bipolar flake #738 from TP38 spit 3.**

Scale 5mm long in 1mm increments.



**Plate 19 White and pink quartz with crystal inclusions, bipolar broken flake #860 TP38 spit 4.**



**Plate 20** Dark red flake #673 from TP38 spit 2.

Scale 5mm long in 1mm increments.



**Plate 21** Brown black chalcidonic FGS cone-split broken flake left side #704 from TP38 spit 3.

Scale 5mm long in 1mm increments.



**Plate 22** Chalcedony distal piece #731 from TP38 spit 3.

Scale 5mm long in 1mm increments.

Six objects have remnant rounded/weathered surfaces, suggesting that older discarded objects were recycled (**Plate 23**, also ID #823, 826, 827, 830 and 835). A relatively large flake of a coarse-grained material, possibly sandstone, is also present (**Plate 27**). Seven small quartz pebbles and broken pebbles (between 12 mm and 23 mm in size) appear to have been left at this location without being flaked.



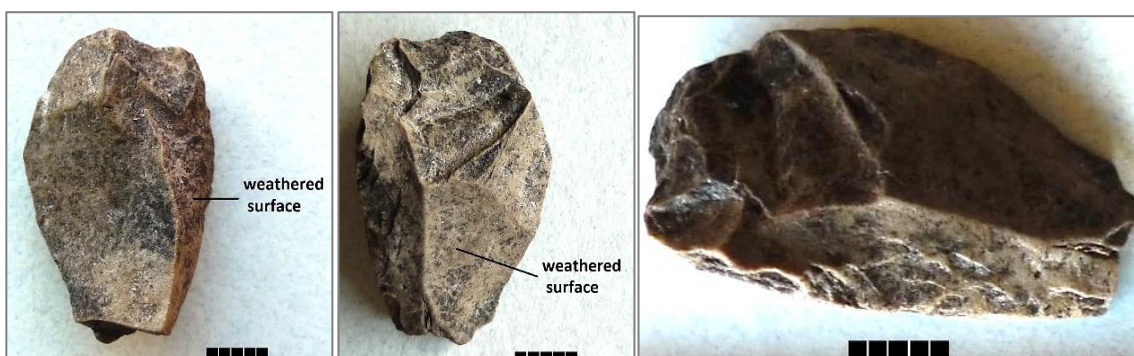
**Plate 23** FGS bipolar core #677 from TP38 spit 2.

Scale 5mm long in 1mm increments.



**Plate 24** FGS bipolar core #709 from TP38 spit 3.

Scale 5mm long in 1mm increments.



**Plate 25** FGS bipolar broken flake #806 struck from recycled core TP38 spit 4.

Scale 5mm long in 1mm increments.



**Plate 26** FGS bipolar core #807 with use-wear TP38 spit 4.

Scale 5mm long in 1mm increments.



**Plate 27** Sandstone(?) flake #962 from TP38 spit 6.

Scale 5mm long in 1mm increments.

## 4.0 Stone materials, their sources and distribution across the study area

### 4.1 Introduction

Understanding the sources of lithic materials and where they were carried from could potentially provide information on the extent of country over which people travelled or links to neighbours with whom they exchanged materials, goods or information (Branagan and Megaw 1969; Guilfoyle 2005; Stokes 2015). This section discusses the materials in the current assemblage and outlines available information on the potential sources of those materials. The available information supports the idea that people at Kamay obtained their stone materials locally (quartz) with FGS and other materials possibly from the catchment of the Hacking River and/or the northern Illawarra coast.

The extent of cortex on objects, and size of objects, can provide an indication of the form (body) of materials (e.g. pebbles, cobbles, bedrock quarry, recycled objects) and their size. Summary counts of the material types and extent of cortex on objects is given on **Table 18**, and summary size counts are given on **Table 19**.

**Table 18** Lithic materials and extent of cortex on objects in the current study.

Material	absent	weathered or rounded	<40%	40-60%	>60%	100%	Total	% with cortex
Quartz	449	1	152	165	153	15	<b>935</b>	51.9
FGS/MGS	412	19	67	43	26		<b>567</b>	24.0
Silcrete	17	1	5	3	2		<b>28</b>	35.7
S Wood	20		2		1		<b>23</b>	13.0
Sandstone	2	1	1				<b>4</b>	-
Unidentified	1					1	<b>2</b>	
<b>Total</b>	<b>901</b>	<b>22</b>	<b>227</b>	<b>211</b>	<b>182</b>	<b>16</b>	<b>1,559</b>	<b>40.8</b>

**Table 19 Lithic materials and maximum size of objects in the current study.**

Material	5.5-10	10.5-15	15.5-20	20.5-25	25.5-30	30.5-35	35.5-40	40.5-45	54	74, 86	Total	Total weight	Mean weight	% > 20 mm
Quartz	282	421	173	39	12	4	3		1		<b>935</b>	756.1	0.8	6.3
FGS/MGS	105	227	107	69	42	12	4			1	<b>567</b>	721.9	1.3	22.6
Silcrete	5	10	7	4	1	1					<b>28</b>	19.6	0.7	21.4
S Wood	1	7	7	8							<b>23</b>	23.7	1.0	34.8
Sandstone		1			1			1		1	<b>4</b>	33.3	-	-
Unidentified	1						1				<b>2</b>	20.4	-	-
<b>Total</b>	<b>394</b>	<b>666</b>	<b>294</b>	<b>120</b>	<b>56</b>	<b>17</b>	<b>8</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1,559</b>	<b>1,567.5</b>	<b>1.0</b>	<b>13.2</b>

## 4.2 Quartz

Quartz is the most frequent material type by count and by weight. The quartz objects vary widely in texture from translucent, to plain white or pink, through to granular/crystalline forms, and some may even be highly siliceous quartzite (**Plate 1, Plate 18, Plate 19**). Half the quartz objects (52%) have cortex (**Table 18**). This is a high proportion and indicates early stage flaking of small pebbles (Dibble et al. 2005). The largest quartz object measures 54 mm in size and is a primary flake (dorsal entirely covered with cortex) of a dark grey granular stone (**Plate 1**); it was probably struck from a large pebble or cobble. However, most quartz objects were probably struck from smaller pebbles.

Fifteen complete pebbles were recovered, which may have been manuports. These range in size from 26 mm to 11.5 mm, and from 12.9 g to 0.9g. These pebbles were not the largest quartz objects; 19 quartz objects measure larger than the pebbles, indicating that some larger pebbles were procured and flaked (**Figure 3**). Some of the manuport pebbles may have been left on the site because they were within the smaller end of the size range used for flaking, not needed for immediate tasks or left in case of future need.

Quartz pebbles up to 40 mm in size occur naturally within the Hawkesbury Sandstone (Bowman et al. 1986:32) and as this formation forms the bedrock of Kurnell Peninsula, quartz pebbles could have been sourced locally. They could probably have been sourced from Hawkesbury Sandstone on the Woronora Plateau south-west of Kurnell Peninsula. Quartz pebbles also occur in other geological formations, such as the Coal Cliff Sandstone (Bowman 1974:67), which outcrops around the base of the Illawarra Escarpment south of Scarborough, c.35 km south-west of the study area.

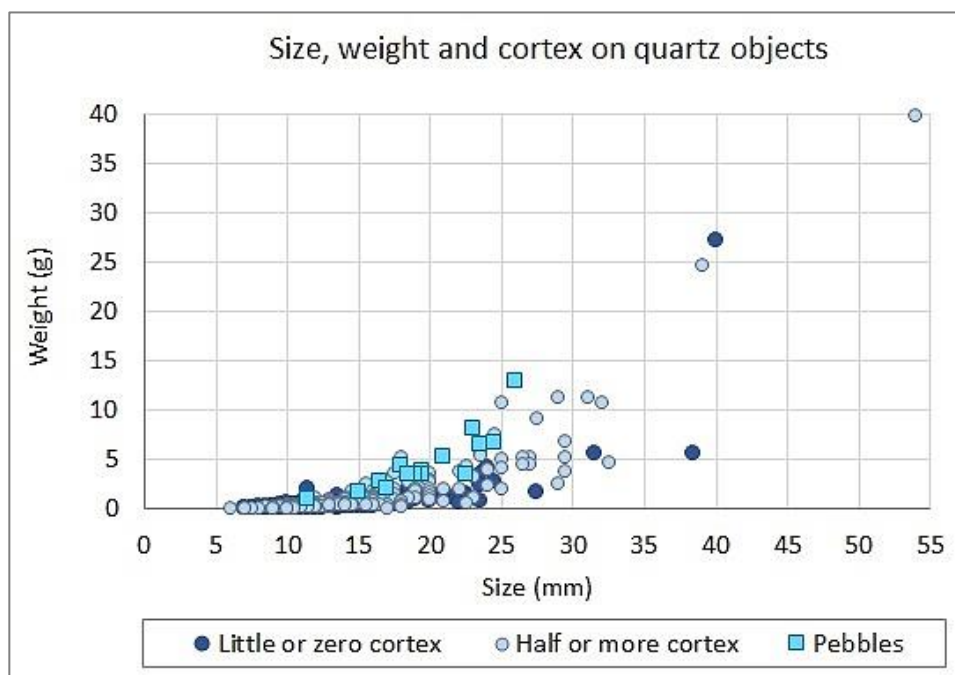


Figure 3 Size, weight and cortex on quartz objects.

#### 4.3 Fine and medium grained siliceous materials (FGS/MGS)

A diverse array of fine to medium grained siliceous materials occur in the assemblage. These vary in texture, composition and colour (Plate 3 to Plate 16, Plate 21 to Plate 25). One quarter of FGS/MGS objects retain cortex (Table 18) indicating that materials were probably procured as pebbles. Some FGS/MGS objects tend to be larger than quartz, with nearly one-quarter more than 20 mm in size (23% compared to 6.4% of quartz objects, Table 19). The lower proportion of cortex and presence of relatively more larger objects suggests that at least some of the original pebbles and cobbles may have tended to be larger than those of quartz. A few objects have remnant older flaked surfaces which are more rounded or worn than more recent scars, indicating that previously discarded objects were reused (recycled, Plate 6, Plate 25).

The sources of FGS/MGS materials are not certain. The Bulgo Sandstone includes green, red, black and grey “chert” pebbles (Ward 1980). This formation occurs in the upper catchment of the Hacking River and pebbles could potentially have been carried northwards in the stream’s bedload, within 20 km of the study area. The Bulgo Sandstone also outcrops around headlands along the Illawarra coast between Werrong and Garie North (Stroud et al. 1985), c.22 km south-west of the study area.

Pale grey and coloured “chert” pebbles occur in the Scarborough Sandstone which outcrops behind Stanwell Park Beach c.33 km south-west of the study area (Bowman 1974:67, n.d.; Stroud et al.

1985). The Wilton Formation also includes rounded pebbles of light-grey “chert” and light-grey indurated siltstone (Bowman 1974). The Wilton Formation occurs around the base of the Illawarra Escarpment cliffs (Stroud et al. 1985), with the nearest potential outcrop at Scarborough c.36 km south-east of the study area. Jasper pebbles occur on Coalcliff Beach (Bowman et al. 1986:69), c.34 km south-west of the study area. Less formal reports from internet posts refer to agate and carnelian at Garie Beach, agate at Thelma Head and Stanwell Park, chalcedony at North Wollongong and jasper and agate on beaches between Wollongong and Shellharbour (GML Heritage 2022b). Red, green and grey “chert” pebbles have also been reported in the Terrigal Formation (Herbert 1983:15) but this formation is exposed north of Broken Bay, more than 60 km from the study area.

The available information suggests that the most likely sources of the diverse FGS/MGS materials are south-west of the study area, on the Woronora Plateau and the northern Illawarra coast. It can be noted that Branagan and Megaw (1969) were of the view that “chert” pebbles in the Illawarra region were generally too small to have been flaked, but the size and incidence of cortex on FGS/MGS materials in the current assemblage indicates that most materials were procured as pebbles.

As a few European items dating to the Early Historic phase have been found in the Meeting Place Precinct (Megaw 1968) the current analysis considers the possibility that some of the chalcedonic objects (**Plate 6**, **Plate 7**, **Plate 22**) may have been European flint. Flint in other assemblages in the Sydney region has been observed by the analyst, and photos of those flint objects were revisited (e.g. GML Heritage 2018, 2021; Munt and Owen 2022). It is concluded that none of the objects from the current excavations are likely to be European flint.

#### 4.4 Silcrete

Only 28 objects of silcrete were recovered by the current excavations, making up just 1.8% of the assemblage (**Plate 2**, **Plate 17**). However about one-third of these retain cortex (36%, **Table 18**) and one-fifth (21%) are more than 20 mm in size (**Table 19**). Silcrete was probably procured as large pebbles, possibly from a coastal source rather than Western Sydney (cf. Corkill 1999; Kohen 1986). An exception is the object shown in **Plate 2** which has a rounded/worn dorsal surface suggesting that this object was struck from a recycled core.

Silcrete occurs naturally in the Bendalong area (Hughes et al. 1973) c.84 km south of West Dapto but cortical silcrete objects occur occasionally in coastal Sydney, suggesting a closer beach source is probable (Fullagar et al. 1999; KNC 2020; cf. Lampert 1980).

#### 4.5 Silicified wood (fossil wood, petrified wood)

Twenty-three (23) objects of silicified wood were recovered, making up just 1.5% of the current assemblage. Only three retain cortex (**Table 18, Table 19**). Silicified wood occurs occasionally in the St Marys geological Formation in western Sydney (Corkill 1999) but it is more common in the Illawarra, where it occurs on beaches in the Wollongong area (Sherwin et al. 1986). It also occurs within the Pheasants Nest Formation (Bowman et al. 1986:16) and towards the top of the Erins Vale Formation (Bowman 1974:129), which outcrop over extensive hilly areas below the Illawarra escarpment (Stroud et al. 1985), more than 40 km south-west of the study area.

The overall paucity of silicified wood in the current assemblage (just 1.5% of stone objects) suggests that the Wollongong area was not the primary source of stone materials, although occasional silicified wood objects may have been carried from this area to Kurnell Peninsula.

#### 4.6 Other materials

Two objects of dark brown to red-brown unidentified material are present – one is a manuport pebble (ID #351), and the other is a tiny irregular patinated object, classified as a broken piece (ID #984).

A coarse-grained flake (**Plate 27**) may be of a hard sandstone; its relatively large size (43 mm) and presence of cortex on the platform, indicates it was probably struck from a small cobble. A medial fragment (ID #543) is of a similar type of material. The source of these materials is not known. Two files (ID #98 and #966) are of hard sandstone which may deriving from local Hawkesbury Sandstone.

#### 4.7 Distribution of materials in test pits

Quartz occurs in all but four of the test pits which contain stone objects; the exceptions being TP18, TP20, TP28 and TP30 (**Table 20**). Quartz is the predominant material and it was used most widely across the study area. The diverse materials which together comprise FGS/MGS were used only a little less widely, not occurring in six test pits, being TP7 to TP10, TP28 and TP30. Silcrete is much less frequent in the total assemblage, but occurs in 10 test pits, suggesting discard of small numbers of objects during multiple activities. Silicified wood occurs only within the upper midden suggesting that this material was used during earlier activities.

Five test pits within the upper midden have larger numbers of objects, and quartz is the most frequent material in each of these (**Figure 4**). However, TP32 has a lower proportion of quartz objects (46%), while TP16 and TP38 have higher proportions of quartz objects (67% and 65% respectively).

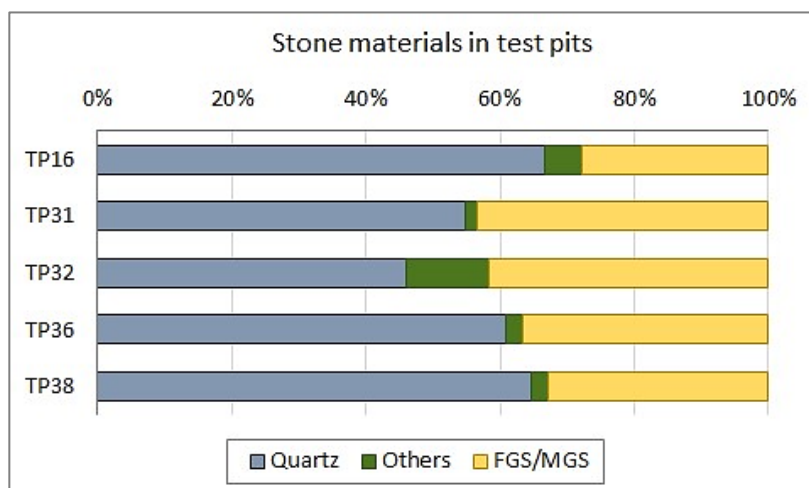


Variation in the proportions of quartz objects is unlikely due to random chance (chi-squared=16.84, df=4, p=.002). TP31 and TP32 have the highest proportions of FGS/MGS (43% and 42% respectively). Variation in the proportions of FGS/MGS objects is also unlikely due to random chance (chi-squared=12.02, df=4, p=.017). TP32 has a slightly higher proportion of materials other than quartz and FGS/MGS than other test pits (12% compared to 2% to 6%). Again, variation in the proportions of other materials combined is unlikely due to random chance (chi-squared=28.94, df=4, p<.001).

These variations in the proportions of material types suggests some minor variation in the proportions of materials which people carried to the upper midden and/or variation in the intensity of flaking (number of removals from each transported core).

**Table 20 Materials of stone objects in test pits.**

Context	Pit	Quartz	FGS/MGS	Silcrete	S Wood	Sandstone	Unidentified	Total
Upper midden	10	1						1
	15	15	15	1	1			32
	16	48	20	4				72
	30				1			1
	31	144	114	1	4			263
	32	41	37	3	7		1	89
	33	12	12	2				26
	35	25	11	2	1			39
	36	265	160	6	4	1		436
38	369	187	7	5	1	1	570	
Lower midden	20		1					1
	27	2	1			1		4
	28					1		1
other pits	7	1						1
	8	3						3
	9	1		1				2
	14	2	3					5
	18		1					1
	29	2	3					5
	34	4	2	1				7
<b>Total</b>		<b>935</b>	<b>567</b>	<b>28</b>	<b>23</b>	<b>4</b>	<b>2</b>	<b>1559</b>



**Figure 4** Proportions of stone materials in test pits with higher counts, by % frequency.

## 5.0 Assemblage analysis

### 5.1 The assemblage generally and flaking technology

As noted above the overall assemblage is predominantly of quartz (60%) with a diverse array of FGS/MGS materials (36%), some silcrete (2%), silicified wood (2%) and a few other materials (**Table 21**). A small number of objects have macroscopically visible signs of modification, including a flaked cobble, two files, two backed artefacts, and nine objects with retouch and/or use-wear. Additional objects with use-wear could be present which were not identified by the analysis. It is notable that the two files occur in the younger lower midden while the two younger backed artefacts occur in the upper midden (**Table 22**). The relative paucity of quartz objects with apparent modification could be related to the difficulty of macroscopically identifying fine edge damage on quartz of lesser flaking quality. Only two freehand cores are present. Sixteen (16) objects are classified as bipolar cores, although others were probably present as bipolar reduction can proceed until cores have been entirely split into flakes (and flaked pieces) with no remaining core.

Quartz was flaked predominantly by the bipolar technique, with bipolar objects greatly outnumbering platform objects from freehand flaking (**Table 21**). The quartz assemblage is dominated strongly by FF/FP objects (65%, **Figure 5**) indicating a high rate of fragmentation. Poor flaking quality of many quartz pebbles may have contributed to the high breakage rate, and may also have obscured technical attributes of flaking on some objects which might otherwise have been assigned to other categories. Quartz objects tend to be small with only 6% of objects more than 20 mm in size (**Table 19, Figure 6**). Thirty-three (33) quartz pebbles appear to be manuports, carried to the site but left behind without being worked. Some of these pebbles are towards the small end of

the size range of useable pebbles and may have been left for various reasons, as noted above (Figure 3).

**Table 21 Materials and types of stone objects.**

Category	Quartz	FGS/MGS	Silcrete	S Wood	Sandstone	Unidentified	Total
Flaked cobble		1					1
Files					2		2
Backed object	1		1				2
Retouched object		4					4
Bipolar with use-wear		2					2
Use-wear		3					3
Cores		2					2
Bipolar object	202	85	3	1			291
Platform object	34	131	10	8	1		184
FF/FP object	603	277	10	10	1		901
Remnant flaked surface	2	15	1	2			20
Broken piece	59	47	3	2		1	112
Manuport	34					1	35
<b>Total</b>	<b>935</b>	<b>567</b>	<b>28</b>	<b>23</b>	<b>4</b>	<b>2</b>	<b>1,559</b>

**Table 22 Types of stone objects in the upper and lower middens and other test pits.**

Category	upper midden	lower midden	other pits	Total
Flaked cobble	1			1
Files		2		2
Backed object	2			2
Retouched object	3		1	4
Bipolar with use-wear	2			2
Use-wear	3			3
Cores	2			2
Bipolar object	284		7	291
Platform object	177	1	6	184
FF/FP object	891	1	9	901
Remnant flaked surface	20			20
Broken piece	109	2	1	112
Manuport	35			35
<b>Total</b>				

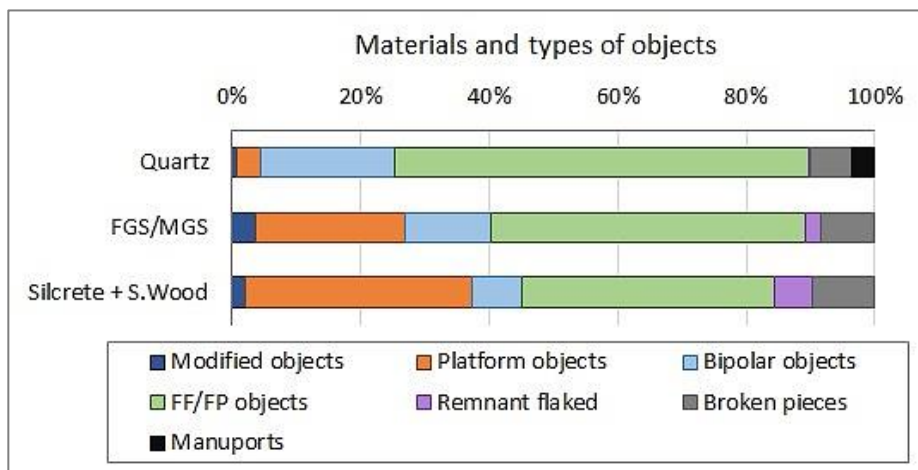


Figure 5 Materials and summary types of objects, by % frequency.

FGS/MGS materials were flaked by freehand and bipolar flaking, with platform objects outnumbering bipolar objects (Table 21). FGS/MGS objects tend to be a little larger than quartz, with 23% more than 20 mm in size compared to only 6% of quartz objects (Table 19, Figure 6). Some FGS/MGS materials may have been a little larger in size when procured, able to be flaked by freehand techniques, resulting in more objects larger than 20 mm in size.

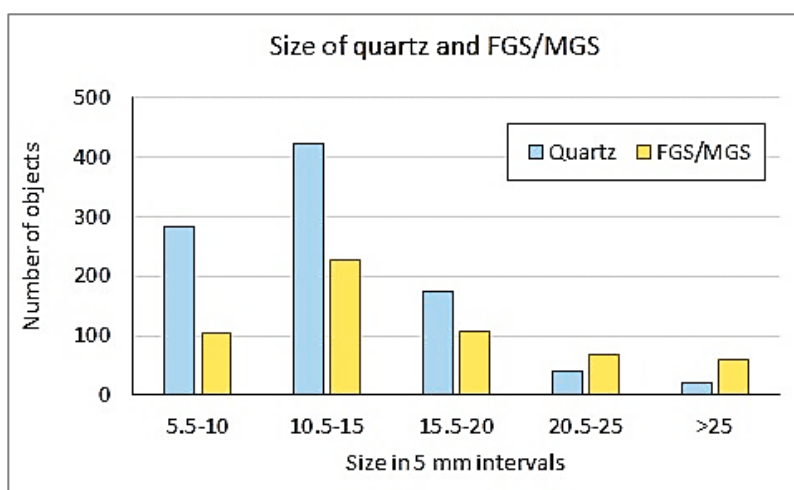


Figure 6 Size of quartz and FGS/MGS objects.

Two freehand cores and 16 bipolar cores were identified during recording, although as noted above other bipolar cores may have been flaked. Quartz bipolar cores (Table 23), and other evidence discussed above and below, indicate that quartz was procured as pebbles and flaked predominantly by the bipolar technique. The FGS/MGS cores include a heat shatter which was flaked unifacially, and four bipolar cores which were former flakes. Two of the latter cores were previously discarded flakes which were recycled (ID #123, #125).

More information about the nature of on-site flaking could be obtained from the types of platforms on unretouched flakes and proximal broken flakes (Hiscock 1986). The presence of cortical and plain

platforms indicates unifacial flaking. Cortical platforms result from striking the outer surface of pebbles. To produce objects with plain platforms, pebbles would have been rotated and previously flaked surfaces used as striking platforms. Hence, plain platforms indicate that flaking was a little later in reduction than cortical platforms.

**Table 23 Materials, cores and bipolar cores.**

Material	Flaking	pebble or pebble piece	heat shatter	flake	indeterminate	Total
Quartz	Bipolar	4			2	6
FGS/MGS	Bipolar			4	6	10
	Freehand		1		1	2
<b>Total</b>		<b>4</b>	<b>1</b>	<b>4</b>	<b>9</b>	<b>18</b>

Amongst classified objects from freehand flaking (i.e. not including bipolars or crushed platforms) FGS/MGS has a higher proportion of non-cortical platforms (chi-squared=6.58, df=1, p=.010). The size data suggests that this could have been related to some FGS/MGS materials occurring as larger rocks, able to withstand more extensive freehand flaking from non-cortical surfaces. Larger numbers of freehand objects with crushed platforms could have resulted from attempts to produce more flakes before bipolar flaking was adopted.

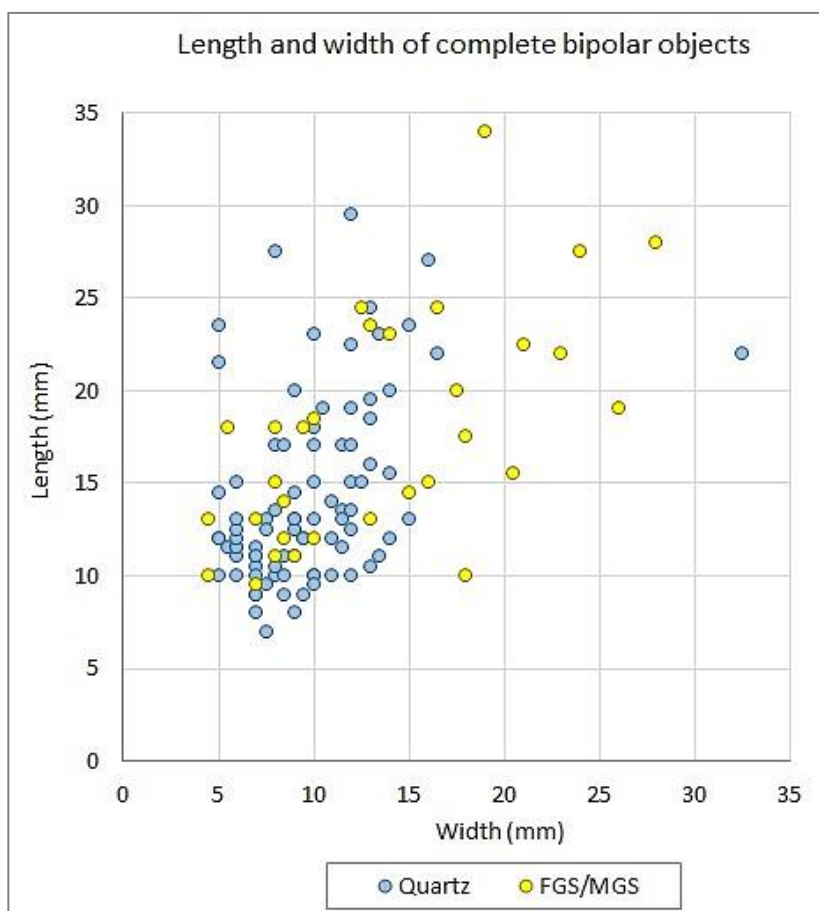
**Table 24 Materials and platforms on unretouched proximal objects.**

Material	cortex	cortex + ridge	plain	ridge	scar	focal	bipolar	Crushed or partly crushed	Total
Quartz	11		6			1	163	4	185
FGS/MGS	11	1	15	9	2	7	64	41	150
Silcrete			3	1			1	2	7
S Wood			2	2			1	1	6
Sandstone?	1								1
<b>Total</b>	<b>23</b>	<b>1</b>	<b>26</b>	<b>12</b>	<b>2</b>	<b>8</b>	<b>229</b>	<b>48</b>	<b>345</b>

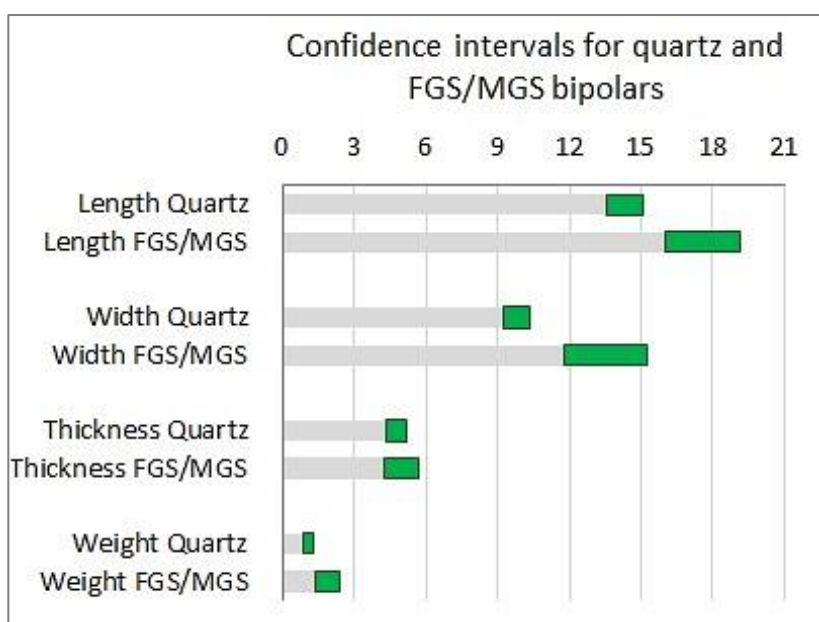
## 5.2 Complete bipolar objects

Sufficient numbers of complete bipolar objects were recovered to enable additional analysis of their materials and technology. Some quartz bipolar objects are shorter than FGS/MGS bipolar objects, and some FGS/MGS bipolar objects tend to be wider than most quartz objects (**Figure 7**). The single wide quartz object is flake #305 (TP32). More detailed analysis indicates that FGS/MGS bipolar objects tend to be a little longer, wider, and heavier than quartz bipolar objects, but thickness does not vary with material type (**Figure 8, Table 25**). This analysis is consistent with overall maximum size

data, which suggests that some of the original FGS/MGS materials were larger, and perhaps wider, than quartz pebbles.



**Figure 7 Length and width of complete bipolar objects of quartz and FGS/MGS.**



**Figure 8 Confidence intervals for average length, width, thickness and weight of complete bipolar objects of quartz and FGS/MGS.**

Green bars show average (mean) plus 84% confidence interval. Confidence intervals which do not overlap are statistically significant at the 0.05 level or better. Horizontal axis in mm for length, width and thickness, and g for weight.

**Table 25 Summary size and weight data for complete bipolar objects.**

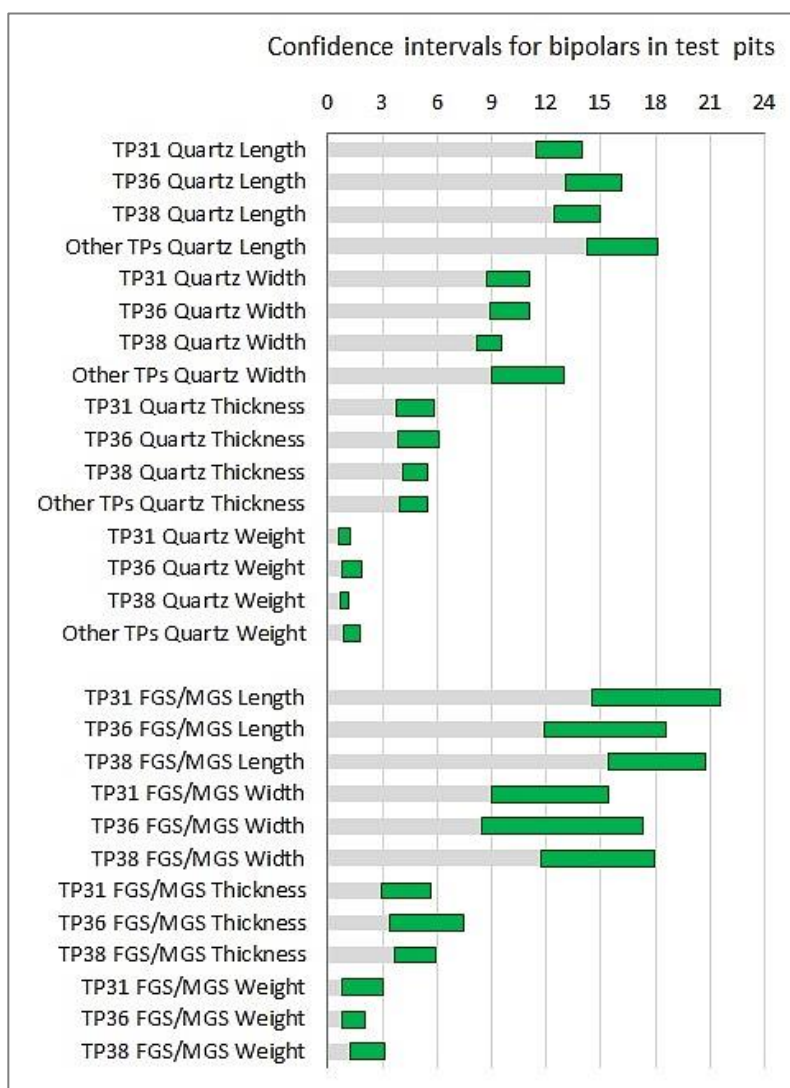
Note that few complete FGS/MGS bipolar objects were recovered from 'other' test pits.

Variable	Count	Average	Minimum	Maximum	Standard deviation
Length Quartz	86	14.3	7	29.5	4.98
Length FGS/MGS	31	17.6	9.5	34	6.11
Width Quartz	86	9.8	5	32.5	3.81
Width FGS/MGS	31	13.6	4.5	28	6.56
Thickness Quartz	86	4.8	2	18	2.78
Thickness FGS/MGS	31	5.0	1	10.5	2.78
Weight Quartz	86	1.1	0.1	6.9	1.23
Weight FGS/GS	31	2.0	0.1	6.6	2.03
TP31 Quartz Length	14	12.7	8	21.5	3.27
TP36 Quartz Length	21	14.6	9	27	4.88
TP38 Quartz Length	32	13.7	7	29.5	5.06
Other TPs Quartz Length	19	16.2	10	27.5	5.70
TP31 FGS/MGS Length	11	18.0	9.5	34	7.68
TP36 FGS/MGS Length	6	15.2	10	23	4.97
TP38 FGS/MGS Length	11	18.1	11	27.5	5.86
TP31 Quartz Width	14	9.9	5	14	2.97
TP36 Quartz Width	21	10.0	5	16.5	3.36
TP38 Quartz Width	32	8.9	5	15	2.67
Other TPs Quartz Width	19	11.0	6	32.5	5.85
TP31 FGS/MGS Width	11	12.2	4.5	28	6.95
TP36 FGS/MGS Width	6	12.9	4.5	20.5	6.55
TP38 FGS/MGS Width	11	14.8	8	26	6.81
TP31 Quartz Thickness	14	4.8	2	11	2.57
TP36 Quartz Thickness	21	5.0	2	18	3.62
TP38 Quartz Thickness	32	4.8	2	11.5	2.66
Other TPs Quartz Thickness	19	4.7	2	10.5	2.19
TP31 FGS/MGS Thickness	11	4.3	1	10.5	2.99
TP36 FGS/MGS Thickness	6	5.4	1.5	10	3.01
TP38 FGS/MGS Thickness	11	4.8	2	8.5	2.44
TP31 Quartz Weight	14	0.9	0.2	2.7	0.82
TP36 Quartz Weight	21	1.3	0.1	6.9	1.69
TP38 Quartz Weight	32	0.9	0.2	3.9	0.92
Other TPs Quartz Weight	19	1.3	0.2	4.7	1.38
TP31 FGS/MGS Weight	11	1.9	0.2	6.6	2.42
TP36 FGS/MGS Weight	6	1.4	0.1	2.8	0.96
TP38 FGS/MGS Weight	11	2.2	0.1	5.3	2.11

Complete bipolar objects are also analysed to assess whether the nature of bipolar flaking varied between test pits (locations). For this analysis bipolar objects from TP31, TP36 and TP38 are

distinguished from bipolar objects from other lower density test pits combined. Quartz bipolar objects in TP31 tend to be a little shorter than quartz bipolar objects in lower density test pits (top of Figure 9, Table 25). It is possible that more intensive flaking in higher density test pits resulted in slightly smaller bipolar flakes. The confidence intervals for width, thickness and weight of quartz bipolar objects overlap between test pits, indicating that other aspects of bipolar flaking did not differ substantially between locations.

Similar analyses are carried out for FGS/MGS complete bipolar objects. Fewer of these are present, resulting in wider confidence intervals. The confidence intervals for each test pit for the four variables (length, width, thickness and weight) overlap (lower half of Figure 9) indicating that either substantial variation does not occur between test pits, or that the sample sizes are too small to allow variation to be identified.



**Figure 9 Confidence intervals for average length, width, thickness and weight of complete bipolar objects in test pits with higher counts.**

Green bars show mean plus 84% confidence interval. Confidence intervals which do not overlap are statistically significant at the 0.05 level or better.



Another aspect of bipolar flaking technology relates to the manner by which pebbles or other objects are oriented when placed on an anvil to be struck by a hammerstone. They could be placed so that a person struck flakes from the long axis of a pebble/core, or placed so that a person split a pebble/core through the short axis. The first orientation tends to result in flakes which are long and have thin ends, while the second orientation tends to result in shorter thicker flakes with at least one flattish end (White 2022, **Figure 20**, **Figure 21**).

Complete quartz bipolar objects tend to have a slightly higher proportion of flat ends than those of FGS/MGS, although a larger number of FGS/MGS complete bipolar objects would give more confidence to this result (**Table 26**, chi-squared=3.3, df=1, p=.069, thin ends only vs 1 or 2 flat ends combined). The available data suggests there was a slight increase in flaking of quartz pebbles through their short axis.

Quartz bipolar objects with at least one flat end tend to be larger and heavier than those with thin ends (**Table 27**). Two thirds of those with at least one flat end are more than 15 mm in size, compared to only 27% with thin ends (chi-squared=11.27, df=1, p<.001). In contrast is the high proportion of quartz flakes with thin ends in the 10.5-15 mm size range. Short axis flaking of quartz pebbles resulted in larger heavier (more robust) objects, while long axis flaking resulted in smaller lighter objects. Flaking quartz pebbles through the short or long axis may have provided a choice between production of fewer robust objects vs production of larger numbers of small thin objects.

The available data does not distinguish between test pits (**Table 28**), indicating that people probably used a mix of these bipolar flaking strategies across the site.

**Table 26 Materials and type of ends on complete bipolar objects.**

Material	4 thin	2 thin	1 thin 1 flat	2 flat	Total	% At least 1 flat end
Quartz		62	17	7	86	27.9
FGS/MGS	1	28	4		33	12.1
<b>Total</b>	<b>1</b>	<b>88</b>	<b>21</b>	<b>7</b>	<b>119</b>	<b>23.5</b>

**Table 27 Type of ends and size on complete quartz bipolar objects.**

Ends	5.5-10	10.5-15	15.5-20	20.5-25	25.5-30	30.5-35	Total	Weight	Average weight
at least 1 flat		8	10	4	2		24	45.8	1.9
thin only	6	39	10	4	2	1	62	49.1	0.8
<b>Total</b>	<b>6</b>	<b>47</b>	<b>20</b>	<b>8</b>	<b>4</b>	<b>1</b>	<b>86</b>	<b>94.9</b>	<b>1.1</b>

**Table 28 Type of ends of complete quartz bipolar objects in test pits.**

Pit	at least 1 flat	Thin ends	Total	Weight	Average weight	% at least 1 flat
TP31	4	10	14	12.8	0.9	28.6
TP36	6	15	21	27.5	1.3	28.6
TP38	9	23	32	29.9	0.9	28.1
Other TP	5	14	19	24.7	1.3	26.3
<b>Total</b>	<b>24</b>	<b>62</b>	<b>86</b>	<b>94.9</b>	<b>1.1</b>	<b>27.9</b>

## 6.0 Comparison with other assemblages

### 6.1 Densities of stone objects

The current excavations recovered 1,559 stone objects from 5.375 m<sup>2</sup> of excavation at an average density of 290 objects/m<sup>2</sup>. The upper midden has a very high average density of 941 objects/m<sup>2</sup>. Several test pits were not excavated to the base of the deposit, and counts in some test pits increased in the last spit which was excavated (e.g. TP32, TP35 and TP36), so the densities of objects within the upper midden may be even higher. Available data indicates that the upper midden has the highest average density of stone objects for known controlled excavations on Kurnell Peninsula (Table 29). A caveat on this finding is that the Foreshore Midden west of the current study area within the Meeting Place precinct, investigated by Megaw (1968) and Irish (2007, 2010) may also have high artefact densities, but comparable controlled density data is not currently available.

**Table 29 Average densities of stone objects from excavations on Kurnell Peninsula.**

Site	Total objects from controlled excavation	Total area excavated (m <sup>2</sup> )	Mean density/m <sup>2</sup>	Reference
Kamay23 total	1,559	5.375	290.0	This report
K.23 upper midden	1,529	1.625	940.9	This report
K.23 lower midden	6	0.875	6.9	This report
K.23 other test pits	24	2.875	8.3	This report
260CCD	639	5.25	121.7	JMcD CHM 2008
McCue	486	14	34.7	MDCA 2005
BHW	767	3	255.7	Brayshaw et al. 1992
BH1	101	2	50.5	Dickson 1974

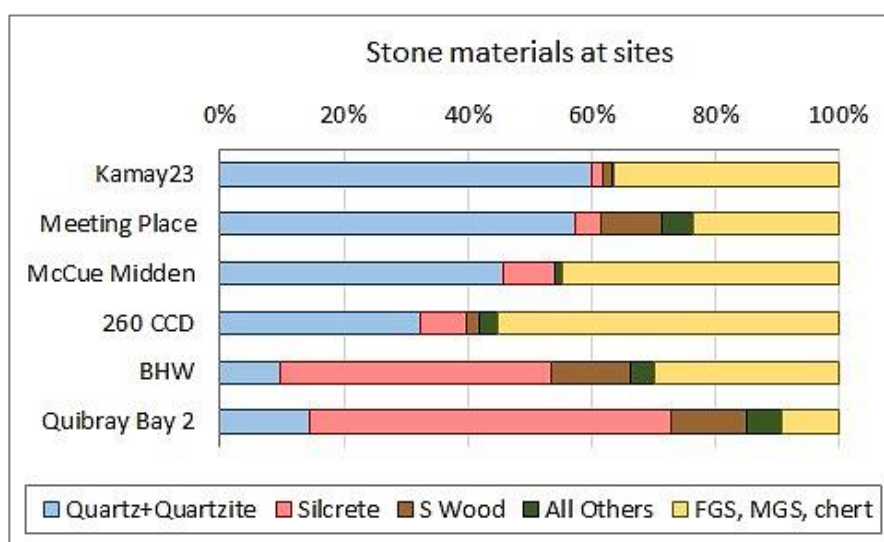
Table 29 modified from JMcD CHM 2008. Data for salvage excavation of redeposited midden at Cooks Stream (Irish 2010) is not included as it is the original extent of that midden deposit is not known. The results of testing in The Meeting Place Precinct (Irish 2007) are not included as excavation was conducted only to the upper surface of intact archaeological deposit or the maximum depth of proposed impact if intact archaeological deposit was not encountered. A total of 216 stone objects were recovered from that testing. Note also that only limited excavation was conducted at site BHW (Brayshaw et al. 1992).

## 6.2 Stone materials

The current assemblage and that from earlier test excavation in the Meeting Place (Irish 2007), are both dominated by quartz/quartzite, although the Meeting Place assemblage has a higher proportion of silicified wood (Table 30, Figure 10). The McCue Midden has almost equal numbers of quartz/quartzite and the FGS/MGS materials, while the adjacent site at 260 CCD has more FGS/MGS and less quartz. Site BHW and Quibray Bay 2, to the south and west, have much higher proportions of silcrete. Variations in the proportions of material types indicate variation in the history of material procurement, flaking and discard.

**Table 30 Materials of stone objects in excavations.**

Site or project	Quartz + Quartzite	FGS, MGS, chert, chaledony	Silcrete	S Wood	Tuff	Others	Total	Reference
Kamay23	935	567	28	23		6	<b>1,559</b>	This report
Meeting Place	124	51	9	21	5	6	<b>216</b>	Irish 2007
McCue Midden	221	217	41		1	4	<b>484</b>	MDCA 2005:85
260 CCD	206	352	49	12	5	15	<b>639</b>	JMcD CHM 2008
BHW	85	263	385	112		34	<b>879</b>	Brayshaw et al. 1992:20
Quibray Bay 2	63	40	254	53	5	20	<b>435</b>	Byrne 1987:8



**Figure 10 Stone materials in assemblages from Kamay23 and other sites, by % frequency.**

The current assemblage has the lowest proportion of backed artefacts (0.1%) in the comparative analysis (Table 31, Figure 11a). The Meeting Place sample has a very wide confidence interval (Figure 11a), indicating that too few objects (n=216) were recovered to effectively assess the proportion of backed artefacts in that sample. The extremely low proportion of backed artefacts in Kamay23

indicates a Post/Late Bondaian time frame for the assemblage, consistent with the available radiocarbon age determinations (see section 2.0).

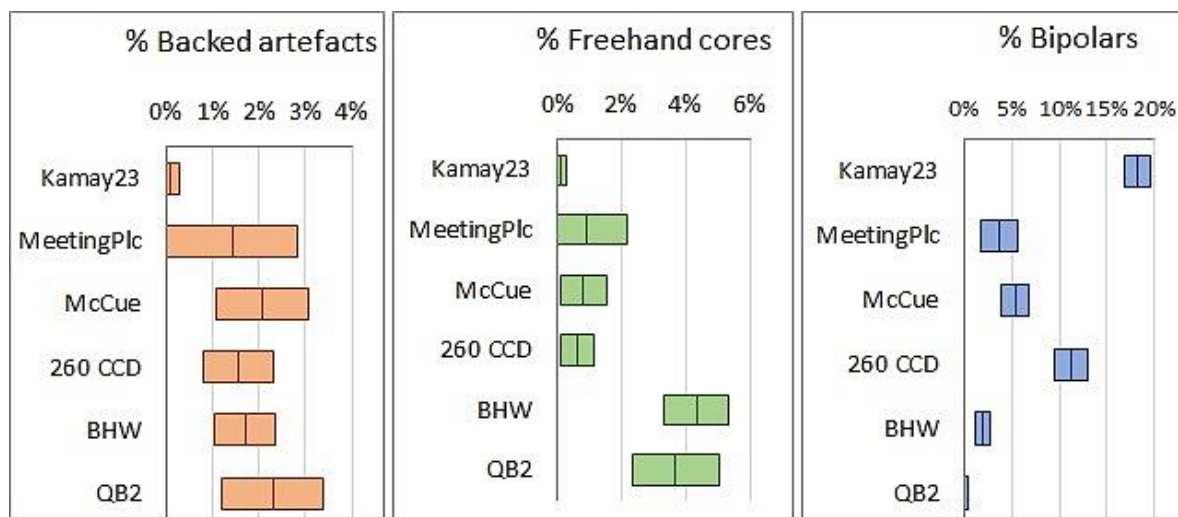
The Kamay23 assemblage has the lowest proportion of freehand cores (0.1%) in the comparative analysis (**Table 31, Figure 11b**). The Meeting Place, McCue Midden and 260 CCD also have quite low proportions. These low proportions indicate that cores were removed from the sites for use elsewhere, or were subsequently flaked by the bipolar technique. Higher proportions of cores occur in the BHW and Quibray Bay 2 assemblages indicating a notable difference in core discard strategies.

It is more difficult to assess the proportions of bipolar objects in assemblages, due to variation in the manner by which this type has been reported. The totals for Kamay23 and 260 CCD are of all identified bipolar objects in those assemblages. The reports for the Meeting Place, McCue Midden and BHW refer to bipolar cores; it is not known whether those counts are of cores only, or if bipolar flakes are included in one or more of those counts. The available data (**Table 31, Figure 11c**) indicates that Kamay23 has a higher proportion of bipolar objects than 260 CCD; and that the Meeting Place and McCue Midden have higher proportions than BHW and Quibray Bay 2. The high proportion of bipolar objects in the Kamay23 assemblage indicates a stronger focus on use of the bipolar technique.

**Table 31 Backed and bipolar objects in excavations.**

Note that bipolars marked with an asterisk are counts for cores as the relevant reports did not give counts for bipolar complete and broken flakes.

Site or project	Backed + elouera	Cores	Bipolars	Total objects	Reference	% Backed + elouera	% Bipolars	% Cores
Kamay23	2	2	294	<b>1,559</b>	This report	0.1	18.9	0.1
Meeting Place	3	2	8 *	<b>216</b>	Irish 2007	1.4	3.7	0.9
McCue Midden	10	4	26 *	<b>484</b>	MDCA 2005:85	2.1	5.4	0.8
260 CCD	10	4	72	<b>639</b>	JMcD CHM 2008	1.6	11.3	0.6
BHW	15	38	17 *	<b>879</b>	Brayshaw et al. 1992:20	1.7	1.9	4.3
Quibray Bay 2	10	16	0	<b>435</b>	Byrne 1987:8	2.3	0	3.7



**Figure 11 Backed artefacts, freehand cores and bipolar objects at sites, by % frequency.**

Shows 84% confidence intervals with % frequency at midpoint. Confidence intervals which do not overlap are significantly different at the 0.05 level or better.

### 6.3 Chronology

Shell from TP27 spit 4 in the lower midden provides a calibrated age determination, taking the Marine reservoir effect into account, of  $531 \pm 64$  cal BP (UNSW-2273, Chronos 2023). Spit 2 includes a stone file, and another file was found in TP28, also in the lower midden.

Shell from TP38, in the lower part of spit 4 of the upper midden, provide two calibrated age determinations which take the Marine reservoir effect into account, of  $1,561 \pm 86$  cal BP (UNSW-2274) and  $1,657 \pm 85$  cal BP (UNSW-2275, Chronos 2023). These age determinations overlap, providing an age range between c.1.750 and 1,475 cal BP for the stone assemblage from the lower part of spit 4. The vertical distribution of stone materials in this test pit does not indicate change with depth of deposit (section 3.20), so either change through time in material use did not occur or most stone objects were discarded within the time frame indicated by the radiocarbon determinations.

The nature of the assemblage from the current excavation is consistent with occupation more recent than c.2,000 cal BP. Only two backed artefacts were recovered, despite a relatively large sample size (1,559 objects), indicating occupation after the backed artefact proliferation, which continued until c.2,000-1,700 in coastal Sydney and the South Coast (Attenbrow et al. 2009; Boot 2002; Hiscock 2008; Lampert and Steele 1993). Additionally, the assemblage from the current excavations is dominated by quartz and FGS/MGS materials, with a combination of objects from bipolar and

freehand flaking. The predominant use of bipolar flaking for quartz, and use of some bipolar flaking for FGS/MGS, silcrete and silicified wood, is also consistent with Post/Late Bondaian technology in the region.

TP36 shows variation in the proportions of quartz and FGS/MGS with depth of deposit. The proportion of FGS/MGS decreases towards the top of the deposit. This trend suggests decreasing use of FGS/MGS through time. No other test pits show variation in the proportions of material types with depth of deposit. Either variation through time did not occur consistently, or older objects occur in deeper unexcavated deposits in some test pits.

The lack of evidence for earlier occupation is intriguing. Sea level was 1-1.5 m higher than present prior to c.2,000 cal BP (Lewis et al. 2008; Sloss et al. 2007; Switzer et al. 2010). The study area may have been exposed to higher storm waves (especially if they coincided with king tides) which could have washed evidence of earlier occupation away.

The lower midden in the current study, with young age determinations of c.595-467 cal BP (UNSW-2273) and with stone files, has relatively few stone objects. These associations appear similar to rock shelter site #52-3-220 where stone files were present but relatively few stone objects were recovered; and most of those objects were just above bedrock suggesting that they were older than the midden (Megaw 1968). It is possible that reduced flaking of stone at places of shellfish consumption was a widespread local practice during recent times.

## 7.0 Research question

The proposal for test excavation within the study area set out several aims which include:

- To gain a better understanding of how Aboriginal people used the area through observations during excavation and analysis of any retrieved stone, bone and shell tools and faunal remains.

In its regional context (section 2.1) the time frame for the current assemblage places it within the last phase of major technological change prior to European invasion. The Greater Sydney Region has a long changing social history (over a time span of at least 35,000 years) which may be described as 'regional fissioning' (McNiven 1999). A single social group may have occupied the entire region from the coast (further east during lower sea level) across to the western side of the Blue Mountains (Barry et al. 2021). Through time this large group subdivided into groups who occupied smaller tracts

of country. By the mid-Holocene (c.7,000 cal BP or a bit later) the distribution of silcrete indicates that western and eastern Sydney was one country, separate from the Blue Mountains (White 2018). Kurnell Peninsula, with a high proportion of silcrete backed artefacts (Hughes et al. 1973), was probably part of the same country at this time. By c.2,300 cal BP further fissioning of that group occurred, although the fissioning may have been gradual rather than abrupt. Eastern/coastal Sydney people no longer accessed large quantities of silcrete from western Sydney. During this Post/Late Bondaian phase people on Kurnell Peninsula utilised locally available quartz (which occurred in the sandstone of Kurnell headlands) and fine to medium grained siliceous materials (FGS/MGS), which were probably carried from the Woronora Plateau/Hacking River and/or the northern Illawarra coast. This shift in material use indicates a major shift in social relations, from ties to people of western Sydney to ties southward with people of the Woronora and Illawarra. Documents from the early historic phase indicate that Kurnell Peninsula was occupied by the Gweagal people who spoke and/or were affiliated with the Tharawal/Dharawal of the Woronora and Illawarra (Attenbrow 2010; McDonald 2008). Historical studies also demonstrate ongoing connections along the Sydney coast to the Illawarra and beyond (Donaldson et al. 2017; Stokes 2015). The nature of the stone artefact assemblages in the current study, as well as those from the Meeting Place, McCue Midden and 260 CCD, suggest that the social arrangements of the early historic phase may have been in place for c.1,700 years or more.

The stone objects in the current analysis were variously carried, made, used and discarded within the last major technological phase prior to European invasion. FGS/MGS materials were obtained as pebbles, some larger than quartz pebbles, and occasional use was also made of previously discarded objects (recycling). Larger FGS/MGS objects were flaked and retouched by freehand flaking. Only two FGS/MGS freehand cores were recovered, both from the same spit in one test pit (TP31 spit 5). The absence of other freehand cores, and presence of bipolar cores and bipolar flakes suggests that most freehand cores, as well as recycled objects and FGS/MGS pebbles, were flaked by the bipolar technique after previous freehand flaking. Most quartz pebbles were also flaked by the bipolar technique.

Bipolar flaking confers technological advantages over freehand flaking. Most notable is that flakes can be struck from small cores and pebbles, which could not be flaked by freehand techniques, so extending the use-life of stone materials (Hiscock 2003, 2015). Additionally, people could have oriented pebbles or cores in different ways during bipolar flaking (White 2022). These alternatives provide different advantages – lying a pebble/core flat on an anvil to remove flakes from the short axis results in fewer flakes but they are more robust (e.g. suitable for use as scrapers), while

positioning a pebble/core to remove flakes from the long axis provides a larger number of flakes but they are smaller. In the current study area both of these strategies were used.

Elsewhere, people could have adopted the bipolar technique to obtain flakes from small pebbles during transient occupation of a site where small pebbles are the readily available stone material. This strategy could account for peoples' use of quartz and bipolar flaking at sites in upper catchments, marginal to stream valleys where more focussed occupation may have occurred (e.g. Attenbrow 2004). However, bipolar flaking has also been linked to more sedentary occupation (Hiscock 1996; Nelson 1991; Parry and Kelly 1987). As people lived in one area for longer periods of time, they would have used up available stone materials, so switching to bipolar flaking would have enabled people to extract more flakes from available stone. Recycling of previously discarded objects would add to the supply of available materials. People could have carried FGS/MGS materials from the Woronora Plateau/Hacking River or northern Illawarra coast while carrying out foraging and hunting activities (embedded procurement) or they could have sent people to those areas to obtain suitable materials (logistical procurement, Binford 1980; Nelson 1991). The presence of very high densities of stone objects within the foreshore site focus in the current study area also suggests that bipolar flaking at this site was associated with more sedentary occupation in the area of the upper midden

The marked reduction in the discard rate of stone objects in the area of the lower midden indicates a change in practice, c.600-450 cal BP, with minimal stone flaking contemporary with food consumption. If occupation of the upper midden was relatively sedentary, then occupation of the lower midden may have been more transitory (e.g. day-time use rather than residential occupation).

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## 9.0 Appendix 1: Methods of Analysis

### 9.1 Identification of objects and artefacts

This report refers to 'objects' as defined under the National Parks and Wildlife Act:

**Aboriginal object** means any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.

In this sense a stone object is an artefact with technical features of modification (flaking, grinding, pitting or use-wear) as well as unmodified manuports which were carried by people, or broken pieces of artefacts or manuports which now lack technical features of modification (heat shatters, otherwise broken pieces of stone). Flaked stone artefacts were identified using technical criteria based on stone fracture mechanics (Cotterell and Kamminga 1987; Holdaway and Stern 2004; Speth 1972).

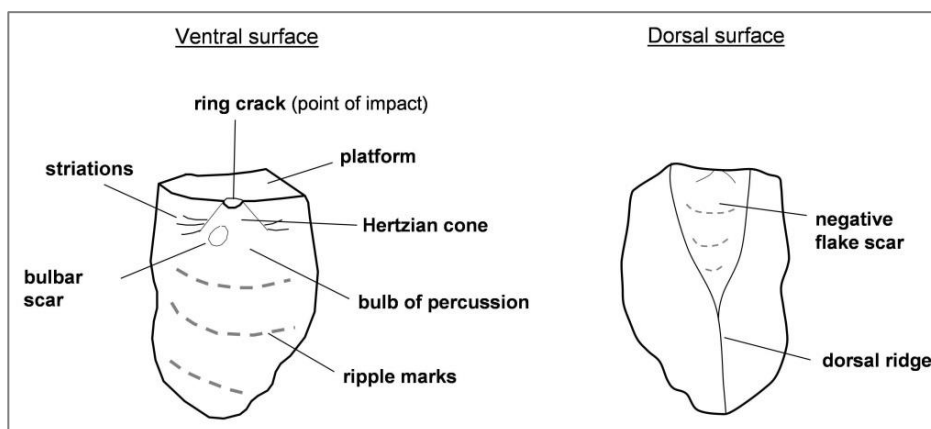
Stone flakes made by freehand direct hard-hammer percussion (normal flaking) show specific technical features (**Figure 12**). A flake has a platform (unless crushed, see below), a point of impact (force application), a Hertzian cone and a bulb of percussion. Some flakes also have striations extending from the bulb, a bulbar (errailure) scar and ripple marks (Faulkner 1972; Speth 1972). Sometimes the platforms on flakes were crushed during knapping (Holdaway and Stern 2004:120). These features are more or less pronounced, depending on the quality of the stone, the hardness of the hammer relative to the stone, and whether an anvil was used and the manner of its use. The negative scars on cores and other retouched artefacts show some of the same technical features, but in reverse.

Bipolar flaking was useful where the angle of the striking platform and the sides of the core was 90° or greater, and for flaking small cores and pebbles. In bipolar flaking the core was placed on an anvil and hit so that the force was directed down through the rock and rebounded off the anvil, to split the core into smaller pieces (**Figure 13**, Hiscock 1996; Holdaway and Stern 2004). The resulting flakes and core show crushing at the end which was struck by the hammer stone and at the end which was in contact with the anvil (unless a flake detached before force reached the anvil). Bipolar flakes have sheared or compressed bulbs of percussion and sometimes have hinge bulbs or a pronounced ripple horizontally across their ventral surfaces (Cotterell and Kamminga 1987:688,698-700; de la Pena 2015). Some bipolar artefacts have strong ridges running vertically or diagonally from proximal to distal ends.

Artefacts were sometimes broken, either during flaking or afterwards by trampling, burning, modern land use or during archaeological excavation. Fragments of broken artefacts are here counted as artefacts if they could be identified as such. Fragments of the same material types as artefacts which lack identifiable flaked surfaces

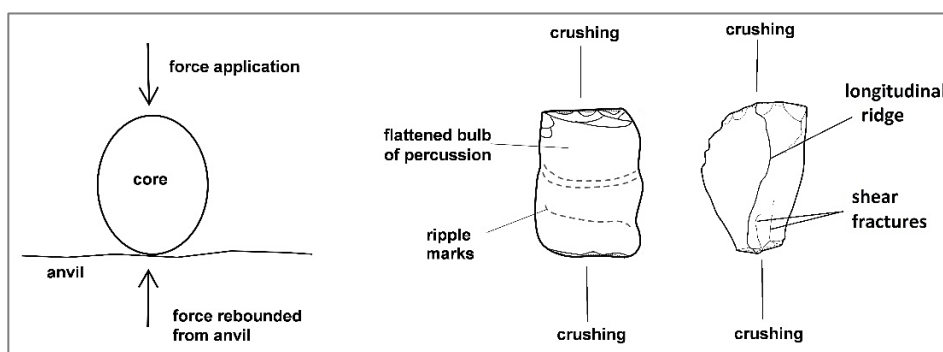


or other forms of modification (pitting, grinding) are classified as broken pieces; these are not counted as artefacts but are included in the count of total cultural objects.



**Figure 12**  
General features of a flake.

(After Faulkner 1972; Speth 1972).



**Figure 13**  
Bipolar flaking technique and bipolar flake.

## 9.2 Recording of objects

Data was entered into Microsoft's Access relational database programme for analysis, with tables and graphs prepared in Excel prior to import into Word. Provenance data and catalogue numbers were written on zip-locked bags and tyvek labels were placed in these bags with the objects.

### 9.2.1 Provenance data and catalogue number

The test pit and spit were recorded. Most objects were recorded individually, but where large numbers of objects were present and they shared similar attributes, they were counted and entered into the database as a single record. Each record (usually individual objects) was assigned a catalogue identification number, automatically generated by the computer program.

### 9.2.2 Lithic materials

Different types of lithic materials were present. These are described, and their potential sources discussed, in the body of the report.

Cortex. An estimate of the extent of cortex on the dorsal and platform surfaces was made. This was done by laying flakes on their ventral surface and estimating the extent of cortical cover on dorsal and platform surfaces. Objects other than flakes were laid on their largest non-cortical surface and the extent of cortical cover was estimated for the remaining visible surfaces. Four categories were used:

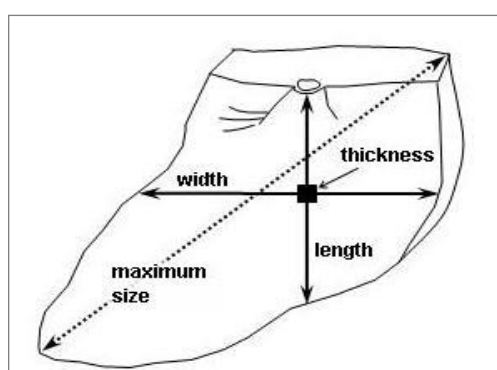
- Absent
- <40% where small areas of cortex were present, covering about one-third or less of surfaces
- 40-60% where about half the surfaces were covered with cortex
- >60% where extensive cortex was present, covering about two-thirds or more of surfaces.

### 9.2.3 Size and weight

Maximum size. The maximum size of objects along their longest dimension, was recorded to the nearest 0.5 mm (**Figure 14**). This was summarised into 5 mm size categories.

Oriented length, width and thickness. For flakes and fragments of broken flakes, length was measured from the point of force application along the percussion axis to the distal end of the flake. Width was measured at right-angles to oriented length and at the midpoint of oriented length. Thickness was measured at the intersection of length and width (**Figure 14**). Cores and flaked pieces were oriented as if they were rectangular blocks and measured accordingly. Cores which were flake bodies were measured as if they were flakes. Measures for broken objects were entered in brackets. Measures were made to the nearest 0.5 mm.

Weight. Weight was recorded for each record to the nearest 0.1 g.



**Figure 14 Maximum and oriented measures for flakes.**

### 9.2.4 Category and type

Two fields were used to record the type of objects. The Category field summarized modification or grouped objects of particular types.

- Anvil. Pitting from percussive use was present on one or more flat surfaces.
- Backed artefact. A flake, a broken flake or flake fragment with blunting (vertical) retouch along one or more margins. The retouch must have occurred after the artefact was struck from its core. The retouch

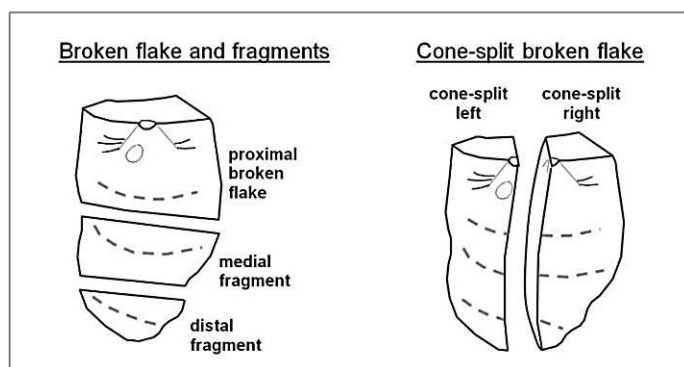
was usually initiated from the ventral surface. Backed artefacts were of any shape, and particular forms included Bondi points, geometrics or amorphous shapes. The presence of macroscopically visible damage to the chord which may have been use-wear was noted where present.

- Backing artefact. A flake from backing. A tiny flake with dorsal surfaces which had remnant backing like that found on the retouched margins of backed artefacts. The ventral surface had a proximal bulb, and sometimes a smaller distal bulb or cone as a result of force rebounding from an anvil if bipolar backing was carried out. Some distal tips of backed artefacts also had a bulbar surface along the 'break', from having been removed (broken) during backing.
- Bipolar core or artefact. This category highlighted bipolar artefacts (**Figure 13**, section 9.1).
- Broken piece. A piece of cultural material which did not retain flaking, grinding or pitting and did not meet the criteria listed for other types.
- Core (functioning as a raw material supply). A piece of stone which had been flaked to produce artefacts which could have been used as tools. The piece of stone may have originally been a cobble, a flake, a heat shatter or a naturally broken rock (after Gorman 1992:156). Cores were artefacts with negative flake scars only, or where flakes were reduced as cores, the negative scars intercepted the ventral surface of the flake used as the core; that is the negative scars were more recent in the reduction sequence than the ventral surface of the flake). Cores were generally distinguished from tools by scar size and nature of retouch. Cores (as flake producers) had one or more flake scars, whole or remnant, more than 10 mm in size, indicating the repeated removal of flakes which were large enough to have been used as tools.
- Elouera. A retouched implement resembling a backed artefact but with limited retouch and considerably larger and heavier than backed artefacts.
- FF/FP artefact. This category grouped medial and distal flake fragments and flaked pieces.
- Flaked surface. Remnant flaked surface. Broken pieces or heat shatters with remnant flaked surfaces, being fragments of heavily broken artefacts. The broken surfaces intercepted the flaked surface in such a way as to indicate that breakage occurred after flaking. The remnant flaked surface covered half or less than the total surface of the object.
- Ground artefact. An artefact with parallel striations from grinding.
- Hammer stone. Pitting from percussive use was present on the tips or margins of the artefact.
- Heat shatter. A piece of stone which had crenated surfaces and/or potlid scars.
- Manuport. A piece of stone which lacks macroscopically visible modification but which from its context was carried to a site by one or more people. The category includes cobbles or pebbles which were probably carried to a site as material supplies, unusual objects (e.g. crystals, exotic materials) or stone which was used in hearths or as heat retainers.
- Stone of the same material as artefacts but which lack modification and which from

- Non diagnostic. Items of the same material types as other artefacts, which did not show features diagnostic of flaking or heat breakage, but from their context were likely to have had an Aboriginal origin. They may have been of poor quality stone which did not retain diagnostic features. They may have been fragments of flakes or heat shatters but did not retain sufficient technical evidence to enable a precise identification.
- Platform artefact. This category grouped flakes, proximal broken flakes and longitudinal cone-split broken flakes which have a bulb immediately below the platform, and which retain their proximal (platform) ends (unless the platform was crushed during flaking or otherwise damaged).
- Possible use-wear. An object with edge chipping, rounding, polish or striations. This was identified macroscopically.
- Recent fragment. A piece of stone of the same raw material type as artefacts but with fresh fracture surfaces.
- Retouched. Other retouched artefacts. The negative scars from flaking were struck from surfaces in such a way as to indicate that the retouching was more recent in the reduction sequence than the object being retouched. Retouching scars may have been struck from or intercept with the ventral surface of a flake, but scars removed during core preparation (e.g. platform faceting or ridge-straightening) were excluded from this category because the preparation occurred before the flake was struck from the core. Artefacts in this category generally had small flake scars (e.g. <10 mm in size) and too small to have been used as tools. Retouched artefacts may have been core or tool blanks, failed cores or tools, practice items or broken fragments of cores or tools.

The Type field summarized the reduction and breakage of stone. The identification of flakes, proximal broken flakes, and flake fragments was made by reference to the technical descriptions and definitions of a flake given by Cotterell and Kamminga (1987) and Speth (1972) (see section 9.1). For modified artefacts this field recorded what the object was before it became a core or tool, e.g. a hatchet (axe) may have originally been a cobble, then flaked and edge-ground, or a core may have been a large flake before being knapped. The reduction type list included:

- Cobble. A rock more than 64 mm in size.
- Cone-split/left, Cone-split/right (CSBF/L, CSBF/R). Longitudinal cone-split broken flake. A broken flake, split vertically along its long axis, often through or close to its point of force application, bisecting the platform (**Figure 15**). Cone-split broken flakes may have been broken distally or laterally were included in this category.



**Figure 15** Flake breakage.

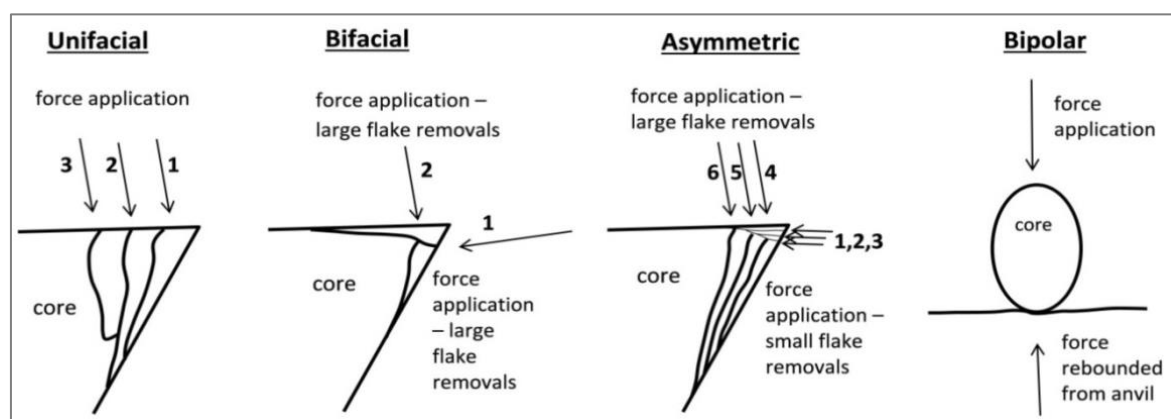
- Distal. A distal piece of a flake not having a platform (**Figure 15**). It had an identifiable ventral surface. This category included artefacts with very heavily crushed platforms which removed part of the bulb.
- Flake. A flake had a platform (unless crushed during knapping), a point of impact (force application, PFA), a Hertzian cone, and a bulb of percussion (**Figure 12**). A flake may also have had striations, a bulbar scar (also called erraillure scar) and ripple marks (Faulkner 1972; Speth 1972:35). These features were more or less pronounced, depending on the quality of the stone material, the hardness of the hammer relative to the stone, and whether an anvil was used and the manner of its use.
- Flaked piece. A flaked artefact which could not be oriented towards a particular point of force application. Surfaces showed signs of flaking such as lines from shear fracture and/or ripple marks.
- Flaw piece. A piece of cultural stone which fractured along flaw surfaces and did not retain clear traits diagnostic of flaking.
- Medial. A mid-section of a flake, not having a platform or distal margin, but having an identifiable bulbar or ventral surface (**Figure 15**).
- Pebble. A rock less than 64 mm in size.
- Proximal BF (proximal broken flake). The proximal end of a flake (**Figure 15**). A flake with one or more margins broken. It had a platform (unless crushed during flaking), point of force application, bulbar surface and usually ripple marks. This type included flakes with step terminations. Some broken flakes were missing part of their proximal end but were not longitudinal cone-split broken flakes (see above) and these were classified here as broken flake/left or broken flake/right as appropriate.

### 9.2.5 Cores

Additional information was recorded for cores to show how they were flaked (Baker 1992). 'Flaking pattern' was the pattern of flake removals evident on cores. The categories recorded here were unifacial, bifacial (alternating), asymmetric (including faceting) and bipolar (**Figure 16**).

- Unifacial. Reduction proceeded from one face of a platform. Cores may have been rotated, showing reduction from multiple faces but the force was applied in only one direction from each platform. Flakes from unifacial flaking variously had cortical, plain, ridged or focal platforms (see below).

- **Bifacial.** Relatively large-sized flakes were struck from the two faces of a platform edge. A bifacial pattern of removals made use of the bulbar scar from one flake removal to give a lower platform angle for a flake removed from the alternate face of the platform edge (Witter 1990:31).
- **Asymmetric.** Small flakes in the form of core preparation and platform faceting were removed from the platform surface, then larger flakes were struck using that prepared surface. This pattern was associated with backed artefact production (Hiscock 1993; Holdaway and Stern 2004:205).
- **Bipolar.** The core was rested on an anvil and force applied to it at an angle close to 90°, towards the core's contact with the anvil. Force passed through the core and bounced back from the anvil. The resulting flakes and core show crushing at the end which was struck by the hammer and at the end which was in contact with the anvil (Cotterell and Kamminga 1987:688, 698-700).



**Figure 16 Core flaking patterns.**

### 9.2.6 Flake shape

Flakes were laid on graph paper with their platforms oriented parallel to the horizontal lines and shape was recorded (**Figure 17**):

- **Wide.** Wider than long ( $W > L$ ),
- **Length equals width** ( $L = W$ ),
- **Long.** Longer than wide ( $L > W$ ), and
- **El.** Elongate - flakes twice as long as they were wide, or more than twice as long as wide.

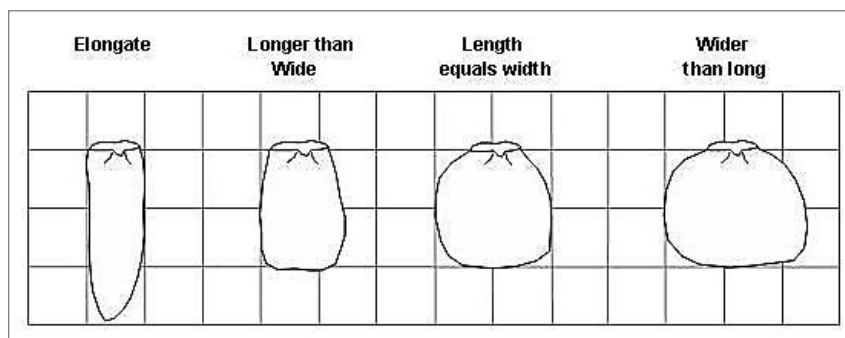


Figure 17 Flake shape.

### 9.2.7 Platforms

Types of platform surfaces on flakes and proximal broken flakes more than 10mm in size were recorded (Figure 18):

- Cortex. Platform surface covered entirely with cortex,
- Plain. Platform surface consisting of a smooth or flaw surface,
- Ridge. Platform surface had a ridge formed by a remnant margin of a flake formerly struck across the core.
- 1+scars. Platform had one or a few flake scars, the points of force showing that they were initiated from blows struck on the dorsal edge of the platform surface,
- Faceted. Platform had many tiny flake scars or step terminations on it, with scars initiated from the dorsal edge of the platform,
- Focal. Very small platforms, less than twice the area of the ring crack,
- Bipolar. A bipolar artefact.
- Crushed or part crushed. The platform surface was crushed during knapping, usually evidenced by the presence of cascading step terminations on the proximal end of the dorsal surface.

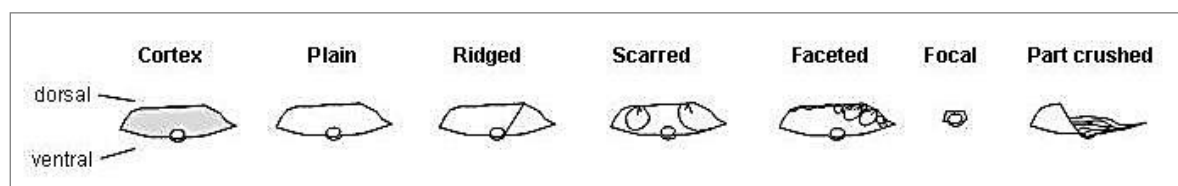


Figure 18 Flake platforms.

### 9.2.8 Terminations

Several types of flake terminations were recorded on flakes and distal flake fragments (Figure 19)

- F. Feather. The termination tapered to a thin end,
- H. Hinge. The termination formed a rounded end,

- S. Step. The termination formed an abrupt, often right-angle, break. Finials were sometimes present, extending from the dorsal face of the termination. Step terminations resembled breaks,
- P. Plunging (also called outrepassé). The termination removed the distal end (bottom) of a core.

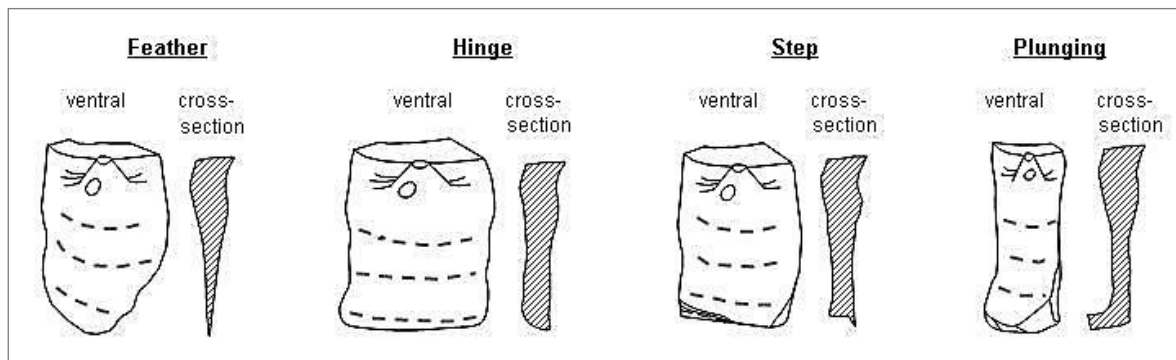


Figure 19 Flake terminations.

### 9.2.9 Ends on bipolar artefacts

This variable described the ends of bipolar artefacts, when the artefact was viewed in cross-section (Figure 20, White 2022). A flattish end had a platform-ventral angle of  $75^\circ$  or more. Transverse breaks were not identified as flattish ends. The type of end related to pebble orientation during flaking, with thin ends more likely from long axis orientation and flattish ends more likely from short axis orientation (Figure 21, white 2022).

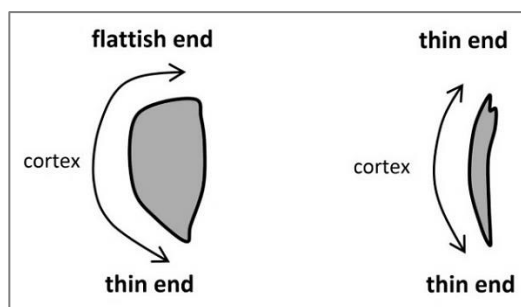


Figure 20 Flat and thin ends on bipolar artefacts, cross-section view (White 2022).

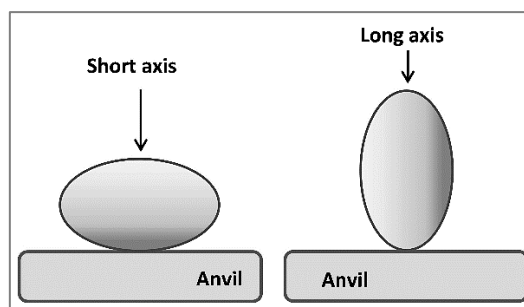


Figure 21 Pebble orientation during bipolar flaking (modified from White 2022).

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Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
15	5		41	1	Quartz	>60	39	35.5-40	24.7	Manuport broken	pebble						(39)	(32)	18		poor quality, poss bipolar chipping 1 edge
15	5		42	1	Quartz	>60	32	30.5-35	10.8	Manuport broken	pebble						(32)	17	14		
16	2		43	1	FGS/MGS	>60	22.5	20.5-25	1.7	Platform artefact	proximal BF left		(plain)	68	6	(feather)	(17.5)		5.5		lateral break unusual hinge termination
16	2		44	1	Quartz	0	19	15.5-20	0.9	Platform artefact	proximal BF		plain	82	2.5	step	15	(13)	2.5		
16	2		45	1	FGS/MGS	>60 wethrd	14.5	10.5-15	0.3	Platform artefact	proximal BF		plain	104	2				1.5		from recycled
16	2		46	1	Quartz	0	14	10.5-15	0.3	Bipolar artefact	proximal BF		bipolar						2	1 thin	
16	2		47	1	FGS/MGS	40-60	17	15.5-20	1.2	FF/FP artefact	distal					feather			5		
16	2		48	1	Unidentified	40-60	44	40.5-45	28.5	Ground?	pebble piece						(43.5)	(21)	23		fine parallel striations 1 flat surface
16	2		49	1	Quartz	100	24.5	20.5-25	6.6	Manuport?	pebble						24	16	10.5		
16	3		50	1	FGS/MGS	<40	24	20.5-25	5.4	Bipolar core	flake ?						22.5	21	10	2 thin	dorsal hinge scars - poss flake body
16	3		51	1	Silcrete	100 wethrd	17.5	15.5-20	1.0	Platform artefact	flake	wide	plain	65	2.5	feather hinge	14	16	2.5		from recycled
16	3		52	1	FGS/MGS	<40	14	10.5-15	0.9	Platform artefact	flake	long	plain		2	feather	13	12.5	5		
16	3		53	1	FGS/MGS	0	13	10.5-15	0.2	Platform artefact	proximal BF		plain	67	2				1		
16	3		54	1	Quartz	0	17.5	15.5-20	0.6	Platform artefact	proximal BF		broken						2		bulb present
16	3		55	1	Quartz	<40	16.5	15.5-20	0.6	Platform artefact	cone-split left		(cortex)	55	2.5				2.5		
16	3		56	1	Quartz	<40	13.5	10.5-15	0.5	Platform artefact	cone-split left		(cortex)	75	2.5						doral freehand flaking, compressed bulb
16	3		57	1	FGS/MGS	<40	23	20.5-25	0.9	Platform artefact	cone-split right		(cortex)	78	2.5	(feather)	21		4		
16	3		58	1	FGS/MGS	>60 wethrd	23	20.5-25	1.4	Bipolar artefact	proximal BF	(long)	bipolar				(23)	11	5.5	1 thin	dorsal ridge natural pebble edge

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
16	3		59	1	Quartz	>60	23	20.5-25	1.2	Bipolar artefact	flake	elongate	bipolar			bipolar	23	10	4.5 max6	2 thin	
16	3		60	1	Quartz	0	13.5	10.5-15	0.7	Bipolar artefact	flake	long	bipolar			bipolar	12	11	5	2 thin	
16	3		61	1	Quartz	<40	13	10.5-15	0.7	Bipolar artefact	flake	long	bipolar			bipolar	12	9.5	3.5	2 thin	
16	3		62	1	Quartz	0	16.5	15.5-20	0.6	Bipolar artefact	proximal BF		bipolar				(16.5)	10	3	1 thin	
16	3		63	1	Quartz	0	12	10.5-15	0.3	Bipolar artefact	proximal BF		bipolar						3.5	1 thin	
16	3		64	1	Quartz	>60	10	05.5-10	0.4	Bipolar artefact	proximal BF		bipolar						4.5	1 thin	
16	3		65	1	Quartz	>60	11	10.5-15	0.3	Bipolar artefact	proximal BF		bipolar						3	1 thin	
16	3		66	1	Silcrete	<40	20	15.5-20	0.7	Flaked surface									4		
16	3		67	1	Silcrete	0	18.5	15.5-20	0.6	FF/FP artefact	medial								1		heavy crushing dorsal
16	3		68	1	FGS/MGS	0	11	10.5-15	0.1	Bipolar artefact	medial										
16	3		69	1	Quartz	>60	16.5	15.5-20	0.5	FF/FP artefact											
16	3		70	5	Quartz	>60		10.5-15	2.2	FF/FP artefact											
16	3		71	2	Quartz	>60		05.5-10	0.3	FF/FP artefact											
16	3		72	1	Quartz	40-60	21	20.5-25	2.0	FF/FP artefact											
16	3		73	1	Quartz	40-60	18	15.5-20	0.8	FF/FP artefact											
16	3		74	2	Quartz	40-60		10.5-15	1.1	FF/FP artefact											
16	3		75	1	Quartz	40-60	8	05.5-10	0.1	FF/FP artefact											
16	3		76	2	Quartz	<40		15.5-20	1.4	FF/FP artefact											
16	3		77	2	Quartz	<40	12.5	10.5-15	0.8	FF/FP artefact											
16	3		78	1	Quartz	0	22	20.5-25	0.7	FF/FP artefact											
16	3		79	1	Quartz	0	16	15.5-20	0.7	FF/FP artefact											
16	3		80	5	Quartz	0		10.5-15	1.3	FF/FP artefact											
16	3		81	5	Quartz	0		05.5-10	0.9	FF/FP artefact											
16	3		82	1	FGS/MGS	0	22.5	20.5-25	1.8	FF/FP artefact	distal					feather hinge	(22)	max22.5	4.5		fairly flat ventral
16	3		83	1	FGS/MGS	>60	14	10.5-15	0.3	FF/FP artefact	distal					feather			2.5		

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
16	3		84	1	FGS/MGS	0	7.5	05.5-10	0.0	FF/FP artefact	distal										
16	3		85	1	FGS/MGS	<40	25	20.5-25	5.1	FF/FP artefact	flaked piece										older weathered piece poss bipolar split
16	3		86	1	FGS/MGS	<40	15.5	15.5-20	0.7	broken piece											
16	3		87	1	FGS/MGS	40-60	15.5	15.5-20	0.5	broken piece											
16	3		88	1	Silcrete	>60	10	05.5-10	0.1	broken piece											
16	3		89	2	FGS/MGS	0		10.5-15	0.5	broken piece											
16	3		90	2	FGS/MGS	0		05.5-10	0.4	broken piece											
16	3		91	1	Quartz	>60	23.5	20.5-25	5.4	Manuport broken?	broken pebble						23.5	15	(10)		
16	3		92	1	Quartz	>60	22	20.5-25	3.9	Manuport broken?	broken pebble						21.5	14.5	9		damage opp ends could be recent
16	3		93	2	Quartz	40-60		10.5-15	1.5	broken piece											
16	3		94	1	Quartz	>60	11.5	10.5-15	0.4	broken piece											
16	3		967	1	Quartz	>60	10	05.5-10	0.1	broken piece											
16	3		968	1	FGS/MGS	0	12	10.5-15	0.2	FF/FP artefact	distal					hinge					
18	3		95	1	FGS/MGS	>60	14	10.5-15	0.4	Platform artefact	proximal BF	(wide)	plain	72	3	feather	9	(12)	2.5		
20	3		969	1	FGS/MGS	0	14	10.5-15	0.2	Platform artefact	cone-split right?		(plain)			(feather)					
24	3		96	0	FGS/MGS	40-60	19	15.5-20	1.5	not cultural	broken piece										bit worn, diff material, poss modern import
24	3		97	0	FGS/MGS	>60	22.5	20.5-25	8.0	not cultural	broken pebble						21	21	(13)		modern? - other pebble pieces diverse materials also present
27	2		98	1	Fe sandstone	>60 wethrd	27.5	25.5-30	4.6	File fragment?	broken piece						(27)	(14)	7.5		bag says poss fish hook file
27	2		99	1	FGS/MGS	40-60	11.5	10.5-15	0.2	broken piece											
27	3		100	1	Quartz	<40	40	35.5-40	27.1	broken piece							32	31	18		



Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
31	3		120	1	Quartz	0	11	10.5-15	0.3	FF/FP artefact	flaked piece										
31	3		121	1	Quartz	0	11	10.5-15	0.2	FF/FP artefact	flaked piece										
31	3		122	1	Quartz	100	23.5	20.5-25	6.5	Manuport?	pebble						22	19	9.5		surfaces a bit irregular
31	4		123	1	FGS/MGS	0	33	30.5-35	6.6	Bipolar core	medial?						28	28	7	4 thin	remnant ventral, rotated, some scars cleaner
31	4		124	1	FGS/MGS	>60	33	30.5-35	6.1	Bipolar possible use-wear	flake	long	bipolar			feather	34	19	7.5	2 thin	scar + irregular damage right lateral
31	4		125	1	FGS/MGS	40-60 worn	25.5	25.5-30	2.5	Bipolar core	indeterminate						24	18	5	2 thin	partial worn/rounded surface both faces
31	4		126	1	FGS/MGS	0	22	20.5-25	1.6	Platform artefact	proximal BF		scar	71	5.5	step	(17)	17.5	3		
31	4		127	1	FGS/MGS	0	12	10.5-15	0.2	Platform artefact	proximal BF		crushed				(12)	7.5	1		
31	4		128	1	FGS/MGS	0	10	05.5-10	0.1	Platform artefact	flake	wide	crushed			hinge	5.5	9	2		pronounced hinge bulb
31	4		129	1	S Wood	0	24	20.5-25	1.9	Platform artefact	flake	long	plain	65	3.5	feather step	23	15	3.5		fine damage right lateral
31	4		130	1	S Wood	0	14.5	10.5-15	0.4	FF/FP artefact	distal	(wide)	v heavily crushed			feather hinge	(11)	11 max14.5	3		proximal very heavily crushed
31	4		131	1	FGS/MGS	0	24	20.5-25	2.7	Bipolar artefact	flake	long	bipolar			bipolar	23.5	13	10.5	2 thin	
31	4		132	1	FGS/MGS	0	18	15.5-20	0.5	Bipolar artefact	flake	long	bipolar			bipolar	18	8	4	2 thin	
31	4		133	1	FGS/MGS	0	13.5	10.5-15	0.3	Bipolar artefact	flake	long	bipolar			feather	13	7	2	2 thin	
31	4		134	1	FGS/MGS	0	13	10.5-15	0.4	Bipolar artefact	flake	long	bipolar			bipolar	12	8.5	3.5	2 thin	
31	4		135	1	FGS/MGS	0	23	20.5-25	2.1	Bipolar artefact	proximal BF		bipolar				(21.5)	max19	2.5	1 thin	
31	4		136	1	FGS/MGS	0	15	10.5-15	0.5	Bipolar artefact	proximal BF		bipolar						2.5	1 thin	
31	4		137	1	FGS/MGS	<40	13.5	10.5-15	0.5	Bipolar artefact	proximal BF		bipolar						3	1 thin	
31	4		138	1	FGS/MGS	>60 weathed	12	10.5-15	0.3	Bipolar artefact	proximal BF		bipolar						2.5	1 thin	curving dorsal more pale weathered





Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
31	4		163	1	Quartz	40-60	9.5	05.5-10	0.2	FF/FP artefact											
31	4		164	1	Quartz	<40	10.5	10.5-15	0.1	FF/FP artefact											
31	4		165	4	Quartz	0		10.5-15	1.7	FF/FP artefact											
31	4		166	1	Quartz	0	10	05.5-10	0.1	FF/FP artefact											
31	4		167	2	Quartz	>60	16	15.5-20	1.2	broken piece											
31	4		168	1	Quartz	>60	16	15.5-20	0.5	broken piece											
31	4		169	1	Quartz	<40	10.5	10.5-15	0.4	Platform artefact	cone-split left		(cortex)								
31	5		170	1	FGS/MGS	0	40	35.5-40	32.9	Core	heat shatter?						32	31	29.5		blocky, 4 uni plats - 1 poss was bifacial, so 3+1=4
31	5		171	1	FGS/MGS	<40	32	30.5-35	12.1	Core	indeterminate						31	24	15		1 continuous bifacial plat prox 3/4 edges
31	5		172	1	FGS/MGS	0	26	25.5-30	2.2	Use polished?	flake	long	damaged			hinge	25	15	5		scars left latera, heavy edge rounding, worn surfaces
31	5		173	1	FGS/MGS	<40	28	25.5-30	3.4	Retouched	flake		removed			feather	28	13	6.5 max10		steep R/U all left latrl, prox, part right lateral, prob too
31	5		174	1	FGS/MGS	<40	26	25.5-30	3.4	Platform artefact	flake	long	cortex	108	4	feather	24	20	5		cone broken away, flattish ventral from high angle platform
31	5		175	1	FGS/MGS	>60 wethrd	16.5	15.5-20	0.9	Platform artefact	flake	long	focal	73	2	hinge	16	12	3		dorsal has worn/weathered ripples poss from older flaking
31	5		176	1	FGS/MGS	<40 wethrd	19	15.5-20	0.6	Platform artefact	flake	wide	part crushed	63	1.5	feather hinge	10.5	14	3		platform prob plain
31	5		177	1	FGS/MGS	0	16	15.5-20	0.5	Platform artefact	flake	long	ridge	65	4	feather	13	10	1.5		
31	5		178	1	FGS/MGS	40-60	16	15.5-20	0.5	Bipolar artefact	flake	wide	bipolar			feather hinge	13	13	2	2 thin	compressed prox ventral, hinge bulb towards distal

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
31	5		179	1	FGS/MGS	0	14	10.5-15	0.3	Bipolar artefact	flake	long	bipolar		1	hinge	14	8.5	1.5	1 thin 1 flat	compressed prox vntrl, vertical ridge left ventral
31	5		180	1	FGS/MGS	0	12	10.5-15	0.2	Bipolar artefact	flake	long	bipolar			hinge	9.5	7	1	1 thin 1 flat	
31	5		181	1	FGS/MGS	0	12.5	10.5-15	0.3	Platform artefact	flake	long	part broken	55	2	feather hinge	10.5	11	2		
31	5		182	1	FGS/MGS	0	11	10.5-15	0.2	Platform artefact	flake	wide	crushed			feather	6.5	8 max11	2		
31	5		183	1	FGS/MGS	0	11	10.5-15	0.1	Platform artefact	flake	wide	part crushed	73	2	feather	6.5	8	1		
31	5		184	1	FGS/MGS	0	10.5	10.5-15	0.1	Platform artefact	flake	wide	crushed			feather	7	8.5	1		
31	5		185	1	FGS/MGS	<40	10	05.5-10	0.1	Platform artefact	flake										
31	5		186	4	FGS/MGS	0		05.5-10	0.5	Platform artefact	flake										
31	5		187	1	FGS/MGS	0	19	15.5-20	0.8	Platform artefact	proximal BF		ridge	65	3		(13)	(max1 8)	2.5		
31	5		188	1	FGS/MGS	0	16.5	15.5-20	0.3	Platform artefact	proximal BF	(el)	part crushed		1		(15.5)	8	2.5		a few step terminations/crushi ng prox end right lateral
31	5		189	1	FGS/MGS	0	17	15.5-20	0.2	Platform artefact	proximal BF	(el)	part crushed				(16)	6	1		from rotated core, irregular shape
31	5		190	1	FGS/MGS	>60	12	10.5-15	0.2	Platform artefact	proximal BF		plain	93	1.5				1		cone split away
31	5		191	1	FGS/MGS	0	11.5	10.5-15	0.2	Platform artefact	proximal BF		crushed								
31	5		192	1	FGS/MGS	0	9	05.5-10	0.0	Platform artefact	proximal BF										
31	5		193	1	FGS/MGS	0	13	10.5-15	0.1	Bipolar artefact	proximal BF		bipolar			(feather )	13		1.5	1 thin	
31	5		194	1	FGS/MGS	0	22	20.5-25	0.5	Platform artefact	cone-split left		(part crushed)						2.5		
31	5		195	1	Quartz	40-60 wethrd	17.5	15.5-20	0.7	Platform artefact	cone-split left		(plain)	76	2.5	(step)	17.5		4.5		
31	5		196	1	FGS/MGS	0	10	05.5-10	0.1	Platform artefact	cone-split left		(crushed )								
31	5		197	1	FGS/MGS	0	18.5	15.5-20	0.9	Platform artefact	cone-split right		(crushed )						2.5		

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
31	5		198	1	FGS/MGS	0	8.5	05.5-10	0.1	Platform artefact	cone-split right										
31	5		199	1	FGS/MGS	0	28	25.5-30	3.4	Bipolar artefact	proximal BF	long	bipolar			(bipolar)	27	(15)	4	2 thin	
31	5		200	1	FGS/MGS	0	25	20.5-25	3.0	Bipolar artefact	flake	long	bipolar			bipolar	20	17.5	5.5	2 thin	
31	5		201	1	FGS/MGS	0	14	10.5-15	0.2	Bipolar artefact	flake	elongate	bipolar			feather hinge	13	4.5	3	2 thin	
31	5		202	1	FGS/MGS	0	21	20.5-25	0.9	Bipolar artefact	cone-split		(bipolar)			(bipolar)	21		4	2 thin	
31	5		203	1	FGS/MGS	0	15	10.5-15	0.3	Bipolar artefact	proximal BF		bipolar						1.5	1 thin	
31	5		204	1	FGS/MGS	<40	21.5	20.5-25	2.7	Bipolar artefact	proximal BF		bipolar				(20)	15	7 max8	1 thin	
31	5		205	1	FGS/MGS	40-60	29	25.5-30	2.5	FF/FP artefact	distal					feather hinge			5		
31	5		206	1	FGS/MGS	<40	15	10.5-15	0.6	FF/FP artefact	distal					feather hinge					
31	5		207	2	FGS/MGS	<40		15.5-20	1.0	FF/FP artefact											
31	5		208	2	FGS/MGS	<40		10.5-15	0.7	FF/FP artefact											
31	5		209	1	FGS/MGS	40-60 worn	29.5	25.5-30	2.0	FF/FP artefact	medial										1 dorsal scar with hinge termination
31	5		210	1	FGS/MGS	0	15	10.5-15	0.2	FF/FP artefact	distal	(el)				feather			2		
31	5		211	1	FGS/MGS	0	12	10.5-15	0.2	FF/FP artefact	distal					feather			2.5		
31	5		212	12	FGS/MGS	0		10.5-15	2.5	FF/FP artefact											
31	5		213	7	FGS/MGS	0		05.5-10	0.9	FF/FP artefact											
31	5		214	1	FGS/MGS	0	19.5	15.5-20	0.9	Flaked surface											
31	5		215	1	FGS/MGS	0	16	15.5-20	0.7	broken piece											
31	5		216	4	FGS/MGS	0		10.5-15	1.7	broken piece											
31	5		217	3	FGS/MGS	0		05.5-10	0.4	broken piece											
31	5		218	1	Quartz	40-60	17	15.5-20	2.7	Bipolar core	pebble						15.5	14	8.5 max 10	2 flat	flakd short axis, main flat is cortex, other thin crshd flat
31	5		219	1	Quartz	40-60	15.5	15.5-20	2.6	Bipolar core	pebble						13.5	11.5	11	2 flat	flakd short axis, both flat ends cortex. Few clear PFA





Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
31	6		266	1	FGS/MGS	<40	13	10.5-15	0.3	Platform artefact	flake	long	cortex part crushed	77		feather	13	9	2		
31	6		267	1	Silcrete	<40	15	10.5-15	0.3	Platform artefact	cone-split left		(plain)	70	1.5				2		
31	6		268	1	FGS/MGS	0	13	10.5-15	0.4	Platform artefact	proximal BF		crushed				(13)	8.5	2		
31	6		269	1	FGS/MGS	>60	28	25.5-30	4.8	FF/FP artefact	medial						(24)	24	7.5		
31	6		270	1	FGS/MGS	<40	15.5	15.5-20	0.3	FF/FP artefact	medial										probably from bipolar flaking
31	6		271	1	FGS/MGS	>60	15	10.5-15	0.2	FF/FP artefact	medial										probably from bipolar flaking
31	6		272	1	FGS/MGS	0	13	10.5-15	0.2	FF/FP artefact	flaked piece										
31	6		273	1	FGS/MGS	0	8	05.5-10	0.1	FF/FP artefact	medial										
31	6		274	1	Quartz	>60	17	15.5-20	0.5	Bipolar artefact	proximal BF		bipolar				(16)	9	3	1 thin	
31	6		275	2	Quartz	0		10.5-15	0.5	FF/FP artefact											
31	6		276	2	Quartz	0		05.5-10	0.3	FF/FP artefact											
31	6		277	1	FGS/MGS	>60	12	10.5-15	0.2	broken piece											
32	3		278	1	FGS/MGS	0	29	25.5-30	3.2	Platform artefact	flake	wide	plain	66	6	feather hinge	17 max26.5	22.5	4.5		tiny new fragment refits
32	3		279	1	FGS/MGS	0	23	20.5-25	1.7	Platform artefact	proximal BF	(wide)	crushed			feather	21	(20.5)	3.5		
32	3		280	1	FGS/MGS	0	11.5	10.5-15	0.1	Platform artefact	flake	l=w	crushed			feather	10.5	10.5	1		
32	3		281	1	FGS/MGS	0	16	15.5-20	0.7	FF/FP artefact	flaked piece										
32	3		282	1	S Wood	0	24	20.5-25	1.3	Flaked surface									7.5		
32	3		283	1	Quartz	0	12	10.5-15	0.2	Bipolar artefact	flake	long	bipolar			bipolar	11.5	6	2 max3	2 thin	
32	3		284	1	Quartz	>60	17	15.5-20	0.1	FF/FP artefact	distal					(plunging)					
32	4		285	1	FGS/MGS	<40	28.5	25.5-30	2.0	Platform artefact	flake	long	cortex part crushed	85	1	hinge	18 max24	13.5	4		
32	4		286	1	FGS/MGS	<40	11	10.5-15	0.3	Platform artefact	flake	wide	cortex	72	3	feather	9.5	8.5	2		
32	4		287	1	FGS/MGS	0	22	20.5-25	2.8	Bipolar artefact	proximal BF		bipolar				(20.5)	19	6	1 thin	

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
32	4		288	1	FGS/MGS	<40	26	25.5-30	2.6	Bipolar core broken	indeterminate								6.5	1 thin	platform poss continuous = rotated
32	4		289	1	Silcrete	<40	32	30.5-35	2.6	Bipolar artefact	distal	(el)				bipolar	(32)	10	5	1 flat	remnant uni cortex+ridge platform dorsal
32	4		290	1	FGS/MGS	<40, >60 worn	21	20.5-25	1.4	FF/FP artefact	medial										dorsal surface bit rounded/worn
32	4		291	1	FGS/MGS	<40	13.5	10.5-15	0.5	FF/FP artefact	distal					feather			2		
32	4		292	1	FGS/MGS	0	17	15.5-20	0.5	FF/FP artefact	distal					feather	(16.5)		2.5		
32	4		293	1	FGS/MGS	40-60	17	15.5-20	0.8	FF/FP artefact	flaked piece										
32	4		294	1	Silcrete	0	14	10.5-15	0.3	FF/FP artefact	medial										remnant cone on dorsal surface - from flake body
32	4		295	1	S Wood	0	19	15.5-20	1.0	Platform artefact	proximal BF		plain	60	5.5		(9.5)	(15 max19)	3 max5		OH removal or UW dorsal edge of platform
32	4		296	1	S Wood	<40	24	20.5-25	1.0	Flaked surface											
32	4		297	1	Quartz	0	15	10.5-15	0.2	Bipolar artefact	flake	elongate	bipolar			feather	15	6 max7	3.5	2 thin	
32	4		298	1	Quartz	0	15	10.5-15	0.7	Bipolar artefact	proximal BF		bipolar						3	1 thin	
32	4		299	1	Quartz	0	10	05.5-10	0.2	Bipolar artefact	proximal BF		bipolar						2	1 flat	
32	4		300	1	Quartz	0	13	10.5-15	0.4	FF/FP artefact	distal					(feather)				1 thin	flattened prox, hinge bulb towards distal
32	4		301	1	Quartz	<40	16.5	15.5-20	0.9	FF/FP artefact	flaked piece										cortical platform from freehand flaking
32	4		302	4	Quartz	<40		10.5-15	1.5	FF/FP artefact											
32	4		303	2	Quartz	0		10.5-15	0.8	FF/FP artefact											
32	5		304	1	FGS/MGS	40-60	86	86	157.2	Flaked cobble Anvil	cobble piece						85	63	18		bifacial & uni flkng, break or pitting 1 end
32	5		305	1	Quartz	40-60	32.5	30.5-35	4.7	Bipolar artefact	flake	wide	bipolar			feather hinge	22	32.5	6	2 thin	flattend prox, wide hinge bulb towards distal





Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
32	5		328	1	FGS/MGS	0	8	05.5-10	0.1	Flaked surface	heat shatter										potlid
32	5		329	1	FGS/MGS	0	8.5	05.5-10	0.1	Platform artefact	cone-split left										
32	5		330	1	Quartz	<40	22.5	20.5-25	1.4	Platform artefact	proximal BF left		(cortex)	85	1.5						
32	5		331	1	Quartz	0	13	10.5-15	0.4	Bipolar artefact	flake	long	bipolar			bipolar	13	7.5	3	2 thin	
32	5		332	1	Quartz	0	12.5	10.5-15	0.4	Bipolar artefact	flake	long	bipolar			bipolar	11	9	3	2 thin	
32	5		333	1	Quartz	40-60	12	10.5-15	0.6	Bipolar artefact	flake	long	bipolar			bipolar	11.5	7	5	1 thin 1 flat	1 end crushed flat, left over fragment 'slug'
32	5		334	1	Quartz	0	15.5	15.5-20	0.3	Bipolar artefact	proximal BF		bipolar				(15.5)	7	2.5	1 thin	poor-medium quality
32	5		335	1	Quartz	>60	19	15.5-20	1.8	FF/FP artefact	medial										
32	5		336	1	Quartz	>60	11	10.5-15	0.3	FF/FP artefact	flaked piece										
32	5		337	1	Quartz	40-60	15	10.5-15	1.1	FF/FP artefact											
32	5		338	1	Quartz	40-60	10.5	10.5-15	0.3	FF/FP artefact											
32	5		339	2	Quartz	40-60		05.5-10	0.3	FF/FP artefact											
32	5		340	1	Quartz	<40	13	10.5-15	0.3	FF/FP artefact											
32	5		341	3	Quartz	<40		05.5-10	0.3	FF/FP artefact											
32	5		342	1	Quartz	0	20	15.5-20	1.3	FF/FP artefact											
32	5		343	1	Quartz	0	12.5	10.5-15	0.3	FF/FP artefact											
32	5		344	4	Quartz	0		05.5-10	0.8	FF/FP artefact											
32	5		345	1	Quartz	>60	23.5	20.5-25	5.8	Bipolar artefact	split pebble		bipolar			bipolar	23.5	15	13	1 thin 1 flat	prob bipolar split but no clear crushing
32	5		346	1	Quartz	>60	18.5	15.5-20	3.3	manuport broken?	pebble piece						14	(15)	10.5	2 flat	split short axis
32	5		347	1	Quartz	100	26	25.5-30	12.9	manuport?	pebble						23	22	15		
32	5		348	1	Quartz	>60	26.5	25.5-30	5.3	manuport?	pebble						20	19	9.5		
32	5		349	1	Quartz	100	19	15.5-20	3.5	manuport?	pebble						19	11	11		

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
32	5		350	1	Quartz	>60	18.5	15.5-20	2.7	manuport broken?	pebble piece						14	(15)	10.5	2 flat	split short axis
32	5		351	1	Unidentified	100	36.5	35.5-40	20.3	manuport?	pebble						36	21	18.5		
33	2		352	1	FGS/MGS	0	23.5	20.5-25	1.2	FF/FP artefact	medial										dark grey damage distal, proximal heavily crushed
33	2		353	1	Quartz	0	10	05.5-10	0.2	FF/FP artefact	medial										
33	2		354	1	Quartz	40-60	13	10.5-15	0.6	FF/FP artefact	flaked piece										
33	3		355	1	FGS/MGS	<40	16.5	15.5-20	0.5	FF/FP artefact	distal					(feather)			2		
33	3		356	1	FGS/MGS	0	12.5	10.5-15	0.1	FF/FP artefact	distal					feather			1		
33	3		357	1	FGS/MGS	0	18.5	15.5-20	1.2	FF/FP artefact	flaked piece										
33	3		358	1	FGS/MGS	0	13.5	10.5-15	0.4	FF/FP artefact	flaked piece										heat shatter break
33	3		359	1	FGS/MGS	40-60	10	05.5-10	0.1	FF/FP artefact	medial										
33	3		360	1	Quartz	0	11	10.5-15	0.2	Bipolar artefact	proximal BF		bipolar						3	1 thin	
33	3		361	1	Quartz	>60	10.5	10.5-15	0.4	FF/FP artefact	flaked piece										
33	3		362	1	Quartz	>60	25	20.5-25	10.8	manuport broken?	pebble piece						22	20.5	(16)		
33	3		363	1	Quartz	100	19.5	15.5-20	3.5	manuport?	pebble						19.5	15	8.5		
33	4		364	1	FGS/MGS	<40	15	10.5-15	0.6	Bipolar artefact	proximal BF		bipolar				(13)		3.5	1 thin	
33	4		365	1	Quartz	40-60	13	10.5-15	0.9	Bipolar artefact	proximal BF		bipolar						6.5	1 thin	
33	4		366	1	Quartz	<40	10	05.5-10	0.6	Bipolar artefact	proximal BF		bipolar						5	1 flat	
33	4		367	1	Quartz	0	9	05.5-10	0.2	Bipolar artefact	proximal BF								2	1 thin	
33	4		368	1	Quartz	0	15.5	15.5-20	0.6	FF/FP artefact	medial								3.5		
33	5		369	1	Quartz	<40	38.5	35.5-40	5.6	Platform artefact	proximal BF		cortex	66	3.5	step	(17.5)	37	6.5		
33	5		370	1	Silcrete	40-60	22.5	20.5-25	2.8	Platform artefact	proximal BF		plain	63	4		(17)	22	5		
33	5		371	1	Silcrete	<40	15	10.5-15	0.4	Bipolar artefact	proximal BF		bipolar				(14.5)		2.5	1 thin	

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
33	5		372	1	FGS/MGS	0	20	15.5-20	1.1	Bipolar possible use-wear	proximal BF		bipolar				(18)	12	3.5	1 thin	continuous flaking damage left lateral
33	5		373	1	FGS/MGS	0	28.5	25.5-30	1.4	Platform artefact	proximal BF	(el)	crushed				(28)	13	2.5		parallel blade
33	5		374	1	FGS/MGS	0	19	15.5-20	0.6	Platform artefact	proximal BF		ridge	81	2	step	(12 max17.		2.5		
33	5		375	1	FGS/MGS	40-60	25	20.5-25	3.1	Bipolar artefact	flake	wide	bipolar			bipolar	17.5	18	6.5	2 thin	
33	5		376	1	FGS/MGS	0	19	15.5-20	0.8	FF/FP artefact	distal					plunging			2		
33	5		377	1	Quartz	0	16.5	15.5-20	0.7	Bipolar artefact	flake	long	bipolar			feather	17	11.5	2	2 thin	
34	2		378	1	Quartz	0	15	10.5-15	0.4	FF/FP artefact	distal					feather	(14)		3		
34	3		379	1	Silcrete	40-60	17.5	15.5-20	0.6	Platform artefact	cone-split left		(plain)	90	2	(feather)	17		5		
34	3		380	1	FGS/MGS	0	13	10.5-15	0.6	FF/FP artefact	medial										
34	4		381	1	Quartz	>60	29.5	25.5-30	5.2	FF/FP artefact	flaked piece						29	(15.5)	8		pebble piece
34	5		382	1	Quartz	0	24	20.5-25	4.2	Bipolar artefact	flake	long	bipolar			bipolar	23.5	15	10.5	1 thin 1 flat	remnant uni ridged platform dorsal ridge
34	5		383	1	Quartz	0	11.5	10.5-15	0.5	FF/FP artefact	flaked piece										prob from bipolar flaking
34	5		384	1	FGS/MGS	0	17	15.5-20	0.5	Bipolar artefact	proximal BF		bipolar			(step)	16.5		2	1 thin	dorsal scar shows opposed flaking
35	2		385	1	FGS/MGS	0	28	25.5-30	3.0	Platform artefact	proximal BF		plain	83	2.5				5		concave platform - former negative scar
35	2		386	1	Quartz	40-60	15.5	15.5-20	1.1	Bipolar artefact	cone-split		(bipolar)							1 thin	
35	2		387	1	Quartz	>60	14	10.5-15	1.0	Bipolar artefact	proximal BF		bipolar			bipolar	13	10	5.5	1 thin 1 flat	1 end crushed flat from repeated removals
35	2		388	1	Quartz	40-60	17	15.5-20	1.2	FF/FP artefact	flaked piece										new break 1 surface
35	3		389	1	FGS/MGS	0	25.5	25.5-30	4.5	Retouched	medial		removed			removed	26	17	8		steep retouch, sharp V's like serrate
35	3		390	1	FGS/MGS	0	27	25.5-30	2.9	Flaked surface											
35	3		391	1	FGS/MGS	>60	17	15.5-20	0.9	FF/FP artefact	medial								3		
35	3		392	1	FGS/MGS	0	17	15.5-20	0.6	FF/FP artefact	medial								2		



Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
35	4		417	1	Quartz	40-60	14	10.5-15	0.6	FF/FP artefact											
35	4		418	1	Quartz	<40	13.5	10.5-15	0.3	FF/FP artefact											
35	4		419	2	Quartz	0		05.5-10	0.1	FF/FP artefact											
35	4		970	1	Silcrete	0	10	05.5-10	0.1	FF/FP artefact	distal					(feather step)					
36	2		420	1	Quartz	<40	31.5	30.5-35	5.6	Platform artefact	proximal BF		plain	69	6		(21)	27	5.5		new split through cone - 2 pcs refit
36	2		421	1	FGS/MGS	0	15	10.5-15	0.5	Platform artefact	proximal BF		plain	83	1				2		
36	2		422	1	Silcrete	>60	20.5	20.5-25	2.0	Bipolar artefact	medial								4.5		
36	2		423	1	Quartz	0	14	10.5-15	0.7	Bipolar artefact	proximal BF		bipolar							1 thin	prox fragment only
36	2		424	1	Quartz	>60	22.5	20.5-25	4.4	FF/FP artefact	flaked piece						21	16	10		prob bipolar flkg, removed pebble end 56 60 degrees
36	2		425	1	Quartz	100	15	10.5-15	1.6	Manuport?	pebble						13	13	5		
36	2		964	1	Quartz	40-60	11.5	10.5-15	0.5	FF/FP artefact	flaked piece										
36	3		426	1	Quartz	<40	10.5	10.5-15	0.2	FF/FP artefact	medial										
36	3		427	1	Quartz	0	9	05.5-10	0.1	Platform artefact	proximal BF		crushed								proximal heavily crushed
36	3		428	1	FGS/MGS	0	17.5	15.5-20	0.8	Platform artefact	proximal BF		crushed								proximal heavily crushed
36	3		429	1	FGS/MGS	40-60	16	15.5-20	0.4	Platform artefact	proximal BF		crushed								
36	3		430	1	FGS/MGS	0	12.5	10.5-15	0.1	Platform artefact	proximal BF		crushed								
36	3		431	1	FGS/MGS	0	20	15.5-20	0.4	Platform artefact	cone-split right		(part crushed)						2.5		
36	3		432	1	FGS/MGS	40-60	19	15.5-20	1.2	Bipolar artefact	proximal BF		bipolar				(17)	12	5.5	1 thin	
36	3		433	1	FGS/MGS	0	19	15.5-20	1.2	Bipolar artefact	flake	wide	bipolar			bipolar	10	18	6	1 thin 1 flat	from bipolar retouching something 10 mm thick
36	3		434	1	FGS/MGS	0	10	05.5-10	0.3	Bipolar artefact	proximal BF	long	bipolar			(step)	(10)	8	2.5	1 thin	
36	3		435	1	FGS/MGS	0	19.5	15.5-20	1.1	Flaked surface											
36	3		436	1	FGS/MGS	0	33	30.5-35	0.1	FF/FP artefact	medial								2.5		



Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments	
36	4		460	1	Silcrete	0	17	15.5-20	0.6	Platform artefact	proximal BF		plain	85	2							proximal end only
36	4		461	1	Quartz	<40	23.5	20.5-25	2.4	Platform artefact	proximal BF	(wide)	cortex	65	7	step	15.5	18max 23	5			distal damage prob recent
36	4		462	1	Quartz	<40	12	10.5-15	0.3	Platform artefact	proximal BF		cortex	49	3	step	8	10	2			
36	4		463	1	Quartz	<40	19	15.5-20	1.3	Platform artefact	cone-split right		(cortex)			(step)	(15)		4			
36	4		464	1	Quartz	0	11.5	10.5-15	0.2	FF/FP artefact	distal					feather			1.5			
36	4		465	1	Quartz	<40	14.5	10.5-15	0.7	FF/FP artefact	medial								5.5			
36	4		466	1	Quartz	0	10	05.5-10	0.1	FF/FP artefact	medial								1.5			
36	4		467	1	FGS/MGS	0	13	10.5-15	0.2	Platform artefact	flake	long	focal	73	1.5	feather	12.5	7 max9. 5	1			
36	4		468	1	FGS/MGS	<40	21.5	20.5-25	1.4	Platform artefact	flake	long	focal	92	3	feather	17 max21	13	4			
36	4		469	1	FGS/MGS	0	11	10.5-15	0.2	Platform artefact	flake	wide	ridge	55	4	feather	6	10	2			
36	4		470	1	S Wood	0	21.5	20.5-25	2.5	Platform artefact	proximal BF		ridge	68	6				4.5			
36	4		471	1	S Wood	0	16.5	15.5-20	0.8	Platform artefact	flake	wide	ridge	57	7	feather hinge	7	15	3.5 max7. 5			
36	4		472	1	FGS/MGS	0	20	15.5-20	0.7	Platform artefact	cone-split right		(crushed )			(hinge)	19		2.5			
36	4		473	1	FGS/MGS	0	18	15.5-20	0.5	Platform artefact	cone-split right		(part crushed)			(hinge step)	11		2.5			
36	4		474	1	FGS/MGS	0	17	15.5-20	0.9	Platform artefact	proximal BF		crushed						1.5 max4			
36	4		475	1	FGS/MGS	0	18.5	15.5-20	0.6	Platform artefact	proximal BF		broken									platform missing but only just, MNI=1
36	4		476	1	FGS/MGS	0	15	10.5-15	0.2	Platform artefact	proximal BF		plain	48	1.5				1			
36	4		477	1	FGS/MGS	0	12	10.5-15	0.6	Platform artefact	cone-split left		(irregular )									can't measure dorsal platform angle
36	4		478	1	FGS/MGS	0	24	20.5-25	2.1	Bipolar artefact	flake	wide	bipolar			bipolar	15.5	20.5	5	2 thin		
36	4		479	1	FGS/MGS	0	26	25.5-30	2.8	Bipolar artefact	flake	long	bipolar			bipolar	23	14	7	1 thin 1 flat		







Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments	
36	4		525	3	Quartz	>60		10.5-15	1.5	FF/FP artefact												
36	4		526	2	Quartz	>60		05.5-10	0.6	FF/FP artefact												
36	4		527	2	Quartz	40-60		15.5-20	1.3	FF/FP artefact												
36	4		528	4	Quartz	40-60		10.5-15	2.2	FF/FP artefact												
36	4		529	3	Quartz	40-60		05.5-10	0.6	FF/FP artefact												
36	4		530	3	Quartz	<40		15.5-20	2.3	FF/FP artefact												
36	4		531	6	Quartz	<40		10.5-15	2.9	FF/FP artefact												
36	4		532	6	Quartz	0		15.5-20	4.5	FF/FP artefact												
36	4		533	10	Quartz	0		10.5-15	3.1	FF/FP artefact												
36	4		534	6	Quartz	0		05.5-10	1.1	FF/FP artefact												
36	4		535	2	Quartz	0		05.5-10	0.6	Flaked surface												
36	4		536	1	Quartz	>60	24.5	20.5-25	7.5	Manupor t?	pebble						20.5	19	14		new break, 2 pcs refit, frag missing	
36	4		537	1	Quartz	>60	18	15.5-20	5.2	Manupor t broken?	pebble piece						18	(17)	12.5		poss flaked, if so short axis 2 flat ends	
36	4		538	1	Quartz	>60	17	15.5-20	1.4	Manupor t broken?	pebble piece						(16 max)	11.5	6.5		poss flaked, if so short axis 2 flat ends	
36	4		539	1	Quartz	>60	15.5	15.5-20	1.1	broken piece											poss flaked	
36	4		540	1	Quartz	>60	10.5	10.5-15	0.1	broken piece												
36	4		541	1	Quartz	>60	9.5	05.5-10	0.3	broken piece												
36	4		542	4	Quartz	0		05.5-10	1.2	broken piece												
36	4		543	1	Sandstone?	0	15	10.5-15	0.3	FF/FP artefact	medial								1			
36	4	y	544	5	FGS/MGS	0		05.5-10	0.6	FF/FP artefact												
36	4	y	545	1	FGS/MGS	0	11	10.5-15	0.3	broken piece												
36	4	y	546	1	Quartz	40-60	12	10.5-15	0.3	Bipolar artefact	flake	long	bipolar			bipolar	12	5	4	2 thin		
36	4	y	547	1	Quartz	0	12	10.5-15	0.3	Bipolar artefact	flake	long	bipolar			bipolar	12	6	3	2 thin		

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
36	4	y	548	1	Quartz	40-60	10.5	10.5-15	0.2	Bipolar artefact	proximal BF		bipolar						2.5	1 thin	
36	4	y	549	1	Quartz	0	9	05.5-10	0.1	Bipolar artefact	proximal BF								max2	1 thin	
36	4	y	550	3	Quartz	>60		05.5-10	0.4	FF/FP artefact											
36	4	y	551	1	Quartz	40-60	10.5	10.5-15	0.2	FF/FP artefact	flaked piece										
36	4	y	552	4	Quartz	40-60		05.5-10	0.6	FF/FP artefact											
36	4	y	553	3	Quartz	0		10.5-15	0.7	FF/FP artefact											
36	4	y	554	14	Quartz	0		05.5-10	1.5	FF/FP artefact											
36	4		973	1	FGS/MGS	0	7	05.5-10	0.1	Platform artefact	flake										
36	4		974	1	FGS/MGS	0	9	05.5-10	0.1	FF/FP artefact	medial										
36	5		555	1	FGS/MGS	0	28	25.5-30	2.5	Use polished ? Bipolar	proximal BF		bipolar			bipolar	27	16	4.5	1 thin	rounded glossy polish right lateral & dorsal
36	5		556	1	FGS/MGS	0	32	30.5-35	6.9	Use polished ? Platform	cone-split right		(plain)	80	5	part retouched?	(25.5)	21.5	8.5		scars polish? rght ltrl, Retuch? dstl, Retuch DtoV mid split
36	5		557	1	Silcrete	0	19.5	15.5-20	0.8	Platform artefact	cone-split left		(flaw)								
36	5		558	1	FGS/MGS	<40 worn	22	20.5-25	2.1	Platform artefact	flake	l=w	worn surface	95	2.5	hinge	19	20	4		platform poss older hinge termination
36	5		559	1	FGS/MGS	0	16	15.5-20	0.3	Platform artefact	flake	l=w	crushed			feather	14	7 max15	2.5		remnant uni platform dorsal ridge
36	5		560	1	FGS/MGS	0	28	25.5-30	1.1	Platform artefact	flake	elongate	crushed			plugging	28	7	5		
36	5		561	1	FGS/MGS	0	24.5	20.5-25	1.3	Platform artefact	proximal BF		crushed			step	(14)	max24	3.5		
36	5		562	1	FGS/MGS	<40	14	10.5-15	0.2	Platform artefact	proximal BF	(long)	cortex focal	118	2.5	feather	14	9	1		
36	5		563	1	FGS/MGS	0	18	15.5-20	1.1	Platform artefact	proximal BF	(long)	crushed			feather	18	15	5 max6		prox left lateral split awy
36	5		564	1	FGS/MGS	<40	23.5	20.5-25	1.3	Platform artefact	cone-split left		(crushed)			(feather)	22		2.5		
36	5		565	1	FGS/MGS	0	19	15.5-20	0.5	Platform artefact	cone-split right		(focal)	70	2		(18)		2		

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
36	5		566	1	FGS/MGS	0	24.5	20.5-25	0.7	Platform artefact	flake	elongate	crushed			plunging	24	6	4		
36	5		567	1	FGS/MGS	0	13	10.5-15	0.5	Platform artefact	proximal BF		ridge	95	4		(12.5)	9.5	3		
36	5		568	1	Quartz	40-60	29.5	25.5-30	6.9	Bipolar artefact	flake	long	bipolar			bipolar	27	16	9	1 thin 1 flat	1 flat cortex end, 1 thinner cortex end, fld short axis
36	5		569	1	FGS/MGS	<40	18	15.5-20	1.5	Bipolar artefact	cone-split left		(bipolar)			(bipolar)	17	(16)	6	2 thin	
36	5		570	1	FGS/MGS	0	17	15.5-20	0.8	Bipolar artefact	flake	l=w	bipolar			bipolar	14.5	15	3	2 thin	
36	5		571	1	FGS/MGS	0	20	15.5-20	0.9	Bipolar artefact	proximal BF	(long)	bipolar			bipolar	20	(13)	2	1 thin 1 flat	
36	5		572	1	FGS/MGS	0	17	15.5-20	0.6	Bipolar artefact	proximal BF		bipolar				(16)	13.5	1.5	1 thin	lateral damage
36	5		573	1	FGS/MGS	0	17.5	15.5-20	0.6	Bipolar artefact	proximal BF		bipolar				(12)		1.5	1 thin	
36	5		574	1	FGS/MGS	0	15.5	15.5-20	0.4	Bipolar artefact	proximal BF		bipolar							1 thin	end only
36	5		575	1	FGS/MGS	0	14	10.5-15	0.5	Bipolar artefact	proximal BF		bipolar			step	(13)		3	1 thin	
36	5		576	1	FGS/MGS	0	9	05.5-10	0.1	Bipolar artefact	proximal BF									1 thin	
36	5		577	1	FGS/MGS	0	25.5	25.5-30	2.3	Bipolar artefact	cone-split		(bipolar)			(bipolar)	25	(11.5)	5.5	1 thin 1 flat	worn/polish most of 1 convex surface, poss ridged platform
36	5		578	1	FGS/MGS	<40	39.5	35.5-40	10.2	Use polished ?	distal	(wide)				feather	(22)	37	9 max 13		distal more rounded than other edges
36	5		579	1	FGS/MGS	0	16	15.5-20	0.5	Platform artefact	flake	wide	broken			feather	13.5	16	2		
36	5		580	1	FGS/MGS	<40	12	10.5-15	0.2	Platform artefact	flake	long	cortex	85	1	feather	12	9	1		
36	5		581	1	FGS/MGS	0	13	10.5-15	0.2	Platform artefact	flake	long	crushed			feather	11	8	1.5		
36	5		582	1	FGS/MGS	0	10.5	10.5-15	0.1	Platform artefact	flake	wide	broken			hinge	6.5	9	1		
36	5		583	1	FGS/MGS	0	11.5	10.5-15	0.1	Platform artefact	proximal BF		crushed			(feather)	11		1		
36	5		584	1	FGS/MGS	0	14	10.5-15	0.4	Bipolar artefact	cone-split left		(bipolar)			(feather)	13.5		3	2 thin	
36	5		585	1	FGS/MGS	0	22.5	20.5-25	0.6	FF/FP artefact	distal					hinge			2		
36	5		586	1	FGS/MGS	0	15	10.5-15	1.1	FF/FP artefact	distal					hinge step			5		removed prox end of big flake - dorsal has PFA 5mm wide

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
36	5		587	1	FGS/MGS	0	11	10.5-15	0.0	FF/FP artefact	distal					hinge			0.5		
36	5		588	1	FGS/MGS	0	12	10.5-15	0.3	FF/FP artefact	distal					feather			5		part dorsal surface darker brown
36	5		589	1	FGS/MGS	0	11	10.5-15	0.2	FF/FP artefact	distal					feather			2		
36	5		590	1	FGS/MGS	0	32.5	30.5-35	7.3	FF/FP artefact	flaked piece										
36	5		591	1	FGS/MGS	<40	12	10.5-15	0.3	FF/FP artefact											
36	5		592	1	FGS/MGS	>60	9	05.5-10	0.1	FF/FP artefact											
36	5		593	1	FGS/MGS	40-60	11	10.5-15	0.1	FF/FP artefact											
36	5		594	1	FGS/MGS	40-60	9.5	05.5-10	0.2	FF/FP artefact											
36	5		595	1	FGS/MGS	0	21	20.5-25	1.1	FF/FP artefact											
36	5		596	1	FGS/MGS	0	19.5	15.5-20	0.7	FF/FP artefact											
36	5		597	10	FGS/MGS	0		10.5-15	2.8	FF/FP artefact											
36	5		598	2	FGS/MGS	0		05.5-10	0.2	FF/FP artefact											
36	5		599	1	FGS/MGS	<40	13	10.5-15	0.2	Flaked surface											
36	5		600	4	FGS/MGS	0		10.5-15	1.1	Flaked surface											
36	5		601	1	FGS/MGS	<40	14.5	10.5-15	1.1	broken piece											possible negative scar?
36	5		602	1	Quartz	0	14	10.5-15	0.7	broken piece											
36	5		603	1	FGS/MGS	<40	10	05.5-10	0.2	broken piece											
36	5		604	1	FGS/MGS	0	20	15.5-20	0.9	Flaked surface											
36	5		605	1	FGS/MGS	>60	16	15.5-20	1.1	FF/FP artefact	medial										
36	5		606	1	FGS/MGS	0	14.5	10.5-15	0.6	FF/FP artefact	medial										
36	5		607	1	FGS/MGS	0	13	10.5-15	0.2	FF/FP artefact	distal					feather			2		
36	5		608	1	Quartz	<40	18.5	15.5-20	1.6	Platform artefact	proximal BF	(wide)	cortex	87	6	(feather )	14	18	4.5		from curving pebble
36	5		609	1	Quartz	0	18.5	15.5-20	0.8	Platform artefact	proximal BF		broken						3		
36	5		610	1	FGS/MGS	0	11	10.5-15	0.1	Platform artefact	proximal BF		crushed						1.5		







Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
36	5	y	657	1	Quartz	<40	13	10.5-15	0.2	Platform artefact	proximal BF		cortex	99	2				1.5		
36	5	y	658	1	Quartz	0	8.5	05.5-10	0.1	Platform artefact	cone-split right										
36	5	y	659	1	Quartz	<40	7.5	05.5-10	0.0	Platform artefact	cone-split right										
36	5	y	660	1	Quartz	0	10	05.5-10	0.1	Bipolar artefact	flake	elongate	bipolar			bipolar	10	5	2	2 thin	
36	5	y	661	1	Quartz	<40	10.5	10.5-15	0.1	Bipolar artefact	proximal BF		bipolar								
36	5	y	662	1	Quartz	40-60	8.5	05.5-10	0.2	Bipolar artefact	proximal BF										
36	5	y	663	3	Quartz	0		10.5-15	0.6	Bipolar artefact	proximal BF										
36	5	y	664	2	Quartz	0		05.5-10	0.2	Bipolar artefact	proximal BF										
36	5	y	665	1	Quartz	>60	11	10.5-15	0.2	FF/FP artefact											
36	5	y	666	4	Quartz	>60		05.5-10	0.6	FF/FP artefact											
36	5	y	667	4	Quartz	40-60		10.5-15	0.7	FF/FP artefact											
36	5	y	668	5	Quartz	40-60		05.5-10	0.6	FF/FP artefact											
36	5	y	669	6	Quartz	0		10.5-15	1.1	FF/FP artefact											
36	5	y	670	24	Quartz	0		05.5-10	2.5	FF/FP artefact											
36	5	y	671	1	Quartz	>60	7	05.5-10	0.0	broken piece											
36	5		972	1	S Wood	0	13.5	10.5-15	0.3	FF/FP artefact	medial										not good quality stone
38	2		672	1	FGS/MGS	0	22.5	20.5-25	2.5	Platform artefact	proximal BF	wide	(plain)		3	feather	17	(20)	5		rounding on dorsal ridges, breaks to platform & right lateral
38	2		673	1	FGS/MGS	<40	21	20.5-25	1.8	Platform artefact	flake	wide	cortex	86	5.5	feather	16.5	19	4		
38	2		674	1	FGS/MGS	0	11	10.5-15	0.1	Platform artefact	flake	wide	part broken	82	1.5	feather	8	8	0.5		
38	2		675	1	FGS/MGS	0	10	05.5-10	0.2	Platform artefact	proximal BF		crushed								
38	2		676	1	FGS/MGS	0	25	20.5-25	1.7	Bipolar artefact	flake	long	bipolar			feather	24.5	12.5	6	2 thin	
38	2		677	1	FGS/MGS	0	22	20.5-25	2.3	Bipolar Core	indeterminate						18	18	5	2 thin	poss rotated
38	2		678	1	FGS/MGS	0	21	20.5-25	0.9	Bipolar artefact	proximal BF		bipolar				(21)		4.5	1 thin	

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
38	2		679	1	FGS/MGS	40-60	18	15.5-20	0.7	FF/FP artefact	distal					feather	(17.5)	8	2.5		
38	2		680	2	FGS/MGS	0		15.5-20	0.6	FF/FP artefact	medial										
38	2		681	1	FGS/MGS	0	13	10.5-15	0.1	FF/FP artefact	medial										
38	2		682	1	FGS/MGS	0	9.5	05.5-10	0.2	FF/FP artefact	flaked piece										
38	2		683	1	FGS/MGS	40-60	20.5	20.5-25	1.1	broken piece											
38	2		684	2	FGS/MGS	0		10.5-15	0.6	broken piece											
38	2		685	1	Silcrete	0	12.5	10.5-15	0.4	broken piece	heat shatter?										
38	2		686	1	Quartz	40-60	9	05.5-10	0.1	FF/FP artefact	medial										
38	2		687	1	Quartz	<40	17.5	15.5-20	0.8	Bipolar artefact	flake	long	bipolar			bipolar	17	8.5	4	2 thin	
38	2		688	1	Quartz	0	9.5	05.5-10	0.2	Bipolar artefact	flake	wide				bipolar	7	7.5	2	2 thin	
38	2		689	1	Quartz	>60	14	10.5-15	0.4	FF/FP artefact											
38	2		690	2	Quartz	>60		05.5-10	0.3	FF/FP artefact											
38	2		691	2	Quartz	40-60	23	20.5-25	2.2	FF/FP artefact											
38	2		692	1	Quartz	40-60	16	15.5-20	0.9	FF/FP artefact											
38	2		693	1	Quartz	40-60	13	10.5-15	0.8	FF/FP artefact											
38	2		694	2	Quartz	<40		15.5-20	1.5	FF/FP artefact											
38	2		695	2	Quartz	<40		10.5-15	1.7	FF/FP artefact											
38	2		696	1	Quartz	0	21	20.5-25	1.1	FF/FP artefact											
38	2		697	2	Quartz	0		15.5-20	0.8	FF/FP artefact											
38	2		698	4	Quartz	0		10.5-15	1.5	FF/FP artefact											
38	2		975	1	FGS/MGS	0	15.5	10.5-15	0.3	Platform artefact	cone-split right										washed
38	2		976	1	S Wood	0	14.5	10.5-15	0.3	FF/FP artefact	medial										washed
38	2		977	1	Quartz	0	10.5	10.5-15	0.4	Bipolar artefact	cone-split left		bipolar								1 thin end, washed
38	3		699	1	Silcrete	0	10	05.5-10	0.1	FF/FP artefact	distal					feather			1		
38	3		700	1	Quartz	0	14	10.5-15	0.2	Platform artefact	flake	elongate	crushed			feather hinge	14	7	1		



Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
38	3		723	1	FGS/MGS	<40	8	05.5-10	0.1	FF/FP artefact											
38	3		724	1	FGS/MGS	0	24.5	20.5-25	2.6	FF/FP artefact	medial										
38	3		725	5	FGS/MGS	0		15.5-20	2.9	FF/FP artefact											
38	3		726	16	FGS/MGS	0		10.5-15	3.4	FF/FP artefact											
38	3		727	7	FGS/MGS	0		05.5-10	0.6	FF/FP artefact											
38	3		728	1	FGS/MGS	40-60	34.5	30.5-35	5.8	broken piece											
38	3		729	2	FGS/MGS	>60		10.5-15	1.2	broken piece											
38	3		730	1	FGS/MGS	0	10	05.5-10	0.2	broken piece											
38	3		731	1	FGS/MGS	0	13	10.5-15	0.2	FF/FP artefact	distal	(wide)				feather	(8)	12	1		
38	3		732	1	FGS/MGS	0	11	10.5-15	0.1	Bipolar artefact	flake	long	bipolar			feather	11	8	2	2 thin	
38	3		733	1	FGS/MGS	40-60	13.5	10.5-15	0.7	Bipolar artefact	flake	long	bipolar			bipolar	12	10	4	2 thin	
38	3		734	1	Quartz	<40	16	15.5-20	0.6	Bipolar artefact	flake	l=w	bipolar			feather	13.5	12	2.5	1 thin 1 flat	flat end is cortical platform
38	3		735	1	Quartz	>60	19	15.5-20	2.9	Bipolar artefact	split pebble	long	bipolar			bipolar	19	10.5	10.5	2 flat	curving pebble at ends, 1 end battered flat
38	3		736	1	Quartz	40-60	17	15.5-20	1.8	Bipolar artefact	flake	long	bipolar			bipolar	17	8	8.5	1 thin 1 flat	both ends cortex
38	3		737	1	Quartz	>60	18.5	15.5-20	1.1	Bipolar artefact	proximal BF	(long)	bipolar			bipolar	18.5	(10)	5	2 thin	
38	3		738	1	Quartz	>60	14	10.5-15	1.1	Bipolar artefact	flake	long	bipolar			bipolar	14	11	5.5	2 thin	
38	3		739	1	Quartz	0	10	05.5-10	0.3	Bipolar artefact	flake	wide	bipolar			bipolar	9	9.5	3.5	2 thin	from rotated core
38	3		740	1	Quartz	<40	23.5	20.5-25	0.8	Bipolar artefact	flake	elongate	bipolar			bipolar	23.5	5	4	1 thin 1 flat	flat end has cortex
38	3		741	1	Quartz	0	15	10.5-15	0.6	Bipolar artefact	flake	long	bipolar			bipolar	13.5	8	4.5	2 thin	
38	3		742	1	Quartz	40-60	14	10.5-15	0.4	Bipolar artefact	flake	elongate	bipolar			bipolar	12	5	5	1 thin 1 flat	flat end is half thin, half crushed flat
38	3		743	1	Quartz	0	11	10.5-15	0.3	Bipolar artefact	flake	l=w	bipolar			bipolar	9	7	3	2 thin	
38	3		744	1	Quartz	0	9.5	05.5-10	0.2	Bipolar artefact	flake	Long				bipolar	8	7	2	2 thin	
38	3		745	1	Quartz	0	16	15.5-20	1.2	Bipolar artefact	flake	Long	bipolar			bipolar	15	10	5.5	2 thin	inclusion interrupted fracture path





Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
38	3	y	796	5	Quartz	40-60		05.5-10	0.5	FF/FP artefact											
38	3	y	797	3	Quartz	0		10.5-15	0.6	FF/FP artefact											
38	3	y	798	11	Quartz	0		05.5-10	1.1	FF/FP artefact											
38	3		978	1	S Wood	0	21	20.5-25	1.0	FF/FP artefact	medial										minor crushing 1 end - poss from bipolar
38	3		979	1	S Wood	0	12	10.5-15	0.5	FF/FP artefact	flaked piece										
38	3		980	1	FGS/MGS	<40	10	05.5-10	0.1	broken piece	heat shatter?										
38	4		799	1	FGS/MGS	>60	26.5	25.5-30	2.2	Platform artefact	flake	wide	broken			feather	16	23	3		most of platform broken away due to cortex
38	4		800	1	FGS/MGS	<40 worn	13.5	10.5-15	0.3	Platform artefact	flake	wide	focal	72	1.5	feather hinge	10.5	11	1.5		
38	4		801	1	FGS/MGS	0	10	05.5-10	0.1	Platform artefact	flake	l=w	crushed			feather hinge	8.5	8	1		
38	4		802	1	FGS/MGS	40-60	24	20.5-25	2.1	Platform artefact	cone-split right		(focal)	85	1		(17.5)		4.5		
38	4		803	1	FGS/MGS	<40	38	35.5-40	14.1	Bipolar core	indeterminate						24	36.5	11	2 thin	
38	4		804	1	FGS/MGS	<40	29	25.5-30	5.1	Bipolar artefact	flake	long	bipolar			bipolar	27.5	24	7	2 thin	
38	4		805	1	FGS/MGS	0	27	25.5-30	5.3	Bipolar core	medial?						19	26	8.5	2 thin	short axis
38	4		806	1	FGS/MGS	0	24	20.5-25	2.2	Bipolar artefact	proximal BF		bipolar				(23.5)	14	4 max6	1 thin	prob struck from use polished implement
38	4		807	1	FGS/MGS	40-60	31	30.5-35	7.7	Bipolar core	medial						24	(25)	8	2 thin	short axis, poss rounding concave crushed edge
38	4		808	1	FGS/MGS	<40	26.5	25.5-30	4.2	Bipolar artefact	flake	long	bipolar			bipolar	24.5	16.5	8	2 thin	crushing lateral - poss dorsal of flake body
38	4		809	1	FGS/MGS	0	17	15.5-20	0.5	Bipolar artefact	flake	long	bipolar			bipolar	15	8	2.5	2 thin	
38	4		810	1	FGS/MGS	<40	12.5	10.5-15	0.4	Bipolar artefact	flake	long	bipolar			bipolar	11	9	3	2 thin	
38	4		811	1	FGS/MGS	0	35	30.5-35	4.1	Bipolar artefact	proximal BF		bipolar			bipolar	35.5	(11)	7 max11	1 thin 1 flat	thin end cortex, flat end flkd surface
38	4		812	1	FGS/MGS	<40	21.5	20.5-25	2.1	Bipolar artefact	proximal BF		bipolar				(21)	12	6.5	1 thin	thin end cortex
38	4		813	1	FGS/MGS	0	16	15.5-20	0.2	Bipolar artefact	proximal BF	(el)	bipolar				(14)	5	2 max3	1 thin	

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
38	4		814	1	FGS/MGS	<40	21	20.5-25	1.3	Platform artefact	proximal BF		crushed			step	(16)	18	2		bulb present
38	4		815	1	FGS/MGS	0	12	10.5-15	0.3	Bipolar artefact	proximal BF		bipolar			hinge step	8.5		2	1 thin	
38	4		816	1	FGS/MGS	0	20	15.5-20	0.3	FF/FP artefact	distal	(el)				feather	(20)	5	2		
38	4		817	1	FGS/MGS	0	14.5	10.5-15	0.3	FF/FP artefact	distal					feather			2		
38	4		818	1	FGS/MGS	>60	12	10.5-15	0.3	FF/FP artefact	distal		heavily crushed			feather hinge	(9.5)	8.5	2		proximal very heavily crushed
38	4		819	1	FGS/MGS	>60	22	20.5-25	1.3	FF/FP artefact	medial								4		
38	4		820	1	FGS/MGS	40-60	26.5	25.5-30	2.1	FF/FP artefact	medial								4		
38	4		821	1	FGS/MGS	<40	30	25.5-30	3.8	Platform artefact	proximal BF		cortex	84	7		(24)		3.5		prox right lateral has edge damage, edge broke during use
38	4		822	1	FGS/MGS	0	22.5	20.5-25	1.4	Platform artefact	proximal BF		crushed						4		right ventral split away
38	4		823	1	FGS/MGS	<40, 40-60 worn	23	20.5-25	1.3	Platform artefact	proximal BF		crushed				12	19	4.5		cortex left lateral, thin red concave surface part dorsal
38	4		824	1	FGS/MGS	<40 worn	16	15.5-20	0.3	FF/FP artefact	medial										
38	4		825	1	FGS/MGS	<40	16	15.5-20	0.7	Platform artefact	flake	wide	cortex	81		feather hinge step	8	16	3		flat cortical plat split away at PFA
38	4		826	1	FGS/MGS	>60 worn	11	10.5-15	0.2	Platform artefact	proximal BF	wide	focal			step	(7.5)	10.5	1		dorsal & platform has smooth rounded surface
38	4		827	1	FGS/MGS	40-60 worn	36	35.5-40	2.3	Bipolar artefact	proximal BF	(el)	bipolar				(35.5)	13	4 max7	1 thin	40% dorsal has smooth worn/rounded surface
38	4		828	1	FGS/MGS	40-60	19	15.5-20	2.3	FF/FP artefact	flaked piece										odd flaw surface with parallel lines
38	4		829	1	FGS/MGS	<40	12	10.5-15	0.4	FF/FP artefact	medial								2.5		
38	4		830	1	FGS/MGS	>60 worn	29.5	25.5-30	1.8	FF/FP artefact	distal	elongate				feather	29.5	8.5	6.5		pale worn/rounded dorsal surface
38	4		831	1	FGS/MGS	0	11.5	10.5-15	0.2	Platform artefact	proximal BF	(long)	focal	71	2		(10)	7	1.5		



Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
38	4		832	1	FGS/MGS	0	24.5	20.5-25	0.7	FF/FP artefact	distal	(el)				feather	(24)	8	3.5		
38	4		833	1	FGS/MGS	0	18	15.5-20	0.6	FF/FP artefact	distal					feather			4.5		
38	4		834	1	FGS/MGS	40-60	17	15.5-20	0.7	FF/FP artefact	distal					feather					potlid scars, breaks
38	4		835	1	FGS/MGS	40-60 worn	15	10.5-15	0.9	FF/FP artefact	flaked piece										poss flake from retouching sthg
38	4		836	1	FGS/MGS	0	28.5	25.5-30	4.8	FF/FP artefact	flaked piece						25	13.5	8		partial negative scars - poss core fragment
38	4		837	3	FGS/MGS	0		15.5-20	1.5	FF/FP artefact											
38	4		838	13	FGS/MGS	0		10.5-15	3.7	FF/FP artefact											
38	4		839	4	FGS/MGS	0		05.5-10	0.6	FF/FP artefact											
38	4		840	1	FGS/MGS	>60 worn	34.5	30.5-35	9.8	broken piece							33	20	8		irregular surfaces, poss flaked
38	4		841	2	FGS/MGS	0		15.5-20	1.6	broken piece											
38	4		842	4	FGS/MGS	0		10.5-15	1.9	broken piece											
38	4		843	1	FGS/MGS	0	7.5	05.5-10	0.1	broken piece											
38	4		844	1	S Wood	0	12	10.5-15	0.4	Platform artefact	proximal BF		broken			hinge step	(10	8.5	2.5		remnant uni platform dorsal ridge - from rotated core
38	4		845	1	Silcrete	0	10	05.5-10	0.1	FF/FP artefact	medial										
38	4		846	1	Silcrete	0	10.5	10.5-15	0.3	broken piece	heat shatter?										
38	4		847	1	Quartz	<40	16.5	15.5-20	0.7	Platform artefact	proximal BF		cortex	63	4		(12.5)	11	1.5		
38	4		848	1	Quartz	<40	17	15.5-20	0.9	Platform artefact	flake	wide	cortex	85	4	feather step	12	16.5	4		
38	4		849	1	Quartz	0	17.5	15.5-20	0.5	Platform artefact	proximal BF		plain	88	2.5		(13)	8.5	2.5		
38	4		850	1	Quartz	>60	29.5	25.5-30	3.9	Bipolar artefact	flake	elongate	bipolar			bipolar	29.5	12	9	1 thin 1 flat	both ends cortex
38	4		851	1	Quartz	<40	22.5	20.5-25	1.5	Bipolar artefact	flake	long	bipolar			bipolar	22.5	12	6.5	2 thin	
38	4		852	1	Quartz	40-60	19	15.5-20	2.1	Bipolar artefact	flake	long	bipolar			bipolar	19	12	8 max 10	2 thin	
38	4		853	1	Quartz	<40	17.5	15.5-20	1.6	Bipolar artefact	flake	wide	bipolar			bipolar	13	15	7.5	2 thin	

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
38	4		854	1	Quartz	<40	13	10.5-15	0.5	Bipolar artefact	proximal BF		bipolar			bipolar	12.5	(6.5)	4	2 thin	from rotated core
38	4		855	1	Quartz	>60	14	10.5-15	0.7	Bipolar artefact	flake	wide	bipolar			bipolar	10	12	5	2 thin	
38	4		856	1	Quartz	0	12	10.5-15	0.3	Bipolar artefact	flake	long	bipolar			bipolar	11	8.5	3	2 thin	
38	4		857	1	Quartz	0	12	10.5-15	0.2	Bipolar artefact	flake	long	bipolar			bipolar	11.5	5.5	2	2 thin	
38	4		858	1	Quartz	0	10.5	10.5-15	0.2	Bipolar artefact	flake	long	bipolar			bipolar	10	6	4	2 thin	
38	4		859	1	Quartz	>60	20	15.5-20	1.3	Bipolar artefact	proximal BF		bipolar				(19)		3	1 thin	
38	4		860	1	Quartz	40-60	22	20.5-25	2.0	Bipolar artefact	proximal BF		bipolar				(21)		6	1 thin	
38	4		861	1	Quartz	40-60	19	15.5-20	1.1	Bipolar artefact	proximal BF		bipolar				(17.7)		4	1 thin	
38	4		862	1	Quartz	0	20	15.5-20	1.2	Bipolar artefact	proximal BF		bipolar				(17.5)	12.5	3	1 thin	
38	4		863	1	Quartz	0	13.5	10.5-15	0.7	Bipolar artefact	proximal BF		bipolar						3.5	1 thin	
38	4		864	1	Quartz	40-60	14	10.5-15	0.6	Bipolar artefact	proximal BF		bipolar						3	1 thin	
38	4		865	1	Quartz	<40	12	10.5-15	0.4	Bipolar artefact	proximal BF		bipolar						2.5	1 thin	
38	4		866	1	Quartz	0	12	10.5-15	0.3	Bipolar artefact	proximal BF		bipolar						2	1 thin	
38	4		867	1	Quartz	40-60	13	10.5-15	0.5	Bipolar artefact	proximal BF		bipolar						4	1 thin	
38	4		868	1	Quartz	<40	10.5	10.5-15	0.2	Bipolar artefact	proximal BF		bipolar							1 thin	
38	4		869	1	Quartz	0	16	15.5-20	0.2	Bipolar artefact	proximal BF		bipolar							1 thin	from rotated core
38	4		870	1	Quartz	40-60	10	05.5-10	0.3	Bipolar artefact	proximal BF		bipolar						4	1 thin	
38	4		871	1	Quartz	<40	11	10.5-15	0.5	Bipolar artefact	proximal BF		bipolar						4	1 flat	flat end is cortex
38	4		872	1	Quartz	>60	10	05.5-10	0.1	Bipolar artefact	proximal BF		bipolar						2	1 thin	
38	4		873	1	Quartz	40-60	9	05.5-10	0.2	Bipolar artefact	proximal BF										
38	4		874	1	Quartz	0	9	05.5-10	0.1	Bipolar artefact	proximal BF										
38	4		875	1	Quartz	>60	7	05.5-10	0.0	Bipolar artefact	proximal BF										
38	4		876	1	Quartz	0	7	05.5-10	0.1	Bipolar artefact	proximal BF										
38	4		877	1	Quartz	>60	25	20.5-25	4.2	FF/FP artefact	flaked piece										
38	4		878	3	Quartz	>60		15.5-20	1.8	FF/FP artefact											1 has 2 flat cortical ends pebble striking axis 19mm long

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments	
38	4		879	3	Quartz	>60		10.5-15	0.8	FF/FP artefact												
38	4		880	3	Quartz	40-60		15.5-20	3.3	FF/FP artefact												
38	4		881	8	Quartz	40-60		10.5-15	4.5	FF/FP artefact												
38	4		882	5	Quartz	40-60		05.5-10	1.0	FF/FP artefact												
38	4		883	4	Quartz	<40		15.5-20	3.4	FF/FP artefact												
38	4		884	9	Quartz	<40		10.5-15	3.3	FF/FP artefact												
38	4		885	11	Quartz	<40		05.5-10	2.0	FF/FP artefact												
38	4		886	4	Quartz	0		15.5-20	2.9	FF/FP artefact												
38	4		887	18	Quartz	0		10.5-15	6.9	FF/FP artefact												
38	4		888	18	Quartz	0		05.5-10	2.8	FF/FP artefact												
38	4		889	1	Quartz	40-60	20	15.5-20	3.0	broken piece												
38	4		890	1	Quartz	40-60	12	10.5-15	0.7	broken piece												
38	4		891	2	Quartz	<40		15.5-20	2.2	broken piece												
38	4		892	3	Quartz	<40		10.5-15	3.2	broken piece												
38	4		893	2	Quartz	0		10.5-15	0.7	broken piece												
38	4		894	1	Quartz	0	9.5	05.5-10	0.1	broken piece												
38	4		895	1	Quartz	100	21	20.5-25	5.3	Manuport?	pebble						19.5	18	10		1 end flat cortex	
38	4		896	1	Quartz	100	18.5	15.5-20	3.5	Manuport?	pebble						15.5	14.5	9		1 end flat cortex	
38	4		897	1	Quartz	0	13.5	10.5-15	1.3	Manuport?	pebble						10.5	10	7.5		irregular shape	
38	4		898	1	Quartz	>60	16.5	15.5-20	2.3	Bipolar artefact	split pebble	long	bipolar			bipolar	17	10	9 max 10	2 flat	both flat ends are cortex	
38	4		899	1	Quartz	>60	27	25.5-30	5.3	broken piece	pebble piece						max20	22	Max 11.5		probably split short axis, 2 flat ends	
38	4		900	1	Quartz	>60	17.5	15.5-20	3.6	broken piece	pebble piece						14	16	10.5		probably split short axis, 2 flat ends	
38	4		901	1	Quartz	40-60	17.5	15.5-20	2.0	Bipolar artefact	split pebble		bipolar			bipolar	10.5	13	11.5	2 flat	split short axis, 2 flat cortex ends	
38	4		902	1	Quartz	0	16.5	15.5-20	0.7	Bipolar artefact	cone-split		(bipolar)			(bipolar)	15.5		5	2 thin		

Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments
38	4		903	1	Quartz	0	11	10.5-15	0.3	Bipolar artefact	flake	long	bipolar			bipolar	11	7	3.5	2 thin	
38	4		904	1	Quartz	0	15	10.5-15	0.4	Bipolar artefact	proximal BF		bipolar				(14.5)	(10)	2.5	1 thin	
38	4		905	1	Quartz	40-60	18	15.5-20	0.2	FF/FP artefact	distal	elongate				feather	(18)	5	2.5		
38	4		906	1	Quartz	0	14	10.5-15	0.3	FF/FP artefact	distal					feather			2		
38	4		907	1	Quartz	0	12	10.5-15	0.2	FF/FP artefact	distal					feather			2		
38	4		908	1	Quartz	<40	12	10.5-15	0.3	FF/FP artefact	distal					feather			2.5		
38	4		909	1	Quartz	>60	9	05.5-10	0.0	FF/FP artefact	distal										
38	4		910	1	Quartz	0	15.5	15.5-20	0.8	Platform artefact	proximal BF		plain	101	4		(12.5)	12	2.5		cone split vertically but artefact didn't split
38	4		911	1	FGS/MGS	0	14	10.5-15	0.2	Bipolar artefact	proximal BF		bipolar						1.5	1 thin	
38	4		912	1	FGS/MGS	0	10	05.5-10	0.3	Bipolar artefact	cone-split right		(bipolar)			(feather)	9.5		2.5	2 thin	
38	4		913	1	FGS/MGS	0	15	10.5-15	0.1	FF/FP artefact	distal					(hinge)			1		
38	4		981	1	Silcrete	0	8	05.5-10	0.2	FF/FP artefact	flaked piece										
38	5		914	1	Silcrete	0	14	10.5-15	0.2	Backed artefact	flake		faceted				14	5.5	1.5		BASI CL=14, MW=7, LMW=1.5
38	5		915	1	FGS/MGS	<40	24	20.5-25	3.5	Platform artefact	proximal BF		cortex+ridge	65	7	step	18	21	6		poss polish on dorsal at distal end, damage left lateral
38	5		916	1	FGS/MGS	<40	18	15.5-20	0.4	Platform artefact	proximal BF	(wide)	cortex	46	2	feather	9	(13)	1.5		dorsal slightly worn/polished
38	5		917	1	FGS/MGS	0	15.5	15.5-20	0.5	Platform artefact	proximal BF	(wide)	focal	80	1.5	feather hinge	12.5	14	2		
38	5		918	1	FGS/MGS	0	12	10.5-15	0.1	Platform artefact	flake	wide	crushed			feather hinge	7	11	1.5		
38	5		919	1	FGS/MGS	0	16	15.5-20	0.5	Platform artefact	proximal BF		crushed				(14)	(10.5)	2		
38	5		920	1	FGS/MGS	0	14.5	10.5-15	0.2	Platform artefact	flake	wide	ridge	30	2.5	feather	5	9 max14	1.5		
38	5		921	1	FGS/MGS	0	10	05.5-10	0.1	Platform artefact	proximal BF										
38	5		922	1	FGS/MGS	0	25	20.5-25	1.4	FF/FP artefact	distal					(hinge)			3		
38	5		923	1	FGS/MGS	0	20	15.5-20	1.0	FF/FP artefact	distal					feather			max6		



Pit	Spit	3mm mesh	ID	Count	Material	Cortex	Max Size	Size category	Weight	Category	Type	Shape	Platform	Plat Angle	Plat Depth	Distal	Length	Width	Thick	Ends	Comments	
38	5		949	1	Quartz	40-60	10	05.5-10	0.2	FF/FP artefact												
38	5		950	1	Quartz	<40	18	15.5-20	0.9	FF/FP artefact												
38	5		951	1	Quartz	<40	13.5	10.5-15	0.7	FF/FP artefact												
38	5		952	2	Quartz	<40		05.5-10	0.3	FF/FP artefact												
38	5		953	5	Quartz	0		15.5-20	5.0	FF/FP artefact												
38	5		954	11	Quartz	0		10.5-15	3.0	FF/FP artefact												
38	5		955	9	Quartz	0		05.5-10	1.6	FF/FP artefact												
38	5		956	1	Quartz	40-60	16	15.5-20	1.4	broken piece												
38	5		957	1	Quartz	>60	14	10.5-15	0.9	broken piece												
38	5		958	1	Quartz	<40	12	10.5-15	0.5	broken piece												
38	5		959	1	Quartz	0	8.5	05.5-10	0.2	broken piece												
38	5		960	1	Quartz	100	23	20.5-25	8.0	Manuport?	pebble						22	20.5	13.5			almost rectangular, possible impact points 1 flattish corner
38	5		961	1	Quartz	100	18	15.5-20	4.3	Manuport?	pebble						15	14.5	12			1 flat cortical end
38	5		982	1	FGS/MGS	0	8.5	05.5-10	0.2	Flaked surface												heat shatter breaks
38	5		983	1	Quartz	0	13	10.5-15	0.3	Bipolar artefact	flake	elongate	bipolar			bipolar	13	6	3	2 thin	not blade	
38	6		962	1	Sandstone?	<40	43	40.5-45	10.6	Platform artefact	flake	l=w	cortex	76	5	feather hinge	34	30.5	10			
38	6		963	1	Quartz	<40	21	20.5-25	1.5	Bipolar artefact	flake	long	bipolar			feather	19.5	13 max14	3	2 thin		
38 ext	3		984	1	Unidentified	0	9	05.5-10	0.1	broken piece												brown glossy patinated irregular, washed
38 ext	3	y	985	1	FGS/MGS	0	10.5	10.5-15	0.1	Platform artefact	proximal BF		broken									
38 ext	4		986	1	Quartz	0	11	10.5-15	0.2	Bipolar artefact	flake	long	bipolar			bipolar	10	7	2.5	2 thin		
38 ext	4		987	1	Quartz	>60	13	10.5-15	0.4	Bipolar artefact	proximal BF	(long)	bipolar					10	2	1 thin		
38 ext	4		988	1	Quartz	0	10.5	10.5-15	0.3	Bipolar artefact	proximal BF		bipolar						3	1 thin		
38 ext	4		989	1	Quartz	0	13.5	10.5-15	0.3	FF/FP artefact	distal					feather						



# Appendix 6

## *Shell analysis data*



### Appendix 6.1: Total shell weights for all excavated units

TP9	TP9	TP8	TP8	TP8	TP8	TP8	TP7	TP7	TP
3	2	3	2	1	3	2			Spit
1			1						3mm weight
25.7	0.9	10.3	4.1	0.7	0.1	0.8			5mm weight TOTAL
0.7			2.3	0.1	0.1	0.8			Unid'd shell weight
									Unid'd limpets
			1.1						Large Turban
									Small turban
									Sydney Rock Oyster
									Mud Oyster
									Hairy Mussel
									Edible mussel
	0.9		0.7						Black periwinkle
25		7.3							Triton
									Cartrut
									Colourful limpet
									Scaly limpet
									8-rayed Limpet
									Chiton
									Barnacle
									Scallop
									Sea urchin
									Sydney Cockle
									Bembicium nanum
									Bembicium auratum
									Prothaliota
									Pipi
									Hercules Whelk
									Veneridae family
				0.6					Austrocochlea
									Austrocochlea
									Austrocochlea sp.
									Sand snail
									Abalone
									Crab
									Worm tubes
		3							Bell Tent Shell
									Cuttlefish
									Bedeva hanleyi
									Elephant snail
									Crepidula aculeata
									Rock shell
									Hiatella australis
									Cardita excavata
									Lima nimbifer
									Codakia rugifera
									Clanculus floridus
									Antisabia foliacea
									Marula marginalba
									Conidae Family
									Cassidae Family
									Opalia australis
									Bittium lacertinum
									Circe sugillata

TP14	TP13	TP13	TP13	TP13	TP13	TP10	TP10	TP10	TP10	TP10	TP
2	4	3	2	1	5	4	2				Spit
					1	2					3mm weight
0.2	9	4.2	0.9	5.8	46.8	79.3	1.3				5mm weight TOTAL
0.2	1.4	1.8	0.8	0.9	6.5	4.2	1.3				Unid'd shell weight
				0.3							Unid'd limpets
	2.5	0.7		0.8	22.5	54.2					Large Turban
					0.8	3.8					Small turban
	1.7	1.5		1.2							Sydney Rock Oyster
											Mud Oyster
		0.2		0.4							Hairy Mussel
											Edible mussel
					0.3	9.5					Black periwinkle
	2.9			6.2	5.3						Triton
						0.3					Cartrut
											Colourful limpet
											Scaly limpet
											8-rayed Limpet
			0.1								Chiton
											Barnacle
											Scallop
											Sea urchin
				2.2	10.5	1.3					Sydney Cockle
											Bembicium nanum
											Bembicium auratum
											Prothaliota
											Pipi
											Hercules Whelk
											Veneridae family
	0.2										Austrocochlea
											Austrocochlea
											Austrocochlea sp.
											Sand snail
											Abalone
											Crab
											Worm tubes
											Bell Tent Shell
											Cuttlefish
											Bedeva hanleyi
								0.7			Elephant snail
											Crepidula aculeata
											Rock shell
											Hiatella australis
											Cardita excavata
											Lima nimbifer
											Codakia rugifera
	0.3										Cianculus floridus
											Antisabia foliacea
											Marula marginalba
											Conidae Family
											Cassidae Family
											Opalia australis
											Bittium lacertinum
											Circe sugillata

TP19	TP18	TP17	TP16	TP16	TP15	TP15	TP15	TP15	TP15	TP
2	1	4	3	2	5	4	3			Spit
		1	1							3mm weight
22	17.9	11.5	76.3	1.1	12	1.4	16.5			5mm weight TOTAL
		0.6	14.9	1.1		0.4				Unid'd shell weight
										Unid'd limpets
15.1		8.3	13.1		9.6	1	0.5			Large Turban
	17.9									Small turban
										Sydney Rock Oyster
										Mud Oyster
										Hairy Mussel
										Edible mussel
			0.7							Black periwinkle
1.7			23.5		2.4		13.9			Triton
										Cartrut
0.3										Colourful limpet
										Scaly limpet
										8-rayed Limpet
										Chiton
			0.1				0.3			Barnacle
										Scallop
										Sea urchin
		2.6					1.8			Sydney Cockle
										Bembicium nanum
										Bembicium auratum
										Prothaliota
										Pipi
			24							Hercules Whelk
										Veneridae family
										Austrocochlea
										Austrocochlea
										Austrocochlea sp.
										Sand snail
4.9										Abalone
										Crab
										Worm tubes
										Bell Tent Shell
										Cuttlefish
										Bedeva hanleyi
										Elephant snail
										Crepidula aculeata
										Rock shell
										Hiatella australis
										Cardita excavata
										Lima nimbifer
										Codakia rugifera
										Cianculus floridus
										Antisabia foliacea
										Marula marginalba
										Conidae Family
										Cassidae Family
										Opalia australis
										Bittium lacertinum
										Circe sugillata

TP24	TP23	TP21	TP20	TP20	TP20	TP20	TP20	TP20	TP20	TP20	TP
1	3	3	4	3	2	1					Spit
			429	310.4	347.2	0.3					3mm weight
16.1	66	21	1311.3	683	391.8	11.7					5mm weight TOTAL
1.5			286.5	174	88.6	0.3					Unid'd shell weight
0.4			72.2	19.7	11	0.4					Unid'd limpets
0.6			160	89	63	7.9					Large Turban
1.1	66		158	66	15.1						Small turban
			16.9	4.4	5.4						Sydney Rock Oyster
			14.2	7.9							Mud Oyster
1.7			55.6	5.4	6.2	0.5					Hairy Mussel
			27.3	29.3	4.8						Edible mussel
1.5			60.4	10.3	15.4						Black periwinkle
2.9		21	94	32.2	14						Triton
			8.5	7.9	30						Cartrut
1.3			24.8	5.3	5.2						Colourful limpet
1.7			20.3	8.1	3.4						Scaly limpet
0.5			6.7	3.8	1.5						8-rayed Limpet
			6.6	10.7	3.9						Chiton
2.8			173	153	78.2						Barnacle
			0.4								Scallop
			0.8	1.1	0.2						Sea urchin
			22	1.4	1.6						Sydney Cockle
			2.8	1.1	1.4						Bembicium nanum
			1.8	1.1	1.9						Bembicium auratum
			0.1								Prothaliota
			1.6								Pipi
											Hercules Whelk
			10.4	8.6							Veneridae family
			5.8	9.7	0.8						Austrocochlea
			4.4	0.4	3						Austrocochlea
			5.8								Austrocochlea sp.
0.1			1.2			2.6					Sand snail
			3.4	17.7	7.3						Abalone
				0.2							Crab
			1.2	15.5							Worm tubes
			47.8	63	23.7						Bell Tent Shell
											Cuttlefish
				1.1							Bedeva hanleyi
			1.2								Elephant snail
			8.6	13	0.2						Crepidula aculeata
					2.5						Rock shell
			1.8								Hiatella australis
			1.8	5.5							Cardita excavata
			0.7		0.1						Lima nimbifer
											Codakia rugifera
					0.9						Cianculus floridus
			2.4	1	2.5						Antisabia foliacea
				0.5							Marula marginalba
				1.9							Conidae Family
			2.1								Cassidae Family
											Opalia australis
											Bittium lacertinum
											Circe sugillata

TP27	TP25	TP25	TP25	TP25	TP24	TP24	TP24	TP24	TP24	TP24	TP
1	3	2	1	5	4	3	2				Spit
1	78			1300	1780	1132					3mm weight
32.5	558.9	30	13.9	758.6	1046.5	1033.6	48.2				5mm weight TOTAL
2	98.3	0.3	1.1	71.6	288	213.5	1.7				Unid'd shell weight
5.8	3.1			15.2	21.8	24.9	0.4				Unid'd limpets
5.5	103	14.3	4.4	48.9	54.6	75.4	11				Large Turban
9.6	33	4.4	0.4	78	51.1	63	2.5				Small turban
	3.8			2.3	7	17.5	0.5				Sydney Rock Oyster
				1.5			10.2				Mud Oyster
1.1	8.1		3.2	41	11.4	5.9	1.3				Hairy Mussel
	72	0.3		69	137.1	70					Edible mussel
0.6	23.9			34.5	45.8	40.2					Black periwinkle
1.8	143	5.3		51	51.8	50.4					Triton
	6.3		1.9		14.2	11.9					Cartrut
3.6	3.9			17.6	22.1	24.5	5				Colourful limpet
1.4	3.9	1.5	1.9	11.1	17.1	11	2.4				Scaly limpet
	0.9			5.1	10	3.6					8-rayed Limpet
	3.4			7.6	17	11.7					Chiton
	28.8		1	246	250.2	335					Barnacle
											Scallop
				0.2	1.4	0.8					Sea urchin
		1.1		0.3		0.9					Sydney Cockle
				3.5	4	3.7					Bembicium nanum
	1.8			2.4	1	3.8					Bembicium auratum
											Prothaliota
											Pipi
											Hercules Whelk
	1			4.2	1	19.6	1.2				Veneridae family
	0.5			4.2	5.4	4.8					Austrocochlea
	11.1			3.2	2.7	3.7					Austrocochlea
											Austrocochlea sp.
		1.3				0.2					Sand snail
1.1	6.5			2.7	5.5	11.6					Abalone
				0.6	0.9						Crab
				0.2	9	1.6					Worm tubes
	1.4	1.5		15.4	11.2	8					Bell Tent Shell
											Cuttlefish
											Bedeva hanleyi
											Elephant snail
					0.7		0.7				Crepidula aculeata
						3.3	11.3				Rock shell
											Hiatella australis
					1.9	8					Cardita excavata
											Lima nimbifer
				19.6							Codakia rugifera
						0.7					Cianculus floridus
	1.2			1.3	2.6	3.3					Antisabia foliacea
				0.4		1.1					Marula marginalba
											Conidae Family
											Cassidae Family
											Opalia australis
											Bittium lacertinum
											Circe sugillata

TP28A	TP28B	TP28A	TP28B	TP28A	TP28B	TP28A	TP28B	TP27	TP27	TP27	TP27	TP
3	2	2	1	1		4	3	2				Spit
692	33	69				1688	2110	534				3mm weight
1155.7	50.3	124.1	0.8	4.6		2540.9	1599.6	943				5mm weight TOTAL
91	9.7	0.1				571	4.31	175.3				Unid'd shell weight
4.9		0.6				36.6	38.6	34.5				Unid'd limpets
104	3.6	3.9				198.4	366	226				Large Turban
236.5	7.6	26.9	0.5	1		196	277	61				Small turban
8.1	11.8	6.3				5.7	53.6	0.9				Sydney Rock Oyster
43.3		11.2				327	2.1					Mud Oyster
245.1	0.4	5.2				322	46.1	6.9				Hairy Mussel
31.3	1.8	5				60	131	37.3				Edible mussel
241.1	3.8	34				65.9	57.2	23.9				Black periwinkle
17.4	8.2	6.2				137	63	89.6				Triton
17.7			0.3			62.1	52.4	14.2				Cartrut
5						21.4	17.9	4.4				Colourful limpet
6.9	0.6	0.2				27.9	17	16.2				Scaly limpet
1.2		0.1				12.2	8.4	3.6				8-rayed Limpet
3.6	0.5					30.9	20.6	6.5				Chiton
34.4	0.7	7.2				304	299	151				Barnacle
												Scallop
							0.3	0.7				Sea urchin
						7.8	12.5	5.3				Sydney Cockle
0.5						2.4	2.7	0.7				Bembicium nanum
2.8						5.3	2.7	2.2				Bembicium auratum
						0.3	0.8					Prothaliota
												Pipi
						44.7						Hercules Whelk
23.4						11.6	26.4	14.3				Veneridae family
	1.4	6.8				8.4	4.8	2.3				Austrocochlea
						2.9	7.7	12.6				Austrocochlea
3.4												Austrocochlea sp.
						0.5	0.4					Sand snail
8	0.2	0.6				11.8	5.9	16.8				Abalone
						0.6						Crab
18.4						11.4	0.2	1.7				Worm tubes
4.9		9.7				30.9	66.8	5.5				Bell Tent Shell
						3.5						Cuttlefish
												Bedeva hanleyi
						1.3						Elephant snail
0.6						0.7	1.4					Crepidula aculeata
1.2						12.7	5.4	27				Rock shell
0.4						0.7	0.5					Hiatella australis
												Cardita excavata
												Lima nimbifer
												Codakia rugifera
						0.2	1.5	0.1				Cianculus floridus
						5.1	2	2.2				Antisabia foliacea
								0.3				Marula marginalba
												Conidae Family
							3					Cassidae Family
							0.3					Opalia australis
0.6		0.1					0.1					Bittium lacertinum
												Circe sugillata

TP30	TP29	TP29	TP28B	TP28A	TP28B	TP28A	TP28B	TP28A	TP28B	TP28A	TP28B	TP
3	3	2	5	5	4	4	4	4	3			Spit
			82	60	240	211	395					3mm weight
4.8	1	0.6	279	53.4	417.1	368.8	670.9					5mm weight TOTAL
		0.6	15	5	58.9	52	47.2					Unid'd shell weight
			1	1.8	10.4	6.3	8.5					Unid'd limpets
			48.7		150	36	50.2					Large Turban
	1		71	9.3	70.6	78	126					Small turban
							9.3					Sydney Rock Oyster
			72.8		2.3	8.1						Mud Oyster
			4	1.7	4.8	27	161.3					Hairy Mussel
			1.8	1.1	21.7	21	12.5					Edible mussel
			4.3	12.4	24.5	23	158.2					Black periwinkle
4.8			43.1	7.3	13	52	44.5					Triton
				0.5		0.8	8.1					Cartrut
			0.4	0.4	2.4	9	1.9					Colourful limpet
			0.3	0.6	8.4	4.6	1.8					Scaly limpet
			0.5	0.2	1.6	0.9	1.2					8-rayed Limpet
			0.9	1.3	1.1	3.7	2					Chiton
			2.5	2	22.5	24	12					Barnacle
												Scallop
							0.2					Sea urchin
			2.7									Sydney Cockle
					0.6	0.4	1.1					Bembicium nanum
						1.1	0.3					Bembicium auratum
												Prothaliota
			1.1			2.4						Pipi
												Hercules Whelk
							5					Veneridae family
												Austrocochlea
												Austrocochlea
			0.8			2.7	3.4					Austrocochlea sp.
				0.1	0.2		1.9					Sand snail
			2.4		5.5	2.5	0.4					Abalone
												Crab
							0.4					Worm tubes
			5.7	9.7	17.4	5	10.6					Bell Tent Shell
												Cuttlefish
												Bedeve hanleyi
												Elephant snail
						1.2						Crepidula aculeata
												Rock shell
							2.4					Hiatella australis
					1.2	0.7						Cardita excavata
												Lima nimbifer
												Codakia rugifera
												Cianculus floridus
												Antisabia foliacea
												Marula marginalba
												Conidae Family
												Cassidae Family
												Opalia australis
							0.5					Bittium lacertinum
							6.4					Circe sugillata

TP32	TP32	TP31	TP31	TP31	TP31	TP31	TP31	TP31	TP31	TP30	TP30	TP
4	3	5	4	3	2	5	4					Spit
0.4		1	51	1								3mm weight
7.9	11.7	4.3	16.8	68.2	6	8.2	1.9					5mm weight TOTAL
1.5		1.5	3.1			1.7	0.4					Unid'd shell weight
												Unid'd limpets
6.4		2.8	6.9	29.4								Large Turban
					6							Small turban
												Sydney Rock Oyster
												Mud Oyster
												Hairy Mussel
			0.1									Edible mussel
												Black periwinkle
	11.7		6.7	37	6.5							Triton
												Cartrut
												Colourful limpet
												Scaly limpet
												8-rayed Limpet
												Chiton
				0.4								Barnacle
												Scallop
												Sea urchin
							1.5					Sydney Cockle
												Bembicium nanum
												Bembicium auratum
												Prothaliota
												Pipi
							1.4					Hercules Whelk
												Veneridae family
												Austrocochlea
												Austrocochlea
												Austrocochlea sp.
												Sand snail
												Abalone
												Crab
												Worm tubes
												Bell Tent Shell
												Cuttlefish
												Bedeva hanleyi
												Elephant snail
												Crepidula aculeata
												Rock shell
												Hiatella australis
												Cardita excavata
												Lima nimbifer
												Codakia rugifera
												Cianculus floridus
												Antisabia foliacea
												Marula marginalba
												Conidae Family
												Cassidae Family
												Opalia australis
												Bittium lacertinum
												Circe sugillata



TP36	TP35	TP35	TP35	TP35	TP35	TP35	TP35	TP35	TP33	TP33	TP33	TP32	TP
2	4	3	2	1	4	3	5						Spit
1	36	3	1								0.1		3mm weight
8.6	310.2	239.6	19.5	0.7	3.7	16.8	0.1						5mm weight TOTAL
1.3	12.6	1.8				2.5	0.1						Unid'd shell weight
													Unid'd limpets
	61.8	57	1.9			5.9							Large Turban
	4.6												Small turban
		122		0.7									Sydney Rock Oyster
	5.9					8.4							Mud Oyster
	0.1	0.3											Hairy Mussel
	1.4	1											Edible mussel
	2												Black periwinkle
	41	5.9	14.7		3.7								Triton
0.5	2.3	12.5											Cartrut
													Colourful limpet
													Scaly limpet
													8-rayed Limpet
													Chiton
		0.3											Barnacle
													Scallop
													Sea urchin
6.8	6.1	4.8											Sydney Cockle
													Bembicium nanum
													Bembicium auratum
													Prothaliota
													Pipi
	172	34	2.9										Hercules Whelk
													Veneridae family
													Austrocochlea
													Austrocochlea
													Austrocochlea sp.
													Sand snail
	0.4												Abalone
													Crab
													Worm tubes
													Bell Tent Shell
													Cuttlefish
													Bedeva hanleyi
													Elephant snail
													Crepidula aculeata
													Rock shell
													Hiatella australis
													Cardita excavata
													Lima nimbifer
													Codakia rugifera
													Cianculus floridus
													Antisabia foliacea
													Marula marginalba
													Conidae Family
													Cassidae Family
													Opalia australis
													Bittium lacertinum
													Circe sugillata

TP38	TP38	TP38	TP38	TP38	TP38	TP37	TP36	TP36	TP36	TP
4	3 (Ext)	3	2	3	5	4	3			Spit
495	12.1	5.5	0.1		2	18	16			3mm weight
191.2	71.5	51.5	1.4	80	32.4	11.5	255.6			5mm weight TOTAL
17.2	12	3.9			7.5	7.7	6.2			Unid'd shell weight
										Unid'd limpets
69	53	3					119			Large Turban
0.3							1.1			Small turban
		0.2								Sydney Rock Oyster
0.6		11.6					24.9			Mud Oyster
							1.1			Hairy Mussel
					0.1	2.1	11.4			Edible mussel
							2.1			Black periwinkle
90	4.5	32.8	1.4	80	21	0.3	85.2			Triton
					2.8		1.8			Cartrut
										Colourful limpet
										Scaly limpet
	0.1									8-rayed Limpet
										Chiton
							1.4			Barnacle
										Scallop
										Sea urchin
6.4	0.9					1.4	1.4			Sydney Cockle
										Bembicium nanum
										Bembicium auratum
										Prothaliota
										Pipi
7.7	1				1					Hercules Whelk
										Veneridae family
										Austrocochlea
										Austrocochlea
										Austrocochlea sp.
										Sand snail
										Abalone
										Crab
										Worm tubes
										Bell Tent Shell
										Cuttlefish
										Bedeva hanleyi
										Elephant snail
										Crepidula aculeata
										Rock shell
										Hiatella australis
										Cardita excavata
										Lima nimbifer
										Codakia rugifera
										Cianculus floridus
										Antisabia foliacea
										Marula marginalba
										Conidae Family
										Cassidae Family
										Opalia australis
										Bittium lacertinum
										Circe sugillata

Total weight	TP38	TP
	5	Spit
	53.1	3mm weight
17320.	205.3	5mm weight TOTAL
2557.5	29.5	Unid'd shell weight
377.4	29.5	Unid'd limpets
2541.7	89.4	Large Turban
1891.8	1.7	Small turban
283.6	2.8	Sydney Rock Oyster
552		Mud Oyster
988		Hairy Mussel
794		Edible mussel
921	3.1	Black periwinkle
1661.1	21	Triton
270		Cartrut
219.1		Colourful limpet
185.2		Scaly limpet
63		8-rayed Limpet
143		Chiton
2385.8		Barnacle
0.4		Scallop
6.6		Sea urchin
107.2	3.9	Sydney Cockle
27.1		Bembicium nanum
29.8		Bembicium auratum
1.2		Prothaliota
5.1		Pipi
313.1	24.4	Hercules Whelk
126.7		Veneridae family
60.6		Austrocochlea
51.7		Austrocochlea
16.1		Austrocochlea sp.
8.5		Sand snail
116.4		Abalone
2.3		Crab
59.6		Worm tubes
365.5		Bell Tent Shell
3.5		Cuttlefish
1.1		Bedeva hanleyi
3.2		Elephant snail
5.5		Crepidula aculeata
83.8		Rock shell
5.4		Hiatella australis
20.7		Cardita excavata
0.8		Lima nimbifer
19.6		Codakia rugifera
3.7		Cianculus floridus
23.6		Antisabia foliacea
2.3		Marula marginalba
1.9		Conidae Family
5.1		Cassidae Family
0.3		Opalia australis
1.3		Bittium lacertinum
6.4		Circe sugillata









### Appendix 6.3: Fragmentation % per excavated pit

TP	Area	Total 5mm weight (g)	Total Fragment weight (g)	% fragments per pit
TP7	Other	0.9	0.9	100
TP8	Other	15.1	7.2	48
TP9	Other	26.6	4.2	16
TP10	Upper	127.4	96.9	76
TP13	Other	19.9	18.2	91
TP14	Other	0.2	0.2	100
TP15	Upper	29.9	29.9	100
TP16	Upper	77.4	77.4	100
TP17	Other	11.5	11.5	100
TP18	Other	17.9	0	0
TP19	Other	22	8	36
TP20	Lower	3507	2790.6	80
TP21	Other	21	0	0
TP23	Lower	66	23	35
TP24	Lower	2903	2553.3	88
TP25	Lower	602.8	436.2	72
TP27	Lower	5116.01	3676.81	72
TP28	Lower	3124.7	2344.5	75
TP29	Other	1.6	1.6	100
TP30	Upper	14.9	14.9	100
TP31	Upper	95.3	95.3	100
TP32	Upper	19.7	19.7	100
TP33	Upper	20.5	20.5	100
TP35	Upper	570	283.3	50
TP36	Upper	308.1	146.2	47
TP37	Upper	80	80	100
TP38	Upper	520.9	431.6	83



## Appendix 6.4. Shell artefact points of measurement

Artefact Type	Measurement	Description
Fish hook blank & Turban cores	Width	Maximum dimension following the growth rings ie horizontal
Fish hook blank & Turban cores	Height	Maximum dimension perpendicular to the growth rings
Fish hook blank & Turban cores	Shell Thickness	Thickness of shell at edge at thickest point as measured with callipers
Fish hook blank & Turban cores	Maximum Concavity	Measurement of greatest “thickness” of blank based on its concavity. This could be used to determine whether from a ninella or subninella (on basis of size ie small size and high concavity might imply subninella)
Fish hook blank	Percent cortex	Visual estimate of percent of shell cortex (original outer surface) present as proportion of total dorsal surface
Turban cores	Height of Shell	Maximum height (where measurable) of the whole shell
Turban cores	Diameter of Shell	Maximum diameter (where measurable) of the whole shell
Turban cores	Start/End Blank	Measurement of position of blank on shell. Taken as degrees around the central columella from the aperture. For example a blank removed starting from the aperture would have a start of 0° and an end of the number of degrees round the shell from the aperture that the blank stops. For blanks taken from a top whorl (ie past a full rotation of the whorl from the aperture) measurements simply continue. For example a blank starting on the top whorl immediately above the aperture would have a start of 0° and an end of for example 410°. Multiple blanks could be measured in this way from the same core and provide a shorthand way of recreating where the blank has been removed from.
Nerita shells	General note	Numbers only approximate as often includes fragments and not clear if all definitely worked. Descriptions included of those examined for usewear
Shell Fish hooks	Maximum size	The greatest diameter of the bounding ellipse of the shell
Shell Fish hooks	Shank leg length	Measurement from the shank tip to the bottom of the base or outer curve
Shell Fish hooks	Point leg length	Measurement from the point tip to the bottom of the base or outer curve
Shell Fish hooks	Thickness	The maximum thickness of the hook (generally at the base)
Shell Fish hooks	Base width	The maximum width (from inner to outer curve) of the base
Shell Fish hooks	Broken/Complete	
Shell Fish hooks	% Cortex	Percentage of the outer surface with original grey shell skin covering
Shell Fish hooks	Right/left sided	Position of the shank when hook placed with outer side facing up
Other Artefacts	General note	Only descriptions and weights taken

**Appendix 6.5. Turban core data (all measurements in mm, weights in g)**

Artefact ID Number	TP	Spit	Description	Artefact?	Species	Blank Number	Weight (g)	Diameter of Shell (mm)	Height of shell (mm)	Blank Width (mm)	Blank Height (mm)	Shell Thickness (mm)	Maximum Concavity	Start Blank	End Blank
001	36	3	Empty med for ...												
002	28	3	... fr ... fr ...				26.8					4		45	270
003	20	4	... 2 ... d				6	30	23	16	11	2		45	90
	20	4	... 2 ... d				6	30	23	17	12	1	5	90	180
004	20	4	... 2 ... d				14	18		12		1		45	135
	20	4	... 2 ... d				14	18		10	6	1	4	135	180
005	20	4	... of ... of ...				19.9								
006	27	2	... of ... or ... d	Definite			15.9	40	28	20	21	2	8	180	225

Artefact ID Number	TP	Spit	Description	Artefact?	Species	Blank Number	Weight (g)	Diameter of Shell (mm)	Height of shell (mm)	Blank Width (mm)	Blank Height (mm)	Shell Thickness (mm)	Maximum Concavity	Start Blank	End Blank
007	027	3	000 000 2 0000 0000 fr 00 000 000000 2 fr 00 000 0000 0 000000f00000 000	Definite	0000 0000	0	20.1	000	40	19	23	4	000	0	45
	027	3	000 000 2 0000 0000 fr 00 000 000000 2 fr 00 000 0000 0 000000f00000 000	Definite	0000 0000	0	20.1	000	40	28	18	3	7	45	135
	027	3	000 000 2 0000 0000 fr 00 000 000000 2 fr 00 000 0000 0 000000f00000 000	Definite	0000 0000	0	20.1	000	40	23	18	3	6	180	270
	027	3	000 000 2 0000 0000 fr 00 000 000000 2 fr 00 000 0000 0 000000f00000 000	Definite	0000 0000	D	20.1	000	40	22	16	2	9	270	360
008	027	3	000 000 3 00000 r 00 000d	Definite	0000 0000	0	49.5	56	57	24	28	2	000	0	45
	027	3	000 000 3 00000 r 00 000d	Definite	0000 0000	0	49.5	56	57	25	28	2	000	45	135
	027	3	000 000 3 00000 r 00 000d	Definite	0000 0000	0	49.5	56	57	36	26	3	10	135	225
009	027	3	000 000 3 00000 r 00 000d	Definite	0000 0000	0	44.3	61	50	25	000	000	000	0	45
	027	3	000 000 3 00000 r 00 000d	Definite	0000 0000	0	44.3	61	50	25	30	3	000	45	135
	027	3	000 000 3 00000 r 00 000d	Definite	0000 0000	0	44.3	61	50	40	27	3	10	135	225

Artefact ID Number	TP	Spit	Description	Artefact?	Species	Blank Number	Weight (g)	Diameter of Shell (mm)	Height of shell (mm)	Blank Width (mm)	Blank Height (mm)	Shell Thickness (mm)	Maximum Concavity	Start Blank	End Blank
010	23	3	Small shell fragment, 2	Yes	Small shell	1	5.3	32	23	25	1	1	1	0	180
	23	3	Small shell fragment, 2	Yes	Small shell	1	5.3	32	23	15	15	1	5	180	225
011	23	3	Small shell fragment, 3	Yes	Small shell	1	4.2	32	23	13	1	1	1	0	45
	23	3	Small shell fragment, 3	Yes	Small shell	1	4.2	32	23	17	1	1	1	45	135
	23	3	Small shell fragment, 3	Yes	Small shell	1	4.2	32	23	13	14	1	5	135	180
012	23	3	Small shell fragment, 3	Yes	Small shell	1	3.6	32	22	12	1	1	1	0	45
	23	3	Small shell fragment, 3	Yes	Small shell	1	3.6	32	22	12	10	1	1	45	135
	23	3	Small shell fragment, 3	Yes	Small shell	1	3.6	32	22	12	10	1	5	135	180



### Appendix 6.6. Fish hook blank data (all measurements in mm, weights in g)

Artefact ID number	TP	Spit	Artefact?	Species	Weight (g)	Width (mm)	Height (mm)	Shell Thickness (mm)	Maximum Concavity (mm)	% Cortex
B001	TP25	2	Possible	Large turban	1.4	17	19	2	6	20
B002	TP28A	4	Possible	Small turban	0.6	17	11	3	4	85
B003	TP28A	4	Possible	Small turban	0.8	20	14	2	7	85
B004	TP28A	4	Possible	Small turban	0.7	18	14	1	7	90
B005	TP28A	4	Possible	Small turban	0.9	20	12	1	4	90
B006	TP10	4	Possible	Large turban	1.7	32	16	2	4	0
B010	TP23	3	Possible	Small turban	0.9	19	14	2	5	100
B011	TP23	3	Possible	Small turban	0.7	14	16	2	5	99
B012	TP23	3	Possible	Small turban	0.5	14	10	2	3	90
B013	TP23	3	Possible	Small turban	0.4	16	9	1	2	99
B014	TP27	1	Possible	Large turban	0.5	17	12	1	3	0
B015	TP27	1	Possible	Large turban	0.5	17	13	1	4	0
B016	TP20	4	Possible	Small turban	0.9	17	13	2	6	90
B017	TP20	4	Possible	Small turban	0.5	18	13	1	5	95
B018	TP20	4	Possible	Small turban	1	20	14	2	4	20
B019	TP20	4	Possible	Small turban	0.4	17	11	1	4	80
B020	TP20	4	Possible	Small turban	0.4	15	11	1	3	0
B021	TP20	4	Possible	Small turban	0.4	15	13	1	5	95
B022	TP20	4	Possible	Small turban	0.4	16	10	2	3	99
B023	TP20	4	Possible	Small turban	0.4	14	10	1	3	95
B024	TP20	4	Possible	Small turban	0.8	22	12	1	4	90
B025	TP28A	3	Possible	Large turban	5.4	30	24	4	12	60
B026	TP28A	3	Possible	Large turban	1.6	24	17	3	5	40
B027	TP28A	3	Possible	Large turban	2.2	23	19	2	18	30
B028	TP28A	3	Possible	Large turban	12.2	39	31	4	9	90
B029	TP28A	3	Possible	Large turban	2.4	28	20	3	8	100
B030	TP28A	3	Possible	Large turban	0.8	23	9	2	3	98
B031	TP28B	5	Possible	Large turban	3.5	17	23	2	15	40
B032	TP20	5	Possible	Large turban	2.2	19	18	3	9	90
B033	TP21	5	Possible	Large turban	8.9	43	26	4	17	99
B034	TP22	5	Possible	Large turban	2.9	25	18	3	6	0

Artefact ID number	TP	Spit	Artefact?	Species	Weight (g)	Width (mm)	Height (mm)	Shell Thickness (mm)	Maximum Concavity (mm)	% Cortex
B035	TP23	5	Possible	Large turban	3.8	29	21	2	8	40
B036	TP24	5	Possible	Large turban	4.2	28	24	3	14	80
B037	TP28A	2	Possible	Large turban	1.4	14	25	3	15	5
B038	TP28A	4	Possible	Large turban	0.5	15	10	2	4	0
B039	TP28A	4	Possible	Large turban	4.4	22	22	2	14	99
B040	TP28A	4	Possible	Large turban	0.9	23	12	1	5	30
B041	TP28A	4	Possible	Large turban	1	17	21	2	8	0
B042	TP28A	4	Possible	Large turban	1.6	25	16	2	5	0
B043	TP27	2	Possible	Large turban	0.6	12	12	1	4	50
B044	TP27	2	Possible	Large turban	1.1	22	19	2	5	70
B045	TP27	2	Possible	Large turban	1.8	15	19	3	9	0
B046	TP27	2	Possible	Large turban	2.4	25	19	3	7	0
B047	TP24	4	Possible	Large turban	6.2	36	24	4	9	99
B048	TP24	4	Possible	Large turban	0.4	16	10	2	2	90
B049	TP24	4	Possible	Large turban	1.2	15	17	2	4	0
B050	TP24	4	Possible	Large turban	1.2	25	12	2	3	80
B051	TP24	4	Possible	Large turban	0.4	21	8	1	2	0
B052	TP20	4	Possible	Large turban	1.2	21	17	2	6	0
B053	TP20	4	Possible	Large turban	3	28	19	4	7	0
B054	TP20	4	Possible	Large turban	0.8	18	16	1	4	0
B055	TP20	4	Possible	Large turban	1.1	21	15	1	4	95
B056	TP20	4	Possible	Large turban	0.8	18	16	1	5	0
B057	TP25	3	Possible	Large turban	2.7	24	20	2	9	0
B058	TP26	3	Possible	Large turban	1.4	23	15	2	5	8
B059	TP27	3	Possible	Large turban	0.8	23	14	<1	5	0
B060	TP27	3	Possible	Large turban	0.9	20	13	1	5	99
B061	TP27	3	Possible	Large turban	0.6	18	14	1	4	0
B062	TP27	3	Possible	Large turban	2	26	16	1	8	100
B063	TP20	5	Possible	Large turban	5.6	43	27	3	8	60
B064	TP20	3	Possible	Large turban	1.4	20	18	3	4	20
B065	TP27	3	Definite	Large turban	2.9	33	23	2	9	80
B066	TP27	3	Definite	Large turban	0.9	18	13	2	6	80
B067	TP27	3	Definite	Large turban	2.7	30	18	3	6	0

Artefact ID number	TP	Spit	Artefact?	Species	Weight (g)	Width (mm)	Height (mm)	Shell Thickness (mm)	Maximum Concavity (mm)	% Cortex
B068	TP27	3	Definite	Large turban	4.7	34	31	4	9	100
B069	TP27	3	Definite	Large turban	1.2	26	12	3	3	30
B070	TP27	3	Possible	Large turban	1.9	23	21	2	8	0
B071	TP27	3	Definite	Large turban	1.4	19	15	3	5	100
B072	TP27	3	Definite	Large turban	1.6	25	20	2	5	5
B073	TP27	3	Definite	Large turban	2.5	20	20	2	7	0
B074	TP27	3	Definite	Large turban	2.8	30	21	3	7	70
B075	TP27	3	Definite	Large turban	2.6	25	19	2	8	95
B076	TP27	4	Possible	Large turban	4.9	35	22	3	13	100
B077	TP27	4	Possible	Large turban	2	27	16	2	7	0
B078	TP27	4	Possible	Large turban	2.6	27	18	4	5	60
B079	TP27	4	Possible	Large turban	1.3	18	17	2	5	0
B080	TP27	4	Possible	Large turban	2	27	19	2	6	0
B081	TP27	4	Possible	Large turban	4.4	24	25	4	8	0



**Appendix 6.7. Fish hook data (all measurements in mm, weights in g)**

Artefact ID Number	TP	Spit	Broken/Complete	Description/reason for inclusion	Artefact?	Species	Weight (g)	Maximum Size	Shank Leg Length	Point leg length	Base width (inner to outer base)	Base thickness	% Cortex on dorsal
H001	TP27	3	Broken	Possible whole hook or perhaps only fragment. Has notch.	Definite	Large turban	0.3	18	18	n/a	n/a	2	0
H002	TP25	3	Broken	Possible fragment of hook, probably at base	Possible	Large turban	0.6	n/a	n/a	n/a	n/a	2	0
H003	TP24	3	Broken	Possible fragment of hook, probably shank	Possible	Large turban	0.5	n/a	n/a	n/a	n/a	n/a	0
H004	TP24	3	Broken	Hook shaped from limpet. Usewear analysis reveals striations from shaping by abrasion	Definite	Scaly limpet	0.4	20	17	10	18	1	100
H005	TP20	4	Broken	Possible hook shaped from limpet but could be natural break	Possible	Scaly limpet	0.5	22	n/a	n/a	n/a	2	100
H006	TP20	4	Broken	Possible hook shaped from limpet but could be natural break	Possible	Scaly limpet	0.4	23	n/a	n/a	n/a	1	100
H007	TP20	4	Broken	Possible hook shaped from limpet but could be natural break	Possible	Colourful limpet	0.5	21	n/a	n/a	n/a	1	100
H008	TP20	4	Broken	Possible hook shaped from limpet but could be natural break	Possible	Colourful limpet	0.5	25	n/a	n/a	n/a	1	100
H009	TP24	5	Whole	Possible whole hook. Usewear analysis shows spots of abrasion that may indicate deliberate trimming.	Possible	Colourful limpet	0.6	21	21	17	18	1	100
H010	TP24	5	Broken	Possible hook shaped from limpet but could be natural break	Possible	Colourful limpet	0.3	26	n/a	n/a	n/a	1	100

Artefact ID Number	TP	Spit	Broken/Complete	Description/reason for inclusion	Artefact?	Species	Weight (g)	Maximum Size	Shank Leg Length	Point leg length	Base width (inner to outer base)	Base thickness	% Cortex on dorsal
H011	TP27	4	Broken	Possible hook shaped from limpet but could be natural break	Possible	Colourful limpet	0.4	28	n/a	n/a	n/a		
H012	TP27	4	Whole	Possible hook shaped from limpet but could be natural break	Possible	Colourful limpet	0.4	25					
H013	TP27	4	Broken	Possible hook shaped from limpet but could be natural break	Possible	Colourful limpet	0.3	20					

### Appendix 6.8. Other possible modified shell data (all measurements in mm, weights in g)

Artefact ID Number	TP	Spit	Species	Artefact?	Notes	Weight (g)	Height (mm)	Width/ Diameter (mm)	Dimensions of Cut (mm)
S001	TP20	4	Triton	No	Hole in back of main whorl. Probably smashed open for meat extraction. Usewear analysis shows not deliberate cut edges	37.6	n/a	46	
S002	TP20	4	Triton	No	Hole in back of main whorl. Probably smashed open for meat extraction	49.6	n/a	55	
S003	TP37	3	Triton	No	Hole in back of main whorl. Probably smashed open for meat extraction	87.6	n/a	58	
S004	TP24	3	Black nerita	Possible	Possible angular cut on shell but only base of segment remains	1.4	n/a	n/a	
S005	TP24	4	Black nerita	Not worked	Three sides of possible cut remain on shell but usewear analysis shows is a natural break	0.5	11	18	17 x 5
S006	TP27	3	Black nerita	Not worked	Possible small window cut in shell in top of main whorl but usewear analysis shows is a natural break	0.7	8	15	7 x 4
S007	TP20	3	Black nerita	Possible	Possible angular cut on shell but only one edge remains	0.9	n/a	n/a	
S008	TP24	4	Veneridae fam	Not worked	Possible cut edge. Similar shells used for chisels on woomeras. Usewear analysis shows is a natural break	2.8	n/a	n/a	
S009	TP24	3	Small turban	Not worked	Possible cut on operculum but usewear analysis shows is a natural break	0.4	n/a	n/a	
S010	TP27	4	Black Nerita	Definite	Usewear analysis shows two deep cuts on shell fragment	0.4	n/a	n/a	

# Appendix 7

## *Faunal analysis data*

### Appendix 7.1: Raw data table for all excavated units

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
9	3	1	0.1	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a					
10	4	8	4.65	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	med size SnapperR maxilla 50mm est 52mm length, also palatine & hyp interneural frag				
10	4			fish	Platycephalidae	premaxilla	L	35	37		med surface damaged & post end broken					
10	4	1	0.07	unid taxa	unid											
10	5	3	1.49	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	med size Snapper L quadrate 6.3mm width process, Lj vert, that flat hyperostotic sometimes crescentic bone maybe from a vert?	2			
10	5	2	2.16	bird	<i>Ardenna</i>	ulna	R	85	93	±1mm	prox end broken	intermediate between my specimens 4.9x3.6mm midshaft				
10	5			bird	<i>Ardenna</i>	tibiotarsus	R	26	n/a	n/a	distal end	recent fracture; could be relatively recent recent				
10	5	2	0.17	unid taxa	unid	unid	n/a	n/a	n/a	n/a	n/a	2 burnt thin-walled cortical shaft frags possibly bird 18x6x1mm & 13x5x1	2			
13	2	1	0.4	unid taxa	unid	unid	n/a	n/a	n/a	n/a	n/a		1			
14	4	3	2.42	mammal	unid	unid	n/a	n/a	n/a	n/a	n/a	mandible fragment +? Small block fragments <20mm			3	
14	5	1	0.49	unid taxa	unid	unid	n/a	n/a	n/a	n/a	n/a	23mm long narrow frag from edge of element			1	
15	5	1	1.8	fish	<i>Achoerodus viridis</i>	infrapharyngeal	n/a	n/a	n/a	Y	plate only broken both sides	plate: 25mm, est 28mm, 18mm depth	1			



TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
20	3			fish	<i>Acanthopagrus australis</i>	dentary	L	8	9		vent missing	28mm length; 2 pieces				
20	3			fish	<i>Acanthistius</i>	dentary	R	6	6			est 27mm length				
20	3			fish	<i>Heterodontus</i>	tooth	n/a	10	10			4mm wide				
20	3			fish	<i>Achoerodus viridis</i>	articular	R	16	16		complete	Leach et al RA1				
20	3	1	<0.01	bird		phalange		13.5	13.5							
20	3	1	0.36	mammal	unid	unid						tibia frag? 16x7x4mm				
20	4	60	8.18	fish	unid							23 frags range elements, incl 1 scale	6	1		
20	4			fish	<i>Chrysophrys auratus</i>	mandible	n/a	n/a	n/a	n/a	small frag mid med surface	med -fairly large- at least 8mm wide medial surface; additional interneural hyp >26mm	1		1	
20	4			fish	<i>Chrysophrys auratus</i>	maxilla	L	12	18	±2		19mm legth epi-ceratohyal				
20	4			fish	<i>Acanthopagrus australis</i>	premaxilla	L	19	19	Y	complete	7mm post width	1			
20	4			fish	Labridae	infrapharyngeal	n/a	25	25	Y	complete	17mm toothed area				
20	4			fish	Plotosidae	pectoral spine	L	6	6	N	fractured process	additional post end articular	1			
20	4			fish	<i>Sillaginidae</i>	maxilla	R	16	16	Y	complete		1			
20	4			fish	<i>Orectolobus</i>	tooth	n/a	15	15			14mm length of just dentine/enamel				
20	4			fish	unid							dent post frag, 2 maxillae & cerato-epihyal				
20	4	1	0.12	bird	unid	phalange										
20	4	2	0.09	unid taxa												
20	5	53	3.39	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	prob sm snapper max, unid articular + assorted elements				
20	5			fish	<i>Acanthopagrus australis</i>	dentary	L	7	7		complete	19mmlength				
20	5			fish	<i>Orectolobus</i>	tooth	n/a	12	12		complete					

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
20	5			fish	<i>Sillaginidae</i>	premaxilla	R	n/a	n/a		ant end fractured	13mm med to top process				
20	5			fish	unid	unid						possibly mandible				
20	5			fish	unid	quadrate						3 idable quadrates- 1 is Labridae L 16mm - likely matching Spit 4	1			
20	5	2	0.25	mammal	unid	metatarsus		8	8		prox end	likely same piece; width measured, 8mm depth				
23	3	37	2.8	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a					
23	3	66	1.08	fish	unid	scales	n/a	n/a	n/a	n/a	n/a					
23	3			fish	<i>Arripis trutta</i>	quadrate	R	12	12		whole					
23	3			fish	<i>Chrysophrys auratus</i>	dentary	L	10	10		ant frag					
23	3			fish	Diodontidae	dermal spine	n/a	11	11		complete					
23	3			fish	? <i>Pseudocaranx georgianus</i>	urohyal		11	12		mostly complete	dorsal length				
23	3			fish	unid	otoliths						all Sparidae				
24/ 25?	?	100	3.24	fish	unid	n/a						* all burnt, most are charred, all small frags below 13mm, some red/partially decomposed	*			
24/ 25?	?			fish	Plotosidae	pectoral spine	L	6	≥6		broken process & 2 spine frags	additional frag of charred spine		3		
24/ 25?	?			fish	Shark	tooth	n/a	8	8			narrow - small, semi-circular cross section at base 4mm x 2mm				
24/ 25?	?			fish	Monacanthidae	dorsal spine	n/a	n/a	n/a		6mm spine frag					
24/ 25?	?			fish	unid	dentary	?				mid	possibly Latridae, or <i>Pseudocaranx georgianus</i> - single tooth row posteriorly				
24/ 25?	?	5	0.2	unid taxa	unid	unid						small burnt frag, possible mammal tooth frag				



TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
24/25?	?	1	0.14	mammal	unid	unid						bone point 17 x 2 x 3mm				
24	1	2	5.75	mammal	domestic	rib, vert						chopped vert				
24	3	42	2.49	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	most burnt, mostly very small pieces (largest vert 7mm long 5mm high, spines 3-4mm wide process, largest frag is 22mm frag of large hyperostotic bone)	27	14	1	
24	3			fish	Labridae	suprpharyngeal	L	n/a	n/a		frag	quite small		1		
24	3	2	0.21	unid taxa	unid	n/a	n/a	n/a	n/a	n/a	n/a	21 x 4 x 2mm & 10mm thin walled shaft frag				
24	3	1	0.08	mammal	unid	n/a	n/a	n/a	n/a	n/a	n/a	bone point				
24	4	162	6.61	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	as with Spit 3 - lots really tiny bone, most are small elements from small fish - largest vertebra 7mm length, 6mm md centrum, smallest 3mm length 2.5mm diam. *probably more than half burnt not too small to count; scales also	*	19		
24	4			fish	<i>Achoerodus viridis</i>	suprpharyngeal	L	12	12		mostly complete					
24	4			fish	Plotosidae	pectoral spine	L	4	4		fractured process only	small				
24	4			fish	Platycephalidae	maxilla	L	10	42		fractured process only			1		
24	4			fish	<i>Chrysophrys auratus</i>	maxilla	L	26	31		missing process					
24	4			fish	<i>Chrysophrys auratus</i>	articular	L	6	6		arm missing	ridiculously small				
24	4			fish	Orectolobus	tooth	n/a	7	7			enamel length - 6mm				
24	4			fish	Labridae	pharyngeal	n/a	4	n/a		fragment	suprpharyngeal mid frag?				

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
24	4			fish	<i>Mugilidae</i>	hyomandibular	L	n/a	n/a			10mm between processus articularis sphenoticus processus articularis opercularis				
24	4	1	0.07	unid taxa	unid	unid						16x4x1mm slither bird?				
24	4	1	0.38	mammal	unid	tooth						broken both ends 3x4mm in cross section where the enamel starts on one side. Doesn't seem to be a lower diprotodontia incisor as too rounded				
24	4	6		mammal	unid	unid						tiny fragments				
24	5	241	9.08	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	2 unid maxilla frags, scapula, coracoid, a Labrid quadrate, post-temp, L post unid dentary, additional mid frag dent		29		
24	5			fish	Plotosidae	pectoral spine	L	6	6		process only	recent fracture; additionally a maxilla & possible vertebrae				
24	5			fish	Plotosidae	pectoral spine	L	4	4		mostly complete	broken tip, additional charred spine frag				
24	5			fish	<i>Achoerodus viridis</i>	mandible		7	n/a		ant to 2nd canine	maybe c.27mm if pmx				
24	5			fish	Latridae	articular	R	16	16		complete	measurement same both directions				
24	5			fish	Latridae	articular	R	10	10		complete	measurement same both directions				
24	5			fish	Latridae	dentary	L	6	6		ant section, vent and dorsal surfaces damaged					
24	5			fish	<i>Chironemus marmoratus</i>	dentary	R	3	3	Y	complete	10mm length				
24	5			fish	<i>Acanthopagrus australis</i>	premaxilla	L	10	n/a	N	ant/med half	med size		1		
24	5			fish	<i>Chrysophrys auratus</i>	mandible	n/a	n/a	n/a	N		additional small hyperostotic bone		1		

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
24	5			fish	Platycephalidae	dentary	L	3	3	Y	ant 10mm			1		
24	5			fish	unid	scales	n/a	n/a	n/a	n/a	n/a	6 scales				
24	5			mammal	unid	unid	n/a	n/a	n/a	n/a	n/a	bone point, charred tip therefore not considered from usewear/residue		1		
24	5	6	1.9	mammal	unid	unid	n/a	n/a	n/a	n/a	n/a	2.19g some related to bone working some		1		
24	5	1	0.17	bird	Procellariidae?	carrpo-metacarpus	R	n/a	n/a	n/a	prox end	similar size to a Shearwater, very damaged so hard to tell if the features match exactly		1		
24	5	1	0.09	unid taxa	unid	unid	n/a	n/a	n/a	n/a	n/a	12x6x2mm burnt irregular cortical frag, probably mammal				
24	5	2	0.06	pumice?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	from stone bag				
25	3	41	15.25	fish	unid	unid	n/a					almost all burnt; includes 1 vert (lacking spines) of unid species several interneural hyperostoses + frontal frags	*	8		
25	3			fish	<i>Chrysophrys auratus</i>	frontal	n/a	27	27	Y	post 2/3	1 med size pmx frag				
25	3			fish	<i>Chrysophrys auratus</i>	frontal	n/a	n/a	19	±2	L & R post just prox of measured width					
25	3			fish	<i>Chrysophrys auratus</i>	frontal	n/a	n/a	>27	N	L post just prox of measured width but damaged all sides	larger than 27 width, another frag could be from an additional even larger frontal				
25	3			fish	<i>Acanthopagrus australis</i>	premaxilla	L	11	17	±2	post end	additional frag of large dentary				
25	3			fish	Monacanthidae	dorsal spine	n/a	n/a	n/a	n/a	mid spine	very weathered				
25	3			fish	Latridae	Premaxilla	R	13	24	±3	mid-ant corpus			1		
27	2	37	1.56	fish	unid	n/a	n/a	n/a	n/a	n/a		scale 11mm width, likely 2nd scale frag, fragmentary;	3	3		

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
27	2			fish	<i>Chrysophrys auratus</i>	premaxilla	L	12	n/a	N	post frag	med-lg; a small quadrate frag 5mm process width				
27	2			fish	?Diodontidae	dermal spine	n/a									
27	2			fish	<i>Sillaginidae</i>	premaxilla	L	7	10	Y	both ends					
27	2	4	2.02	mammal	<i>Oryctolagus cuniculus</i>	humerus	L	63	63		complete	not burnt, likewise rib				
27	2			mammal	unid	unid	n/a	n/a	n/a	n/a	n/a	rib 33mm, probably rabbit, 2 small burnt cortical frags both c 11mm md				
27	2	3	0.24	unid taxa	n/a	n/a	n/a	n/a	n/a	n/a	n/a	27x9x1mm curved as a long bone cortical, very thin but very rough, textured, faceted on the outer surface - chewed bone? Or fish?; 2nd piece sm 7x2x2m burnt bone frag; sm burnt flat frag 7x7x1mm	2			
27	3	319	21.61	fish	n/a	n/a	n/a	n/a	n/a	n/a	n/a	130 bits, 1 scale, large elements incl articular, large vertebra, unid otolith				
27	3			fish	<i>Chrysophrys auratus</i>	frontal	n/a	24	24	Y	mostly complete					
27	3			fish	<i>Chrysophrys auratus</i>	frontal	n/a	24	24	±2	many pieces with bits missing in between		1			
27	3			fish	<i>Chrysophrys auratus</i>	frontal	n/a	15.5	31	±4	L mid-post side					
27	3			fish	<i>Chrysophrys auratus</i>	frontal	n/a	6	12	Y	R half					
27	3			fish	<i>Chrysophrys auratus</i>	premaxilla	R	11	15							
27	3			fish	<i>Chrysophrys auratus</i>	premaxilla	R	8	13							
27	3			fish	<i>Acanthopagrus australis</i>	maxilla	R	21	24							

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
27	3			fish	<i>Girella elevata</i>	dentary	R	10	11							
27	3			fish	<i>Pomatomus saltatrix</i>	dentary	R	n/a	>8mm		broken ant frag					
27	3			fish	Myliobatoidei	tooth	n/a									
27	3			fish	unid	dentary	R	4	4			small 7mm length dentary with teeth sockets similar to Kyphosid, doesn't seem to fit Parma microlepis but might be a different Pomacentridae				
27	3			fish	Monacanthidae	ray	n/a	n/a	n/a	n/a	n/a	ray				
27	3			fish	Diodontidae	dermal spine	n/a	n/a	n/a	n/a	n/a					
27	3	2	2.8	unid taxa	unid	unid	n/a	n/a	n/a	n/a	n/a	cortical shaft bone, bird or small mammal 31x5x1 & 11x5x2mm				
27	3	3	0.54	unid taxa	unid	unid	n/a	n/a	n/a	n/a	n/a	small irregular fragments <17mm				
27	3	1	0.17	mammal	unid	unid	n/a	n/a	n/a	n/a	n/a	16x4x2mm potentially a point tho no grinding marks				
27	4	>600	33.8	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	2large & c20 small scales (0.20g); mostly very small frags, intact 43mm maxilla & supraoccipital 33mm, ant frontal frag little larger than small one + a charred frag of a larger frontal, a handful of various size snapper elents, many burnt/charred bones				
27	4			fish	<i>Chrysophrys auratus</i>	frontal	n/a	30.5	30.5	Y	complete					
27	4			fish	<i>Chrysophrys auratus</i>	frontal	n/a	7.2	14.4	Y	R half					
27	4			fish	<i>Chrysophrys auratus</i>	premaxilla	L	17	28	±2	ant half	L dent approx est 21mm length				
27	4			fish	<i>Chrysophrys auratus</i>	premaxilla	L	21	21	Y	missing process					
27	4			fish	<i>Latropiscis purpurissatus</i>	dentary	n/a	17	n/a	N	mid frag					

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
27	4			fish	<i>Carangidae</i>	scutes	n/a					at least 14 small scutes thick & thin				
27	4			fish	<i>Trachurus/Carangidae</i>	premaxilla	L	10	11		post broken	probably Trachurus				
27	4			fish	<i>Carangidae</i>	premaxilla	R	6	n/a		ant frag	hard to tell if matches L, very similar; possibly Trachurus				
27	4			fish	<i>Myliobatoidei</i>	tooth	n/a	4.5				width				
27	4			fish	unid	mandibles										
27	4			fish	<i>Diodontidae</i>	dermal spine	n/a									
27	4	5	0.45	unid taxa	unid							incl 4.5mm phalange prob mammal, 3 cortical frags ≤16mm of which one may also be a phalange, a carpal/tarsal 12mm md				
28	2	63	10.62	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	most if not all Snapper and Bream - range of elements		3		X
28	2			fish	<i>Chrysophrys auratus</i>	premaxilla	R	13	38		ant end	L dent approx est 35mm length				
28	2			fish	<i>Chrysophrys auratus</i>	premaxilla	R	17	29		missing dorsal & both ends					
28	2			fish	<i>Chrysophrys auratus</i>	premaxilla	L	27*	31		missing both ends	*with post end from TP28A				
28	2			fish	<i>Acanthopagrus australis</i>	dentary	L	18	21		missing vent & ant					
28	2	2	0.34	unid taxa	unid	unid	n/a	n/a	n/a	n/a	n/a	mammal? cancellous bone frags 18x8x3mm & 14x6x4mm				

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
28	4	125	22.36	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	wrong date, should be 23.5.23 instead of 18/5/23 this bag is 98 pieces and 11.92 fish weight: tooth frag of Achoerodus recorded with joining frag from 28B Spit 3; fragmented includes sparid cranial frags, urohyal, opercular; unid species hyomandibula & articular, both broken; 2nd bag is 27 pieces and 10.44g: mostly fragmented & fairly decomposed/weathered, range elements incl several cranial elemnts & 1 scale; 1 snapper maxilla but other species present - incl possible leatherj vert		4		
28	4			fish	<i>Chrysophrys auratus</i>	dentary	L	11	11		missing post , 3 pieces	30mm, est 34mm length; additional 2 quadrates L & R diff sizes, both quite small				
28	4			fish	<i>Chrysophrys auratus</i>	premaxilla	L	34	41	±3mm	missing post frag & process	supraoccipital hyperostosis 47mm length				
28	4			fish	<i>Chrysophrys auratus</i>	Premaxilla	L	11	n/a		post frag	similar to dent size				
28	4			fish	<i>Chrysophrys auratus</i>	dentary	L	9	9							
28	4			fish	<i>Chrysophrys auratus</i>	dentary	R	n/a	6	N	dorsal	much smaller, thinner				
28	4			fish	Sparidae	dentary	L	n/a	n/a		post frag	possibly Rhabdosarba sargus - smallish with large too socket broken				
28	4			fish	Carangidae	scutes	n/a	n/a	n/a	n/a		2diff shape thick scutes 10mm e 11mm x 8mm & 13mm e. 15mm x 5mm est 6mm				
28	4			fish	Latridae	premaxilla	R	23	23		with broken process	not species I have id resources for				
28	4			fish	Latridae	dentary	R	7	7		ant piece					





TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
28B	2	195	11.38	fish	unid	n/a						3 bags described - 1st contained 58 frags: few large pieces of mostly cranial frags, med snapper hyomandibular, articular, interhyal & fragmented quadrate, remainder mostly fragmented, some small vertebrae incl likely Carangidae, 2 scales; *several look brown from burning; second bag contained 58 frags - few if any obviously burnt, 1 spine 25mm, remainder fragmented less than 20mm, 1 scale -6mm length; the 3rd had 105 pieces: more than half are burnt; 13 scales	*	30	1	
28B	2			fish	<i>Chrysophrys auratus</i>	premaxilla	R	10	10	Y	mostly complete					
28B	2			fish	<i>Chrysophrys auratus</i>	frontal	n/a	13	26	±3	R mid-post					
28B	2			fish	<i>Achoerodus viridis</i>	tooth	n/a	n/a	n/a	n/a	n/a	quite large -4mm diam				
28B	2			fish	Carangidae	scutes	n/a					2 thick shiny scutes c 7mm length, c.10mm width				
28B	2			fish	Plotosidae	dentary	L	3	3	Y	post end broken					
28B	2			fish	Monacanthidae	dorsal spine	n/a	2.3	2.3		prox end	2 small frags spine		2		
28B	2	1	<0.01	reptile	Ophidia	vertebra	n/a	2.5	2.5			2.5mm length; possibly Elapidae posterior end of skeleton but tiny				
28B	2	2	1.01	unid taxa	unid											
28B	2	1	0.13	mammal	unid							probable bone point fragment 16x5x3.5mm- would need cleaning further to be sure but likely too fragmented to learn anything from; small irregular/triangular cortical frag very smooth glossy surface & edges all but one side				

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
28A	3	*>600	178.86	fish	unid	n/a	n/a					*the bag from the 3mm sieve (weighing 50g) has been looked through for diagnostic bone but has not been counted for no.s frags or no.s vertebrae, spines etc ; of larger bones, 10 cranial frags, 13 max & articular frags - mostly Sparid - 2 hyomandiblas a few quadrates etc A few hyperostotic bones, interneurals of different sizes but absent are many broken up fragments of frontal etc as in other TP/spits; unid dentary				
28A	3			fish	<i>Chrysophrys auratus</i>	frontal	n/a	46	46	Y	complete					
28A	3			fish	<i>Chrysophrys auratus</i>	frontal	n/a	38	38	Y	mid & post intact	3 lg frontals & 1 large interneural weighs 39.85g- nearly a quarter of total fish weight				
28A	3			fish	unid	hyperostotic bone		69	69			elongate with longitudinal mid ridge most of circumference length x 19x18mm; could be a diff species eg Carangidae				
28A	3			fish	<i>Chrysophrys auratus</i>	frontal	n/a	6.5	13	Y	L half					
28A	3			fish	<i>Chrysophrys auratus</i>	premaxilla	L	27	29		post & process broken	5 L & 4R dents & fragments				
28A	3			fish	<i>Chrysophrys auratus</i>	premaxilla	L	29	33		both ends broken					
28A	3			fish	<i>Chrysophrys auratus</i>	premaxilla	L	25	38							
28A	3			fish	<i>Chrysophrys auratus</i>	premaxilla	L	23	25							
28A	3			fish	<i>Chrysophrys auratus</i>	premaxilla	R	25	26		post & process broken					

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
28A	3			fish	<i>Chrysophrys auratus</i>	premaxilla	R	26	28		post & process broken					
28A	3			fish	<i>Chrysophrys auratus</i>	premaxilla	R	15	26		ant half					
28A	3			fish	<i>Chrysophrys auratus</i>	premaxilla	R	20	26		both ends broken	plus ant and post fragments				
28A	3			fish	Labridae	premaxilla	L	15	18	N	ant frag	both quite small, also has orckets for a large canine and row of large teeth with smaller teeth behind, still look a bit different, could be be different species, both fragmented so hard to tell				
28A	3			fish	Labridae	premaxilla	R	9	n/a	N	ant frag	process 19mm est 19 or 20mm; additional post frag; Labrid quadrate				
28A	3			fish	Monacanthidae	dorsal spine	n/a	3	3		prox end					
28A	3			fish	Monacanthidae	dorsal spine	n/a	3	3		prox end			x		
28A	3			fish	<i>Girella elevata</i>	dentary	R	10	12		misiing post	length				
28A	3			fish	Plotosidae	pectoral spine	L	6.6	6.6		process, prox end spine					
28A	3			fish	Plotosidae	pectoral spine	l	3.6	3.6		process					
28A	3			fish	Plotosidae	pectoral spine	R	n/a	n/a							
28A	3			fish	Plotosidae	dentary	L	8	>8							
28A	3			fish	Plotosidae	dentary	R	9	9							
28A	3			fish	Plotosidae	dentary	R	3.5	3.5							
28A	3			fish	Carangidae	scutes	n/a					16 scutes various sizes				
28A	3			fish	<i>Trachurus</i>	quadrate	R	n/a	n/a			Norma lateralis (in Deese et al 1996): 19mm est 20mm				
28A	3			fish	<i>Trachurus</i>	premaxilla	R	6	6							

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
28A	3			fish	<i>Sillaginidae</i>	quadrate	?	n/a	n/a		prox frag	5mm process Norma frontalis (in Deese et al 1996)				
28A	3			fish	<i>Pseudocaranx georgianus</i>	dentary	R	5	6		ant frag					
28A	3			fish	<i>Atractoscion atelodus</i>	premaxilla	R	n/a	n/a		mid frag					
28A	3			fish	Diodontidae	n/a	n/a	n/a	n/a	n/a	n/a					
28A	3			fish	scales	n/a	n/a	n/a	n/a	n/a	n/a	approx 40 scales/scale frags				
28A	3	4	0.54	mammal	unid	n/a	n/a	n/a	n/a	n/a	n/a	fragments				
28B	3	509	93.34	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	1st bag of 379 frags and 72g: few large ribs - 91, 60, 46mm well preserved, remaining ribs, spines, etc mostly very fragmented; 4 hyperostosis frm vertebrae between 24mm & 13mm length ie oriented ant to post of fish, 3 smaller interneurals 20mm length, 48mm L maxilla, 2nd one e.41mm, smaller R max, quite lg hyomandibula, post temp, preoperc, 2 cranialelements, quadrate all Snapper making up majority of bone from spit; hyperostotic vert - monacanth? or Snapper? Several unid incl quadrate 2 articulars, maxilla, urohyal, palatines etc; 2nd bag of 130 fragments & 21.34g: 3 R Snapper quadrates of diff sizes; mostly snapper but some unid bones of diffspecies incl vertebrae, hyomandibular frag; while most bones dark in colour only a small proportion obviously burnt				
28B	3			fish	<i>Chrysophrys auratus</i>	premaxilla	R	37	37	Y	complete but process broken	L dent about same size as are a L & R articular, & palatine. Other snapper that appear simiilar size are 2 cranial elements, a post temp, opercular, a ceratobranchial bone that appears chewed;				

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
28B	3			fish	<i>Chrysophrys auratus</i>	frontal	n/a	27	27	Y	complete	2nd slightly larger frontal frag, supraoccipital hyperostosis 50mm, e. over 60mm likely 60-70mm length				
28B	3			fish	<i>Chrysophrys auratus</i>	premaxilla	R	31	36	±3						
28B	3			fish	<i>Chrysophrys auratus</i>	dentary	L	14	14	y	ant 3/4	(e.44mm length ± 5mm)				
28B	3			fish	<i>Chrysophrys auratus</i>	dentary	R	14	14	Y	ant 3/4	3 dent frags, 2 of which are smaller post frags				
28B	3			fish	<i>Chrysophrys auratus</i>	dentary	R	9	10	N	ant frag					
28B	3			fish	Carangidae	scute	n/a	n/a	n/a	n/a	sides broken	7mm est 11mm width, 8mm length				
28B	3			fish	<i>Girella elevata</i>	dentary	R	10	12		ant missing					
28B	3			fish	Labridae	mandible	?	n/a	n/a			seems ant section of premax				
28B	3			fish	<i>Achoerodus viridis</i>	tooth	n/a	n/a				large b broken in several pieces				
28B	3			fish	Platycephalidae	premaxilla	L	13	31	±4	ant end					
28B	3			fish	Plotosidae	pectoral spine	R	4	4	Y	all but tip spine broken	not terribly strong looking- thin & bent				
28B	3			fish	unid	scales						22 scales - 6-15mm width				
28B	3	6	0.95	unid taxa	unid	n/a	n/a	n/a	n/a	n/a	n/a	fragments				
28A	4	40	1.12	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	small bits incl a mandible frag - not enough to id; quadrate probably Labridae but too broken to be sure;				
28B	4	48	2.14	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	small fragments, some discoloured bone may have been exposed to heat but not certain; one frag recorded with tp28 spit 4 matched the labridae pmx	2	1		

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
28B	4			fish	Sparidae	dentary	L	n/a	n/a	n/a	post frag	small enough to be any species, 2 other mid frags				
28B	4			fish	scale	n/a	n/a	n/a	n/a	n/a	n/a	1x 14mm width				
28B	4	5	0.38	unid taxa	unid							thin walled slight 's' shaped tube broken both ends 17 x 1 x 1mm; 19x4x2mm chewed? damaged bone; 2 bones are probably fish but unusual shape & pitted 14mm md & 10mm md, possible chew marks, see pic; one defoliating calcined bone frag 10x3x3mm				
28A	5	127	5.73	fish	unid							Acanthoagrus quadrate, small unid cerato/epihyal plus various frag				?
28A	5			fish	<i>Chrysophrys auratus</i>	frontal	n/a	6	12	Y	L half	additionally 31mm maxilla, 12mm md scapula				
28A	5	1	0.05	unid taxa	unid	unid	n/a	n/a	n/a	n/a	n/a	fish? Long 17x4x2mm thin spine-like frag hollow with a flat end				
28A	5	1	0.3	pumice	n/a	n/a	n/a	n/a	n/a	n/a	n/a					
28B	5	101	6.79	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	none charred, no obvious extensive burning, mostly fragmented, small unid articular, hyomandibulars & maxilla frag, sparid teeth, possible Achoerodus tooth broken				
28B	5			fish	<i>Chrysophrys auratus</i>	dentary	L	10	10	Y	ant bit	also numerous mandible frags & small palatine				
28B	5			fish	<i>Chrysophrys auratus</i>	quadrate	R	n/a	n/a			Norma lateralis (in Deese et al 1996) 12mm, e.15mm				
28B	5			fish	? <i>Gilrella elevata</i>	quadrate	L	n/a	n/a			Norma lateralis (in Deese et al 1996): 13mm, extremely close to ref specimen variation possibly due to weathering & breakage				
28B	5			fish	unid	scales	n/a					5 scales 11-15mm width				
28B	5			fish	Carangidae	scute	n/a	10	13	±2						

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
28B	5			fish	<i>Acanthopagrus australis</i>	dentary	L	5	n/a				1			
28B	5			fish	<i>Atractoscion atelodus</i>	otolith		18	18	Y	whole					
28B	5			mammal	Peramelidae	phalanx					whole	P3 Pes digit 3or 4? Not Isoodon obseelus				
28B	5			mammal	Peramelidae	phalanx					proximal half?	P3 Pes digit 3or 4? Not Isoodon obseelus				
28B	5	3	0.15	mammal	unid	unid						prob also bandicoot phalanx frag				
28B	5	3	0.27	unid taxa								small weathered fragments				
29	2	1	1.81	fish	<i>Chrysophrys auratus</i>	frontal	n/a	n/a	n/a	n/a	n/a	frag from large frontal				
29	3	5	3.62	fish	<i>Chrysophrys auratus</i>	see comments	n/a	n/a	n/a	n/a	n/a	fairly large frontal frag, interneural hyperostotic bone 26mm long, supraoccipital frag, vertebra12mm long, first centrum 6mm long 12mm wide - could be from same fish				
30	4	1	0.12	mammal	unid	unid	n/a	n/a	n/a	n/a	n/a	chewed bone 20x6x2mm				
31	3	1	2.09	fish	<i>Achoerodus viridis</i>	suprapharyngeal	L	20	24		plate curved bit missing					
31	4	15	2.42	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	appear to be all cranial fragments				
31	4	2	0.17	pumice	n/a	n/a	n/a	n/a	n/a	n/a	n/a					
31	5	9	1.29	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	frags of various elements; incl hyperostosis of vert & supraoccipital/frontal junction- both likely snapper; some frag with possible chew marks	1	5		x
31	5	3	0.33	unid taxa	unid	n/a	n/a	n/a	n/a	n/a	n/a	small frags; 1 possible mammal cort shaft frag 9x7x3mm burnt	2			x
32	5	1	13.69	fish	unid	interhyal	n/a	n/a	n/a	n/a	n/a					
32	5	20		fish	<i>Chrysophrys auratus</i>	frontal	n/a	27	54	±3	ventral R mid-post	measured portion + frontal fragments				

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
32	5	2	1.14	mammal	unid	unid						possible worked bone? Part not fractured of pointed end smooth polished surface - both possibly from same long bone med-large mammal 24x9x5mm & 17x8x3.5		1	1	
33	3	4	6.03	mammal	unid	unid						one large, remaindee small cortical frags long bone				
34	3	1	0.26	mammal	unid	unid						rib?				
34	5	1	1.05	fish	<i>Achoerodus viridis</i>	suprapharyngeal	?	n/a	n/a	n/a	fragmented tooth plate	med-lg size individual	1			
35	3	13	1.66	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	fragments of fairly large & fairly small (26mm length supraoccipital) hyperostotic bones, interhyal, vert spine	6	2		
35	3			fish	<i>Chrysophrys auratus</i>	premaxilla	R	15	16		post tip & process missing					
35	3	7	2.06	bird	<i>Ardenna</i>	coracoid	R	n/a	n/a	n/a	n/a	21mm angulus medialis- tip process procoracoideus- ;3 distal & prox frags of L humerus (7.5mm distal shaft)				
35	3			bird	<i>Ardenna</i>	scapula	L	n/a			prox 2/3	width: 10mm				
35	3			bird	unid	vertebra	n/a					thoracic, larger than <i>Ardenna</i> - sulcus ceroticus 11mm width				
35	3	13	5.64	mammal	unid	unid	n/a					mostly unid cortical & cancellous bone	7	5		
35	4	100	13.93	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	includes unid dentary & quadrate				
35	4			fish	<i>Chrysophrys auratus</i>	frontal	n/a	17.5	35	±4	L & R post just prox of measured width		2			
35	4			fish	<i>Acanthopagrus australis</i>	premaxilla	R	22	22	Y	process broken	width: 7mm; L dent ant		1		



TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
35	4			fish	? <i>Rhabdosargus sarba/Acanthopagrus australis</i>	dentary						row fairly large tooth sockets, 3 round canine/incisor tooth sockets		1		
35	4			fish	<i>Achoerodus viridis</i>	unid	n/a	9	*			tooth plate of Left supra- or infrapharyngeal - fairly large - *if infrapharyngeal plate width would be approx 30mm		2		
35	4			fish	Monacanthidae	dorsal spine	n/a	2	2		distal tip broken, distal half broken barbs	sm flat - 13mm, est. 15mm length				
35	4			fish	Plotosidae	dentary	R	9	9		ant half	plus fragments		1		
35	4			fish	Plotosidae	dentary	R	7	8		ant half			1		
35	4			fish	Plotosidae	pectoral spine	L	4	5	Y	process frag no barbed spine	ie very prox end of spine		1		
35	4	11	3.7	mammal	unid	unid						mostly cortical shaft bone splinters				
35	4	1	0.09	reptile	unid	vertebra										
35	4	14	1.15	unid taxa	unid	unid										
36	2	4	3.34	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	Snapper hyperostotic bone frag		1		
36	2			fish	<i>Chrysophrys auratus</i>	frontal	n/a	12	26	±5	Left side post		1			
36	2			fish	<i>Acanthopagrus australis</i>	premaxilla	R	11	28	±3	ant frag	large				
36	2			fish	Latridae	dentary	L	10	10		ant frag	band small tooth sockets - Red Morwong?				
36	2	2	0.44	mammal	unid	unid	n/a	n/a	n/a	n/a	n/a		1			
36	3	56	6.22	fish	unid	unid	n/a	n/a	n/a	n/a	n/a					
36	3			fish	<i>Acanthopagrus australis</i>	n/a	n/a	n/a	n/a	n/a	n/a	L dentary	14			

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
36	3			fish	<i>Chrysophrys auratus</i>	n/a	n/a	n/a	n/a	n/a	n/a	mandible frags/dent, large post temporal				
36	3			fish	Latridae	dentary	R	5	5		ant frag			1		
36	3			fish	unid	mandible										
36	3	11	4.59	mammal	unid	unid	n/a	n/a	n/a	n/a	n/a	chewed bone 15x5x2mm & burnt cortical frags, various thicknesses				*
36	3			mammal	unid*	rib	?	n/a	n/a	n/a	n/a	*could be seal; 57x10x6mm - latter being rib depth not bone thickness				
36	3			mammal	Rattus	incisor	n/a	n/a	n/a	n/a	entire	same size as R fuscipes				
36	4	122	25.61	fish	n/a	n/a	n/a	n/a	n/a	n/a	n/a	many fragments Snapper frontals likely from different size individuals, at least 35 Sparid frags, likely more; vertebrae all small ie ≤5mm diameter centrum, from different species; few pieces fairly intact eg pterygiophores, most are highly fragmented, several pieces appear to be chewed; difficult to tell how many burnt but likely more than 60%	*	23		x
36	4			fish	<i>Chrysophrys auratus</i>	frontal	n/a	27	50	±3	L side mid-post ventral					
36	4			fish	<i>Chrysophrys auratus</i>	frontal	n/a	13	29	±5	R side mid-post					
36	4			fish	<i>Chrysophrys auratus</i>	frontal	n/a	11	21	±5	R side mid-post ventral					
36	4			fish	<i>Chrysophrys auratus</i>	premaxilla	L	22	n/a	N	mid	fairly large prob ≥40; several mandible fragments from diff size individuals				
36	4			fish	<i>Acanthopagrus australis</i>	mandible	unid	n/a	n/a	n/a	n/a	small fragments				
36	4			fish	Plotosidae?	dentary	unid	n/a	n/a	n/a	mid dorsal	possible Plotosid dentary frag				

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
36	4			fish	<i>Achoerodus viridis</i>	mandible	unid	n/a	n/a	n/a	mid toothed 6mm frag					
36	4	36	17.63	mammal	unid	n/a						many fragments, most are blocky, a few are probably bone points but are burnt & or highly degraded				
36	4	49	8.1	unid taxa	unid	n/a						over half are burnt thin bone fragments thus bird/mammal, the remainder are too fragmented or degraded to be distinguished				
36	5	65	8.69	fish	unid	n/a						small frags			3	
36	5			fish	<i>Chrysophrys auratus</i>	premaxilla	R	9	30	±5	ant, no process	one additional ant mandible frag				
36	5				<i>Acanthopagrus australis</i>	premaxilla	unid	n/a	n/a	n/a	mid 9mm frag				1	
36	5			fish	Monacanthidae	dorsal spine	n/a	3	3		prox end					
36	5			fish	Labridae	quadrate	L	8	11			Norma lateralis (in Deese et al 1996) measured				
36	5			fish	unid	premaxilla	L									
36	5	11	3.57	mammal	unid	n/a										
36	5	5	1.61	unid taxa	n/a	n/a						some other species in 3mm,				
38	2	5	0.58	fish	unid	n/a						indeterminant frags tho a few likely snapper	2	3		
38	2	8	2.85	mammal	unid	unid						small fragments	5		1	
38	3	179	68.25	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	majority of unid fish are hyperostotic bone fragments; vert varied in size & species; of the entire spit estimate of ≥40% are charred >60% are burnt; a few quadrates (at least 2 sparid) few facial elemnts or spines				
38	3			fish	<i>Chrysophrys auratus</i>	frontal	n/a	55	55	Y	complete					



TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
38	3 ext			fish	Plotosidae	dentary	R	6	6	Y	ant 2/3					
38	3 ext			fish	Monacanthidae	tooth	n/a					5mm width				
38	3 ext			fish	Labridae	unid	n/a					6mm md ball of teeth & bone; appears to be a small charred infrapharyngeal 7mm width				
38	3 ext	12	1.26	mammal	unid	n/a	n/a	n/a	n/a	n/a	n/a	lots of small burnt-calcined fragments				
38	3 ext	2	0.25	bird	unid	n/a	n/a	n/a	n/a	n/a	n/a	shaft frags				
38	3 ext	13	0.76	unid taxa	unid	n/a	n/a	n/a	n/a	n/a	n/a	lots of small burnt fragments				
38	4	385	107.28	fish	unid	n/a	n/a	n/a	n/a	n/a	n/a	many fragments of large frontals, one large interneural or supraoccipital				
38	4			fish	<i>Chrysophrys auratus</i>	frontal		11	22	±1	L side mid-post			x		
38	4			fish	<i>Chrysophrys auratus</i>	frontal		7.5	16	±2	L side mid-post		x			
38	4			fish	<i>Chrysophrys auratus</i>	frontal	n/a	28	c52	±5	R side vent post	close in size perhaps fraction smaller than Spit 3	x			
38	4			fish	<i>Chrysophrys auratus</i>	frontal	n/a	22	c46	±5	R side vent post	large but smaller than Spit 3		x		
38	4			fish	<i>Acanthopagrus australis</i>	premaxilla	L	28	28		process broken	width:13mm				
38	4			fish	<i>Acanthopagrus australis</i>	premaxilla	L	24	24		process broken	width:10mm				
38	4			fish	<i>Acanthopagrus australis</i>	premaxilla	L	20	20		process broken	width:8mm				
38	4			fish	<i>Acanthopagrus australis</i>	premaxilla	L	13	14		process broken, missing ant	width:6mm				

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
38	4			fish	? <i>Rhabdosargus sarba</i> / <i>Acanthopagrus australis</i>	premaxilla	R	13	14		process broken, missing ant	width:7; not especially large molars but a row increasing in size posteriorly, & premax more of a squat shape with dimple of the top outer side, ant is missing so can't assess tooth 'incisor/canine' shape				
38	4			fish	<i>Rhabdosargus sarba</i>	dentary	R	29	32		medial surface mid & post		x			
38	4			fish	? <i>Rhabdosargus sarba</i> / <i>Acanthopagrus australis</i>	dentary	R	14	17		medial surface mid & post	very narrow, fairly lg molar but could still be Bream, particularly give how narrow it is		x		
38	4			fish	? <i>Rhabdosargus sarba</i> / <i>Acanthopagrus australis</i>		R	n/a	n/a		post frag	not enough detail to be sure		X		
38	4			fish	<i>Achoerodus viridis</i>	premaxilla	L	16	33	±5mm		plus mid frag of pmx or dent & tooth	x	x		
38	4			fish	Labridae	infrapharyngeal	n/a	13	24	±1mm	half without mid process			x		
38	4			fish	Labridae	suprapharyngeal	R	9	9		complete		x			
38	4			fish	Labridae	suprapharyngeal	R	7	8	N	toothed surface			x		
38	4			fish	Monacanthidae	dorsal spine	n/a	2	4		R side prox end		x			
38	4			fish	Monacanthidae	dorsal spine	n/a	3	6		R side prox end			x		
38	4			fish	Plotosidae	pectoral spine	L	4	4		process no barbed spine	2 dentaries, 10mm & 7mm & several fragments				

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
38	4			fish	Plotosidae	pectoral spine	L	5	≥5		process frag no barbed spine	ie very prox end of spine; 1 mid spine frag				
38	4			fish	Plotosidae	pectoral spine	L	5	≥5		process frag no barbed spine	ie very prox end of spine				
38	4			fish	Plotosidae	pectoral spine	L	6	≥6		process frag no barbed spine	ie very prox end of spine				
38	4			fish	Diodontidae	dermal spine	n/a	n/a	n/a	n/a	n/a	2 spines 8 & 13mm broken but small md	x	x		
38	4			fish	Shark	tooth	n/a									
38	4			mammal	Macropodinae	incisor	n/a					lower incisor				
38	4			mammal	Macropodinae	molar	n/a					front half of newly erupted molar				
38	4			mammal	Macropodinae	femurs	L & R					5 frags of L macropod femur shaft, 1 burnt frag R macropod femur shaft, both femurs same size		1		
38	4			mammal	<i>Trichosurus vulpecula</i>	mandible	L					mid frag 23mm				
38	4			mammal	unid	phalange						possibly possum				
38	4	71	68.75	mammal	unid	unid						majority small unidentifiable cortical bone fragments of large and small mammals, some fragments may belong to Macropodinae; one unid incisor				x
38	4	57	5.45	unid taxa	unid	unid						small burnt & calcined frags	*			x
38	4ext	93	4.76	fish	unid	unid						*vast majority is burnt/charred	*			
38	4ext			fish	Plotosidae	pectoral spine	L	6	6		process only					

TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
38	4ext			fish	Plotosidae	pectoral spine	L	5	5		broken process only					
38	4ext			fish	Monacanthidae	dorsal spine	n/a	2.5	2.5		tip broken	small flat, barbs broken distally		1		
38	4ext			fish	Monacanthidae	dorsal spine	n/a	n/a	n/a		spine not process	3mm diam, 12mm frag			1	
38	4ext			fish	Sparidae	quadrate		8	8							
38	4ext	2	0.5	reptile	unid	vertebra	n/a	6	6			ventral fragments				
38	4ext			mammal	<i>Trichosurus vulpecula</i>	mandible	R	25	n/a		mid frag					
38	4ext	12	2.81	mammal	n/a	n/a	n/a	n/a	n/a	n/a		all charred thin cortical frags <18mm length, <4mm thickness	12			
38	4ext	10	0.95	unid taxa	n/a	n/a	n/a	n/a	n/a	n/a		small frags <10mm	>3			
38	5	125	32.84	fish	unid	n/a						range of elements				
38	5			fish	<i>Chrysophrys auratus</i>	frontal	n/a	24	48	±4	R side vent mid-post	*Appears to be at least 2 other frontals of varying sizes, too eroded to measure				
38	5			fish	<i>Chrysophrys auratus</i>	frontal	n/a	14	30	±5	R side vent post					
38	5			fish	<i>Chrysophrys auratus</i>	frontal	n/a	8	17	±4	R side mid-post eroded			x		
38	5			fish	<i>Chrysophrys auratus</i>	premaxilla	R	10	14	±1	mid frag	frags of one or two larger mandibles				
38	5			fish	<i>Acanthopagrus australis</i>	premaxilla	L	16	16		process broken only	2 right dentaries:13mm e.17mm (mid) & 20mm est 22mm length (missing ant) & 1 Left (post frag)				
38	5			fish	<i>Achoerodus viridis</i>	premaxilla	L	38	42		medial surface ant to ant of hook					
38	5			fish	Monacanthidae	dorsal spine	n/a	n/a	n/a		distal end	18mm frag length				



TP	Spit	No. Bone	Weight (g)	Taxa	Species	Element	Side	Size	Est size	Complete	Portion	Comments	burnt	charred	calcined	chewed
38	5			fish	Plotosidae	pectoral spine	R	5.4	≥6		process frag no barbed spine	ie very prox end of spine; additional frag of dorsal spine				
38	5			fish	unid	quadrate						v.small				
38	5	20	3.38	mammal	unid		n/a	n/a	n/a	n/a	n/a	small frags, mandible frag with root of tooth embedded but too fragmented to tell position in mandible or likely size of tooth etc				x
38	5	8	0.68	unid taxa	unid		n/a	n/a	n/a	n/a	n/a					
38	6	13	3.17	plant?	fruit?							charred largest fragments: 22x17x6mm, 17x17x6mm, and 15x14x6mm + 10 or so fragments under ±10mm		x		

### Appendix 7.2: Taxa weights per pit

Midden Area	Test Pit	Fish		Mammal		Bird & Reptile		Unid Taxa	
		No. bone	Weight (g)	No. bone	Weight (g)	No. bone	Weight (g)	No. bone	Weight (g)
Upper	10	11	6.14			2	2.16	3	0.24
Upper	16	25	13.16	14	5.5	1	0.07	5	1.62
Upper	30			1	0.12				
Upper	31	25	5.8					3	0.33
Upper	32	21	13.69	2	1.14				
Upper	33			4	6.03				
Upper	34	1	1.05	1	0.26				
Upper	35	113	15.59	24	9.34	7	2.06	14	1.15
Upper	36	247	43.86	56	26.23			54	9.71
Upper	38	694	209	168	98.09	2	0.4	94	11.31
Upper	38 ext	162	8	24	4.07	2	0.25	23	1.71
Lower	20	136	13.91	3	0.61	2	0.12	2	0.09
Lower	23	103	3.88						
Lower	24 Sp3-5	445	18.18	15	2.75			4	0.37
Lower	25	41	15.25						
Lower	24 or 25	100	3.24	1	0.14			5	0.2
Lower	27 Sp3-4	>919	55.41	1	0.17			10	3.79
Lower	28	188	32.98	4	0.83			5	0.78
Lower	28A	>850	190.43	5	1.94	1	0.1	2	0.38
Lower	28B	853	113.77	4	0.28	1	0.01	16	2.61
Other	9	1	0.1						
Other	13							1	0.4
Other	14							4	2.91
Other	15	1	1.8					1	0.18
Other	17	2	7.94						
Other	19	1	1.98						
Other	29	6	5.43						

### Appendix 7.3. MNI per test pit

Test Pit	Midden area	Taxa	Species	MNI	Total MNI per pit
20	L	fish	Bream	2	
20	L	fish	Wirrah	1	
20	L	fish	Blue Groper	1	
20	L	fish	Snapper	1	
20	L	fish	horn shark	1	
20	L	fish	wrasse	1	
20	L	fish	shark	1	
20	L	fish	catfish	1	
20	L	fish	whiting	1	<b>10</b>
23	L	fish	Australian salmon	1	
23	L	fish	Snapper	1	
23	L	fish	porcupine fish	1	<b>3</b>
24	L	bird	Shearwater?	1	
24	L	fish	catfish	3	
24	L	fish	Snapper	2	
24	L	fish	morwong	2	
24	L	fish	flathead	2	
24	L	fish	Bream	1	
24	L	fish	Blue Groper	1	
24	L	fish	Kelpfish	1	
24	L	fish	wrasse	1	
24	L	fish	mullet	1	
24	L	fish	shark	1	<b>16</b>
25	L	fish	Snapper	3	
25	L	fish	Bream	1	
25	L	fish	morwong	1	
25	L	fish	leatherjacket	1	<b>6</b>
27	L	fish	Snapper	4	
27	L	fish	Snapper	2	
27	L	fish	Bream	1	
27	L	fish	trevally	1	
27	L	fish	porcupine fish	1	
27	L	fish	Rock Blackfish	1	
27	L	fish	Sergeant Baker	1	

Test Pit	Midden area	Taxa	Species	MNI	Total MNI per pit
27	L	fish	leatherjacket	1	
27	L	fish	stingray	1	
27	L	fish	Tailor	1	
27	L	fish	whiting	1	
27	L	fish	damsel fish??	1	<b>16</b>
28	L	fish	Snapper	10	
28	L	fish	leatherjacket	3	
28	L	fish	Rock Blackfish	2	
28	L	fish	catfish	2	
28	L	fish	Bream	1	
28	L	fish	trevally	1	
28	L	fish	porcupine fish	1	
28	L	fish	morwong	1	
28	L	fish	flathead	1	
28	L	fish	Teraglin	1	
28	L	fish	Wirrah	1	
28	L	fish	Silver Trevally	1	
28	L	fish	whiting	1	
28	L	fish	Yellowtail/Jack Mackerel	1	
28	L	fish	Bream	1	
28	L	fish	Blue Groper	1	
28	L	mammal	Bandicoot	1	<b>30</b>
15	O	fish	Blue Groper	1	<b>1</b>
17	O	fish	Snapper	1	<b>1</b>
19	O	fish	Snapper	1	<b>1</b>
29	O	fish	Snapper	1	<b>1</b>
10	U	bird	Shearwater	1	
10	U	fish	flathead	1	<b>2</b>
16	U	fish	Bream	1	
16	U	fish	Snapper	1	<b>2</b>
31	U	fish	Blue Groper	1	<b>1</b>
32	U	fish	Snapper	1	<b>1</b>
34	U	fish	Blue Groper	1	<b>1</b>
35	U	bird	Shearwater	1	
35	U	fish	Snapper	2	

Test Pit	Midden area	Taxa	Species	MNI	Total MNI per pit
35	U	fish	catfish	2	
35	U	fish	Bream	1	
35	U	fish	Blue Groper	1	
35	U	fish	leatherjacket	1	<b>8</b>
36	U	fish	Snapper	3	
36	U	fish	wrasse	3	
36	U	fish	Bream	1	
36	U	fish	Blue Groper	1	
36	U	fish	morwong	1	
36	U	fish	leatherjacket	1	
36	U	mammal	rodent	1	<b>11</b>
38	U	fish	Snapper	9	
38	U	fish	Bream	6	
38	U	fish	catfish	6	
38	U	fish	leatherjacket	3	
38	U	fish	Blue Groper	2	
38	U	fish	porcupine fish	1	
38	U	fish	Tarwhine	1	
38	U	fish	Shark	1	
38	U	mammal	kangaroo/wallaby	1	
38	U	mammal	rat	1	
38	U	mammal	Brushtail Possum	1	<b>32</b>

### Appendix 7.4. Bone point measurements

Artefact ID	Test Pit	Spit	Description	Usewear/Residue notes
BP01	TP24	3	Possible bone point	One small fragment of bone point. Shows only shaping striations from abrasives. The size and shape of the point together with the deliberate shaping of the tip, suggests that this point was probably used as a prong in a composite tool for such actions as piercing skins
BP02	TP28-A	3	Possible bird bone point	No trace of shaping, usewear or residue found
BP03	TP28-B	2	Possible bone point fragment	No trace of shaping, usewear or residue found
BP04	TP28-B	3	Possible bone point	The broken fragment shaped by abrasives and used for piercing soft elastic materials (hide and skin).
BP05	TP28-B	3	Possible bone point	No trace of shaping, usewear or residue found
BP06	TP28-B	3	Possible bone point	No trace of shaping, usewear or residue found
BP07	TP28-B	3	Possible bone point	No trace of shaping, usewear or residue found
BP08	TP28-B	4	Possible bone point	No trace of shaping, usewear or residue found
BP09	TP28-B	4	Possible bone point	No trace of shaping, usewear or residue found
BP10	TP28-B	4	Possible bone point	No trace of shaping, usewear or residue found
BP11	TP35	4	Possible bone point	No trace of shaping, usewear or residue found
BP12	TP35	4	Possible bone point	No trace of shaping, usewear or residue found
BP13	TP38	3	Possible bone point	A broken and longitudinally split point preserved both wear from abrasives used for shaping the point and wear attributes resulted from use. The wear attributes suggest that this bone point was involved in processing relatively soft but highly siliceous and abrasive plants such as grasses and plant parts (woody fibre, leaves or straw).
BP14	TP38	5	Possible bone point	No trace of shaping, usewear or residue found
BP15	TP38	5	Possible bone point	No trace of shaping, usewear or residue found

# Appendix 8

## *Usewear and residue analysis report*

***Dr Nina Kononenko and Dr Peter White***

*The Australian Museum,*

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31 □08□2023

**Results of use-wear/residue analysis of stone, shell and bone artefacts collected the Kamay test excavation, Kurnell, NSW.**

***Report prepared for Consultancy Coast History & Heritage***

**Sydney**







## Working woody plants

Crucian carp 555 172 F 1 5

Crucian carp is a common species in the UK. It is a freshwater fish that is often found in ponds and lakes. It is a popular species for aquaculture and is also a common species in the wild. It is a species that is often found in the UK and is a common species in the wild. It is a species that is often found in the UK and is a common species in the wild. It is a species that is often found in the UK and is a common species in the wild.

Crucian carp 556 807 F 6 9  
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## Working shell

Crucian carp 648 806 F 10 12

Crucian carp is a common species in the UK. It is a freshwater fish that is often found in ponds and lakes. It is a popular species for aquaculture and is also a common species in the wild. It is a species that is often found in the UK and is a common species in the wild. It is a species that is often found in the UK and is a common species in the wild. It is a species that is often found in the UK and is a common species in the wild.

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Crucian carp 578 F 13 14









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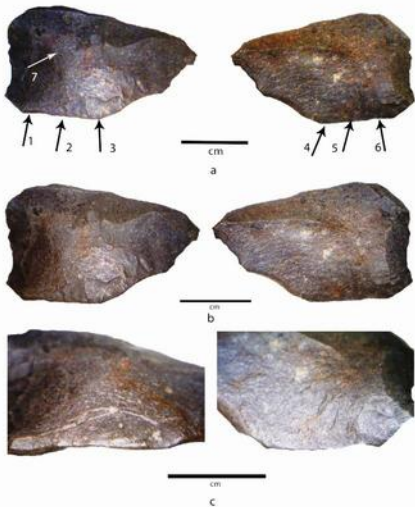
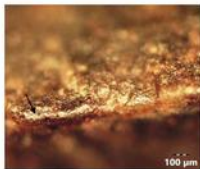
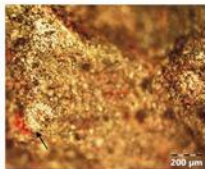


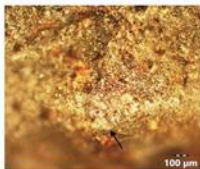
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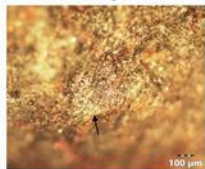
a



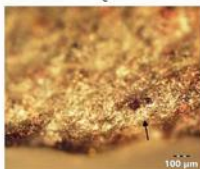
b



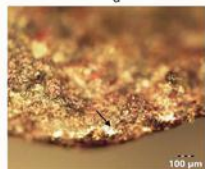
c



d

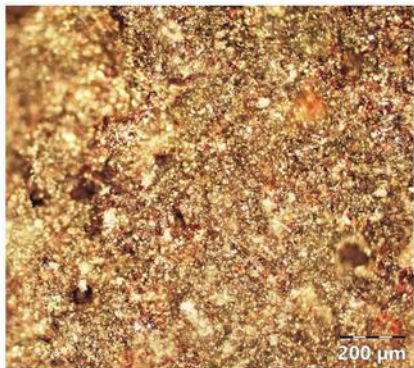


e



f

FIGURE 2

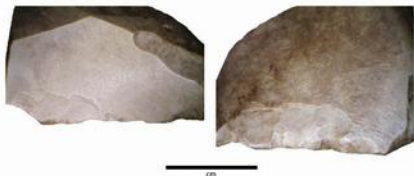


#555, point 7, unused surface

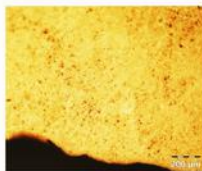
FIGURE 3



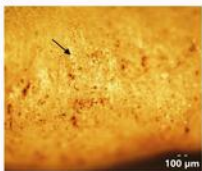
a



b



c



d

FIGURE 4

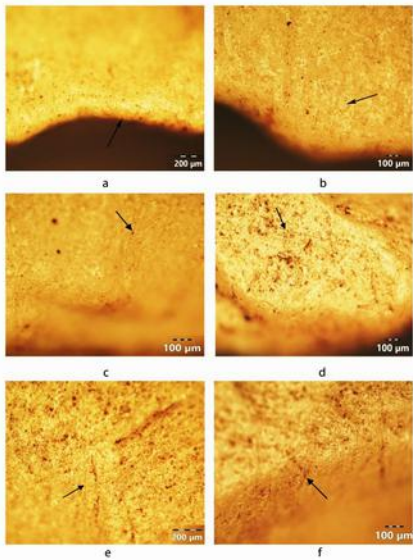


FIGURE 5

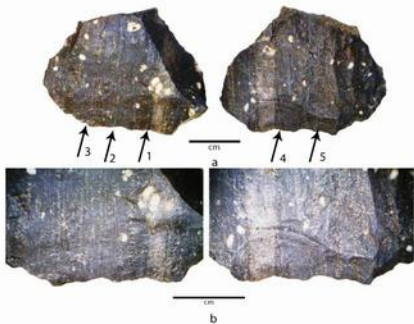
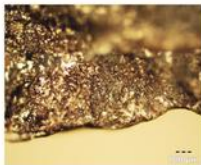
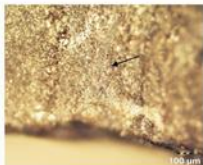


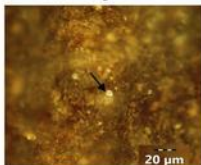
FIGURE 6



a



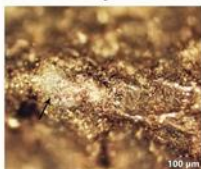
b



c



d



e



f

FIGURE 7

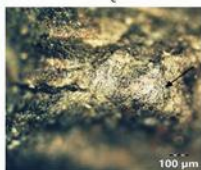
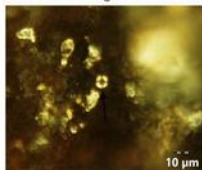
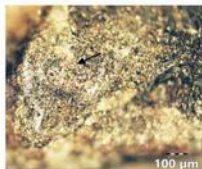
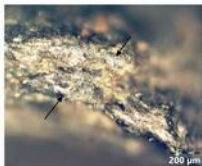


FIGURE 8

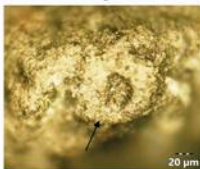




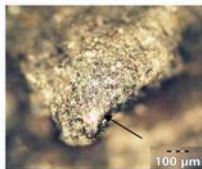
a



b



c



d

FIGURE 9

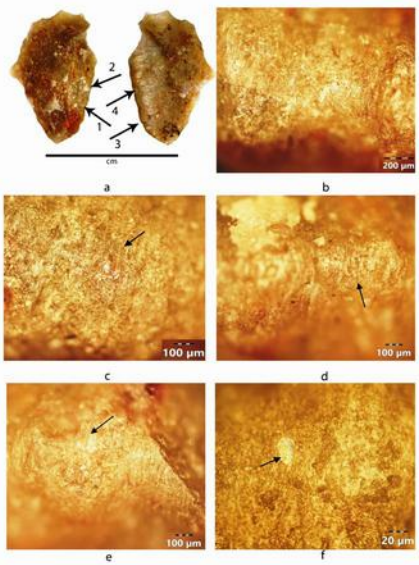


FIGURE 10

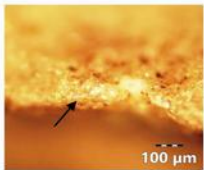
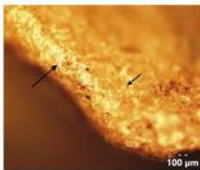
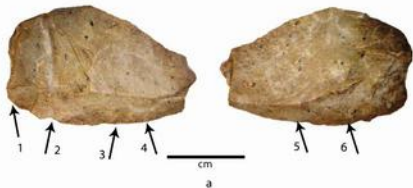


FIGURE 11

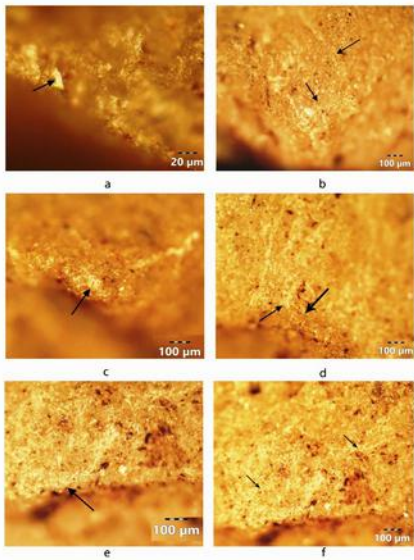


FIGURE 12

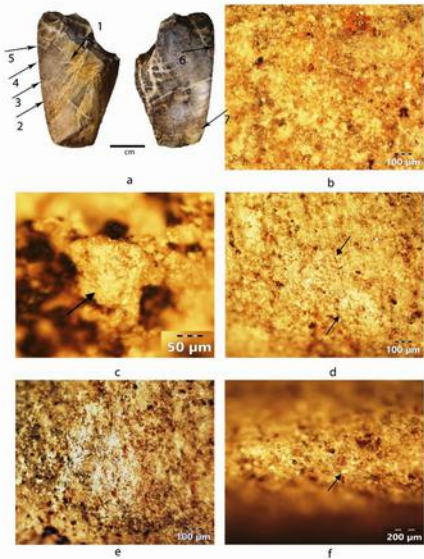
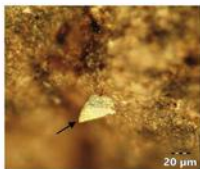
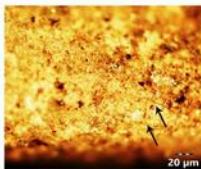


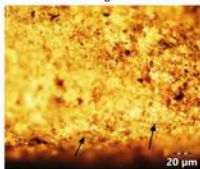
FIGURE 13



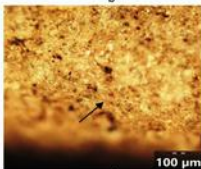
a



b



c



d

FIGURE 14

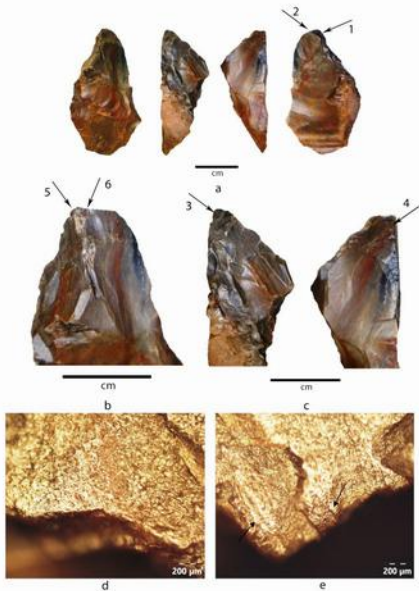


FIGURE 15

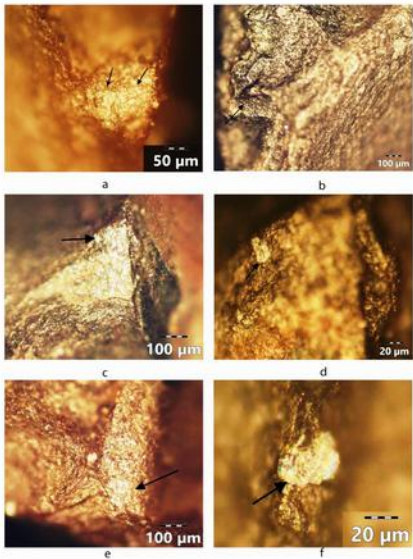


FIGURE 16



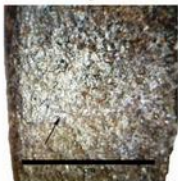
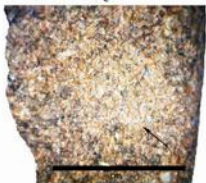
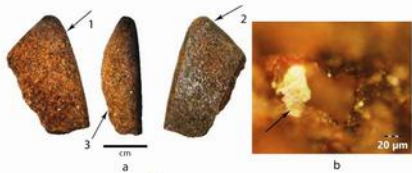


FIGURE 17

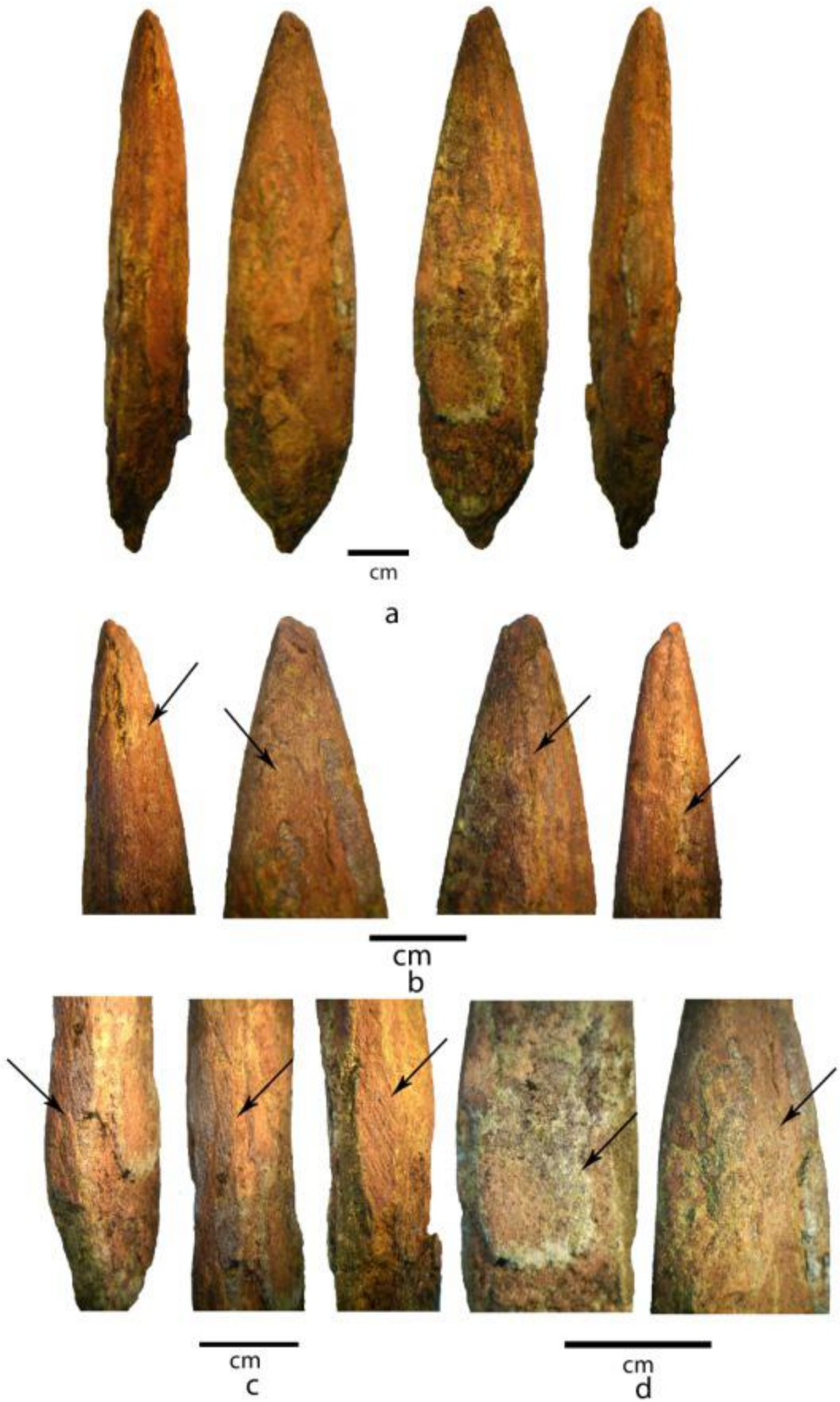


FIGURE 18



FIGURE 19

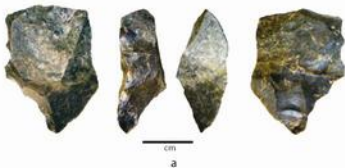


FIGURE 20

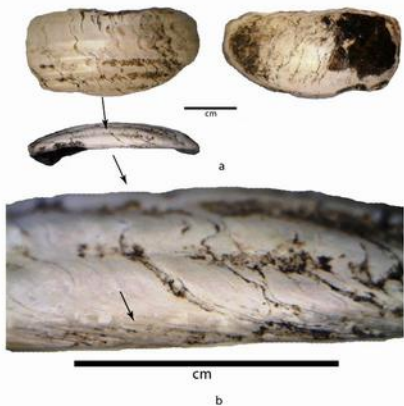


FIGURE 21

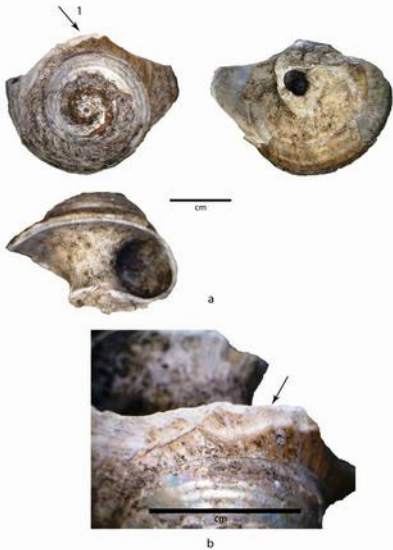


FIGURE 22

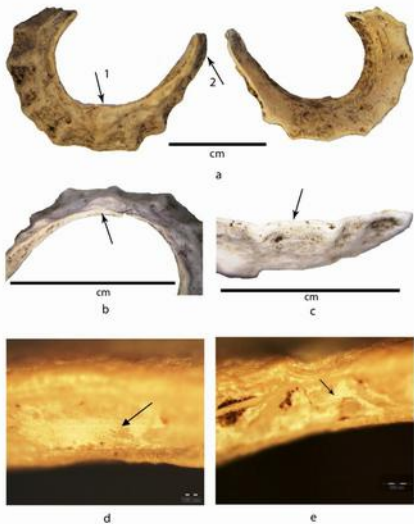


FIGURE 23

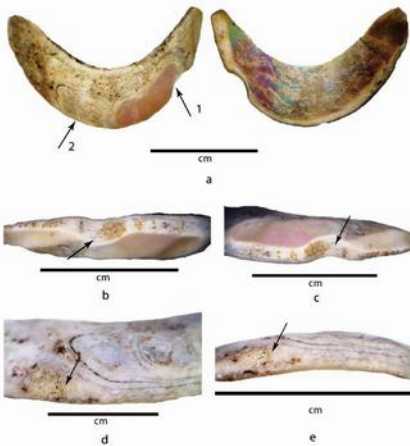


FIGURE 24



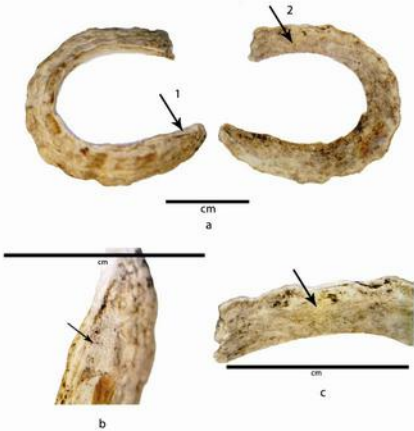


FIGURE 25



cm

a



cm

b

FIGURE 26



cm

a



cm

b



cm

c



cm

d



cm

e



cm

f

FIGURE 27

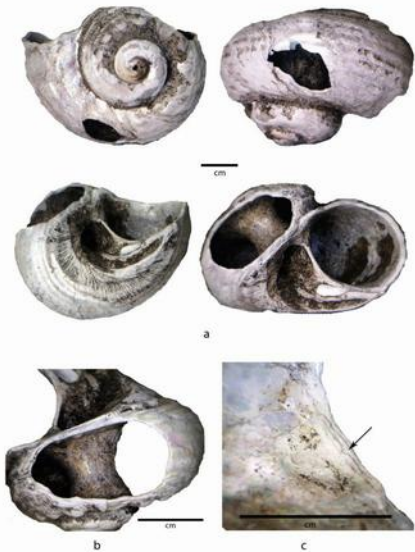


FIGURE 28

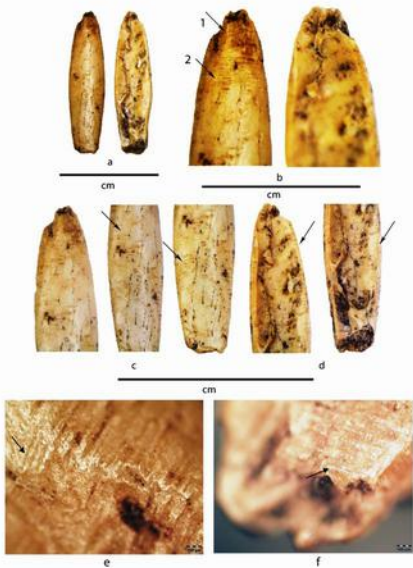
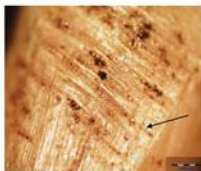
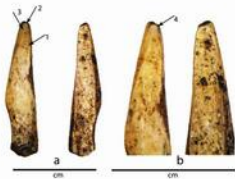
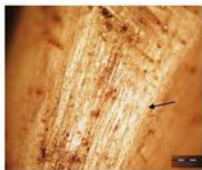


FIGURE 29



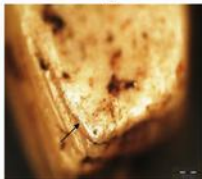
c



d

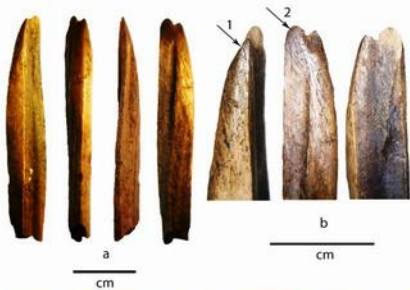


e



f

FIGURE 30



c



d

FIGURE 31

# Appendix 9

## *Other finds data*



Test Pit	Spit	Type / Material	Details
TP1	Spit 1	Glass	one frag purple ribbed glass
TP1	Spit 2	Glass, Metal	modern marble, pull tab frags. c.1970s
TP2	Spit 1	Plastic	plastic bottle insert
TP2	Spit 2	Glass, Metal, Plastic, Stone	nine frags clear glass, one frag brown glass with "...Y.LTD. TH..." (tooheys bottle?), one unid'd metal, 4 frag of plastic (clear and green), one non artefact stone
TP3	Spit 1	Glass, Metal	pull tab frags.c.1970s, two clear glass frags
TP4	Spit 1	Plastic	plastic tape
TP5	Spit 1	Plastic	clear plastic
TP6	Spit 1	Glass	one clear glass frag (window glass?)
TP7	Spit 1	Glass, Metal	one corroded metal (nail?), one frag clear glass
TP7	Spit 3	Metal	one corroded nail
TP8	Spit 1	Metal	one corroded nail
TP8	Spit 2	Metal, Ceramic, stone	one 1911 penny, one ceramic plate frag, fishing weight, safety pin, four corroded nails, unid'd metal object, one non artefact stone
TP8	Spit 3	Glass, Metal, Sandstone, Stone	one mod. green glass frag, six corroded metal (nails?), two sandstone frags. Three non-artefact stone
TP8	Spit 4	Metal	one corroded metal (nail?)
TP9	Spit 1	Glass, Metal	one pull tab (c.1970s), three glass frags (brown and clear), foil
TP9	Spit 2	Stone, Sandstone	24 non artefactual stone: 8 rounded sandstone frags, 17 angular frags
TP9	Spit 3	Stone, Sandstone	non stone artefacts - One large sandstone cobble and three smaller angular frags
TP10	Spit 4	Metal	road metal

Test Pit	Spit	Type / Material	Details
TP11	Spit 2	Stone	mixed stone (non-artefactual)
TP11	Spit 3	Glass, Stone, Charcoal	one clear glass frag. Mixed stone (non-artefactual) and charcoal
TP13	Spit 1	Plastic, Stone	plastic, five non artefactual stone
TP13	Spit 2	Glass, Stone	one clear glass frag. Nine non artefactual stone
TP13	Spit 3	Stone, Sandstone	five non artefactual stone (one sandstone frag) rest conglomerate as seen in spits 1 and 2
TP13	Spit 5	Sandstone	One sandstone frag (not artefact)
TP14	Spit 2	Ceramic	one ceramic frag (cup?)
TP14	Spit 4	Charcoal	one bit of charcoal
TP16	Spit 1	Metal	one pull tab (c.1970s)
TP16	Spit 2	Stone	three non artefactual stones
TP16	Spit 3	Stone	<10 non artefactual stone
TP17	Spit 2	Stone	one non artefact stone
TP17	Spit 3	Stone	one non artefact stone
TP19	Spit 2	Glass, Stone, Pumice, Sandstone	one brown glass frag "...LLED..."; One non artefact stone (conglomerate as seen in TP13), pumice and sandstone frag.
TP19	Spit 3	Glass, Stone, Sandstone	one clear glass frag "...LTD..."; Non artefact stone - sandstone frag
TP20	Spit 1	Glass, Plastic	one brown glass frag (moderately water worn), plastic
TP20	Spit 2	Metal, Pumice, Charcoal, Sandstone, Brick, Stone, Rhodoliths	one corroded metal nail, <60 pumice and charcoal and sandstone frags, brick, water worn stones; Rhodoliths
TP20	Spit 3	Pumice, Charcoal, Sandstone, Glass, Rhodoliths	<40 pumice, charcoal, sandstone, glass, Rhodoliths

Test Pit	Spit	Type / Material	Details
TP20	Spit 4	Glass, Plastic, Pumice, Charcoal, Sandstone	two glass frags (clear and brown), plastic wrapper, <60 pumice and charcoal and sandstone
TP20	Spit 5	Pumice, Charcoal, Sandstone, Stone	<100 pumice and charcoal and sandstone (and tiny quartz pebbles)
TP21	Spit 3	Glass, Ceramic	one brown glass frag and one ceramic sherd (porcelain)
TP22	Spit 2	Glass	three brown glass frags
TP24	Spit 3	Glass, Stone, Charcoal, Pumice, Sandstone, Metal, Rhodoliths	one glass frag (clear). <60 rubble stone, charcoal and pumice. Four non-artefact stones, sandstone, pebbles, slag, Rhodoliths
TP24	Spit 4	Pumice, Charcoal, Stone, Sandstone, Metal	<80 pumice and charcoal, <15 non artefactual stone, sandstone, road slag
TP24	Spit 5	Pumice, Charcoal, Stone, Sandstone, Rhodolith	<80 pumice and charcoal and sandstone, stone, Rhodoliths
TP25	Spit 2	Brick	Brick
TP25	Spit 3	Pumice, Charcoal, Sandstone, Stone, Rubbish, Metal, Wood, Rhodoliths	<80 pumice and charcoal and sandstone (and tiny quartz pebbles), one styrofoam, one corroded nail, Rhodoliths
TP25	Spit 4	Pumice	three pieces pumice
TP25	Spit 5	Pumice	two pumice pieces
TP26	Spit 2	Rubbish	one piece of styrofoam(?)
TP26	Spit 3	Sandstone	One non artefact stone - sandstone
TP27	Spit 1	Glass	MNI 5 (clear glass), "...E?L?...".
TP27	Spit 2	Glass, Pumice, Charcoal, Sandstone, Stone	MNI 4, Purple, clear, brown, and green glass. One glass frag v water-rolled. <20 pumice and charcoal. 12 sandstone frags and other rock, Rhodoliths (?)
TP27	Spit 3	Glass, Pumice, Charcoal, Sandstone, Stone, Rhodoliths	<30 pumice and charcoal. Two glass frag. (clear and green). Sandstone rounded frags. Other 3mm: two glass frags, clear and brown. Rock, Rhodoliths

Test Pit	Spit	Type / Material	Details
TP27	Spit 4	Charcoal, Pumice, Sandstone, Rhodoliths	<30 charcoal and pumice, sandstone, Rhodoliths
TP28A	Spit 2	Glass, Plastic, Stone, Sandstone, Stone, Pumice, Charcoal	two plastic pieces. Conglomerate stone pieces, <15 (similar to TP13). Rounded pieces of sandstone. <60 pumice and charcoal. Glass
TP28A	Spit 3	Pumice, Charcoal, Stone, Metal	<110 pumice, charcoal and rubble stone and <10 pieces of conglomerate stone (non-artefact), slag
TP28A	Spit 4	Pumice, Sandstone, Charcoal, Rhodoliths	Pumice, sandstone, charcoal, <5mm. <200 pumice and charcoal and sandstone. Angular sandstone frags. (not artefacts). Rhodoliths
TP28A	Spit 5	Pumice, Stone	<5 pumice. One non artefact, conglomerate stone
TP28B	Spit 1	Metal	two pull tabs (c.1970s)
TP28B	Spit 2	Glass, Pumice, Charcoal, Stone, Textile	<20 pumice and charcoal. 4 frags of brown glass. Textile pieces. Non artefact, conglomerate rock, <25 pieces
TP28B	Spit 3	Pumice, Charcoal, Sandstone, Stone	<150 pumice and charcoal and sandstone frags (<5). ~6 comglomerate rock (non artefact)
TP28B	Spit 4	Pumice, Charcoal, Sandstone, Rhodoliths	<200 charcoal and pumice. <5 rounded frags of sandstone. Rhodoliths
TP28B	Spit 5	Pumice, Charcoal, Sandstone, Stone	<200 charcoal and pumice. One rounded sandstone frag. and stone
TP29	Spit 1	Sandstone, Stone	5 sandstone / conglomerate non artefact pieces.
TP29	Spit 2	Charcoal, Ceramic, Glass, Metal, Stone	<25 charcoal. One clay pipe. One clear glass frag, five corroded metal (four nails). ~33 conglomerate stone pieces (non-artefact)
TP29	Spit 4	Stone	Four non artefactual stones (e.g. one quartz pebble)
TP30	Spit 2	Sandstone	One non artefactual sandstone
TP30	Spit 3	Sandstone	One non artefactual sandstone
TP30	Spit 4	Stone	One non artefactual stone

Test Pit	Spit	Type / Material	Details
TP31	Spit 2	Glass, Stone	one clear glass. One non artefact stone
TP31	Spit 3	Stone	Four non artefact stones
TP31	Spit 4	Charcoal, Stone	<50 charcoal. 8 non artefactual stone
TP31	Spit 5	Pumice, Charcoal, Stone	<100 charcoal and pumice. <35 non artefact stones
TP31	Spit 6	Charcoal, Sandstone, Stone	<40 charcoal (and plant misc). <10 non artefactual stone (e.g. sandstone frags)
TP32	Spit 1	Metal	one pull tab
TP32	Spit 4	Charcoal, Stone	2 charcoal. 3 non artefactual stone (one conglomerate)
TP32	Spit 5	Charcoal, Sandstone, Stone	<40 charcoal and sandstone. <30 non artefactual stones, including 4 rounded stones, quartz pebbles and sandstone frags.
TP33	Spit 1	Ceramic, Glass	3 ceramic sherds and one brown glass frag
TP33	Spit 2	Ceramic, Stone	one ceramic sherd (porcelain). One non artefactual stone
TP33	Spit 3	Pumice, Charcoal	<3 pumice and charcoal
TP33	Spit 4	Stone	3 pieces of non artefact stone
TP33	Spit 5	Stone	3 pieces of non artefact stone
TP34	Spit 1	Glass	one frag clear glass
TP35	Spit 2	Metal	one pull tab (or foil?)
TP35	Spit 3	Stone	4 non artefactual stones (e.g. two quartz pebbles)
TP35	Spit 4	Charcoal, Stone	<10 charcoal. <15 non artefactual stones
TP36	Spit 3	Charcoal, Stone	<30 charcoal. <10 non artefactual stone
TP36	Spit 4	Charcoal, Stone	<50 charcoal and conglomerate stone (non-artefactual)
TP36	Spit 5	Charcoal	<100 charcoal
TP37	Spit 1	Glass, Sandstone	one brown glass frag, 2 pieces ?sandstone?

Test Pit	Spit	Type / Material	Details
TP37	Spit 3	Pumice	three pumice?
TP37	Spit 5	Charcoal, Sandstone	<20 charcoal, one sandstone frag
TP38	Spit 2	Plastic, Sandstone, Charcoal	sandstone frags (sub-angular), plastic and <10 charcoal frags.
TP38	Spit 3	Sandstone, Stone, Charcoal	rounded sandstone and stone. <40 charcoal
TP38 - Ext	Spit 3	Stone	Stone
TP38	Spit 4	Pumice, Charcoal	<50 charcoal and pumice
TP38	Spit 5	Pumice, Charcoal, Sandstone, Stone	<40 charcoal and pumice and sandstone frags. <15 non artefact stone (e.g. sandstone)
TP39	Spit 3	Stone	one non-artefact stone
TP39	Spit 5	Stone	one non-artefact stone
TP41	Spit 1	Sandstone	one frag sandstone
TP41	Spit 2	Glass, Sandstone	two frags clear glass (one has a design on it) and one ?sandstone frag?