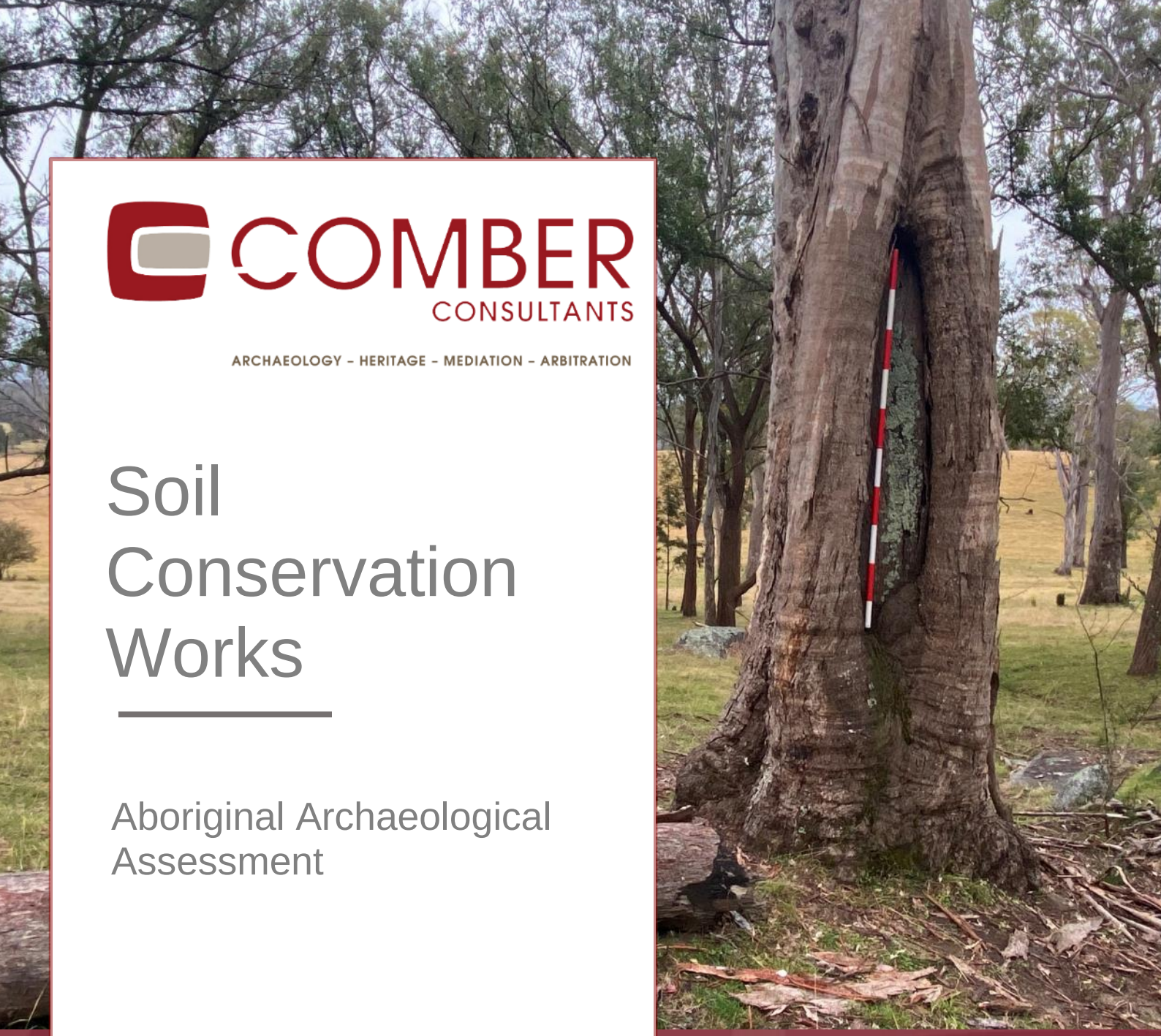

COMBER CONSULTANTS

ARCHAEOLOGY – HERITAGE – MEDIATION – ARBITRATION

Soil Conservation Works

Aboriginal Archaeological Assessment

December 2022

Report to: Health Infrastructure NSW

LGA: Eurobodalla Shire

Version: B.2022

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DOCUMENT CONTROL

PROJECT NO: NH407 **STATUS:** FINAL

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A	09/07/2022	Dr Jillian Comber	David Nutley	Dr Jillian Comber
B	08/12/2022	Dr Jillian Comber	David Nutley	Dr Jillian Comber

ACKNOWLEDGEMENTS

Comber Consultants would like to thank:

- Lee-Anne Parsons, Michelle Davis, Ellis Davis and Christopher Brierley from the Cobowra Local Aboriginal Land Council for their assistance and generosity in sharing information about the site and the Moruya area.
- Also, Ash McGowan, Project Manager, Root Partnership for her assistance in providing maps, explaining the project and general support.

INTEGRATED MANAGEMENT SYSTEM

Comber Consultants has a certified integrated management system to the requirements of ISO 9001 (quality), ISO 14001 (environmental) and ISO 45001 (health and safety). This is your assurance that Comber Consultants is committed to excellence, quality, and best practice and that we are regularly subjected to rigorous, independent assessments to ensure that we comply with stringent Management System Standards.

EXECUTIVE SUMMARY

This report supports a Review of Environmental Factors (REF) prepared for Health Infrastructure NSW pursuant to part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act) for the undertaking of soil conservation and ancillary construction road at Lot 2, DP 1281576, Princes Highway, Moruya.

To ensure that the Aboriginal archaeological significance of the project area is not adversely impacted upon by this proposal, Comber Consultants were engaged to undertake this Aboriginal Archaeological Assessment in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (DPIE 2010).

An AHIMS search undertaken on 17 May 2021 identified five Aboriginal sites within the study area. These sites contain Aboriginal objects. Previous archaeological testing had been undertaken within the study area which revealed a high density of Aboriginal artefacts. In addition, an archaeological site inspection undertaken for this assessment identified three Aboriginal scarred trees in the south-eastern part of the subject site.

As Aboriginal objects are protected under the *National Parks and Wildlife Act* 1979, and it is an offence to harm such objects it will be necessary to apply for an AHIP to undertake the proposed works. This report makes the following recommendations:

Recommendation 1: Consultation
Aboriginal consultation should be undertaken in accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* 2010 and an Aboriginal cultural heritage assessment report (ACHAR) prepared for this proposal.

Recommendation 2: Salvage
Archaeological salvage must be undertaken in consultation with the Cobowra Local Aboriginal Land Council, the South Coast People who are the Native Title claimants and other Registered Aboriginal Parties.

Recommendation 3: AHIP
As Aboriginal objects will be harmed by the proposed soil conservation works it will be necessary to apply for an Aboriginal Heritage Impact Permit to undertake the archaeological salvage and the soil conservation works. The sites to be impacted upon are AHIMS 58-4-1104, 58-4-1317, 58-4-1318, 58-4-1319, 58-4-1320.

Recommendation 4: Scarred Trees
The three scarred trees should be avoided and protected from harm or damage. They should be actively managed and protected to ensure their health and longevity.

Recommendation 5: Interpretation Strategy and Plan
An interpretation strategy and plan should be developed and implemented to showcase the Aboriginal history of Moruya and the site.

CONTENTS

1.0 INTRODUCTION

1.1. Background

This report supports a Review of Environmental Factors (REF) prepared for Health Infrastructure NSW pursuant to part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act) for the undertaking of soil conservation and ancillary construction road at Lot 2, DP 1281576, Princes Highway, Moruya.

To ensure that the Aboriginal archaeological significance of the project area is not adversely impacted upon by this proposal and to meet planning requirements, Comber Consultants have been commissioned to undertake this Aboriginal Archaeological Assessment in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (DECCW 2010).

1.2. Site description

The site of the soil conservation works, and ancillary road works is located on the Princes Highway in the NSW south coast town of Moruya. The site is legally described as Lot 2, DP 1281576 and is a large vacant greenfield site. The soil conservation works will facilitate the ongoing management of the greenfield lot. To the west of the site is Moruya TAFE, and to the north is a small residential subdivision called Mynora Estate.

An aerial figure of the site is shown in Figure 1 below.

Figure 1: Study area edged in red (Google Satellite).

1.3. Proposed Works

The works proposed under this REF are shown in Figure 2 and include the following:

- Construction of three erosion and sediment basins, ranging between 507m^2 and 990m^2 in area.
- Construction of an ancillary road into the site to facilitate construction access into the site.
- Ancillary works including contamination and geotechnical testing.

A further detailed description of the proposed works is contained in the Review of Environmental Factors report for the soil conservation works prepared by Ethos Urban.

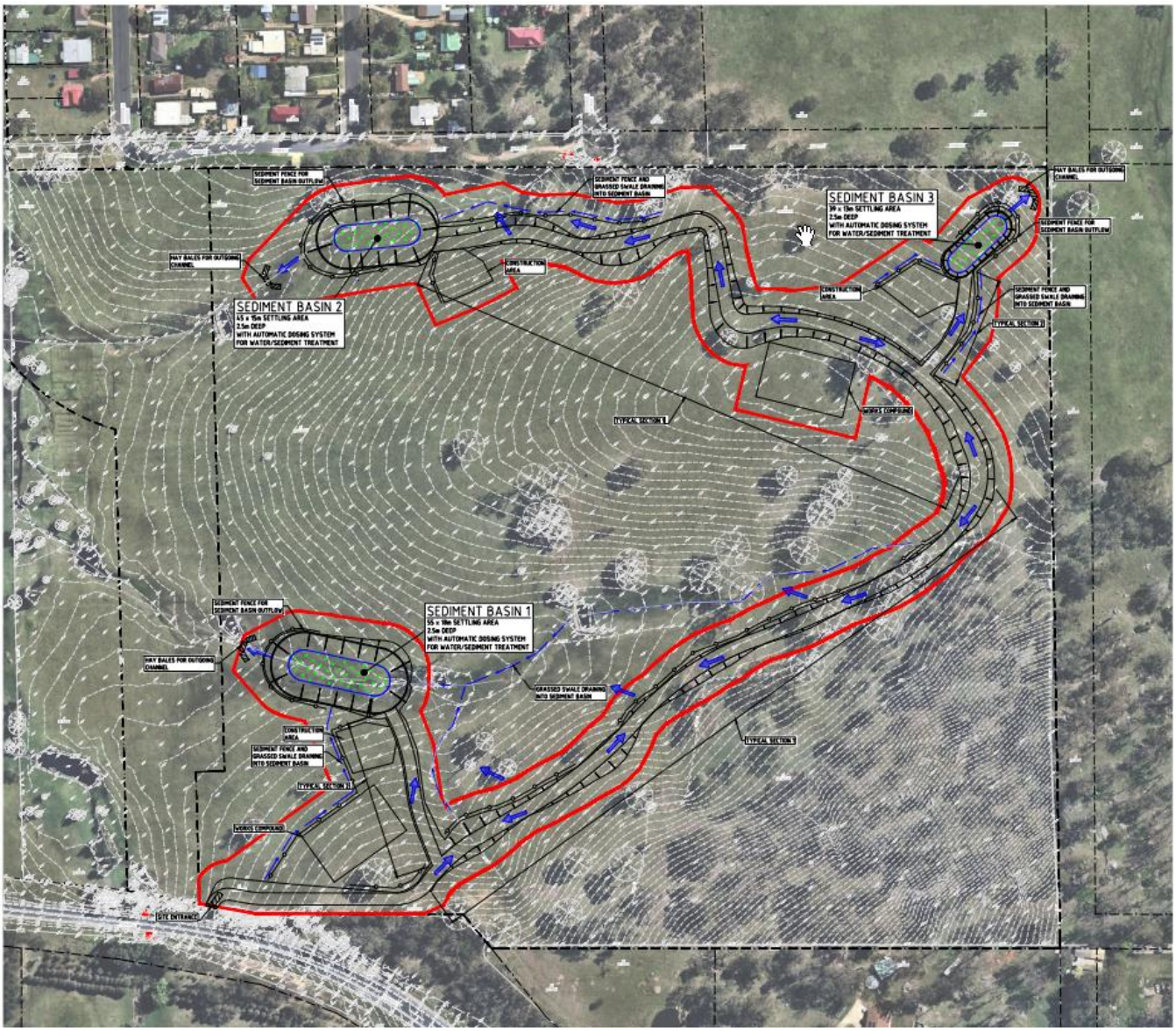

Figure 2: Showing proposed soil conservation works

2.0 METHODOLOGY

This project was conducted in three stages, being background research, field survey and report preparation, as detailed below.

Stage 1: Background Research

Prior to the field component of this project, the Aboriginal Heritage Information Management System (AHIMS) of the Department of Planning and Environment (Heritage NSW) was searched on 17/05/2021. A copy is attached at Appendix A. Site data, associated documents and archaeological reports held by AHIMS were reviewed. Environmental information relating to Aboriginal land use was also researched. Such research facilitated an understanding of the potential nature of sites and site patterning in the region, which enabled a predictive statement to be made. It also provided an archaeological and environmental context within which a significance assessment could be made, if any Aboriginal sites were located during the field survey.

Stage 2: Site Inspection

The archaeological site inspection was undertaken on 3-4 June 2021. The site inspection was undertaken by the following:

Comber Consultants:

- Dr Jillian Comber
- David Nutley
- Glenn Suey
- Chris Jones

Cobowra Local Aboriginal Land Council

- Michelle Davis
- Ellis Davis
- Christopher Brierley

The inspection was undertaken in transects by foot and covered the full extent of the site including all exposed areas. Less than 0.2% of the site was exposed and this was limited to the base of some trees, and tractor tyre marks in areas of soakage.

Stage 3: Report Preparation

Further archaeological research was conducted, where necessary, to clarify the results of the survey. This report was then prepared and provided to Health Infrastructure NSW and the Cobowra Local Aboriginal Land Council.

3.0 LEGISLATION

3.1. National Parks & Wildlife Act 1974

The *National Parks & Wildlife Act 1974* (NPW Act) provides statutory protection to all Aboriginal sites within New South Wales. Heritage NSW is the State Government agency responsible for the implementation and management of this Act.

Part 6 of the *National Parks & Wildlife Act* states that it is an offence to harm or desecrate an Aboriginal object or Aboriginal place, without an Aboriginal Heritage Impact Permit (AHIP). An Aboriginal object is defined 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*.

An Aboriginal Place is defined as*:*

> *A place that, in the opinion of the Minister, is or was of special significance with respect to Aboriginal culture, to be an Aboriginal place for the purposes of this Act.*

This report has determined that the site contains Aboriginal objects that will be impacted upon by the proposed works. Therefore it will be necessary to apply for an Aboriginal Heritage Impact Permit (AHIP) to undertake the proposed soil conservation works. Prior to applying for the AHIP Aboriginal consultation must be undertaken in accordance with the *Aboriginal Cultural Heritage Consultation Guidelines for Proponents 2010*.

4.0 ABORIGINAL CONSULTATION

Aboriginal culture is dynamic and continuous. It includes the tangible and intangible and links people over time to their community and land. It is important to recognise that Aboriginal people have the right to protect, preserve and promote their cultural heritage. In recognition of that right, relevant Aboriginal community organisations were invited to participate fully in the assessment.

The study area falls within Walbunga country and is within the boundaries of the Cobowra Local Aboriginal Land Council (CLALC). Prior to the site inspection Jillian Comber discussed the project with Lee-Anne Parsons of the CLALC and plans and maps were sent to the CLALC. The following representatives of the CLALC attended the site inspection and provide invaluable advice and information:

- Michelle Davis
- Ellis Davis
- Christopher Brierley

5.0 ENVIRONMENTAL CONTEXT

5.1. Topography

The study area is located 1.6 km east of Moruya's town centre and 1.3 km south of the Moruya River. It constitutes a low-lying landscape composed of three low river terraces (c. 15 m AHD) with a south westerly aspect. The terraces are part of the first terrace order, (the highest vertical tier of river terraces) and are delimited by three small seasonal channels, which converge into a larger channel developing along the study area's western boundary. This seasonal channel leads into a swamp along the right bank of Racecourse Creek, a major tributary of the Moruya River.

5.2. Geology and soils

The local lithology is characterised by Devonian granite, exposed in valleys incised through Permian siltstone and silty sandstone, elevation about 170m (Mitchell 2002: 116). The study area is located within a coastal lowlands system developing along the right bank of the Moruya River. This system is characterised by rolling to undulating terrain described as the Moruya Channels and Floodplains Landscape (MCF) (Mitchell 2002:126). According to Mitchell (2002:126), the MCF landscape is defined by:

Channel, floodplain, and terraces of the deep, narrow valley of Quaternary alluvium of the Moruya and Deua Rivers from the coast to the base of the Great Escarpment. ... Uniform sands and loamy sands on the active floodplain, gradational loams, and sandy loams on the first terrace and brown texture-contrast soils on higher terraces. Limited areas of abandoned channel and swamp.

5.3. Vegetation and wildlife

According to the Mitchell landscape descriptions endemic vegetation throughout the study area would have comprised:

Gallery forest of river oak (Casuarina cunninghamiana) along the main channel, tall forest of river peppermint (Eucalyptus elata) on the floodplains with rough-barked apple (Angophora floribunda) and Acacia sp., understorey. … Small patches of temperate rainforest with sassafras (Doryphora sassafras) and lilly pilly (Acmena smithii) in gully heads and as a gallery forest along major streams in sheltered locations.

Such vegetation communities would have provided a variety of edible plant species and plants suitable for artefact manufacture. They would have also sustained a diverse fauna including a variety of marsupials, which would have provided a sustainable food resource. The proximity to fresh water also determines the availability of further food resources such as fish and possibly eels.

5.4. Land use and disturbance

The study area is currently partially deforested. It was previously part of an historic farm called "Braemar" and the name Braemar remains on the gate which provides access to the property (Photograph 1). The homestead has since been demolished and the northern section of Braemar Farm was developed into a residential subdivision. The current study area is located on the southern portion of the former Braemar Farm and is still vacant land. The study area has been used as for grazing and possibly agriculture since the late 1860s. The historical archaeological report for the site (Comber 2022) also indicates that military exercises may have been undertaken within the study area during the 1970s. There is evidence of possible foxhole trenches on the property.

Photograph 1: Entrance to the study area, view to the north.

6.0 ARCHAEOLOGICAL BACKGROUND

6.1. Moruya

Archaeological survey, assessment and testing as part of development consulting projects have been undertaken in the Moruya area since the late 1970s with the quantity of works notably increasing in the 1990s and 2000s (for an exhaustive summary of works prior to 2004 see Dibden 2005). The vast majority of Aboriginal sites recorded and studied in the local area reveal broadly similar parameters. The sites are usually represented by artefact scatters and subsurface archaeological deposits of Aboriginal stone tools. Artefact concentrations are of various density determined by microregional specifics such as landform, land use and disturbance. Midden sites are usually located on coastal headlands.

More recently, Williams (2005) undertook subsurface probing at Bangalay Estate, Moruya Heads. This site is located c. 2.5 km east of the study area. It was surveyed in 2003 and test-excavated in 2005. It is located on a similar landform to the general locality of the current study area. Williams excavated 88, 250x250 mm test pits (c. 5.5 m^2) which yielded 590 Aboriginal stone artefacts, indicating concentrations exceeding 93 artefacts per m^2. The highest densities were identified on flat to gently sloping ridge saddles.

In 2006 Dibden undertook an archaeological assessment for a proposed residential subdivision at Lot 69, DP 752151, South Head Road, Moruya. This property is located immediately to the north-east of the current study area. The initial site survey of this property was undertaken by Dr Julie Dibden in October 2006 and revealed a vegetated agricultural land with minimal ground surface visibility. While no Aboriginal artefacts were identified on the ground surface, four of the seven survey units, in which the project area was divided, were identified as archaeologically sensitive for the likely presence of subsurface archaeological deposits. A program for subsurface archaeological testing was recommended as a result of this assessment.

In 2007 the Lot 69 which had been assessed by Dibden (2006) was test-excavated by AHMS (2007). This was a machine excavation using a mechanical excavator with a 1 m flat bucket. Test pits were laid out in transects across the project area and excavated in 100 mm mechanical layers.

Eighteen test pits were excavated down to basal clay which revealed a heavily disturbed soil profile with evident traces of ploughing down to the basal clay. 293 definite and probable Aboriginal artefacts were recovered comprising items of quartz (34.8%), silcrete (26.3%), tuff (14.3%) and chert (5.8%), plus a mixture of other materials such as volcanic rocks, FGS, qartzite and agate (6.8%). The assemblage was dominated by broken flakes as residue of the stone tool production process (aka 'knapping', or 'debitage'). Nevertheless, some complete flakes and cores were also recovered. Usewear analysis found micro chipping on several of the artefacts. No further archaeological and mitigation works were recommended after the completion of the test excavation.

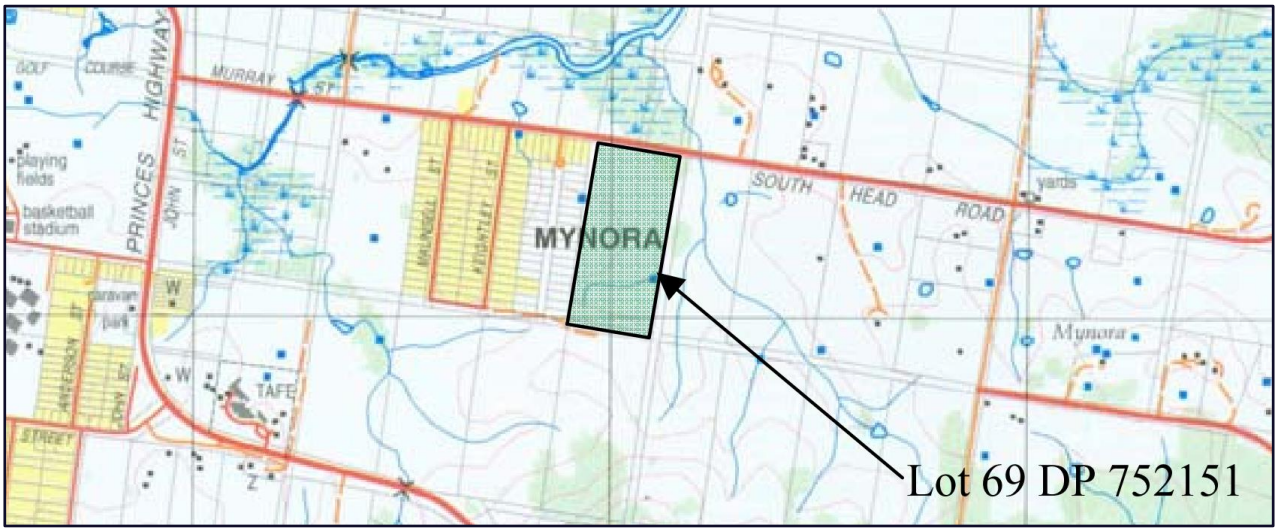

Figure 3: Dibden's 2006 survey area, excavated in 2007 by AHMS (after Dibden 2006, Figure 4)

6.2. AHIMS

An AHIMS search was undertaken on 17 May 2021. This search revealed 18 Aboriginal sites in a 1 km radius around the study area (Figure 1). Six AHIMS sites were identified within the study area (see next section). The majority of sites (93.75%) represent surface artefact sites (artefact scatters and isolated finds), one site is a shell midden (**Table 1**). Aboriginal sites are generally only recorded as part of archaeological surveys undertaken prior to redevelopment. Therefore, the number of sites and site patterning is not reflective of the number of sites within the region. They are only the sites which have been identified to date.

Site Type	Occurrence	Percent
Artefact Scatter	13	81.25%
Isolated Find	2	12.5%
Midden	1	6.25%
Total	16	100%

Table 1: AHIMS search results site statistics

6.3. Study Area

There are six previously identified Aboriginal archaeological sites within the study area (Figure 1 & Table 2). The study area is not a declared Aboriginal place.

The AHIMS sites within the study area are one Isolated Find and five surface artefact scatters (Table 2). An Isolated find is a single stone artefact, found on the surface of the land not in association with any other artefact. An Artefact scatter is an area where precontact material such as artefacts and the residue from stone tool production are lying exposed on the surface of the ground and most likely exist subsurface.

Site ID	Site name	ite Type
58-4-1104	Moruya Site 2	Open site / Isolated Find
58-4-1317	BF-SU7	Open site / Isolated Find
58-4-1318	BF-SU9	Open site / Artefact scatter (2 artefacts)
58-4-1319	BF-SU10	Open site / Artefact scatter (58 artefacts)
58-4-1320	BF-SU11	Open site / Artefact scatter (59 artefacts)
58-4-1321	BF-SU12	Open site / Artefact scatter (67 artefacts)

Table 2: AHIMS sites within the study area.

The AHIMS sites within the study area were identified by Dr Julie Dibden in relation to the Braemar Farm redevelopment, and were subsequently excavated. Further details are below.

Due to low ground surface visibility conditions, and due to the prior testing, none of these sites could be identified in the site inspection undertaken for this report.

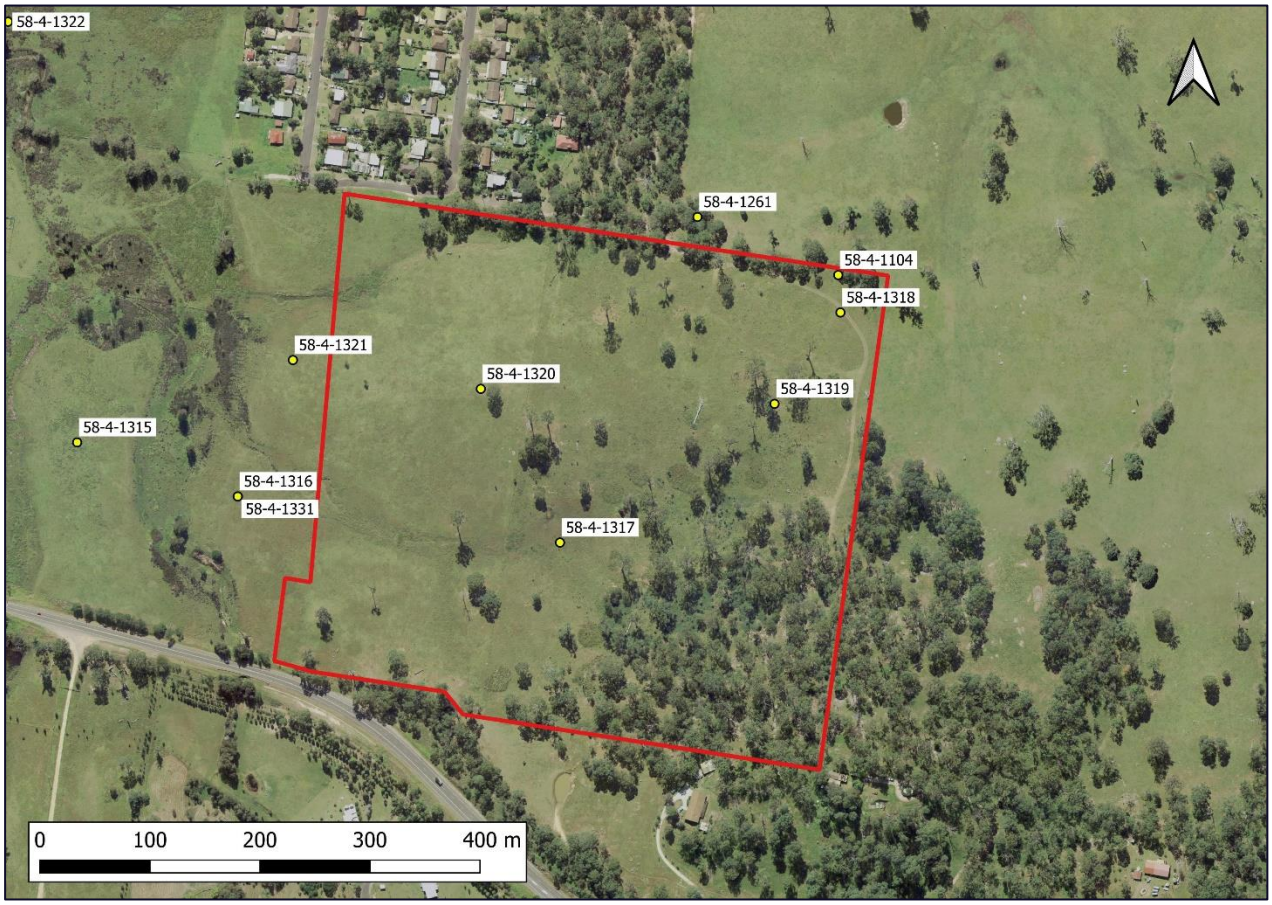

Figure 1: Map of the study area showing the location of entries in the AHIMS register.

6.4. Testing by Dr Julie Dibden

In 2004 Dr Julie Dibden excavated the site of Braemar Farm prior to a proposed subdivision. The site comprised Lots 1, 2, 3, 4 in DP 758710, Lot 50, 51, 54, 65, 68 in DP 752151, and Lot 2 in DP 553273. The subdivision site included the current study area (Figure 2).

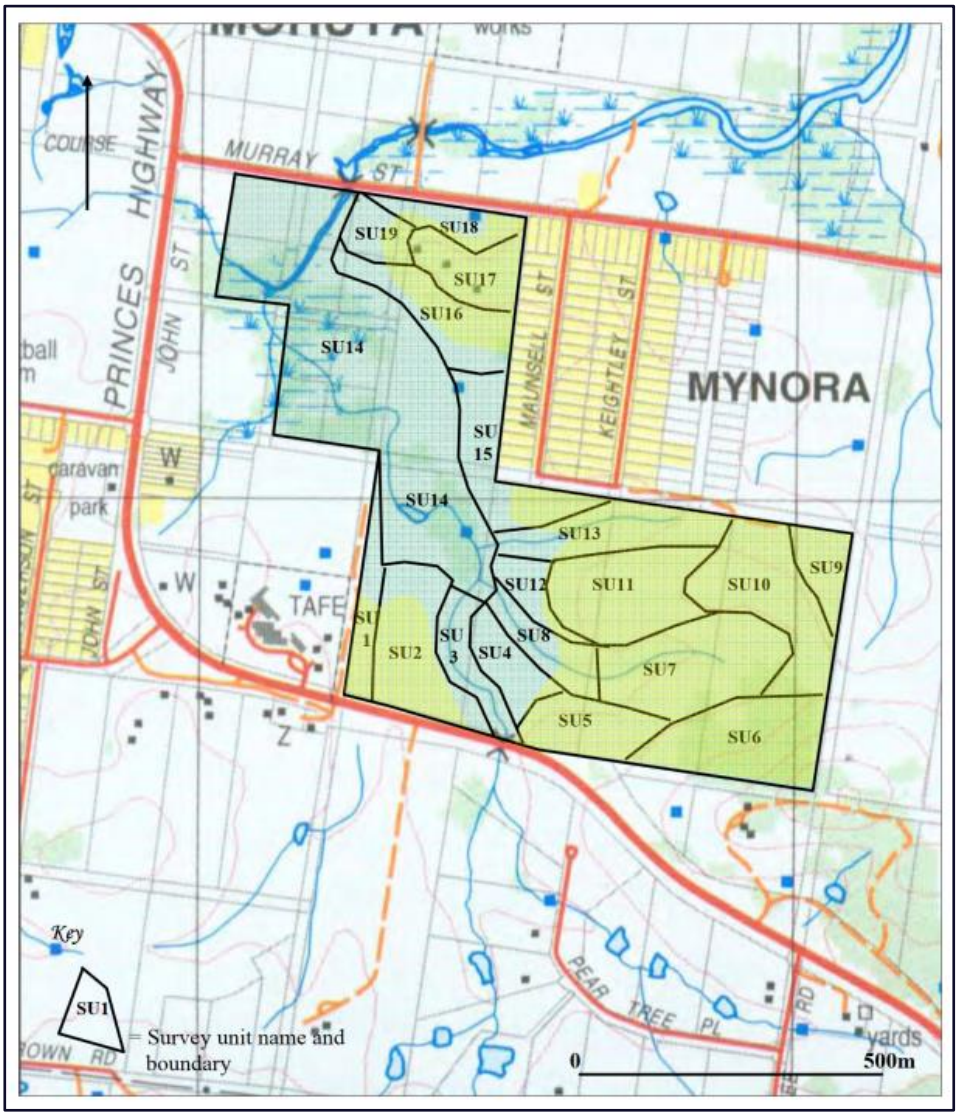

Figure 2: The proposed 2004 Braemar Farm subdivision with J. Dibden's survey units (after Dibden 2005 Figure 3). The current study area forms the southern portion of the above subdivision.

Dibden (2005) excavated 222 test pits in 21 transects across the property and 307 Aboriginal stone artefacts were recovered. The highest densities were found in basal simple slopes and medium densities were found on spur crests. The average density recorded was 5.5 artefact per m^2. The following artefact raw materials were identified: silcrete (37%), quartz (35.9%) and volcanic rock (22%). Both terrestrial as well as alluvial cortex was identified which suggested that raw materials were sourced both from quarries and from riverine context. Significantly, artefact scatters are not necessarily close to fresh water sources and were found at a considerable distance from fresh water.

Dibden's 2005 test excavation report (provided as Appendix E to this report) recommended ongoing consultation with the Cobowra LALC, consideration of an active conservation management strategy for the site and archaeological salvage, should the latter prove to be unfeasible.

6.5. Site prediction

On the basis of the environmental and archaeological information the following predictions can be made for the study area:

- The study area is located within an accessible and diverse open landscape with ample resources, therefore it would have been suitable for human occupation and daily activities;
- The study area may contain exposed granite rock outcrops, so it is possible that Aboriginal axe grinding grooves or rock art could be found;
- The study area has been mainly cleared of endemic vegetation and natural resources, however some native trees are to be found, therefore there is the potential for scarred or carved trees to remain within the study area.
- As the predominant Aboriginal settlement pattern in the micro-region was based on open camp sites, and not necessarily close to a water source, the study area may contain open artefact scatters and subsurface archaeological deposits.
- The study area has been modified by modern farming, therefore any artefact scatters and subsurface archaeological deposits within the study area are expected to have sustained previous impact and would be disturbed;
- Archaeological testing in the study area has revealed extensive material evidence of Aboriginal occupation in the form of subsurface archaeological deposits containing Aboriginal stone artefacts;
- Six Aboriginal sites have already been identified within the study area.
- Test excavations within the study area have revealed a high density of artefacts;
- The study area therefore has a very high potential to have retained archaeological evidence for past Aboriginal occupation represented by surface artefact scatters and subsurface archaeological deposits.

7.0 SITE INSPECTION RESULTS

7.1. Results

The site survey was undertaken on 3-4 June 2021 by Dr Jillian Comber, David Nutley, Glenn Suey and Chris Jones of Comber Consultants together with Michelle Davis, Ellis Davis and Christopher Brierley from the Cobowra Local Aboriginal Land Council. The inspection was undertaken in transects by foot and covered the full extent of the study area including all exposed areas. Less than 0.2% of the site was exposed and this was limited to the base of some trees, and tractor tyre marks in areas of soakage. Due to low ground surface visibility conditions, none of the AHIMS sites within the study area could be identified.

The study area is largely cleared and covered with thick pasture (Photograph 2). The high ground in the south-east portion of the property has numerous granite outcrops and is lightly covered with open forest (Photograph 3). Four shallow swales drain moisture from the high ground into that wetland (Photographs 4-5) which, in turn, runs to the north-west outside of the property to join Racecourse Creek. Evidence of the damming of one of these swales was also present (Photograph 6).

Photograph 1: View of open pasture and trees on upper slopes. View to the south-east.

Photograph 2: Granite outcrops and open forest on the high ground in the south-east sector of the study area.

Photograph 3: Soakage swale running south-east to north-west across the property. View to the north-west.

Photograph 4: Wetland near western border

Photograph 5: Small dam on the swale running east to west across the property. View to north-east

The ridgelines, natural soakage and the creek running along the western boundary of the study area indicate an area that had potential to be a source of aquatic animals and plant foods and the dry ridge lines had potential to be used as occupation sites. Aboriginal lithic material on the ridgelines, and slopes, and on the shallow valleys, and creek bed on the property have the potential to have been distributed through natural processes (rain, bioturbation etc), and from colonial, and post-colonial agricultural activities, including tree-felling, grazing and ploughing.

While the extant AHIMS sites were not identified due to the high ground cover, the site inspection identified three Aboriginal scarred trees near the south-eastern extent of the site. These have been registered on the Aboriginal Heritage Information Management System.

The details of the scarred trees are as follows:

Scarred Tree 1: E.tereticornis, being colonised by fig

Dimensions:
Girth of tree: 5000mm
Scar dimensions:
Length: 1200mm
Width: 530mm
Regrowth Dimensions:
Left side regrowth:
Width: 450mm
Depth: 222mm
Right side regrowth:
Width:210mm
Depth: 180mm
Distance of base of scar above ground: 600mm

Scarred Tree 2: E.tereticornis

Dimensions:
Girth of tree: 4400mm
Scar dimensions:
Length 2100mm;
Width 340mm
Regrowth Dimensions:
Left side regrowth:
Width: 950mm
Depth: 260mm
Right side regrowth:
Width: 980mm
Depth: 270mm
Distance of base of scar above ground: 1220mm

Scarred Tree 3: E.tereticornis

Dimensions:
Girth of tree: 4400mm
Scar dimensions:
Length 1600mm;
Width 110mm
Regrowth Dimensions:
Left side regrowth:
Width: 510mm
Depth: 140mm
Right side regrowth:
Width: 540mm
Depth: 150mm
Distance of base of scar above ground: 580mm

8.0 SIGNIFICANCE ASSESSMENT

8.1. Preamble

Significance assessment is the process whereby sites or landscapes are assessed to determine their value or importance to the community. A range of criteria have been developed for assessing the significance which embody the values contained in the Burra Charter. The Burra Charter provides principles and guidelines for the conservation and management of cultural heritage places within Australia.

Following are the criteria which will be used to assess the study area:

Social Value (sometimes termed "Aboriginal" value) which refers to the spiritual, traditional, historical or contemporary associations and attachments which the place or area has for the present-day Aboriginal community.

Historic Value refers to the associations of a place with a person, event, phase, or activity of importance to the history of an Aboriginal community.

Scientific Value refers to the importance of a landscape, area, place, or object because of its archaeological and/or other technical aspects.

Aesthetic Value refers to the sensory, scenic, architectural, and creative aspects of the place.

Representativeness refers to whether the site demonstrates the principal characteristics of that site and is a good representative example of that site type.

Rarity refers to the degree to which such a site is known elsewhere and whether the site is uncommon, rare or endangered.

8.2. Assessment

Social Value
Consultation with representatives of the Cobowra Local Aboriginal Land Council indicates that the study area is of importance to the local and broader Aboriginal community. The precinct contains evidence of Aboriginal occupation which provides a continuing cultural link to their past. The study area provides evidence of tangible and intangible links of Aboriginal occupation with the lifestyle and values of their ancestors.

Historic Value
The study area contains evidence of Aboriginal occupation which contributes to an understanding of the history of the pre and post contact history of the local Aboriginal community.

Scientific Value
The study area has the potential to yield further information through further detailed scientific and archaeological research into the nature of Aboriginal occupation and techniques utilised in subsistence activities. It has the potential to contain sub-surface archaeological deposits.

Aesthetic Value
The current site is an attractive and significant cultural landscape.

Representative Value
Until the excavation has been completed it is not known if the site contains representative values.

Rarity Value
Until further research has been completed it is not known if the study area contains rarity values, although due to natural attrition scarred trees are increasingly becoming unusual within the landscape.

8.3. Statement of significance

Consultation with representatives of the Aboriginal community indicates that the study area is important to the local and broader Aboriginal community. The precinct contains evidence of Aboriginal occupation which provides a continuing cultural link to their past. The study area provides evidence of tangible and intangible links of Aboriginal occupation with the lifestyle and values of their ancestors; it contains evidence of Aboriginal occupation which contributes to an understanding of the history of the pre and post contact history of the local Aboriginal community, it has the potential to yield further information through detailed scientific and archaeological research into the nature of Aboriginal occupation and techniques utilised in subsistence activities. The current site is an attractive and significant cultural landscape. The Aboriginal archaeological and cultural heritage potential of the study area therefore fulfils the criteria for social, historic, scientific and aesthetic value. Until further research has been completed it is not known if the area contains representative or rarity values.

9.0 IMPACTS AND MITIGATION

9.1. Impacts

Figure 6 below shows the proposed works and the registered sites within the study area including the three scarred trees. The project has the potential to impact on five of the registered sites through direct and indirect impact. The impact will occur as a result of:

- Construction of three erosion and sediment basins, ranging between 507m^2 and 990m^2 in area.
- Construction of an ancillary road into the site to facilitate construction access into the site.
- Contamination and geotechnical testing including drilling and excavating sampling pits.
- Movement of the drill rig over the site.
- Movement of vehicles and equipment needed to construct the erosion and sediment basins.
- Installation of a works compound.
- Tree planting

The sites to be impacted are:

- 58-4-1104 – direct impact
- 58-4-1317 – direct impact
- 58-4-1318 – direct impact
- 58-4-1319 – direct impact
- 58-4-1320 – indirect impact
- The three scarred trees will not be impacted upon

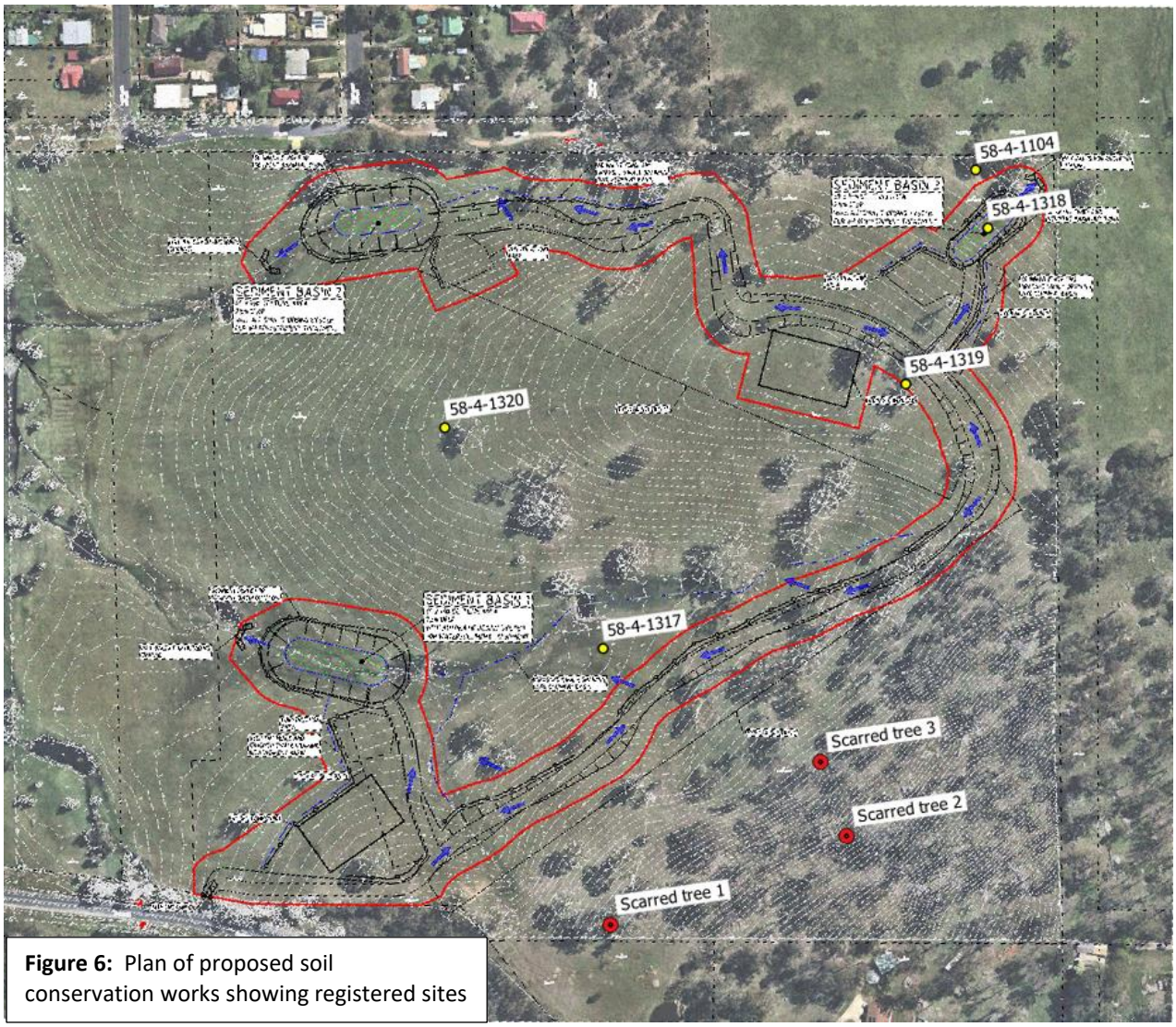

Figure 6: Plan of proposed soil conservation works showing registered sites

9.2. Mitigation

As Aboriginal objects have been identified within the study area (AHIMS sites 58-4-1104; 58-4-1317, 58-4-1318, 58-4-1319, 58-4-1320), and it is an offence to harm such objects, and as avoidance cannot be achieved, archaeological salvage must be undertaken in consultation with the local Aboriginal community.

The information gained from archaeological excavation contributes to our knowledge and understanding of Aboriginal occupation. This knowledge can then be passed down to future generations through educational programs and interpretation. Such strategies will contribute to building and maintaining social cohesion within the Aboriginal and broader community and protecting cultural values for future generations. Archaeological sites are valued by the Aboriginal community for more than their archaeological/scientific values. Such sites reflect both the physical and spiritual presence of ancestors on country. It is therefore important that as much information as possible is obtained to ensure recognition of Aboriginal heritage and to pass this information on to future generations.

The three Aboriginal scarred trees identified within the study area will not be impacted upon. Due to their age, Aboriginal scarred trees are suffering loss and damage, so it is important that all scarred trees be protected and actively managed to ensure their health and longevity.

10.0 RECOMMENDATIONS

The following recommendations are made based on:

- Legal requirements under the terms of the *National Parks & Wildlife Act* 1974 (as amended), which states that it is an offence to harm or desecrate an Aboriginal object without first gaining a permit under Part 6 of the *National Parks & Wildlife Act 1974.*
- Research into the archaeological record for the region, and the study area.
- Results of the assessment as outlined in this report.

Recommendation 1: Consultation
Aboriginal consultation should be undertaken in accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* 2010 and an Aboriginal cultural heritage assessment report (ACHAR) prepared for this proposal.

Recommendation 2: Salvage
Archaeological salvage must be undertaken in consultation with the Cobowra Local Aboriginal Land Council, the South Coast People who are the Native Title claimants and other Registered Aboriginal Parties.

Recommendation 3: AHIP
As Aboriginal objects will be harmed by the proposed soil conservation works it will be necessary to apply for an Aboriginal Heritage Impact Permit to undertake the archaeological salvage and the soil conservation works. The sites to be impacted upon are AHIMS 58-4-1104, 58-4-1317, 58-4-1318, 58-4-1319, 58-4-1320.

Recommendation 4: Scarred Trees
The three scarred trees should be avoided and protected from harm or damage. They should be actively managed and protected to ensure their health and longevity.

Recommendation 5: Interpretation Strategy and Plan
An interpretation strategy and plan should be developed and implemented to showcase the Aboriginal history of Moruya and the site.

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APPENDIX A: AHIMS SEARCH

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Eurobodalla

Client Service ID : 591283

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
58-4-1104	Moruya Site 2	GDA	56	238050	6020945	Open site	Valid	Artefact : -		
	Contact Searle	**Recorders**	Doctor.Julie Dibden					**Permits**	2249,2250	
58-4-1105	Moruya Site 3	GDA	56	237487	6021409	Closed site	Valid	Shell : -		
	Contact Searle	**Recorders**	Doctor.Julie Dibden					**Permits**	2249,2250,3438	
58-4-1261	Lot 69 South Head Road 1	GDA	56	237922	6020998	Open site	Valid	Artefact : -		103039
	Contact	**Recorders**	Jim Wheeler					**Permits**		
58-4-1326	BF - SU 17	GDA	56	237410	6021374	Open site	Valid	Artefact : 4		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**		
58-4-1320	BF- SU11	GDA	56	237725	6020841	Open site	Valid	Artefact : 59		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**		
58-4-1321	BF- SU12	GDA	56	237554	6020868	Open site	Valid	Artefact : 67		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**		
58-4-1322	BF- SU14	GDA	56	237295	6021175	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**	3438	
58-4-1323	BF- SU16	GDA	56	237386	6021302	Open site	Valid	Artefact : 3		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**	3438	
58-4-1324	BF- SU18	GDA	56	237419	6021453	Open site	Valid	Artefact : 3		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**	3438	
58-4-1315	BF- SU2	GDA	56	237358	6020793	Open site	Valid	Artefact : 28		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**		
58-4-1316	BF- SU4	GDA	56	237504	6020744	Open site	Valid	Artefact : 43		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**		
58-4-1317	BF- SU7	GDA	56	237797	6020702	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**		
58-4-1318	BF- SU9	GDA	56	238052	6020911	Open site	Valid	Artefact : 2		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**		
58-4-1319	BF- SU10	GDA	56	237992	6020828	Open site	Valid	Artefact : 58		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**		
58-4-1325	BF- SU19	GDA	56	237279	6021453	Open site	Valid	Artefact : 22		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**		
58-4-1331	BF-SU4	GDA	56	237504	6020744	Open site	Valid	Artefact : 43		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**		

Report generated by AHIMS Web Service on 17/05/2021 for Dragomir Garbov for the following area at Lat, Long From : -35.9234, 150.0804 - Lat, Long To : -35.9121, 150.0986 with a Buffer of 0 meters. Additional Info : Assessment. Number of Aboriginal sites and Aboriginal objects found is 16

APPENDIX B: TEST EXCAVATION REPORT BY DR JULIE DIBDEN

Braemar Farm
Proposed Residential Subdivision, Moruya NSW
Subsurface Test Excavation
s87 Permit #2249

A Report to Melocco & Moore
Level 5 122 Kippax Street
Surrey Hills 2110

September 2005

Julie Dibden
New South Wales Archaeology Pty Limited
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1. SUMMARY

1.1 Introduction

New South Wales Archaeology was commissioned in August 2004 to undertake a program of subsurface test excavation at Braemar Farm, Moruya, NSW, by Melocco and Moore Architects Pty Ltd, on behalf of Patent Developments. Patent Developments propose to subdivide the land into residential allotments.

The proposal site is situated north of the Princes Highway, on the southern outskirts of Moruya. The property measures approximately 52 hectares in area and comprises Lots 1, 2, 3, 4 in DP 758710, Lot 50, 51, 54, 65, 68 in DP 752151, and Lot 2 in DP 553273.

It is proposed to subdivide the property into a number of residential lots. The design of the subdivision is not yet finalised. The final layout of the subdivision will be based on the results of the current study and other relevant studies including a flora and fauna assessment and a bushfire constraints assessment.

New South Wales Archaeology Pty Ltd and the Cobowra Local Aboriginal Land Council conducted an initial archaeological survey of the proposal area (Dibden 2004). Effective survey coverage was low across the study area and the ability to detect Aboriginal objects on the ground was correspondingly low. It was therefore assessed that visibility variables were less than adequate for determining the full nature and significance of the Aboriginal archaeological deposits on the proposal area (Dibden 2004).

A program of subsurface test excavation was recommended to be undertaken for the purposes of clarifying the nature and significance of the archaeology present. It was recommended that based on the results of the subsurface work, management and mitigation strategies could then be formulated in regard to any Aboriginal archaeological deposits in relation to the subdivision proposal.

Accordingly NSW Archaeology Pty Ltd was engaged by Melocco and Moore Architects Pty Ltd, on behalf of Patent Developments, to undertake this work. A s87 Preliminary Research Permit (#2249) was obtained from the Director-General, NSW DEC.

DPNIR is the Consent Authority in regard to the subdivision proposal.

1.2 The Subsurface Excavation Program

This project has been managed by Julie Dibden, New South Archaeology Pty Ltd. The work has been conducted in partnership with the Cobowra Local Aboriginal Land Council.

Twenty one Test Transects were excavated in order to obtain a representative sample of the archaeological resource within a number of the landform elements present in the proposal area.

Survey Units had previously been defined in the proposal area by Dibden (2004). The Survey Units sampled during this excavation program included Survey Units 2, 4, 5, 7, 9, 10, 11, 12, 14, 16, 17, 18 and 19.

A total of two hundred and twenty two Test Pits each measuring 0.5 x 0.5 metres were excavated by spade and trowel.

- A total area of 55.5 square metres of ground was excavated.
- A total of 16.91cubic metres of soil was excavated.
- Artefacts were recovered from 20 of the 21 Test Transects
- Artefacts were recovered from 112 of the 222 Test Pits.
- A total of 307 whole and broken stone artefacts were retrieved.
- A minimum number estimate of 253 artefacts was calculated.
- No shell midden material was encountered during the excavation.

- Mean artefact density is calculated to be 5.5 artefacts per conflated square metre.
- Mean artefact density is calculated to be 18.2 artefacts per cubic metre.
- Artefact densities vary for 40.2 m^3 to 1.2 m^3.

The results indicate that artefact density across the proposal area is generally low although variable between survey units. Artefact distribution is patchy within survey units.

The lithic assemblage exhibits low levels of artefact variability and technical diversity. A limited range of artefact types are present and this in conjunction with low artefact density is interpreted to reflect a correspondingly limited range of behavioural activities that were undertaken in the local area.

1.3 Statutory Context

Sections 84 and 90 of the *National Parks and Wildlife Act 1974* (as amended) provides statutory protection for any physical/material evidence of Aboriginal occupation of NSW and places of cultural significance to the Aboriginal community. The rationale behind the Act is the prevention of unnecessary, or unwarranted destruction of Aboriginal objects, and the active protection and conservation of objects which are of high cultural significance.

The implementation of the Aboriginal heritage provisions of the Act is the responsibility of the NSW Department of Environment and Conservation. It is an offence to *knowingly* disturb an Aboriginal object, irrespective of its nature or significance, without the prior written consent of the Director-General of the NSW Department of Environment and Conservation.

The Act defines an Aboriginal 'object' as

> 'any deposit, object or material evidence (not being a handicraft for sale) relating to indigenous and non-European habitation of the area that comprises New South Wales, being habitation before or concurrent with the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains'.

1.4 Recommendations

It is recommended that (see Section 12 for a full listing of recommendations):

1. The proponent should give due consideration to the list of recommended management and mitigation strategies in regard to Survey Units outlined in Section 11 of this report.

2. It is recommended that the proponent consult further with the Cobowra Local Aboriginal Land Council in regard to the management of the Aboriginal archaeological resource located within the study area.

3. A management strategy of active conservation, if at all feasible, should be considered in relation to the following Survey Units: SU2; SU4; part of SU10; SU12 and SU19. If a strategy of conservation is not feasible mitigated impacts (salvage excavation) is an appropriate alternative management strategy; accordingly s90 Consent with Salvage would need to be sought from the Director-General NSW DEC. An archaeologist would need to be engaged to conduct a salvage excavation in the Survey Units in question.

4. A management strategy of unmitigated impacts is recommended in relation to the following Survey Units: SU5; SU7; SU9, SU11 (if conservation outcomes are achieved elsewhere); SU14; SU16; SU17 and SU18. A s90 Consent would need to be sought from the Director-General NSW DEC.

5. There are no archaeological constraints in regard to the remainder of the Survey Units present in the proposal area.

Acknowledgements

Gratitude is extended to the following people for their assistance in this project:

Danielle Towers, NSW DEC
Norman Parsons, Ron Stewart and Dennis Bond, Cobowra Local Aboriginal Land Council
Temara Ripamonti, Melocco and Moore Architects Pty Ltd
Lauris and Mick McCauley, Braemar Farm property managers
Gareth Hall, proponent
Ed Clarke, South East Archaeology Pty Ltd
Norma Richardson, lithic analyst
Jo Dibden, Lodie Webster, Col Rayner, Andrew Pearce and Glen Willcox, field assistants
Doug Williams, Archaeo Analysis

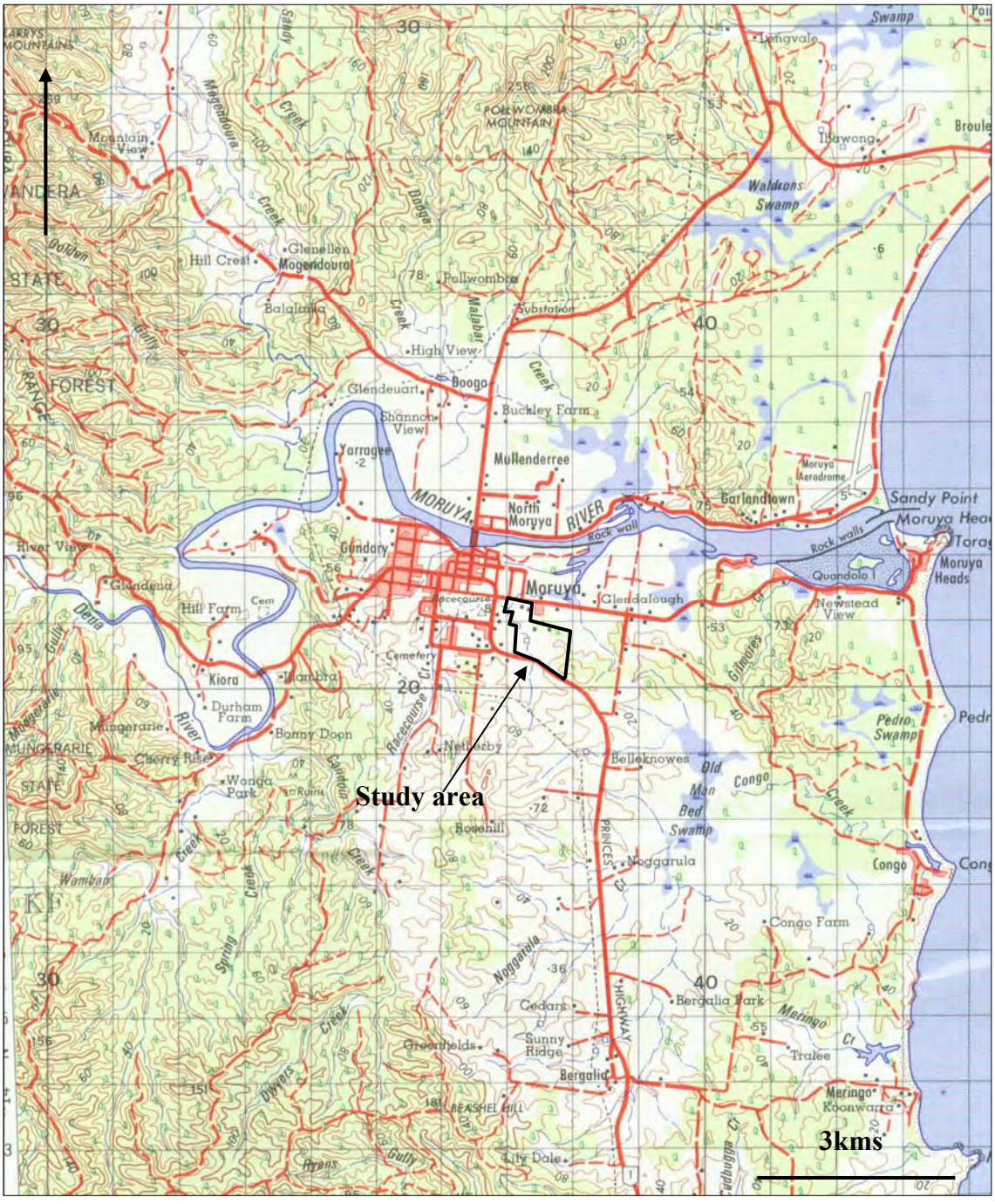

Figure 1 Proposed subdivision area (1:100,000 topographic map Batemans Bay Sheet 8926 1st ed.)

2. INTRODUCTION

The property consists of Lots 1, 2, 3, 4 in DP 758710, Lot 50, 51, 54, 65, 68 in DP 752151, Lot 2 in DP 553273 situated at Moruya on the South Coast of New South Wales (Figure 1).

The property is owned by Patent Developments. It is proposed to subdivide the property into a number of residential allotments and small landholdings.

The property measures ca. 52 hectares in area and is situated on the southern outskirts of Moruya. It is bounded to the south by the Princes Highway and to the north by South Head Road. Elsewhere the property is bounded by private landholdings.

The study area is situated at ca. 0.8 km south of the Moruya River. The property comprises a number of landform elements including spurs, drainage depressions and a low lying flood plain/wetland. The land is predominantly grassed paddocks and is currently used for cattle grazing. A minor drainage line traverses the property, draining from the south to the north.

An original archaeological assessment of the proposal area was in November 2004 (Dibden 2004). Two low density artefact scatter sites were recorded. A small distribution of fragmented shell was also recorded although its artefactual status was questioned. Effective survey coverage was however low and the ability to detect Aboriginal objects on the ground was correspondingly low. Accordingly it was assessed that visibility variables were less than adequate for determining the full nature and significance of the Aboriginal archaeological deposits across the proposal area.

It was predicted that the low gradient, undulating land situated adjacent to the wetland and drainage depression was likely to have been utilised by Aboriginal people for encampments, hunting and gathering, and in addition movement through country and that such land usage is likely to have resulted in the deposition of stone artefacts and midden material and the subsequent formation of archaeological sites.

The limited nature of the archaeological evidence encountered during the field survey was therefore determined to be unlikely to be representative of the actual archaeological status of the study area. It was predicted that there is a high potential for further archaeological material to be present in the study area in the form of subsurface distributions of stone artefacts and possibly shell midden.

According a program of subsurface archaeological investigation was recommended to be undertaken within a representative sample of the study area in order to determine the nature, extent, integrity and significance of the predicted subsurface archaeological deposits.

The subsurface test excavation program has therefore been undertaken for the purposes of clarifying the archaeological status of the study area in order to provide the proponent with a more informed basis for designing the subdivision layout and proceeding with the development.

New South Wales Archaeology Pty Ltd has been engaged by Melocco and Moore Architects Pty Ltd, on behalf of Patent Developments, to undertake a program of subsurface test excavation on the property. The results of the study will be used to inform the planning and master plan stage of the subdivision process.

A s87 Preliminary Research Permit (#2249) has been obtained from the Director-General, NSW DEC.

This report has been written by Julie Dibden.

3. PARTNERSHIP WITH THE ABORIGINAL COMMUNITY

The study area falls within the boundaries of the Cobowra Local Aboriginal Land Council (CLALC) as defined under the *Aboriginal Land Rights Act 1983* (NSW). Mr Norman Parsons has endorsed the proposed subsurface test excavation. Representatives of CLALC assisted in the field work.

4. THE DEVELOPMENT PROJECT

It is proposed to subdivide the property into both residential lots and rural smallholdings. The property measures ca. 59 hectares in area.

A preliminary Masterplan layout of the proposed impact areas of the property is shown in Figure 2. The location of the proposal area in relation to topography and survey units is shown of Figure 3.

The development proposal will have the potential to directly impact any Aboriginal objects which might be present on the land subject to subdivision. Impacts will include the construction of roads and drainage works, the installation of underground facilities and other services, and as well the construction of houses and related structures.

Figure 2. Preliminary Masterplan (supplied by Melocco & Moore). Yellow areas define primary areas for development; the hatched yellow area defines a possible future development area based on a rezoning application.

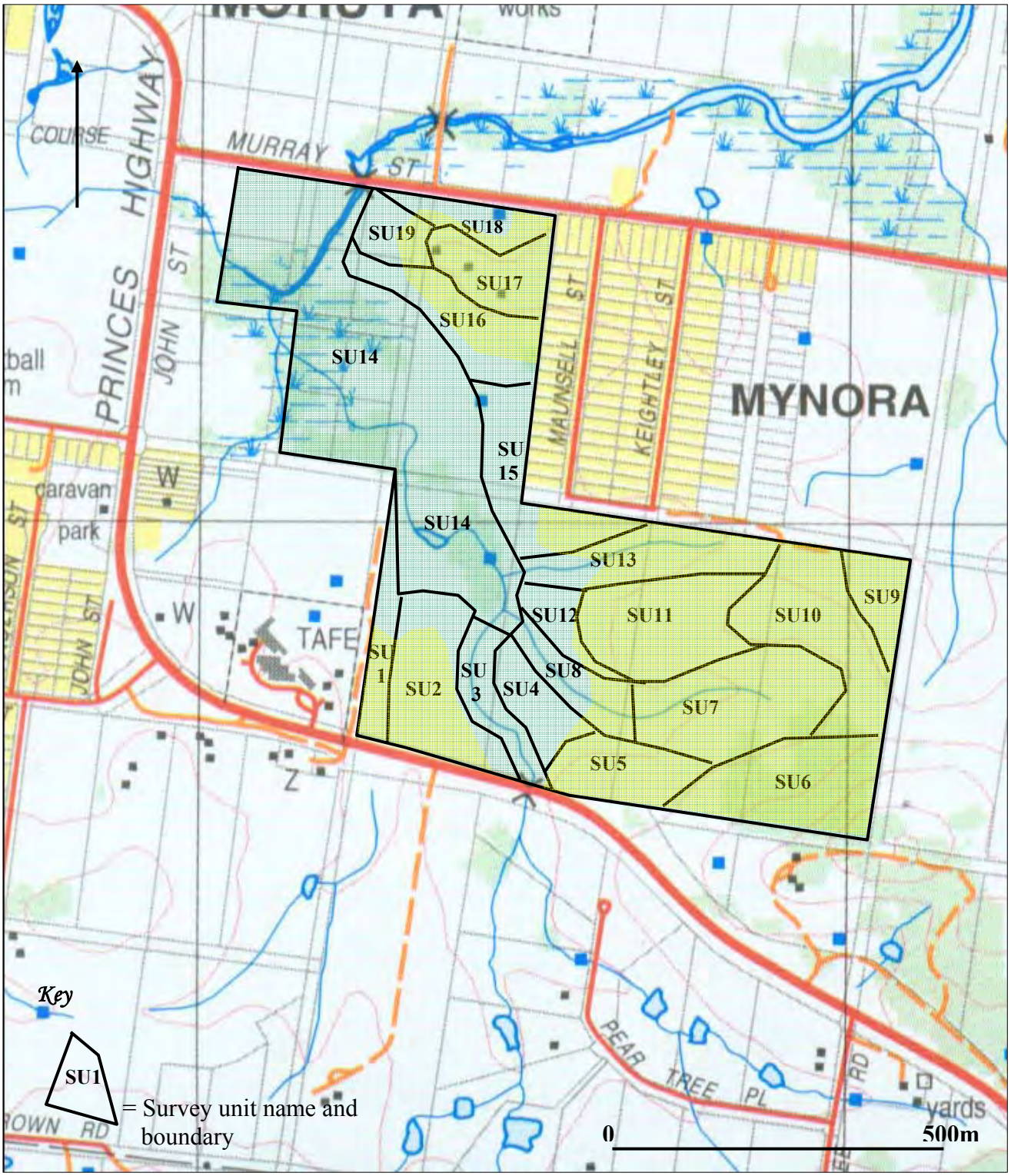

Figure 3 Location of proposal area in relation to Survey Units as previously defined by Dibden 2004 (Moruya 8926-3S 3rd ed. Topographic map: GDA).

5. STUDY METHODOLOGY

5.1 Rationale for the Subsurface Excavation Program

During the surface survey of the proposal area conducted by Dibden (2004) effective survey coverage was very low and accordingly the surface survey was determined to have been inadequate for the task of determining the archaeological status of the proposal area.

A program of subsurface test excavation was recommended to be undertaken for the purposes of clarifying the nature and significance of the archaeology present. It was recommended that based on the results of the subsurface work, appropriate management and mitigation strategies could then be formulated in regard to the Aboriginal sites within the context of the subdivision proposal.

The aim of the subsurface work has been to clarify the archaeological status of the study area in order to provide the proponent with more informed advice in regard to the management of Aboriginal archaeological evidence and ultimately the management of development impacts.

The test excavation program was undertaken in accordance with the conditions of a s87 Permit issued by the NSW DEC (s87 #2249). Field work was undertaken within a two week field program in August 2005.

5.2 Methodology

A total of 222 Test Pits measuring 0.5 x 0.5 metres have been excavated by hand utilising spades and hand trowels. Pits have been excavated at 5 meter intervals along twenty one Test Transects. Test Transects measured between 30 and 50 metres in length. Plan drawings of each transect were made in the field and their location has been recorded by hand GPS.

Each pit has been excavated in successive 10 cm spits; in some Test Pits the lowest spits were excavated in varying depths depending on when excavation was concluded. Excavation was concluded after clay or sediments devoid of artefacts were encountered. All pits were backfilled at the completion of excavation and recording.

All deposit recovered has been wet sieved through 3 mm sieves. All material recovered from sieves was then hand sorted in the field on a sorting table by qualified archaeologists.

All stone determined or suspected to be humanly modified was bagged according to individual Test Transect/Pit/Spit. A representative sample of background stone has been retained for comparative purposes.

5.3 Lithic Analysis Methodology

Stone artefacts excavated from the Moruya study area have been identified and analysed by Norma Richardson. The analysis entailed inspection under low magnification, weighing, measuring and description according to technological attributes. Details of the stone artefact assemblage recovered during the test excavation are listed in a table in Appendix 1 of this report.

Analysis of the data resulting from this identification and recording process has been conducted to address the following issues:

- Technological and behavioural activities represented by the lithic material;
- Artefact density;
- The organisation and use of stone resources in the Moruya area.

To undertake an investigation of these issues a basic profile of the artefact assemblage has to be developed from the recorded data. Assemblage content was determined by recording and/or measuring a number of variables that are outlined below in Table 1.

Variable	Definition
Type	Category of artefact or non-artefact
Raw material	Category of rock from which the artefact was made
Colour	Colour of raw material
Quality	Flaking quality of raw material
Initiation	Type of fracture initiation
Platform	Type of platform
Termination	Type of termination
Cortex	Percentage of dorsal cortex
Cortex type	Type of cortex
Fragment	Portion of artefact
Length	Distance from fracture initiation to termination for flakes or maximum dimensions for other types in mm.
Width	Distance from one lateral margin to the other, half way along width for flakes or max dimensions for other types in mm
Weight	Weight of artefact or non-artefact in grams.
Elongation	Index for flakes obtained by dividing length by width
Heat affected	Presence of potlidding, lustre, crazing, crenated fracture or heat shatter
Core type	Category of core
No. Scars	Number of complete scars
Core scar length	Length of negative scar in mm
Retouched flake	Category of retouched flake
Excav Damage	Presence of recent breakage of artefacts
Conjoined	Presence of joins between artefacts or non-artefacts
Joined to	Details of joined artefact or non-artefact

Table 1. Variables used to record assemblage.

Details of each artefact were entered into an Approach database on a PC. Details of the structure of the database are presented below in Table 2. This table lists the attributes defined for each of the variables defined in Table 1 as well as other data required for the analysis such as transect number, excavation pit and spit number.

Variable	Attribute
ID	Each artefact was allocated a sequential number from 1 to 307.
Transect	1 to 21.
Pit	1 to 11
Spit	1 to 5
Artefact Type	Flake, retouched flake, flaked piece, core, eraillure, manuport; non-artefactual fragment or non-diagnostic
Raw material	Silcrete, porphyry, quartz, clear quartz, quartzite, FGS, chert, volcanic
Colour	Grey, beige, red, white, grey/beige, grey/pink, clear, brown, beige mottled, pink mottled, grey mottled, red/yellow, white/yellow, orange, purple.
Quality	High, medium or low
Initiation	Conchoidal, bending, bipolar
Platform	Single, multiple, focused, cortical, facetted, shattered, bipolar
Termination	Feather, step, hinge, retro hinge, outrepasse, bipolar
Cortex	0%, 1-25%. 26-50%, 51-75%, 76-99% or 100%
Cortex type	Terrestrial or alluvial (water worn)
Fragment	Complete, distal, medial, proximal, LCS L & R, LCS prox L & R, LCS distal, LCS medial, platform shatter, margin missing.
Length	Length in mm.
Width	Width in mm
Weight	Weight in grams.
Elongation	Length divided by width (calculated field)
Heat affected	Potlidding, lustre, crazing, crenated fracture or heat shatter
Core type	Single platform, multiple platform, bipolar

No. Scars	Number of complete scars
Core scar length	Length of negative scar in mm
Retouched flake	Backed artefact, point, other retouched
Excavation damage	Yes/No
Weathered	Yes/No
Joined to	ID of joined artefact or non-artefact

Table 2. Attributes recorded for each variable.

Further definition of the variables and attributes listed in Tables 1 and 2 are provided to assist readers with interpretation of the results of the Moruya artefact analysis.

Provenance - Each artefact is categorized according to its retrieval location as follows:

Survey Unit #: as defined according to archaeological terrain units (Dibden 2004).
Transect #: Each Test Transect is given an individual number; numbers are sequential ranging from 1 to 21 (see also Appendix 1).
Pit #: Each Test Pit situated within an individual transect is given an individual number; numbers are sequential and at Moruya ranged from 7 to 11.
Spit #: Each Spit located within a Pit is given an individual number; numbers are sequential and range from 1 to 5. Spit 1 is closest to the ground surface; Spit 2 is below Spit 1 and so on.

Type – Classification of artefacts was based on technical criteria. The following classes have been identified in the assemblage:

Core: Cores are a piece of rock from which flakes have been detached. Cores are characterised by negative flake scars where flakes have been detached.
Flake: A sharp edged piece of stone detached from a core by the application of force. Flakes are characterised by a number of features which may include a platform, bulb of percussion, a bulbar scar, ripple marks and fissures on the ventral surface and negative flake scars on the dorsal surface.
Flaked piece: A flaked piece is an artefact that exhibits features such as negative flake scars but does not have any other features that would allow differentiation between a flake, a retouched flake or core.
Retouched flake: An artefact which has had flakes removed subsequent to its original manufacture.
Eraillure flake: small flake from bulb on ventral of a flake; does not possess a platform.
Manuport: An unmodified piece of rock situated away from its original context; assumed to have been humanly transported by an Aboriginal person.
Non-artefactual fragment: suitable artefactual stone devoid of diagnostic features which confirm artefactual status.

Raw material - The raw material of each artefact is categorized according to the following:

Colour – The purpose of recording the colour of raw material is to assist during analysis in identifying source material (if possible), related objects within an episode or episodes of stone reduction and to infer heat treatment.

Raw material – The following raw materials were identified to be present in the assemblage:

Chert: A cryptocrystalline siliceous rock of organic or inorganic origin. Chert is isotropic and brittle. It is accordingly a highly favoured rock for artefact manufacture (Holdaway and Stern 2004).
Quartz: The mineral quartz is crystalline silica with a hardness value of 7 (Mohs's hardness scale). Given this property quartz flakes possess highly durable sharp edges (Holdaway and Stern 2004). However given quartz possesses internal flaws and cleavage planes it typically flakes in an unpredictable manner.
Silcrete: This rock is formed by the impregnation of a sedimentary layer with silica; it consists of quartz grains in a matrix of either amorphous or fine-grained silica. The flaking qualities of silcrete are dependent of the size of the quartz grains (Holdaway and Stern 2004).
Quartzite: Quartzite is formed by the cementing together of siliceous grains through pressure or chemical processes.
Volcanic: Of igneous origin.
Porphyry: Porphyritic volcanic rock characterised by larger crystals in a fine grained groundmass
FGS: Acronym for fine grained siliceous rocks, covering siltstones, mudstones, tuff etc where identification is unclear without petrological analysis.

Quality – Raw material has been classified in terms of its quality based on size of mineral grains and homogeneity (in regard to quartz quality refers to the presence or absence of internal flaws and the general homogeneity of the stone) as follows:

High
Medium
Low

Initiation type – The type of primary fracture initiation including the following:

Hertzian: (conchoidal fracture) Formed when stone is struck by a hammer forming a ring crack; the ring crack forms a cone that bends backward towards the surface of the core (Holdaway and Stern 2004).
Bending: Formed when the angle between the platform and surface of the core is acute. Flakes do not possess clear ring cracks or well defined bulbs of percussion.
Bipolar: A bipolar flake is formed as a result of compression forces. Bipolar flakes often show signs of impact on opposing ends and have compression rings moving in two directions towards each other (Andrefsky 1998).

Initiation surface = platform

Single: Single flake scar.
Multiple scars: With three or more scars.
Cortical: Retaining evidence of cortex.
Shattered: Damaged: platform attributes can not be identified.
Facetted: Three or more flake scars in uniform arrangement.
Focused: Struck from close to the edge of the platform.
Bipolar: Flake or core with evidence of fracture initiation on both ends.

Termination type –

Feather: Exhibits minimal thickness at the distal end and acute angle between ventral and dorsal surface.
Hinge: Forms when the fracture meets the surface of the core at c. 90º to the longitudinal axis of the flake.
Step: Forms when flake terminates abruptly in a right angle break.
Outrepassé (plunge): Forms when the fracture plane curves away from the face of the core removing the base of the core.

Percentage of cortex – An estimate of the percentage of cortex present on an artefact. On flakes the estimate refers to the dorsal surface only.

Cortex type – The type of cortex (weather worn surface) on an artefact is listed. The following cortex types were identified in the assemblage:

Pebble (Code: alluvial): A water worn surface indicative of an alluvial origin.
Terrestrial (Code: terr): A weathered surface indicative of terrestrial origin.

Breakage: Where artefacts were broken the portion of the artefact was classified using the following categories.

Flake distal: A broken flake: the distal end, exhibiting the termination.
Flake medial: A broken flake: the mid section, exhibiting dorsal scars and/or ventral surface features.
Flake proximal: A broken flake: the proximal end exhibiting the platform and initiation.
Longitudinal cone spit: A broken flake: broken longitudinally; typically occurs during flaking event. Separate categories for left and right LCS portions were used to facilitate artefact number estimates.
Margin Missing: A broken flake where width can not be measured due to missing marginal sections.
Platform shattered: A broken flake where percussion length can not be measured due to shattered platform.

Core attributes - including:

Type of core: Refers to number of platform and/or initiation type
Number of scars: Expressed numerically
Length of longest complete scars: Measured in millimetres

6. LANDSCAPE CONTEXT

A consideration of the landscape is necessary in archaeological work in order to characterise and predict the nature of Aboriginal occupation across the land (NPWS 1997). In Aboriginal society landscape could be both the embodiment of Ancestral Beings and the basis of a social geography and economic and technological endeavour. The various features and elements of the landscape are/were physical places that are known and understood within the context of social and cultural practice.

Given that the natural resources that Aboriginal people harvested and utilised were not evenly distributed across landscapes, Aboriginal occupation and the archaeological manifestations of that occupation, will not be uniform across space. Therefore, the examination of the environmental context of a study area is valuable for predicting the type and nature of archaeological sites which might be expected to occur. Factors which typically inform the archaeological potential of a place include the presence or absence of water, animal and plant foods, stone and other resources and as well, the nature of the terrain.

Additionally, geomorphological and humanly activated processes need to be defined as these will influence the degree to which archaeological sites may be visible and/or conserved. Land which is heavily grassed will prevent the detection of archaeological material while land which has suffered disturbance may no longer retain artefacts or stratified deposits.

The following section provides information in regard to the landscape context of the study area.

6.1 Topography, geology, climate and vegetation

The study area is located at Moruya on the South Coast of New South Wales. The study area is located within the coastal lowlands system consisting of rolling to undulating terrain (Gunn *et al.* 1978). Elevation ranges from ca. 20-50 AHD. The topographic context of the study area is shown on Figure 3.

The study area is situated at ca. 0.8 km south of the Moruya River and immediately adjacent to and incorporating sections of the river flood plain.

The property area is situated within the catchment of Racecourse Creek, a 4th order stream which flows northwards into the Moruya River. The study area contains a tributary of Racecourse Creek which possesses a catchment area of ca. 2 km². The creek is ephemeral and does not contain a defined creek channel until it meets with the wetland at the north section of the study area.

The highest elevation (50 m AHD) in the study area is situated on a side slope of a knoll in the southeast corner. The lowest elevation at sea level is located within the drainage depression and wetland in the central north part of the property.

The site is located partially on Devonian Moruya Granite beds comprising granodiorite and tonalite (Monaro 1:500,000 map sheet) which is present on low rises in the north-east and south-east corners. The remainder of the property consists of low-lying floodplain on alluvium.

From the knoll situated in the south east corner, the land drops as a series of spurs which extend westward towards the main drainage depression. To the west of the drainage depression the land falls gently to the north. The central part of the study area is a flood plain/wetland.

The climate of the area is described as meso-thermal. Precipitation is uniformly distributed throughout the year and summers are long and mild. Annual rainfall averages 960 millimetres at Moruya Heads, situated five kilometers to the east of the study area (Kalma and McAlpine 1978).

Four vegetation communities are present on the property including Far Southern Grass/Herb Dry Forest/Woodland, South Coast Swamp Oak Forest Complex, Saltmarsh and freshwater wetland communities.

The Far Southern Grass/Herb Dry Forest/Woodland community is located in the eastern most paddock. In the south-east corner it is present as a well-developed mixed age forest with large old relict trees, younger mature trees and patches of more recent regeneration. The tree species present are forest red gum (*Eucalyptus tereticornis*), white stringybark (*E. globoidea*) and rough-barked apple (*Angophora floribunda*). A sparse small tree layer including black wattle (*Acacia mearnsii*), hickory wattle (*A. implexa*) and black sheoak

(*Allocasuarina littoralis*) is present with a sparse shrub layer dominated by *Leucopogon juniperinus*. The groundcover is dominated by native grasses including *Cymbopogon refractus* and *Eragrostis leptostachya*. (Miles 2004).

The South Coast Swamp Oak Forest Complex community dominated by swamp oak (*Casuarina glauca*) with occasional patches of swamp paperback (*Melaleuca ericifolia*) is located in the north-western part of the site on low flats which are slightly elevated above tidal level. There is a sparse shrub understorey in places, including swamp paperbark and *Pittosporum undulatum*, but dominated by the exotic shrub small-leaved privet. The groundcover varies from a sparse cover of grasses and salt-tolerant native forbs such as *Selliera radicans* and *Leptinella longipes* to exotic pasture grasses and dense patches of sharp rush (*Juncus acutus*) (Miles 2004).

Saltmarsh dominated by samphire (*Sarcocornia quinqueflora*) and the forb *Samolus repens*, or by sea rush (*Juncus kraussii*) occurs in the zone of tidal influence along the creek in the north-west corner of the site. Other species include the grass *Sporobolus virginicus*, subshrub *Suaeda australis* and forbs *Limonium australe, Apium prostratum, Selliera radicans, Mimulus repens, Spergularia* and *Triglochin striatum*. A sparse occurrence of young grey mangroves (*Avicennia marina*) is located along the bare edges of the tidal channel (Miles 2004).

A mixture of freshwater wetland communities occurs further upstream above the tidal influence on the same drainage line. The weed *Juncus acutus* dominates much of the drainage line. Small patches are dominated by the native sedge *Carex appressa*, and cumbungi (*Typha orientalis*) occurs in small dams (Miles 2004).

The majority of the study area has been cleared in the past with the exception of the south-east corner. However, this area has been logged. Regrowth of swamp oak and forest red gum has occurred in the north-west and south-east corners of the property respectively. The entire property has been used for grazing, including the wetlands, where trampling and pugging of the soil is evident throughout wetter areas of saltmarsh and freshwater wetland.

The study area is situated at a confluence of resource zones including woodland, wetland and the river. In addition a reliable supply of fresh water is present. Cumbungi and sedges present is the wetland would have provided a source of plant food. The wetland is also likely to have provided fauna foods including eels and birds.

While the wetlands are likely to have been targeted resource zones, Aboriginal occupation (living) sites are likely to have been situated on the adjacent elevated land including the low gradient hillslopes and spur crests.

7. ARCHAEOLOGICAL CONTEXT

7.1 Social geography

A deep understanding of the nature of the pre-European social geography of the people of the Moruya area is limited given the absence of reliable information. The main sources of information relating to Aboriginal life in south east come from Howitt and Mathews, both of whom obtained information in the late 1800s. During this time Aboriginal people had adjusted to the settler economy. Accordingly, the information recorded at this time is limited in regard to pre-European social life and geography.

In addition, the work of both Howitt and Mathews is complicated further by the nature of their assumptions regarding Aboriginal society; "…they were working with ethnographic models which laid emphasis on a rather limited view of social and cultural life" (Rose 1990: 8). The work of Matthews is generally regarded as "slight and unreliable" (Flood 1982: 8) and Howitt, who collected information by questionnaires, is often found to be contradictory.

Relying heavily on these early writers, Tindale (1974) defined 'tribal' groups in this area: according to Tindale the study area lies within the country of the Walbanga people. Tindale's (1974) modeling was based on an uncritical adoption of the Radcliffe-Brown model of social organization in which the band is perceived as the most important structural feature in Aboriginal social organisation. Tindale's tribal boundaries were largely defined according to what he understood to be language groups (Flood 1980: 107) and his work was conceptualized according to a model of band social organisation in which the 'horde' or clan was considered to be the group which possessed political power and proprietary rights to land (Rumsey 1989: 70). The 'tribes' which Tindale determined to have existed were seen as coterminous with language groups with the implication that these groupings were territorial units.

The assumptions inherent in this conflation of language group with tribe are no longer seen to be relevant, and furthermore the concept of tribe as a territorial group is not regarded as being correct or useful. In Aboriginal society people were multilingual rather than monolingual; therefore conceiving of language groups as bounded social groupings is not appropriate (Rumsey 1989: 74). In the Radcliffe-Brown model the land/language relationship was seen as indirect: the estate of a tribe was seen as the aggregation of all the clan estates who spoke the same language. This relationship is now viewed to be direct – it is recognised that the importance of land/language relations in Aboriginal society is that particular languages and particular tracts of country were directly linked according to Dreaming activity (Rumsey 1989: 74-75).

While it was previously assumed that tribes or language groups functioned as politically cohesive corporate groups, more recently it has been recognised that linguistic groupings do not structure the Aboriginal social and geographical landscape. Sutton and Rigsby (1979: 722) argue that Tindale's tribal boundaries are not meaningful at either a demographic or political level. In order to overcome Tindale's limited and flowed tribal boundary model recourse must be made to more contemporary anthropological concepts and understanding.

Howitt (1904) defined the Yuin tribal area as extending from Cape Howe in the south to the Shoalhaven River in the north. Howitt recorded information provided to him by Aboriginal people during the 1880s relating to socially sanctioned marriages in country which extended over a large area from coast to the tablelands. It is generally understood that movement of individuals and small groups occurred between the coast and tablelands and that relationships had the potential for both amity and conflict (Flood 1980; Rose 1990).

While a persons Yuin identity derived from both mother and father more fine grained aspects of identity which are likely to have prevailed include totemic identity and specific relationships to country inherited via birth rights, place of birth and so on (Rose 1990). People would have traveled to and resided in different tracts of country, forging temporary groups of varying personnel and clan composition for the fulfillment of a variety of economic, familial and ceremonial purposes. Archaeological conceptions of social groupings need to consider the multidimensional nature of groups based on clan, gender and age identities which are likely to have been both contemporaneously and generationally fluid.

Drawing on a number of early ethnographers Wesson (2000) has defined the multi-dimensional aspect of Aboriginal social geography in the region based on habitual place of residence, dominant mode of livelihood and language. Oldrey made a blanket distribution census in 1843 naming ten different groups of 146 people living between Gundary (south bank of the Moruya River) and Jervis Bay (Wesson (2000). Oldrey recorded six people at Gundary, one family at Kiora, three families near Kiora and Gundary (Wesson 2000).

The study area is situated within the area named as Kurregal/Kurial or northern fisher people. The Dhurga (Thoorga) language which was spoken over a large area extending from Jervis Bay in the north to Wallaga Lake in the south and west to Braidwood (Eades 1976). Wesson (2000) also defines the Thoorga language as spoken in the area in which the proposal area is situated.

The study area is located within the Cobowra Local Aboriginal Land Council area.

7.2 Previously Recorded Sites

A search of the NSW DEC Aboriginal Heritage Management Information System was conducted on 28th September 2004 (AHIMS #11005). The search was undertaken for an area which measures 20km² (Eastings: 236000-240000; Northings: 6020000-6025000).

Four Aboriginal sites are recorded on AHIMS as being present within the site search area. The AHIMS register only includes sites which have been reported to NSW DEC (formally NPWS). Accordingly, this search cannot be considered to be an actual or exhaustive inventory of Aboriginal sites situated within the local area. Generally, sites are only recorded during targeted surveys undertaken in either development or research contexts. It can be expected that other sites are present within the local area but that to date they have not been recorded and/or reported to NSW DEC.

Two Aboriginal sites and one possible midden were recorded during the initial survey (Dibden 2004). These sites are described below and their location is shown in Figure 4.

Moruya Site 1 hand held GPS (WGS 84) grid ref: 237618e 6020580n

This site is situated 3 m inside the property boundary fence adjacent to the Princes Highway. The site contains a single stone artefact found on a bare earth patch.

The artefact is a broken bifacially end-flaked pebble. The pebble possesses a longitudinal split along one margin. It has possible usewear/damage marks on opposing end. The pebble is possibly quartzite. The artefact measures 111 x 42 x 27 mm.

The artefact was found within an area measuring ca. 15 x 10 m (150m²) which contain a number of ground exposures. Of this area 10% is assessed to be ground exposure and 30% of that exposure is assessed to be archaeological visibility. Artefact density is calculated to be 1 per 4.5m² (*or* 0.2/m²).

Moruya Site 2 hand held GPS (WGS 84) grid ref: 238050e 6020945n

This site is situated immediately adjacent to and inside the property boundary fence close to the north east corner. The site contains four stone artefacts which were found on bare earth patches.

The artefacts are described as follows:

- Milky quartz flaked piece measuring 22 x 12 x 8 mm;
- Milky quartz chip;
- Broken porphyry volcanic flake measuring 32 x 24 x 7 mm;
- Broken porphyry volcanic flake measuring 27 x 21 x 5 mm.

The artefacts was found in an area measuring ca. 20 x 5 m (100m²) which contain a number of ground exposures. Of this area 5% is assessed to be ground exposure and 60% of that exposure is assessed to be archaeological visibility. Artefact density is calculated to be 4 per 3m² (*or* 0.75/m²).

Moruya Site 3 hand held GPS (WGS 84) grid ref: 237487e 6021409n

This site is situated on a spur crest in the north of the property. The site contains a small, sparse distribution of highly fragmented shell. The artefacts were found on a bare earth patches under an old coral tree.

The shell is old fragmented oyster and was assessed to possibly be representative of an Aboriginal midden. A small piece of unidentified bone is also present at the site. The shell is situated in a small exposure measuring ca. 2m².

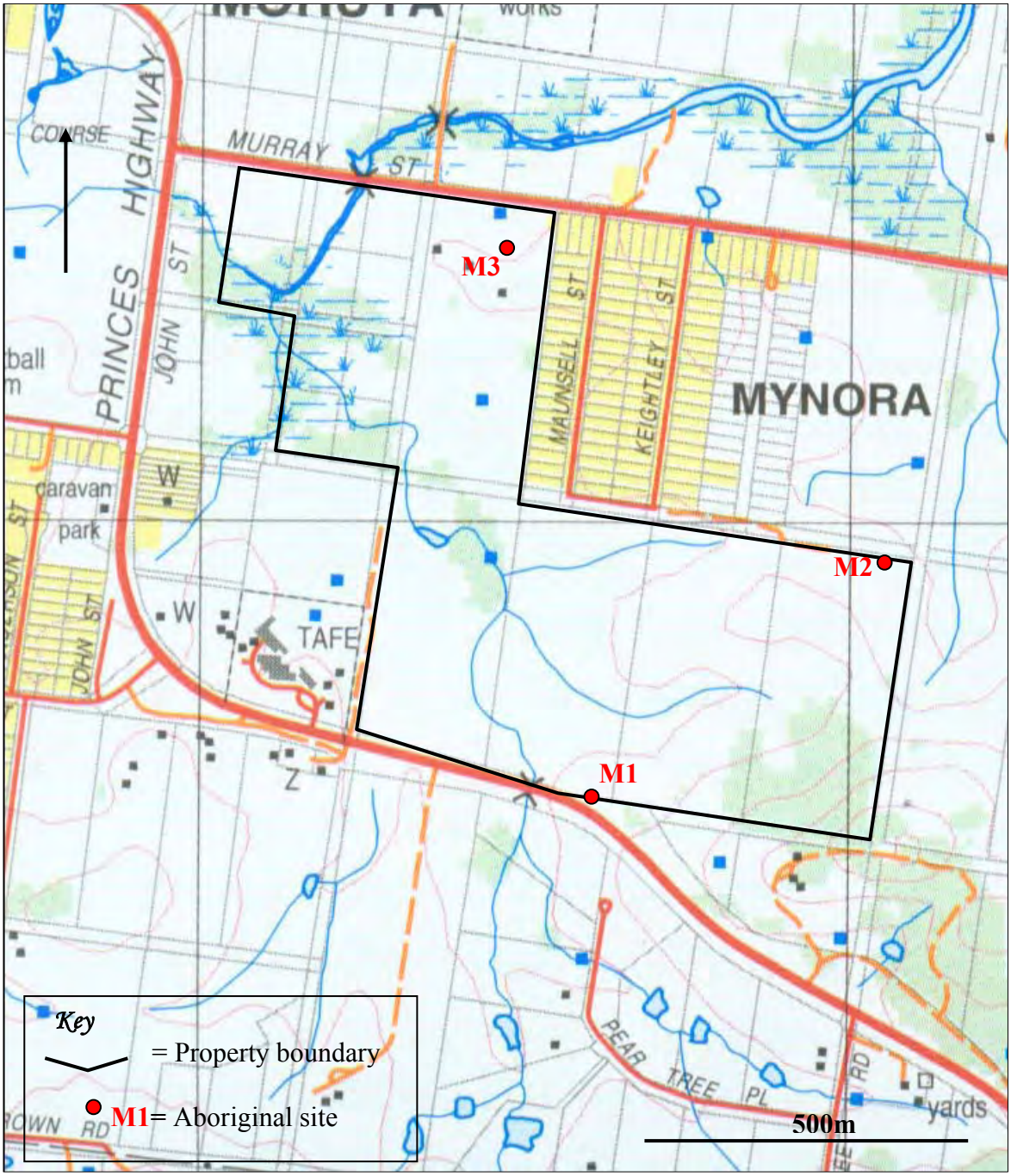

Figure 4. Location of Aboriginal sites recorded during the initial survey: Dibden 2004 (Moruya 8926-3S 3rd ed. 1:25000 topographic map: GDA)

7.3 Archaeology – The local area

On the basis of archaeological research it is known that Aboriginal people have occupied Australia for at least 40,000 years and possibly as long as 60,000 years (Mulvaney and Kamminga 1999: 2). By 35,000 years before present (BP) all major environmental zones in Australia, including periglacial environments of Tasmania, were occupied (Mulvaney and Kamminga 1999:114).

At the time of early occupation Australia experienced moderate temperatures. However, between 25,000 and 12,000 years BP (a period called the Last Glacial Maximum) dry and either intensely hot or cold temperatures prevailed over the continent (Mulvaney and Kamminga 1999: 114). At this time the mean monthly temperatures on land were 6-10ºC lower; in southern Australia coldness, drought and winds acted to change the vegetation structure from forests to grass and shrublands (Mulvaney and Kamminga 1999: 115-116).

During the Last Glacial Maximum at about 24-22,000 years ago, sea levels fell to about 130 m below present levels and accordingly, the continent was correspondingly larger. With the cessation of glacial conditions, temperatures rose with a concomitant rise in sea levels. By ca. 6000 BP sea levels had more or less stabilised to their current position. With the changes in climate during the Holocene Aboriginal occupants had to deal not only with reduced landmass, but changing hydrological systems and vegetation; forests again inhabited the grass and shrublands of the Late Glacial Maximum. As Mulvaney and Kamminga (1999: 120) have remarked:

> When humans arrived on Sahul's shores and dispersed across the continent, they faced a continual series of environmental challenges that persisted throughout the Pleistocene. The adaptability and endurance in colonising Sahul is one of humankinds' inspiring epics.

Occupation of the NSW south coast dates from at least 20,000 years ago as evidenced by dated sites at Burrill Lake (Lampert 1971), Bass Point (Bowdler 1970) and two sites near Buchan in Victoria; Cloggs Cave (Flood 1980) and New Guinea 2 (Ossa *et al* 1995). The Bulee Brook 2 site in the south coast hinterland ranges, excavated by Boot (1994) provides evidence that occupation of this zone had occurred by at least 18,000 years ago. These known Pleistocene occupation sites are few on the south coast; the majority of recorded sites date from the mid to late Holocene at the time when the sea more or less stabilized at its current level. It is nevertheless reasonable to assume that the Moruya area was occupied and utilised by Aboriginal people from the late Pleistocene onwards.

The nature of Aboriginal occupation on the South Coast has been considered by a number of researchers which has resulted in conflicting arguments. Perceived higher site densities on the coast compared to forested hinterland contexts have led researchers, until recently, to argue that the coast was the focus of Aboriginal occupation and landuse.

Poiner (1976) proposed a model of semi-nomadic occupation of the coast during summer and nomadic occupation of both coastal and hinterland during winter. However, this model was based on scanty evidence (Hiscock 1982) and an assumption that hinterland sites were few in number, small and widespread (Boot 2003). The strong seasonal focus of Poiner's (1976) model is however, inappropriate given the mesothemal climate which prevails on the south coast which possesses little seasonal variation (Boot 2002).

The forest-woodland environment contains large numbers of land mammals and plants (Attenbrow 1976). Poiner (1976) and Attenbrow (1976) have argued that both inland and marine resources declined in both range and abundance during winter. Poiner (1971) argued that the sea was the source of the bulk of food resources.

Attenbrow (1976) argued that the major determinant of Aboriginal land use would have been the carrying capacity of the landscape. While Attenbrow proposed that groups would have utilized the coast and inland at all times of the year she argued that in spring, summer and autumn more people in larger numbers would have occupied the coastal zone practicing a largely marine economy and in winter smaller groups would be spread more evenly across country subsisting on a higher proportion of land animals. She predicted that areas such as coastal margins and inland valleys would have supported larger populations than the mountain slopes or foothills.

Vallance (1983) argued that a range of subsistence strategies would have been pursued and that these would have varied both within and between seasons and from year to year. This shift away from a seasonal model has been further expanded by Boot (1994) who has predicted that based on the Vallance (1983) model larger archaeological sites could be expected to be situated in areas where large quantities of food is available either on a single occasion or on a regular basis with smaller sites located elsewhere reflecting short term occupation or movement between focused occupation sites.

The archaeological surveys undertaken in the Moruya, Congo and Bingie areas have resulted in the recording of a large number of artefact scatter sites situated on landform units such as ridge and spur crests, headlands and gently inclined slopes or flats bordering water courses, and shell middens along estuaries and on rocky headlands. Artefacts are typically made on quartz, silcrete, volcanic and chert materials.

One of the preliminary consultancy projects undertaken on the south coast was conducted by Sullivan and Gibbney (1978) for the CSIRO. The study was aimed at identifying and recording locations containing evidence of Aboriginal and early non-Aboriginal occupation. Two hundred and eleven Aboriginal sites were listed during the survey, including 145 shell midden deposits. Site types recorded include shield and canoe trees, surface campsites, hatchet grinding grooves and stratified deposits including open shell middens and rock shelters (Sullivan and Gibbney 1978: 197).

Barz (1979) surveyed a proposed 66kv transmission line extending from Mossy Point to Batemans Bay, and between Moruya and Narooma. The Moruya end of this survey area is situated west of the proposal area. The surveyed area covered a range of landforms including rolling hills, deep gullies, ridge crests and creek, estuary and swamp environments. Isolated artefacts were found in seven separate localities, and were all either quartz cores or unretouched quartz flakes. In addition nine artefact scatters were located all of which contained low artefact numbers and sparse densities. Raw materials in the artefact assemblages were predominantly quartz. Two stone quarries were located – one a quartz quarry of good quality material containing two quartz cores and a couple of 'dubious' unretouched flakes. The other is a 'minor' basalt quarry. Two shell middens and one unambiguous scar tree was found.

Boot (1994b) undertook a preliminary archaeological survey of five sections of council roads in the Moruya/Narooma area prior to the commencement of improvement works along these roads. One isolated find, comprising a broken grey porphyry flake was located. The artefact was found on a relatively flat area of an otherwise steep ridge and was consequently assessed by Boot (1994b) to have potential to be a component of a larger artefact scatter. Much of the area inspected was considerably disturbed and visibility was poor in most places. Areas of good visibility tended to be disturbed such as informal graveled tracks, private driveways or roadside clearings.

Navin Officer Archaeological Resource Management (1995) undertook a survey of Reservoir Road prior to upgrading and sealing of the existing road from Wamban Road to the main Moruya Water Reservoir. The area measured approximately 3 ha and covered a minor spurline, west facing upper ridge side slopes and a large portion of a ridgeline crest. One isolated find previously located by Boot (1994b) was relocated.

Byrne (1986) surveyed an area proposed for a sand and gravel quarry at Burra Creek situated west of the study area. The area was found to be highly disturbed due to previous quarrying and movement of gravels downstream from flooding of the Burra Creek. No sites were recorded.

Paton (1986) surveyed an area proposed for the construction of a water pipeline route from Moruya to Narooma as part of the Lower South Coast water supply augmentation scheme. The route followed existing road and power line easements. Three artefact scatters were located. Site location was found to conform with the predictive model - two were found on elevated hilltops in close proximity to potable water and another on a ridge top 300 m from potable water.

Williams (1996) surveyed a 73 hectare area within the Bergalia Park property, six km south of Moruya in response to a proposed subdivision. Ground visibility was generally poor however six open artefact scatters and one isolated find were recorded. These comprised small and sparse scatters located on the upper slopes and crests of spurs with gentle gradients.

Several surveys have been conducted at Moruya Heads (Carter 2003; Hughes 2000a; Kuskie and Webster 2003; Paton 1997a). Paton (1997a) conducted a survey in respect of the proposed Sewerage Scheme. Two sites containing stone artefacts and midden material were recorded (MS1 and MS2). MS1 was described as a sparse scatter of *Anadara trapezia* and two stone artefacts, a silcrete flake and a pebble manuport. Site MS2 is situated adjacent to a small creek and also contained a sparse scatter of shell and two quartz flakes.

Both sites, MS1 and MS2, were subject to subsequent test excavation by Hughes (2000a). A further two locations were included in this project. MS1 was assessed to be a highly disturbed artefact scatter and midden. Artefacts were predominantly made of quartz. MS2 was found to contain sand fill and artefacts imported to the site as road construction fill from the vicinity of site MS1 (Hughes 2000a). At site MS3 15 artefacts and a small amount of shell were retrieved from a 1.14m² excavation. At MS4 a quartz knapping floor was excavated.

The site MS4 was excavated again by Hughes (2002a) when the site was predicted to extend into a proposed residential allotment (Lot 101). Shell midden was found to be concentrated on a sand ridge crest. Shell species included mud whelk, cockle and rock oyster, with minor frequencies of triton, pipi and black periwinkle. Quartz was found to be the dominant raw material in the lithic assemblage. The site was found to possess high stratigraphic integrity and a high density of artefacts.

Carter (2003) conducted a survey of a proposed residential allotment and found a sparse occurrence of shell and stone artefacts.

Kuskie and Webster (2003) surveyed a 16 ha area in response to a proposed residential subdivision 3km to the west of Moruya Heads. The area consisted of two broad, gently inclined simple slopes situated one kilometre south of the Moruya River. Employing a broad-area landscape unit of definition, eight Aboriginal sites were recorded. Some shell fragments were recorded and in addition over 500 stone artefacts were observed in surface exposures. Kuskie and Webster (2003) predicted that the sites would contain further heritage material. The evidence was assessed to represent activities associated with encampments, hunting/gathering or transitory movement.

The Congo area has been subject to numerous surveys and some test excavation (Allen 2000; Boot 1999a; Boot 1999b; Dearling 1999; Hughes 2000b; Hughes 2002b; Kuskie 1993; Paton 1997b; Williams 1997; Williams and Barber 1995). Kuskie (1993) surveyed a 17 ha area off Berriman Road, Congo, in respect of a proposed rural residential subdivision. One small artefact scatter was recorded. The small nature of the site and absence of further sites was attributed to the distance of the study area away from silcrete outcrops and absence of a local source of water.

Williams and Barber (1995) recorded 25 open campsites, five isolated finds and seven silcrete outcrops during their study of 516ha of coastal land at Congo conducted on behalf of Cobowra Local Aboriginal Land Council. Implements found in campsites associated with the quarries were found to be generally made from imported material rather than the local silcrete. The local silcrete appeared to be utilized for amorphous flaking only. Most sites were located on ridge and spur crests, although several occurred on simple slopes and gullies. Williams and Barber (1995) concluded that artefactual material would occur at varying densities throughout the study area.

Silcrete comprised 86% of raw materials and clearly dominated the Congo assemblage (Williams and Barber 1995). Smaller frequencies of other stone types including agate, chert, quartzite, granite, rhyolite, quartz and porphyritic volcanic were recorded. Flakes were the most common artefact recorded however a wide variety of other types were found including hatchets, hammerstones, cores, retouched or utilized flakes, Bondi points, geometric microliths and scrapers. The sites recorded during this study represent evidence of the exploitation of silcrete, manufacturing stone artefacts, occupation and possible resource utilization.

Paton (1997b) conducted a survey of a proposed optic fibre cable route between Moruya and Congo. Two artefact scatters, one isolated find and two areas of assessed archaeological sensitivity (Area 1 and Area 2) were recorded. Site CM1 was found to contain sixty one artefacts made predominantly on silcrete. Site CM2 comprised four artefacts in an erosion scour. Subsurface test excavation was subsequently undertaken at CM1 and the two sensitive areas (Paton 1998). The excavation revealed low density artefact deposits.

Boot (1999a) conducted a survey at Congo along Point Parade South and Point Parade North. Two isolated stone artefacts and an artefact scatter were recorded. Boot (1999b) recorded shell midden fragments and artefacts and a previously recorded site on Congo Road. An additional area of high potential was also recorded.

Dearling (1999) conducted a survey of two residential lots in Congo and recorded a site containing eighteen artefacts dominated by silcrete flakes.

Hughes (2002b) surveyed two proposed roads at Gum Leaf Drive and Point Parade Road, Congo. Hughes (2002b) relocated Isolated Find 2 (originally recorded by Boot 1999a), a sandstone retouched flake, and a silcrete flake on Point Parade Road. Isolated Find 1, originally recorded by Boot (1999a) was not relocated. Four previously recorded sites were present on Gum Leaf Drive; Hughes (2002b) recorded a total of 137 artefacts distributed between three exposures. The assemblage was dominated by silcrete flakes, while silcrete cores, volcanic cores and flakes, quartz flakes and cores were also recorded. Hughes (2002b) attributed the site distribution pattern to the absence of potential waters sources near to Point Parade.

Allen (2000) conducted subsurface test excavation at Lots 2, 3 and 4 DP 797649 on Congo Road following Boot's (1999b) recordings. Eight test augers measuring 20cm diameter were excavated at Lot 2. One chert artefact, and shell and bone material were recovered. The deposit was assessed to be of low stratigraphic integrity given the presence of European material. Nine 20cm diameter auger holes were excavated at Lot 3. Shell and bone was recovered as well as 138 stone artefacts. The lithic assemblage was dominated silcrete flakes with minor frequencies of chert and quartz present. A flaking floor was identified. Lot 4 was subject to twenty 20cm diameter test auger holes. No shell material was found. Eight stone artefacts were retrieved. Allen

(2000) assessed the site to have been disturbed and considered it possible that topsoil and its associated artefactual material had washed downhill.

The camping ground at Congo Point was surveyed by Williams (1997). An ochre quarry and midden and stone artefact site were relocated. Williams assessed the two sites to be one site complex.

The Bingie area has also been subject to considerable survey and subsurface investigation (Allen 2002a; 2002b; Allen 2002c; Allen 2003; Barber 1999a Barber 1999b; Barber 2001a; Barber 2001b, Barber 2001c, Barber 2001d; Boot 1994c; Boot 1997).

Barber (1999a) surveyed Grey Rocks Headland in response to a proposed facility upgrade. Five artefact scatters and two isolated finds were recorded with midden material found to be distributed throughout the area. The sites were found to be in poor condition due to erosion and the deflation of dunes.

Barber (1999b) conducted subsurface test excavation on Bingie Road in response to a proposed road upgrade. The site is situated in a saddle of a major ridgeline at 1.7km west of Meringo Beach. The works found that the site was not extensive and artefact density was found to be low. The apparent lack of subsurface material was interpreted as a true reflection of artefact density at the site. Barber (1999b) interpreted the site to be a minor campsite within a saddle. He interpreted the site as probably representative of usage of the ridge as a travel route. The artefacts at this site were subsequently salvaged (Barber 2000).

Barber (2001a) surveyed a 16ha property (lot 258 DP 752137) on Bingie Road situated 2km inland from Meringo Beach located immediately south of the above mentioned site. The area consisted of the crest and side slopes of a knoll and associated spurline and drainage lines. A large site (Site 1) was found to be distributed across the crest and side slopes of the main knoll and spur. Site 2 containing five artefacts was located on the edge of an erosion gully at the head of a drainage line. Silcrete dominated the assemblage with quartz, quartzite, fine grained siliceous, porphyritic volcanic and volcanics making up the remainder. The assemblage contained flakes, flaked pieces, hammerstones, and backed artefacts. Site 1 was considered to be a large site covering the entire knoll and spur, however, with greatest artefact density situated on the crest of the knoll.

Barber (2001b) subsequently conducted subsurface test excavation at Site 1 on Lot 258. Twenty two shovel probes were excavated to depths ranging from 15cm to 37cm. Barber (2001b) concluded that Site 1 was probably part of the same site previously excavated on Bingie Road immediately to the north (Barber 1999b). Artefact density was calculated across the site to be 81.6 artefacts per m³ although Barber (2001b) cautioned that this calculation could be inflated given the small volume actually excavated. Spatially, greatest artefact density occurred on the crest of the knoll supporting the initial conclusion based on the surface survey (Barber 2001a). Silcrete flakes dominated the assemblage.

Barber (2001c) conducted a survey of Lot 12, measuring 1.5 ha and located immediately to the north of Bingie Road and Lot 258 as described above. The property consists of the upper slopes of a major ridgeline and a drainage depression. Artefacts were found and Barber (2001c) considered these to be part of the large NPWS Site #62-7-210 (Site 1 as per Barber 2001a). Eighteen artefacts were recorded. Artefact density was assessed to be lower than that found on the main portion of the site on Lot 258 and this was attributed to the sloping terrain encountered.

Barber (2001d) conducted a survey of Portion 101 in an area measuring 4.7 ha on the southern side of Bingie Road and situated immediately west of Lot 258. The area included a knoll and upper slopes of the same ridge line on which Barber (see above) has conducted the previous work (Barber 2001a, b, and c) and a drainage depression. Site 1 (subsequently named NPWS Site # 62-7-212) was found situated in a number of exposures on the crest and side slopes of the main knoll. One hundred and thirty eight stone artefacts were recorded with silcrete dominating the assemblage. The site was determined to be a part of the same site as that previously recorded as NPWS Site # 62-7-210.

Allen (2002a) conducted subsurface test excavation of NPWS Site #62-7-212 which had been identified by Barber (2001d) as Site 1 (see above). The works were undertaken within two defined building envelopes and a proposed access road. The proposed building envelope sites were chosen specifically so as to avoid the archaeologically sensitive area of the knoll/crest of the ridge. Accordingly the subsurface work was conducted downslope of the ridge crest. Allen (2002a) recovered 35 stone artefacts. Silcrete dominated the assemblage and Allen (2002a) noted the presence of pebble cortex on several pieces indicating a source other than that of

the noted Congo quarries. A silcrete flaking episode was noted in association with a Bondi point supporting the interpretation of the site as a camping and manufacturing location. Allen (2002a) characterized the site as a low density subsurface artefact distribution which showed evidence of some stratigraphic integrity. The work confirmed that the main distribution of artefacts in the wider area was focused along the ridgeline.

Allen (2002b) conducted subsurface excavation of a building and barn envelope on Lot 6 which is a part of the Lot 258 subdivision (see Barber 2001a). Two artefacts had previously been identified on what is currently Lot 6 (Barber 2001a). Lot 6 is located downslope of the most sensitive part of the larger site which is located on the ridge. The results indicated a low density subsurface artefact occurrence; however some spatial variation in density was noted with greater artefact densities present along the north side of the building envelope.

Cobowra Local Aboriginal Land Council conducted salvage of 134 artefacts from the Lot 6 building envelope during site construction. Allen (2002c) conducted an analysis of this material which included primarily flakes, cores and two hammerstones. Quartzite dominated the salvaged assemblage which contrasts to previous raw material frequencies calculated for the site.

Allen (2002c) conducted subsurface excavation of a building and shed envelope on Lot 8 which is a part of the Lot 258 subdivision (see Barber 2001a). More than 300 artefacts had previously been recorded in the north western corner of what is currently Lot 8 (Barber 2001a). The subsurface work was conducted on the south portion of the lot. The results of the excavation indicated a low density subsurface artefact occurrence, but at slightly higher densities than in Lot 6.

Allen (2003) conducted subsurface excavation on Lot 14 which was additional to previous excavation of the same Lot (see Allen 2002a). The new owners of the property wished to construct a dwelling further south and southwest of the originally defined envelope. No artefacts were recovered during the work which is consistent with the distribution of the sites as previously defined (See above); artefact densities are much higher on level areas than on more steeply sloping sites.

Boot (1994c) surveyed a property adjacent to Spring Place and located two artefact scatters. The Spring Place 1 site consisted of four artefacts distributed over an area measuring 70 x 10m on a level section of a gently sloping ridge side. The artefacts included a grey porphyry core and three silcrete artefacts. Spring Place 2 consisted of over 20 artefacts distributed across a 60 x 16m area. Artefacts included silcrete, porphyry and quartz. The owner of the property had previously found a stone hatchet head on the property. In addition Boot located a granodiorite slab which contained two pecked marks.

Boot (1997) subsequently conducted a survey of proposed road improvement areas at Spring Place and Meringo Road. Two artefact scatters were located on Meringo Road and two at Spring Place.

Further to the south, Navin Officer Heritage Consultants (2003a) undertook a limited program of sub-surface test excavation along selected test areas of the route of a proposed Turlinjah waste water pipeline. No material was retrieved in ridge top and low spurline locations adjacent to a valley floor. However, substantial deposit was encountered along the Coila Lake foreshore. A previous site had been located at the site during monitoring of pipeline installation works. The visible material comprised a low density scatter of stone artefacts and a few pieces of *Anadara trapezia*.

During test excavation two hundred and five artefacts were recovered from eight 60 cm diameter auger test pits. Artefacts were found to be located in greatest density closest to the lake with density decreasing away from the shoreline of Coila Lake. An average artefact density of 97.7/m² was calculated for the entire site. The authors (Navin Officer Heritage Consultants (2003a) compared this figure to other south coast sites subject to test excavation and concluded that this figure represented a medium to high artefact density site. Artefact density peaked at ca. 40 cm depth, trailing off to a total depth of 1.60 m.

The assemblage at the Coila Lake site was dominated by flakes, flaked pieces and broken flakes. In addition cores and backed artefacts were recovered. The assemblage was dominated by silcrete, followed by quartz and chert. Minor frequencies of quartzite, rhyolite, andesite, chalcedony and other volcanics were present. The site was found to possess stratigraphic integrity. Based on an analysis of backed artefact distribution at the site, the deposit has been dated to be no older than the mid to early Holocene (Navin Officer Heritage Consultants 2003a). The results of the test excavation has led the authors (Navin Officer Heritage Consultants 2003a) to

argue that the estuarine shoreline and associated basal slopes were the focus of local Aboriginal occupation compared to the higher terrain further inland.

In summary the majority of sites recorded during surveys of the local area are artefact scatters. These sites are often found to contain subsurface deposits when subject to excavation. Surface scatters and subsurface deposits vary in artefact density according to the broader landscape and the micro-terrain units in which they are located. In the local area artefact scatters are *not* tethered to fresh water sources and will be often be found at considerable distances away from water. Middens are typically found on headland contexts on the south coast.

8. EXCAVATION RESULTS

8.1 Results

Summary

This program of test excavation has been conducted in accordance with s87 Permit # 2249 issued by the NSW DEC on 13 July 2005.

A total of twenty one Test Transects were excavated during the program (Table 3 and Table 4). Transect location was selected so as to obtain a representative sample of the archaeological resource from each of the Survey Units across the proposal site.

Survey Units have been defined on the basis of a combination of environmental variables which are assumed to relate to Aboriginal usage of the area (Dibden 2004b). These areas are termed *archaeological terrain units* and have been defined on the basis of a combination of landform element, gradient and aspect (*cf* Kuskie 2000: 67). Survey areas are defined as individual units that are bounded on all sides by different archaeological terrain units. The rationale for employing this definition relates to its utility in regard to predicting the archaeological potential of landforms; archaeological terrain units are "…discrete, recurring areas of land for which it is assumed that the Aboriginal land use and resultant heritage evidence in one location may be extrapolated to other similar locations" (Kuskie 2000: 67).

Given this theoretical assumption, it is predicted that the archaeological material recovered from the individual Test Transects excavated in each Survey Unit is likely to be generally representative of that which is distributed across the entire Survey Unit. The Survey Units sampled during this excavation program included Survey Units 2, 4, 5, 7, 9, 10, 11, 12, 14, 16, 17, 18 and 19. The location of Test Transects is shown on Figure 5.

A total of two hundred and twenty two Test Pits each measuring 0.5 x 0.5 metres were excavated by spade and trowel. Hand GPS coordinates for each Test Transect is listed in Table 4. A summary of results is listed below:

- A total ground area of 55.5 square metres was excavated.
- A total of 16.91cubic metres of soil were excavated.
- Artefacts were recovered from 20 of the 21 Test Transects
- Artefacts were recovered from 112 of the 222 Test Pits.
- A total of 307 whole and broken stone artefacts were retrieved.
- A minimum number estimate of 253 artefacts was calculated.
- No shell midden material was encountered during the excavation.
- Mean artefact density is calculated to be 5.5 artefacts per conflated square metre.
- Mean artefact density is calculated to be 18.2 artefacts per cubic metre.
- Artefact densities vary for 40.2 m^3 to 1.2 m^3.

Test Transect	Impacts proposed	Archaeological Terrain Unit	Survey Unit
1	Possible future development area	Spur crest	SU2
2	Development area	Spur crest	SU10
3	Development area	Simple slope	SU9
4	Impacts unknown	Basal slope/flat	SU4
5	Impacts unknown	Basal simple slope	SU4
6	Development area	Spur crest	SU5
7	Development area	Spur crest	SU11
8	Development area	Spur crest	SU10
9	Development area	Spur crest	SU11
10	Impacts unknown	Basal simple slope	SU12
11	Impacts unknown	Basal simple slope	SU12
12	Development area	Spur crest	SU11
13	Development area	Drainage depression	SU7
14	Development area	Ridge crest	SU10
15	Impacts unknown	Flat/wetland	SU14
16	Impacts unknown	Basal simple slope	SU16
17	Development area	Spur crest	SU17
18	Development area	Simple slope	SU18
19	Impacts unknown	Spur crest	SU19
20	Impacts unknown	Spur crest	SU19
21	Development area	Simple slope	SU16

Table 3. Summary of Test Transect locations in respect of proposed impacts and Survey Units.

Transect #	**Grid references (Hand GPS: WGS 84)**
1	North end: 237362e 6020739n South end: 237364e 6020689n
2	North end: 237959e 6020860n South end: 237976e 6020826n
3	North end: 238053e 6020941n South end: 238053e 6020889n
4	West end: 237477e 6020738n East end: 237507e 6020698n
5	West end: 237505e 6020736n East end: 237534e 6020696n
6	West end: 237593e 6020651n East end: 237625e 6020615n
7	East end: 237699e 6020834n West end: 237648e 6020841n
8	West end: 237835e 6020866n East end: 237887e 6020868n
9	West end: 237771e 6020846n East end: 237821e 6020848n
10	East end: 237583e 6020848n West end: 237532e 6020853n
11	East end: 237525e 6020858n West end: 237571e 6020854n
12	East end: 237702e 6020848n West end: 237651e 6020854n
13	South end: 237993e 6020714n North end: 237986e 6020746n
14	South end: 238048e 6020725n North end: 238037e 6020767n
15	East end: 237382e 6021256n West end: 237424e 6021227n
16	East end: 237394e 6021282n West end: 237429e 6021250n
17	East end: 237410e 6021374n West end: 237457e 6021359n
18	East end: 237441e 6021439n West end: 237486e 6021412n
19	East end: 237275e 6021442n West end: 237319e 6021442n
20	East end: 237270e 6021459n West end: 237315e 6021434n
21	North end: 237448e 6021310n South end: 237430e 6021268n

Table 4. Hand GPS coordinates for Test Transect locations.

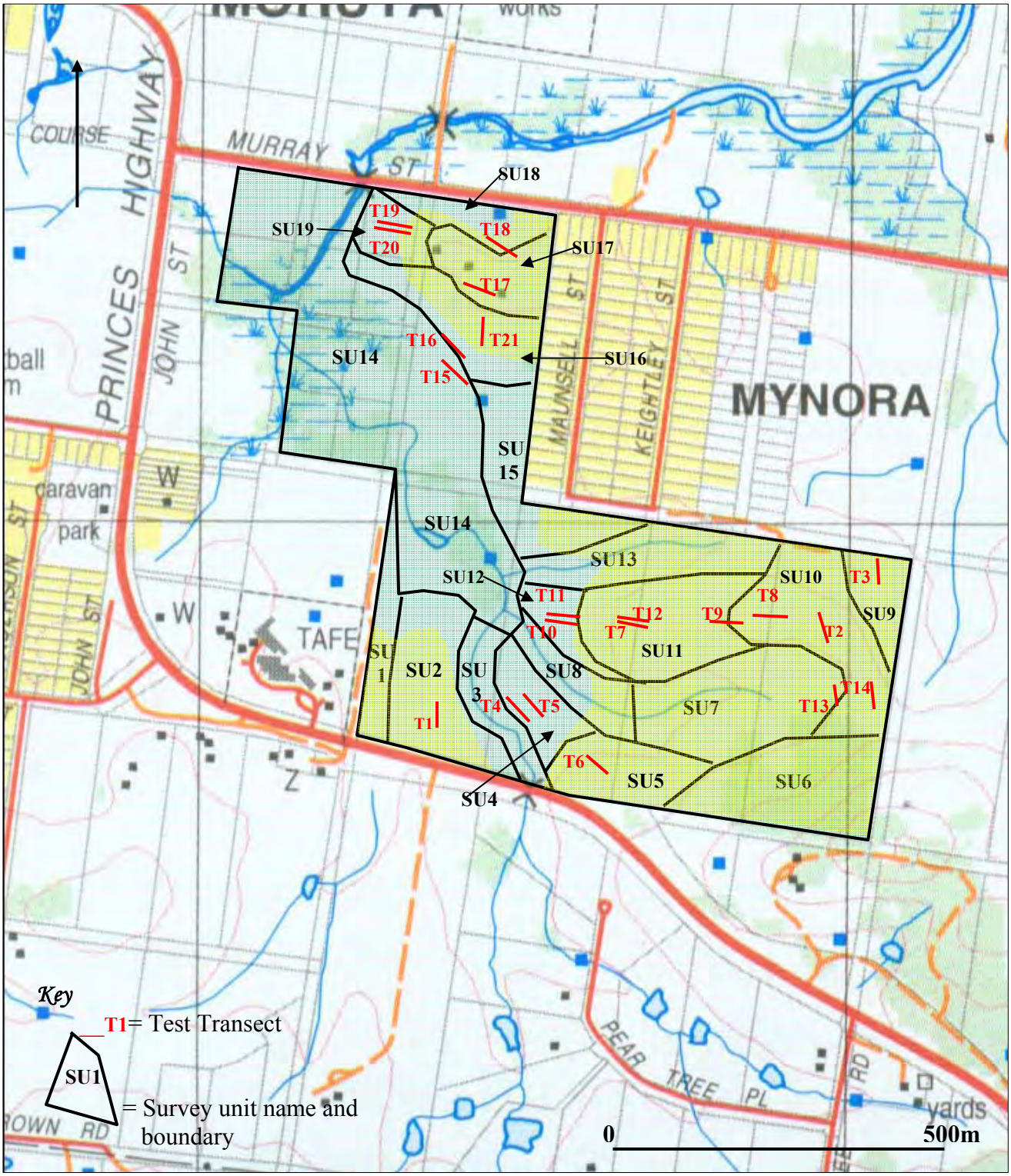

Figure 5. Location of Test Transects shown in respect of possible proposed impacts (area in yellow), areas situated below the flood zone (green) and Survey Units (Moruya 8926-3S 3rd ed. Topographic map: GDA).

8.2 Excavation

At the time of the excavation the soil in the proposal site was damp due to heavy rains in the preceding weeks. The soils in the proposal site are derived from decomposing granite and hence possess very high gravel content (up to 2 x 10 litre buckets of gravel per spit). Gravels consisted primarily of small quartz crystals which

generally measured less than 5 mm. Some larger (<10 cm) pieces of white/orangey veinous quartz is also present in the soil.

The soil profile possesses a loamy sand which overlies a medium clay (Plate 1). Both the sand loam and clay possessed high gravel content. Typically small grass rootlets extend throughout the profile into the clay. The clay layer is generally present at c. between 20 and 30 cm below the ground surface, however the depth varies according to the topographic context; clay is located at greater depth on lower slopes.

Plate 1 South west section of Transect 4/Pit 4. Note yellow clay at ca. 20 cm below ground level.

8.3 Stone Artefact Analysis

The artefact analysis has been structured to address the following issues:

- Technological and behavioural activities represented by the lithic material;
- Artefact density;
- The organisation and use of stone resources in the Moruya area.

To examine these topics the results of the artefact analysis is presented in four parts. The first part will present a profile of the assemblage through basic descriptive statistics and the second examines the spatial distribution of this material. Using the data presented in these sections the third component will examine the variability in assemblage content and distribution within landscape units. The final section will contain a summary and discussion of these findings.

In this presentation the nature of the assemblage will be examined through basic descriptive statistics on artefact type, raw material type, presence and type of cortex, initiation, platform and termination attributes, breakage, size and shape and relevant relationships between these variables. Although the excavated material is described as a total unit it should be recognized that the resulting assemblage is a compilation of material which may have accumulated as a result of numerous unrelated events spread over an indeterminate period of time. The purpose of this whole of assemblage analysis is to provide a basis for both intersite and intrasite content comparisons.

Artefact types and raw material

Artefact types identified in this assemblage were: flake, retouched flake, core and flaked piece. Two eraillure flakes was identified but are not included in the analysis as they are by-products of flake manufacture, not an intentionally produced artefact. Four manuports, which are items out of geological context but physically unmodified, were noted but are also not included in this analysis.

A summary of the numbers of each artefact type made from the range of raw materials present in the excavated assemblage is presented in Table 5. A total of 307 whole and broken flaked artefacts were recorded during this analysis. Flakes are the most frequently occurring type in the assemblage with a total of 272 (88.6%)

found in the area excavated. Retouched flakes are the second most frequent category of artefact (18 or 5.9%). Retouched flakes were divided into two types: backed artefacts and other retouched flakes. There were 4 backed artefacts and 14 other retouched flakes (Table 6). Backed artefacts were the only type of implement recorded during the analysis. A small number of cores (13 or 4.2%) and flaked pieces (4 or 1.3%) were recorded. Flaked piece includes artefacts that exhibit features such as negative flake scars but do not have any other features that would allow classification either as a flake, a retouched flake or core. These could have been either a broken flake or a broken retouched flake. Some flaked pieces could be broken cores. This classification does not contain items that do not exhibit any flake attributes. Fragments of raw materials the same as flaked artefacts that do not exhibit any flake features are placed into the non artefactual fragment category. Non artefactual items were identified and labelled but are not included in this review of assemblage content.

	Chert	Clear quartz	Porphyry	Quartzite	Quartz	Silcrete	Volcanic	Total
Core			2	1	9	1		13
Flake	2	7	62	8	88	102	3	272
FP			2		2			4
RFl	1	3	1	1	1	11		18
Total	3	10	67	10	100	114	3	307

Table 5. Crosstabulation of artefact types by raw material for all flaked artefacts: FP=flaked piece; RFl=retouched flake.

	Chert	Clear quartz	Porphyry	Quartzite	Quartz	Silcrete	Total
Backed Artefact	1	2		1			4
Other Retouch		1	1		1	11	14
Total	1	3	1	1	1	11	18

Table 6. Crosstabulation of retouched artefact types by raw material.

A range of raw material types were utilised to produce the 307 flaked artefacts. Roughly equal amounts of silcrete (37.1%) and quartz artefacts (35.9%) are present. A small number (10 or 3.3%) of the quartz artefacts were made from clear quartz, a high quality translucent material. Porphyritic volcanic rock was the next most frequently used material with nearly 22% of this rock type present. Small amounts of other volcanic materials (1%), chert (1%) and quartzite (3.3%) were identified.

A different pattern of raw material use is seen within retouched flakes and cores compared to unretouched flakes. While more than half of the retouched flakes (61.1%) are silcrete, quartz accounts for only another 22.2%, with one chert (5.6%), one porphyry (5.6%) and one quartzite (5.6%) retouched flake also present. The incidence of raw material types between backed artefacts and other retouched types is different. There are no backed artefacts made from silcrete with two quartz backed artefacts and one each of chert and quartzite. Half of the flaked pieces are quartz while the other half is porphyry. While there is a notable difference in raw material use between the rarer types, the small sample size does suggest caution in further interpretation of these data. Another example of dissimilar raw material use exists with cores, which are also different to unretouched flakes. Nine quartz cores (69.2%) are present but there is only one silcrete core (7.7%) out of the total 13 cores. Two porphyry (15.4%) and one quartzite (7.7%) make up the remainder of the core material types. A graphic illustration of this variation in raw material composition between artefact types is shown in Figure 6.

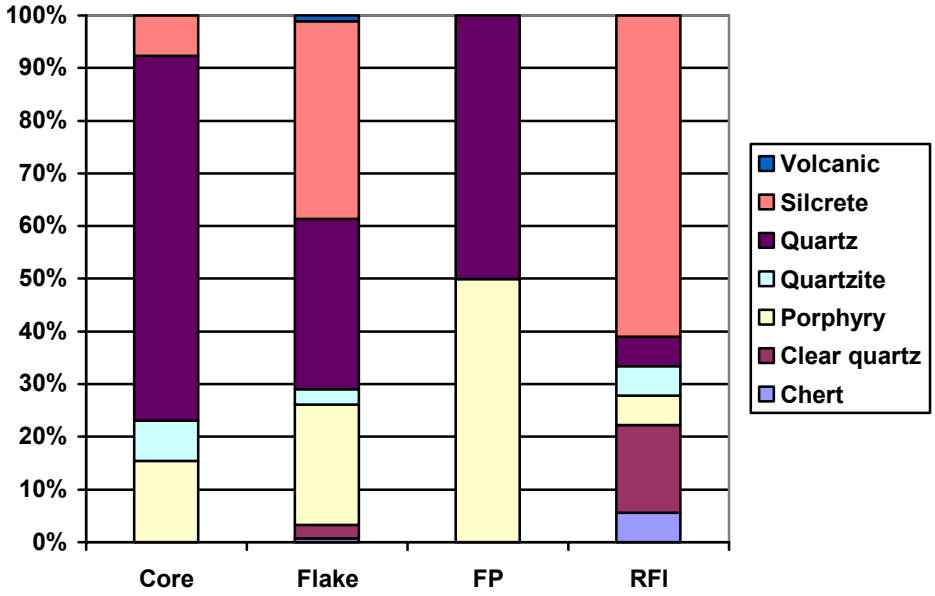

Figure 6. Relative proportions of artefacts made from each raw material type.

A clear pattern of unretouched flakes dominating an assemblage made from almost equal amounts of silcrete and quartz materials and small amounts of other materials is evident from the data presented above. An important consideration is the source of these materials. Is there evidence of a single source of either material or does the material originate from a variety of sources? A review of raw material colour and quality assists with the examination of these issues. In this study the colour of each artefact, quality of material and presence of cortex was noted. A summary of the range of material colours and quality for silcrete and quartz is presented in Tables 7 and 8. The presence of cortex is also a direct indicator of the morphology of the material source. Incidence rates for both alluvial and terrestrial cortex types are presented in Table 9.

Material Colour	Material Quality			
	High	Low	Medium	Total
Beige	13		3	16
Beige mottled	6		2	8
Grey	35		26	61
Grey mottled	1		1	2
Grey/Beige	1		3	4
Grey/Pink	1		4	5
Orange mottled			1	1
Purple			1	1
Red	9		6	15
White		1		1
Total	**66**	**1**	**47**	**114**

Table 7. Range of colours for silcrete flaked artefacts.

Material Colour	Material Quality			
	High	Low	Medium	Total
Beige			3	3
Clear	7		4	11
Pink mottled			1	1
White	6	4	74	84
White/Yellow	1		10	11
Total	**14**	**4**	**92**	**110**

Table 8. Range of colours and quality for quartz flaked artefacts.

On the basis of data presented in Tables 7 and 8 on the colour and quality of silcrete and quartz it is possible to conclude that a variety of these raw material types were utilised to produce the excavated assemblage. Not only were a wide range of colours present but also the quality varied within and between colours. It is possible that local gravels composed of a variety of rock types were the source of the raw materials. The presence of cortex developed in an alluvial context would indicate river gravels as a raw material source. Table 9 lists the number of artefacts exhibiting cortex developed in either alluvial or terrestrial contexts. Only 10 artefacts retained cortex from an alluvial context while 35 exhibited terrestrial cortex. The low incidence of cortex retention (3.3% alluvial and 11.4% terrestrial) suggests that neither hard rock quarries or water worn gravels and cobbles were close to the study area. As quartz is available from within the study area and considerable non artefactual fragments of quartz were recovered from the excavated pits this issue needs further examination. A crosstabulation of cortex retention with material type is presented in Table 10. These data show that rate of cortex retention varies between material types. Although there are proportionately more cortex bearing silcrete artefacts than coloured quartz (7% versus 13.2%) these incidence rates are still comparably low. Clear quartz artefacts exhibit no cortex. Porphyritic volcanic rock has the highest incidence of cortex retention with 20.9% of this material showing cortex.

Cortical platforms were recorded independently from dorsal cortex. Flakes with cortex on the platform have been struck from the natural surface of the core. Table 11 lists the numbers of alluvial and terrestrial cortex platforms found in the assemblage. One third of the artefacts exhibited alluvial cortex on the platform and two thirds retained terrestrial cortex. The dominance of terrestrial weathering over alluvial forms is also seen in the relative occurrence of these two types of cortex on dorsal surfaces.

These data support the conclusion that a range a raw material sources were utilised to manufacture the artefacts excavated from the study area. It is likely that both alluvial and terrestrial sources were used and that either cortex bearing artefacts were not frequently transported to the location or that non-cortex bearing sources were utilised more often.

Cortex Type	**Percentage of Dorsal Cortex**						
	0	**1-25%**	**26-50%**	**51-75%**	**76-99%**	**100%**	**Total**
None	262						262
Alluvial	2	3	3			2	10
Terrestrial	3	15	10	3	4		35
Total	267	18	13	3	4	2	307

Table 9. Type and percentage of cortex present on flaked artefacts.

Material type	**Percentage of Dorsal Cortex**						
	0%	**1-25%**	**26-50%**	**51-75%**	**76-99%**	**100%**	**Total**
Chert	2		1				3
Clear quartz	10						10
Porphyry	53	5	4	1	3	1	67
Quartzite	8	1	1				10
Quartz	93	6		1			100
Silcrete	99	6	7		1	1	114
Volcanic	2			1			3
Total	267	18	13	3	4	2	307

Table 10. Crosstabulation of material type with percentage of cortex present on flaked artefacts.

	Cortex type		**Total**
	Alluvial	**Terrestrial**	
Cortical platform	5	15	20

Table 11. Type of cortex present on platforms.

Summary

Data on the relative frequencies of artefact types and raw material varieties has been reviewed. A limited range of artefact types were identified with unretouched flakes dominating the assemblage. Of the 18 retouched flakes only four were implements (backed artefacts). Roughly equal amounts of quartz and silcrete (35.9% and 37.1%) make up the assemblage with another 22.8% being porphyry. When artefact types are examined independently different patterns of raw material use exist between flakes, retouched flakes and cores (See Figure 10). Unretouched flakes which dominate the assemblage follow the broad pattern shown by the entire collection. Most of the 18 retouched flakes are silcrete, however none of the backed artefacts within this category are silcrete. Two of the backed artefacts are made from high quality clear quartz with one example each of chert and quartzite present. In this assemblage the rare types are made from the rarer materials and therefore do not match the raw material profile of the rest of the collection. Although only roughly one third of the entire assemblage is quartz the majority of cores (9) are made from this material. Only one silcrete core was identified along with one quartzite and two porphyry cores.

The wide range of colours and variation in quality within material types suggest a variety of sources for the materials in the assemblage. An examination of the relative incidence and type of dorsal cortex present shows that while both alluvial and terrestrial cortex is present (3.3% alluvial and 11.4% terrestrial) the relative incidence is low. A similar pattern exists for cortex on flake and core platforms. Either primary reduction of cortex bearing raw materials was undertaken outside the study area or non cortical rock types, such as hard rock quarries, were utilised. The issue of *in situ* knapping of locally available quartz for artefact production would require more detailed data collection and analysis than is feasible for this current study. One aspect of this can be examined through artefact size analysis which is examined later in this section.

Initiation, platform and termination attributes

There are a number of attributes present on artefacts produced by flaking that can be used to positively distinguish between naturally fractured stone and artefacts. These features are well defined and the presence of two or more is usually required before an artefact can be conclusively identified. Full descriptions of these fracture features are available in numerous publications (c.f. Cotterell and Kamminga 1987; Andrefsky 1998: 17-19). The three attributes identified in this analysis were: initiation type, platform type and termination type. Positive identification of flaked stone artefacts is dependent upon the presence of these features which were described in Section 5.3. The recognition of one or more of these features on the artefacts used in this analysis demonstrates the validity of these identifications.

These attributes can also be used to examine basic technological features of an assemblage. In this study these fracture characteristics are examined to determine if any patterns in the reduction strategies used to produce the artefacts are evident. In particular, the influence of raw material type and morphology on the types of initiation, platform and termination attributes is examined.

Initiation types

Three initiation types were recorded in this analysis: bending, bipolar and conchoidal. Bipolar (or compression) knapping is recorded separately as it an important indicator of technological strategies. Positive and negative initiation features are found on flakes while only negative features are visible on cores. Retouched flakes can have both positive and negative scars, however, the secondary flaking frequently removes platform features and bulbs from retouched flakes. Flaked pieces are not included as platform features are missing. Invariably these artefacts exhibit only negative scarring. If a platform was present then a different identification would be possible. A crosstabulation of artefact type against initiation type is available in Table 12.

Artefact type	**Initiation type**				
	Missing	**Bending**	**Bipolar**	**Conchoidal**	**Total**
Flake	41		24	207	272
Retouched Flake	10	1	0	7	18
Core	0	0	3	10	13
Total	51	1	27	224	303
		Total number of initiations 252			

Table 12. Initiation types present on artefacts.

These figures show that conchoidal fractures exhibiting a range of features such as bulbs of force, initiation points, platforms, eraillure scars, ripples and terminations are the most frequently observed (88.9%) initiation type in the Moruya assemblage for the 252 artefacts with intact platforms. Bipolar flakes and cores account for most (10.7%) of the remaining specimens. One bending initiation (0.4%) was observed. This relative occurrence of initiation types is not an unexpected feature for an assemblage. Conchoidal fractures are typically the most frequent initiation type in Australian artefact assemblages. A number of broken artefacts (51 or 16.8% of the assemblage) did not have platforms and initiations. As expected, retouched flakes often have initiation and platform features removed.

Raw material morphology can exert a strong influence on core reduction strategies. In particular quartz can present difficulties for hand held percussion (conchoidal initiations) techniques due to the hard brittle nature of the stone and the small size of quartz nodules and pebbles. Bipolar reduction, where the core is rested on an anvil, is frequently employed to produce quartz flakes. As a result bipolar flakes often show signs of impact on opposing ends and have compression rings moving in two directions towards each other. (Andrefsky 1998: Glossary xxi). A breakdown of initiation types against raw material groups is presented in Table 13.

Material type	**Initiation type**				
	Missing	**Bending**	**Bipolar**	**Conchoidal**	**Total**
Chert	1			2	3
Clear quartz	3		2	5	10
Porphyry	13			52	65
Quartzite	1			9	10
Quartz	4		25	69	98
Silcrete	29	1		84	114
Volcanic				3	3
Total	**51**	**1**	**27**	**224**	**303**

Table 13. Crosstabulation of material types with initiation types.

For all raw materials conchoidal initiations were the dominant fracture type (88.8%) for artefacts where the platform was not missing. A clear association between bipolar reduction and quartz is demonstrated by these figures. Quartz is the only raw material where this reduction strategy is employed. In contrast only one of the silcrete artefacts was not produced by conchoidal fracture. In this case a bending initiation was recorded. In this assemblage the morphology of available materials has influenced the selection of reduction strategies. Andrefsky (1998:27) states that

> Bipolar technology is often used when the objective piece is too small to be reduced by hand-held methods or when the tool maker is trying to maximize the use of a limited raw material source.

There are considerable amounts of naturally occurring small quartz nodules within the study area so it is unlikely that bipolar reduction was used as a material conservation strategy. It is however, likely that hand held percussion techniques would be difficult with these nodules. Although the utilisation of this locally available quartz has not been demonstrated the morphology is consistent with the identified flakes in the assemblage. The evidence for *in situ* quartz artefact production will be considered in the review of flake sizes later in this report.

Platform types

In this study a range of platform types were identified: single, multiple, focused, cortical, shattered and bipolar. These characteristics were documented to provide both a mechanism for the accurate identification as well as technological features of the artefacts.

A number of aspects of artefact reduction technology are indicated by a range of platform traits. Hiscock (1986:44) demonstrated a number of technological changes in the Sandy Hollow excavated assemblage by measuring attributes which reflected the various combinations of platform preparation and force application. Hiscock (1986:43) lists a range of measures to examine application of force precision and platform preparation. The percentage of focalised platforms was used as an indicator of the precision of the blow. Platform preparation was measured by the percentage of flakes with facetted platforms, multiple platforms and cortical platforms. In the Sandy Hollow assemblage changes in the relative proportions of these indicators were associated with technological changes through time. Although the current study does not investigate any

temporal aspects of artefact production it is possible to examine platform preparation aspects as a general indicator of reduction technology. The number of each platform type for flakes and retouched flakes where the platform is not missing is listed in Table 14.

Platform type	Flake	Retouched Flake	Total Number	% of Assemblage
Bipolar	23		23	9.4%
Cortical	18	1	19	7.8%
Focused	49	1	50	20.5%
Multiple	21	3	24	9.8%
Shattered	21		21	8.6%
Single	104	3	107	43.9%
Total	**236**	**8**	**244**	

Table 14. Platform types on flakes and retouched flakes.

Single surface platforms were the most frequently recorded platform type (43.9%). In combination with cortical platforms (7.8%) these indicate that platform preparation was not undertaken for roughly half of the assemblage. Focused platforms, where the point of force application (PFA) covers more than half of the platform, were present on 20.5% of flakes and retouched flakes. Core preparation techniques such as overhang removal assist with precise application of force. Too much force near the edge of a core can result in platform shatter. Broken focused platforms may now be part of the shattered platform category which includes 8.6% of flakes. These are not classified as distal portions as the flake length can often still be measured from the remnant bulb surface. Other indicators of platform preparation such as facetted or multiple surfaces were either absent or present in small proportions. Bipolar platforms were present at the same rate as bipolar initiations, as would be expected.

In summary, the assemblage is dominated by flakes and retouched flakes with no platform preparation. The presence of roughly 20% focused platforms indicates a degree of platform preparation to facilitate precise blows close to the edge of the platform. Some of the shattered platforms may represent the application of too much force during attempted removal of flakes with focused platforms. The occurrence of a small proportion of cortical platforms demonstrates either the primary reduction of raw material or the transport of large flakes with cortical surfaces to the study area.

Termination types

The amount of force and the angle of force determine the way a flake detaches from the core resulting in feather, step, hinge, retroflex hinge or outré passé terminations. These types as well as bipolar terminations were recorded in this study. Hiscock (1986:34) measures two aspects of reduction technology using termination traits. The amount of force is indicated by the ratio of feather to non feather terminations and the angle of force by the ratio of hinge to step terminations. He classifies amount of force as low, moderate or high and angles of force as normal, inward and outward.

A breakdown of the numbers of flakes and retouched flakes exhibiting each termination type is presented in Table 15. The ratios of feather to non feather terminations and hinge to step terminations are listed in Table 16 which follows the format of Table 7 in Hiscock (1986:45). Interpretation of the results also follows the methodology employed by Hiscock (1986:44) at Sandy Hollow. The use of this methodology is not intended to imply any chronological or technological relationship between the Moruya and Sandy Hollow assemblages. It is used to explore technological features common to all flaked stone assemblages.

Termination type	Flake	Retouched Flake	Total Number	% of Assemblage
Bipolar	23		23	9.3%
Feather	185	7	192	78%
Hinge	9		9	3.7%
Outré passé	3		3	1.2%
Retro flex Hinge	1		1	0.4%
Step	18		18	7.3%
Total	**239**	**7**	**246**	

Table 15. Termination types for flakes and retouched flakes.

Aspect of technology	Measure	Result
Amount of force	Feather:non feather	Ratio of 6.2:1
Angle of force	Hinge:step	Ratio of 0.6:1

Table 16. Aspect of technology measured and ratio for each measure.

A large majority of non bipolar flakes and retouched flakes (78%) exhibit feather terminations. Step termination account for 7.3% and hinge terminations make up only 3.7% of the remainder. Bipolar terminations occur on nearly 10% of flakes which matches the rate for bipolar initiations. A small percentage of flakes (1.2%) end in outré passé or overshot terminations which are characteristic of strong, inward facing blows. In Table 16 the measures used to examine the amount of force and angle of force have been calculated. In the Sandy Hollow analysis Hiscock (1986:44) interpreted the ratio of feather to non-feather terminations greater than 3.5:1 in the Phase I Bondaian level as indicating the application of relatively high amounts of force. Step and hinge termination occur when the force exits the core at an abrupt angle. Successful feather terminations result from enough force being applied to travel smoothly to the surface of the core. In his study the ratio of hinge to step terminations less than 6.0:1 in the Phase II Bondaian were interpreted to indicate predominantly outward directions of force application. This is consistent with the current analysis where the dominance of feather termination over all other types also suggests outwards or normal direction of force.

Summary

Flake initiation, platforms and termination types are linked. The best examples of this are bipolar flakes which exhibit all three features that are exclusive to this reduction technique which at Moruya is used only on quartz materials. For all non-bipolar flakes conchoidal fracture dominates the assemblage even for quartz flakes. Only one bending initiation flake was recorded. Data on platform types was used to examine the incidence of platform preparation and precision of force application. The dominance of single surface platforms over all other types indicates that just over half of the flakes and retouched flakes do not exhibit evidence of platform preparation. Evidence of this technique is present in the 20.5% of the assemblage with focused platforms. Some of the shattered platforms may also have been focused. All other indicators of platform preparation, such as faceting and multiple surfaces are either absent or present in low proportions.

In this study termination types were reviewed to indicate whether the amount of force and angle of force applied was consistent or variable. Feather terminations exist on 86% of non-bipolar flakes with 18.1% step and only 4.5 % hinge terminations present. Using the methodology published by Hiscock (1986) the ratio of feather to non-feather and hinge to step terminations was used to indicate the amount and angles of force used to produce the assemblage. Measures of amounts of force indicate relatively high force was applied in predominantly outward directions for the majority of the assemblage. Bipolar flakes are an exception to this pattern as this anvil rested technique results from a form of initiation and termination using compression.

Breakage

A high incidence of artefact breakage in an assemblage can impact upon the accuracy of the estimation of original assemblage size and composition. Unequal rates of breakage of artefact types and raw material types can distort the original relationships between these variables. Breakage of flaked stone artefacts can occur during the production process, through use of the artefact, exposure to fire or post-depositional damage such as trampling. Breakage patterns affect the interpretation of raw numbers as one artefact can be represented by one or more pieces. Data on both whole and broken artefacts are presented in Table 17 to highlight the effect inclusion of data on broken artefacts can have. Flaked pieces are excluded from this table as by definition they are broken but the fragment type cannot be determined.

Fragment type	Core	Flake	Retouched Flake	Total
Broken/Other	1			1
Complete	12	191	11	214
Distal		30	5	35
LCS Left		5		5
LCS Right		3		3
LCS Distal		1		1
LCS Proximal Right		2		2
Medial		8	3	11

Platform Shattered		8		8
Proximal		22	1	23
Total	13	270	20	303

Table 17. Number of each fragment type for all artefacts: LCS=longitudinal cone split.

A majority of artefacts are unbroken with 214 or 70.6% recorded as complete. A simple minimum number count can be obtained by adding complete artefacts to other fragments that represent at least one other artefact but excluding sections that may over-represent artefact numbers. This includes medial and distal sections and the smallest number of longitudinally cone split proximal sections. The broken core can also be included as all the other cores are complete. A total of 253 artefacts remain when these types are excluded from the estimate. It can be concluded that this refined estimate of original assemblage size is likely to present a more accurate total considering the moderate proportion of broken artefacts present.

A more accurate estimate can be obtained by breaking down the fragment types into raw material groupings. This recognizes that a proximal portion of a silcrete flake can not join to a distal portion of a quartz flake. Different types of raw material may be either more resistant or susceptible to fragmentation. Table 18 lists the number and percentage of broken flakes, retouched flakes and cores in each raw material group. Flaked pieces are excluded from this analysis.

Raw Material	**Complete**		**Broken**		**Total**
	Number	**%**	**Number**	**%**	**Number**
Chert	3	100	0	0	3
Clear quartz	9	90	1	10	10
Porphyry	40	61.5	25	38.5	65
Quartzite	9	90	1	10	10
Quartz	87	88.8	11	11.2	98
Silcrete	65	57	49	43	114
Volcanic	1	33.3	2	66.7	3
Total	214	70.6	89	29.4	303

Table 18. Number and percentage of broken artefacts in each raw material group.

There is clear evidence of differential breakage rates between raw material types. Quartz and quartzite exhibit very low rates of breakage compared to silcrete, porphyry and other volcanics. As silcrete artefacts make up 37.1% of the assemblage a high breakage rate in this material has the potential to affect the estimates of original assemblage size. If the silcrete originated from one source then it would be difficult to adjust for this potential bias. As it has been shown that the wide range of colours and material qualities suggest a variety of sources have been used then it is possible to divide the assemblage into raw material types, colours and fragments to obtain a minimum number estimate. This complex calculation is not considered necessary for this analysis as it is unlikely that matching distal, proximal, longitudinal cone split and medial portions exist with enough frequency to warrant the process.

The estimate of 253 artefacts presented above is considered accurate enough for the analysis undertaken on the Moruya assemblage. To ensure that the next section on flake size and elongation is not affected by breakage only the 191 complete flakes will be used in this analysis. Retouched flakes and flaked pieces are normally excluded from size analysis as retouching and fragmentation affect size measurements.

Size and elongation

An examination of the size and elongation of artefacts is an important aspect of any assemblage content analysis. Complete flakes will be used to examine these features of the flaked artefact assemblage from the Moruya project. A total of 191 whole flakes were identified in the assemblage. Information on the length, width, elongation and weight of these flakes is presented in Table 19. Data on size and elongation was obtained by measuring the length of flakes along the percussion axis and the width at a point half way along and at a right angle to the percussion axis. Elongation was calculated by dividing length by width to create an elongation index. An index of 1 indicates that a flake is as wide as it is long. A flake twice as long as it is wide has a shape index of 2. An index less than 1 indicates a flake is wider than it is long. The weight of each flake was measured to the nearest tenth of a gram.

	No.	Av	Std. Dev.	Minimum	Maximum
Length in mm	191	13.5	9.2	2.8	45.3
Width in mm	191	11.1	7.7	2.4	70.5
Elongation	191	1.3	0.6	0.33	5
Weight in grams	191	1.8	4.4	0.05	33.5

Table 19. Length, width, elongation index and weight range for all complete flakes.

Overall the size of whole flakes in the assemblage is small with the largest flake measuring less than 46 mm in length. The average flake length was 13.5 mm with a wide variation in length between 2.8 mm and 45.3 mm. There was also a wide variation in flake width, ranging between 2.4 mm and 70.5 mm with an average width of 11.1 mm. Flake shape varied from three times wider than long to 5 times longer than wide. The average elongation was 1.3 which is slightly longer than wide. Flakes that are two or more times longer than wide are classified as blades by some archaeologists, although some classification systems require other characteristics, such as parallel sides, to be also present on blades. The generally small size of individual flakes is supported by the statistics on weight. The average weight of flakes in the assemblage is 1.8 grams. The heaviest flake weighed 33.5 grams and the smallest 0.05 grams. In summary the assemblage contains mostly small flakes which tend to be slightly longer than wide.

Flake size can be used as an indicator of *in situ* manufacture of artefacts. It is widely accepted that "Small artifacts, especially micro artifacts, on occupation surfaces often indicate primary refuse" (Schiffer 1987:267). An examination of the proportion of flakes less than 5 mm and between 5.1 and 10 mm in length for all raw materials in Table 20 reveals a higher proportion of silcrete flakes 5 mm or less in length (48%) than quartz flakes (28%). The higher incidence of small silcrete flakes may indicate that artefacts were manufactured from this material *in situ* more frequently than from the quartz types. This is not supported by the data on flakes between 5.1 and 10 mm in length which shows a higher proportion of quartz flakes in this size class (49.2%) than silcrete flakes (20.6%). It is possible that the difficulty in identifying small quartz flakes compared to silcrete may have biased these results. When the two size classes are combined quartz flakes account for 43.2% of flakes while silcrete flakes make up 28.4%. The availability of quartz nodules in the study area may have provided a source of material for the *in situ* reduction of quartz resulting in a higher proportion of small quartz flakes in the assemblage compared to silcrete which had to be imported.

	Chert	Clear quartz	Porphyry	Quartzite	Quartz	Silcrete	Total
Flakes 0-5mm	0	2 (8%)	4 (16%)	0	7 (28%)	12 (48%)	25 (28.4%
Flakes 5.1-10mm	1 (1.6%)	4 (6.3%)	13 (20.6%)	1 (1.6%)	31 (49.2%)	13 (20.6%)	63 (71.6%)
Total	1 (1.1%)	6 (6.8%)	17 (19.3%)	1 (1.1%)	38 (43.2%)	25 (28.4%)	88

Table 20. Flakes 10 mm or less in length for all materials.

It is possible to conclude that flaked artefacts were produced from a range of raw materials in the study area if small flakes are accepted as evidence of this activity. This conclusion is reinforced by the dominance of silcrete and quartz artefacts less than 10 mm in length which reflect the composition of the entire assemblage. The presence of small porphyry flakes at rates less than quartz and silcrete but higher than other materials also supports this interpretation.

This review of size and elongation for the 191 whole flakes has shown that the Moruya assemblage is composed of mostly small flakes which tend to be slightly longer than wide. Nearly half of the complete flakes (46%) are 10 mm of less in length. Very small flakes less than 5 mm in length make up 13% of whole flakes. The presence of these very small flakes made from a range of materials in broadly comparative amounts to the entire assemblage reinforces the conclusion that artefacts were being manufactured in the study area.

Section Summary

A list of the key findings of this assemblage attribute analysis is presented below.

- A total of 307 whole and broken artefacts were identified.
- Most artefacts were unretouched flakes = 272
- Only 4 of the 18 retouched flakes were backed artefacts
- The 307 artefacts are made from roughly equal amounts of silcrete (37.1%) and quartz (35.9%) with another 22% porphyry
- Retouched flakes and cores show a different pattern of raw material use to flakes
- The wide range of raw material colours and variation in quality suggest a variety of material sources
- The incidence of either alluvial or terrestrial cortex is low
- Two types of initiations dominate the assemblage – conchoidal (88.8%) and bipolar (10.7%)
- All bipolar flakes and cores are quartz
- Single surface platforms dominate the assemblage (43.9%)
- Evidence of platform preparation is present as focused platforms (20.5%)
- Feather terminations dominate the assemblage (78%)
- An analysis of the feather to non feather and hinge to step term ratios indicate relatively strong force application in predominantly outward directions
- The majority of artefacts are unbroken (70.6%)
- A simple minimum number estimate of 253 was calculated
- Only the 191 complete flakes were used in the size and elongation analysis
- Overall length is small (Av. 13.5 mm) with a maximum length of 46 mm
- Elongation index is on average 1.3 which is slightly longer than wide with a maximum index of 5
- An average flake weight of 1.8 grams is consistent with the generally small length and width of flakes
- Flakes less than 5 mm in length make up 13% of the 191 whole flakes which is considered evidence for *in situ* artefact production
- Flakes 10 mm or less (including those <5 mm) account for 46% of the 191 whole flakes reinforcing the evidence for local artefact manufacture.

8.4. Artefact Analysis – Distribution and Density

In the previous section a profile of the entire assemblage was developed through examination of individual artefact attributes. This section uses data on artefact attributes to examine the spatial distribution of material over the 21 transects along which excavation pits were placed. The aim is to determine whether there is an even spread of artefacts or a variable distribution. The relative density between transects and landforms will be examined.

Horizontal distribution

To assist in the interpretation of data on artefact distribution within and between the 21 transects information will be summarised into tables and where necessary graphs will be provided to illustrate artefact distribution. Two measures of artefact abundance, number and weight, will be used where necessary and density will be expressed as either one or both measures per cubic metre. Initially this analysis will examine the spread of all artefacts and then the spread of raw material will be considered. A detailed breakdown of artefact types is not considered necessary due to the dominance of unretouched flakes. Clusters of individual raw materials could indicate individual reduction events or other technological and behavioural aspects of site formation. It should be noted that the total number and weight of all 307 artefacts are used in the spatial analysis even though the minimum number estimate is 253. Eliminating flake fragments which may represent more than one artefact would be too complicated for the current study. Although breakage does influence the accuracy of artefact abundance estimates the use of weight as a measure mitigates against this potential bias.

A summary of artefact numbers recovered from each excavation pit within the 21 transects is provided in Table 21. Not all transects contained the maximum number of 11 pits. Pits that were not excavated are indicated by N/E. A graph of these data is presented in Figure 7.

Transect Number	Pit Number											Total
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	
1	3	0	7	3	5	1	0	7	2	0	N/E	**28**
2	2	0	1	0	0	4	4	7	0	N/E	N/E	**18**
3	0	0	0	0	1	1	0	0	0	N/E	N/E	**2**
4	16	7	9	3	0	1	0	0	0	0	1	**37**
5	0	0	0	1	1	1	0	0	2	1	0	**6**
6	5	5	1	0	0	1	1	1	0	2	0	**16**
7	0	2	0	2	0	0	3	3	0	2	2	**14**
8	2	6	1	1	0	0	3	2	0	8	0	**23**
9	0	1	0	2	3	9	2	2	0	1	2	**22**
10	20	2	2	1	1	8	2	0	2	0	2	**40**
11	2	5	2	2	1	5	2	2	1	4	1	**27**
12	3	4	1	0	2	1	7	2	2	1	0	**23**
13	0	1	0	0	0	0	0	N/E	N/E	N/E	N/E	**1**
14	2	0	2	3	3	0	1	1	2	1	2	**17**
15	1	0	0	0	0	0	0	0	0	0	0	**1**
16	0	2	0	0	0	0	0	0	0	0	1	**3**
17	1	0	0	0	0	0	0	1	0	1	1	**4**
18	2	0	0	0	0	0	0	0	0	1	0	**3**
19	3	2	0	0	5	0	0	1	0	0	0	**11**
20	4	0	0	0	1	4	1	0	0	1	0	**11**
21	0	0	0	0	0	0	0	0	0	0	0	**0**
Total artefacts												**307**

Table 21. Number of artefacts recovered from each excavation pit (pits with artefacts are highlighted).

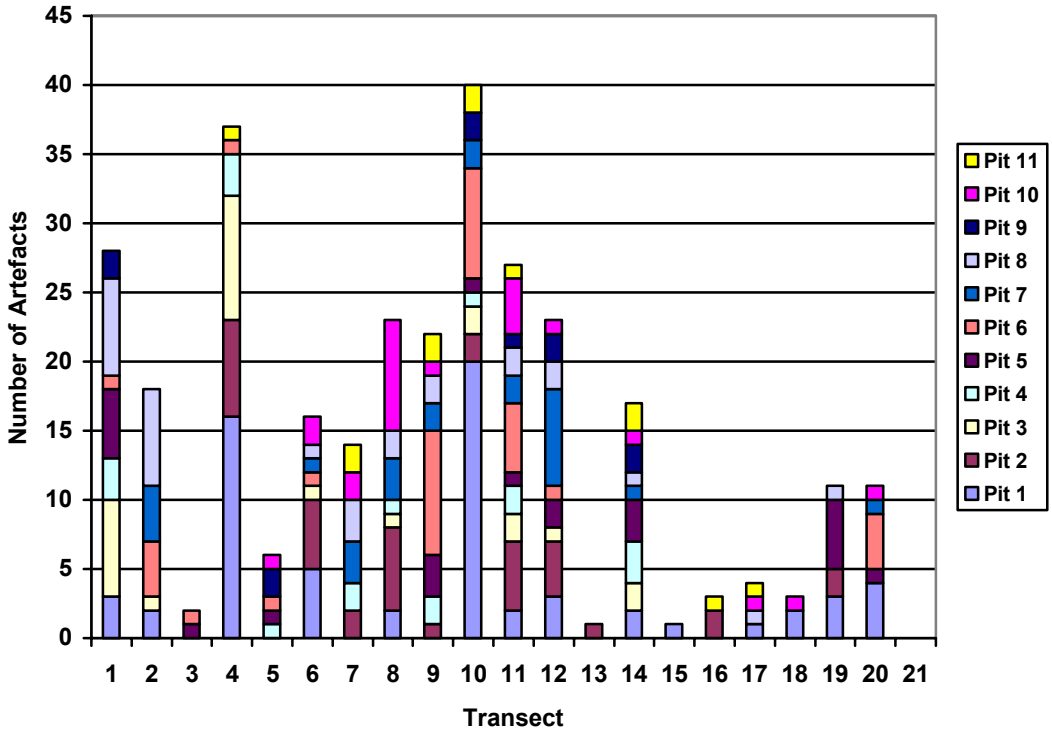

Figure 7. Number of artefacts found in each pit along the 21 transects.

A total of 222 pits were excavated along the 21 transects. Artefacts were recovered from 112 of the pits. The number of pits dug along individual transects varied from seven to eleven. A highly variable distribution of archaeological material both within and between transects is shown by the figures in Table 21 and the graph in Figure 7. None of the 11 pits in Transect 21 contained artefacts. Transects 4 (37 artefacts) and 10 (40 artefacts) yielded the highest numbers while Transects 3 (2 artefacts), 13 (1 artefact) and 15 (1 artefact)

contained the least. Pit 1 in Transect 10 had the highest number of all the excavation units with 20 artefacts identified. The next biggest cluster was in Pit 1 of Transect 4 where 16 of the total of 37 from this transect were located. Patterns in the distribution are evident in Figure 7 which shows that some transects contained several pits with small numbers (i.e. Transects 1, 2, 6, 11 and 14) each while other transects had clusters of artefacts in a small number of pits (Transects 4, 8, 10 and 12) making up a relatively large totals. Further investigation of artefact density will be undertaken using artefacts per volume later in this section. The use of average artefact density per cubic metre is aimed at reducing any potential bias introduced by comparing transects containing 11 test pits with the four transects along which seven to ten pits were dug. This bias is considered likely to be minimal in light of the highly variable distribution of material, including many squares devoid of artefacts, along all 21 transects.

An examination of artefact distribution using weight provides another method to investigate this issue. Combined artefacts weight for each pit within the 21 transects are listed in Table 22 and illustrated in Figure 8. It is apparent from the very different outline of the histogram in Figure 8 that artefact weight is highly variable both within and between transects. Transect 9 contains the largest total weight of artefacts. One of the 22 artefacts in this unit is a large core weighing 170 grams. This unusually heavy item has skewed the results so that Transect 9 appears to contain a cluster of material. In contrast Transect 10 which contains the most artefacts has a combined weight of only 28 grams. A very low average weight of artefacts exists in this pit. Transects 11 and 12 also show a reversal of comparative measures. The 27 artefacts in Transect 11 weigh 44.1 grams but the 23 in Transect 12 weigh 88.2 grams. A summary of the number, combined and average weight of artefacts is provided in Table 23. These three measures are plotted in Figure 9 which shows the variable relationship between them.

Transect Number	**Pit Number**											**Total in grams**
	1	2	3	4	5	6	7	8	9	10	11	
1	13.2	0	23.1	0.9	21.8	0.3	0	23.8	3.3		N/E	**86.4**
2	4.7	0	1.9	0	0	32.9	5.4	9.8	0	N/E	N/E	**54.7**
3	0	0	0	0	0.5	0.3	0	0	0	N/E	N/E	**0.8**
4	18.4	10.9	53.6	1.9	0	0.2	0	0	0	0	0.2	**85.3**
5	0	0	0	1.9	0.1	3	0	0	0.3	1.9	0	**7.2**
6	1.05	3.1	0.05	0	0	1.9	0.8	2.3	0	0.9	0	**10.1**
7	0	3.4	0	15.7	0	0	1.2	1.5	0	0.5	2.9	**25.2**
8	7.05	12.9	0.05	29.5	0	0	26.6	0.7	0	2.85	0	**79.7**
9	0	170	0	5.7	2.85	30.3	0.5	0.2	0	0.4	8	**218**
10	17.1	4.4	1.6	0.2	0.4	1.8	1.1	0	0.4	0	1	**28**
11	0.6	1.6	1.95	0.4	0.1	2.5	0.3	29.4	5.5	1.6	0.3	**44.1**
12	7.7	1.7	0.1	0	5.1	0.05	4.2	35	33.7	0.7	0	**88.2**
13	0	18.8	0	0	0	0	0	N/E	N/E	N/E	N/E	**18.8**
14	0.3	0	0.8	13	4.8	0	0.1	0.4	0.15	0.1	0.3	**19.9**
15	4.7	0	0	0	0	0	0	0	0	0	0	**4.7**
16	0	0.5	0	0	0	0	0	0	0	0	0.3	**0.8**
17	3.6	0	0	0	0	0	0	7	0	0.1	0.05	**10.8**
18	1.8	0	0	0	0	0	0	0	0	0.1	0	**1.9**
19	1.9	0.6	0	0	36.6	0	0	0.7	0	0	0	**39.9**
20	7.2	0	0	0	3	27.8	32.6			0.1		**70.7**
Total weight in grams												**894.8**

Table 22. Weight of artefacts (in grams) recovered from each excavation pit.

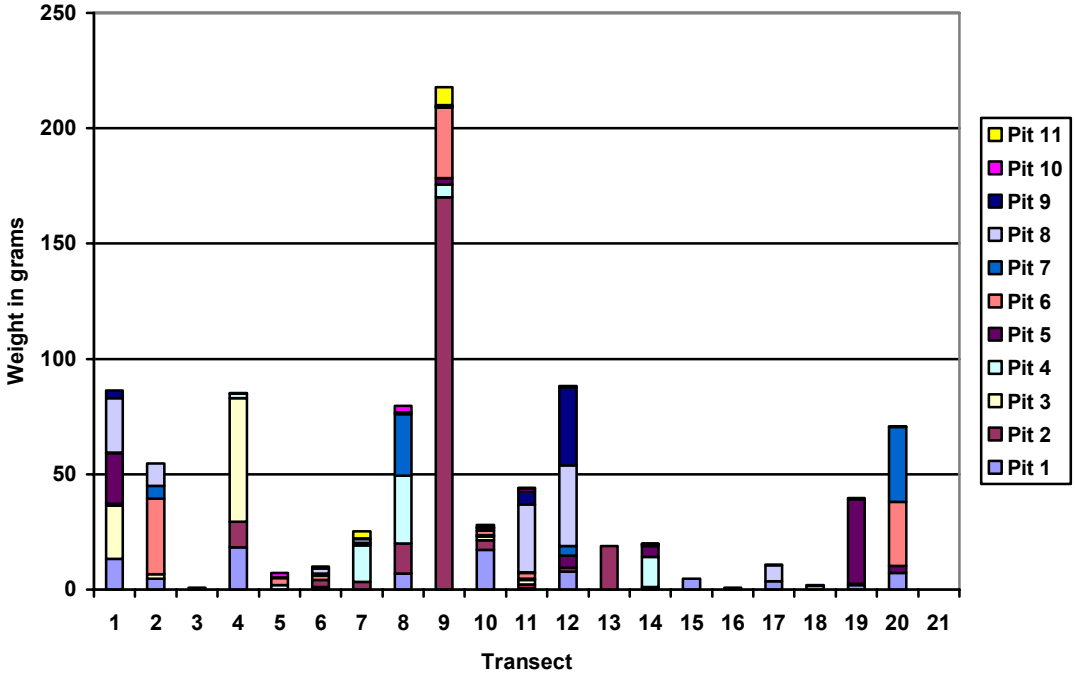

Figure 8. Weight of artefacts found in each pit along the 21 transects.

Transect Number	Total number	Total weight in grams	Average weight in grams
1	28	86.4	3.1
2	18	54.7	3.0
3	2	0.8	0.4
4	37	85.3	2.3
5	6	7.2	1.2
6	16	10.1	0.6
7	14	25.2	1.8
8	23	79.7	3.5
9	22	218	9.9
10	40	28	0.7
11	27	44.1	1.6
12	23	88.2	3.8
13	1	18.8	18.8
14	17	19.9	1.2
15	1	4.7	4.7
16	3	0.8	0.3
17	4	10.8	2.7
18	3	1.9	0.6
19	11	39.9	3.6
20	11	70.7	6.4
21	0	0	0

Table 23. Artefact number, combined weight and average artefact weights for each transect.

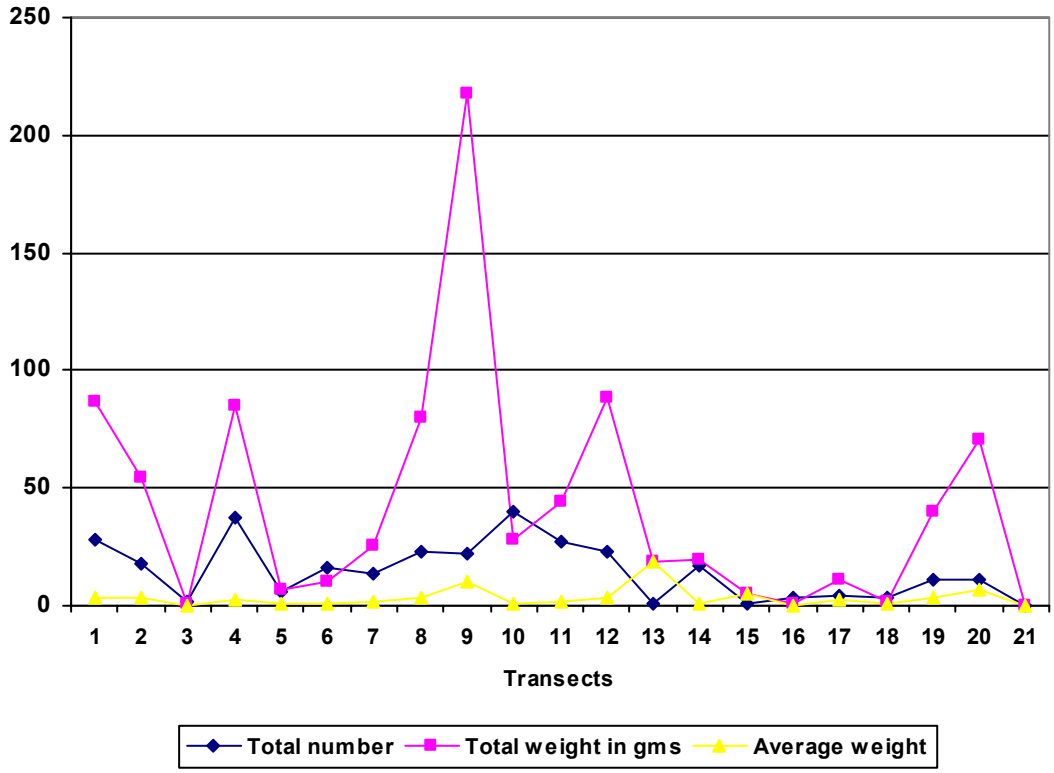

Figure 9. Comparative plot of number, combined weight and average artefact weights for each transect.

Although many transects show a predictable casual relationship between artefact numbers, total and average weight there are a few which do not follow this trend. Transects 8, 9, 12 and 20 appear to exhibit large differences between artefact count and combined weight. The common factor is the presence of larger artefacts in individual pits. In Transects 9 and 20 the average weight is consequently higher than other transects. Transect 13 contains only one artefact but this weighs 18.8 grams which is considerably higher than many average weight figures per transect. In conclusion it is possible to confidently state that considerable variation exists not only in the distribution of the amount of archaeological material over the excavated pits at Moruya but also in the size of individual objects. Although only a small number of cores were recovered it is clear that some of these influenced the combined weight figures for some units. A brief examination of the spread of artefact types shows which transects contain cores. Table 24 indicates the numbers of each artefact type in every transect and Figure 10 contains a graph of these data.

Transect	Artefact Type				Total number
	Core	Flake	Flaked Piece	Retouched Flake	
1	1	26	1		28
2		18			18
3		1		1	2
4	1	29	1	6 (Inc 3 BA)	37
5		5		1	6
6		14	1	1	16
7		14			14
8	2	18		3	23
9	1	20		1 (= BA)	22
10		37		3	40
11	1	25		1	27
12	2	20		1	23
13	1				1
14	1	16			17
15			1		1
16		3			3

17		4			4
18		3			3
19	1	10			11
20	2	9			11
Total	13	272	4	18	307

Table 24. Numbers of each artefact type per transect (BA=backed artefact).

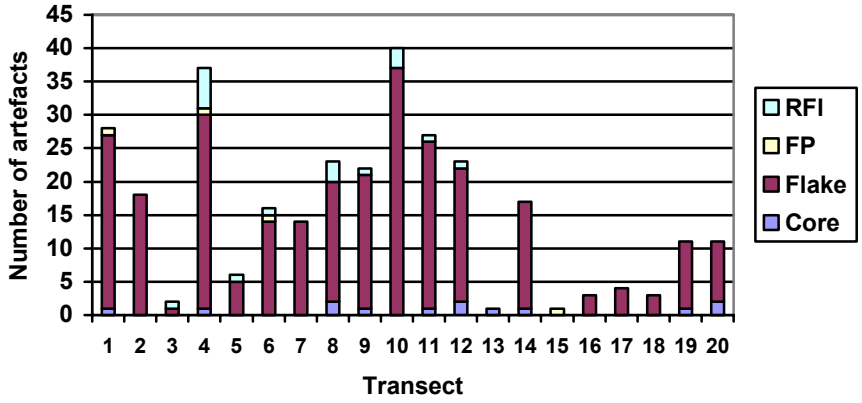

Figure 10. Distribution of artefact types within and between transects.

There appears to be a tendency for cores and retouched flakes to be found in association with clusters of other artefacts. This sample size effect is to be expected. Larger assemblages of material often contain the widest range of artefact and raw material types. Exceptions to this trend are seen in Transects 3 and 5 where retouched flakes and cores are associated with small numbers of flakes and in Transect 13 which contains only one core. The distribution of retouched flakes also appears linked to larger clusters of archaeological material. Of the four backed artefacts identified, three were all from Spit 3 of Pit 1 in Transect 4. This transect contained a total of 37 artefacts including another three retouched flakes. Two of these other retouched flakes have features consistent with being unfinished or broken backed artefacts. This cluster of retouched flakes including three definite and two possible backed artefacts represents a unique feature of the assemblage. As they are made from a range of material types, clear quartz, silcrete and chert, there is no direct evidence that this represents a knapping location.

Another aspect of the distribution of the assemblage is the spread of raw material types. A summary of the numbers of artefacts made from each raw material is presented in Table 25. A graphic illustration of the dispersal of material types over all transects is shown in Figure 11.

Transect	Chert	Clear quartz	Porphyry	Quartzite	Quartz	Silcrete	Volcanic	Total
1	1		14		3	8	2	28
2				1	3	14		18
3						2		2
4	2	3	2		8	22		37
5			2		4			6
6			1	1	3	11		16
7				1	10	3		14
8			3		2	18		23
9			4	2	3	13		22
10		3	22		6	9		40
11		2	3		16	6		27
12		1	3	1	16	2		23
13			1					1
14			5	1	7	4		17

15			1					1
16					2		1	3
17				1	2	1		4
18					3			3
19		1	2	1	6	1		11
20			4	1	6			11
Total	3	10	67	10	100	114	3	307

Table 25. Numbers of artefacts made from each raw material type.

The figures in Table 25 show an overall trend of roughly equal numbers of silcrete and quartz artefacts making up nearly three quarters of the assemblage. Porphyry is the next most frequently occurring material type. This overall trend is not present within individual transects. Some contain a large proportion of silcrete artefacts (Transects 2, 4, 6, 8 and 9) while others are mainly quartz (Transects 5, 7, 11, 12, 16, 18, 19 and 20). While porphyry is present in several transects considerable proportions of Transects 1, 10, 14 and 20. It is the only material in Transects 13 and 15 which contain only one artefact each. Quartzite is present in small amounts in a number of transects. In summary, the horizontal spread of raw material types does not follow a single trend with very different proportions of materials located within individual transects.

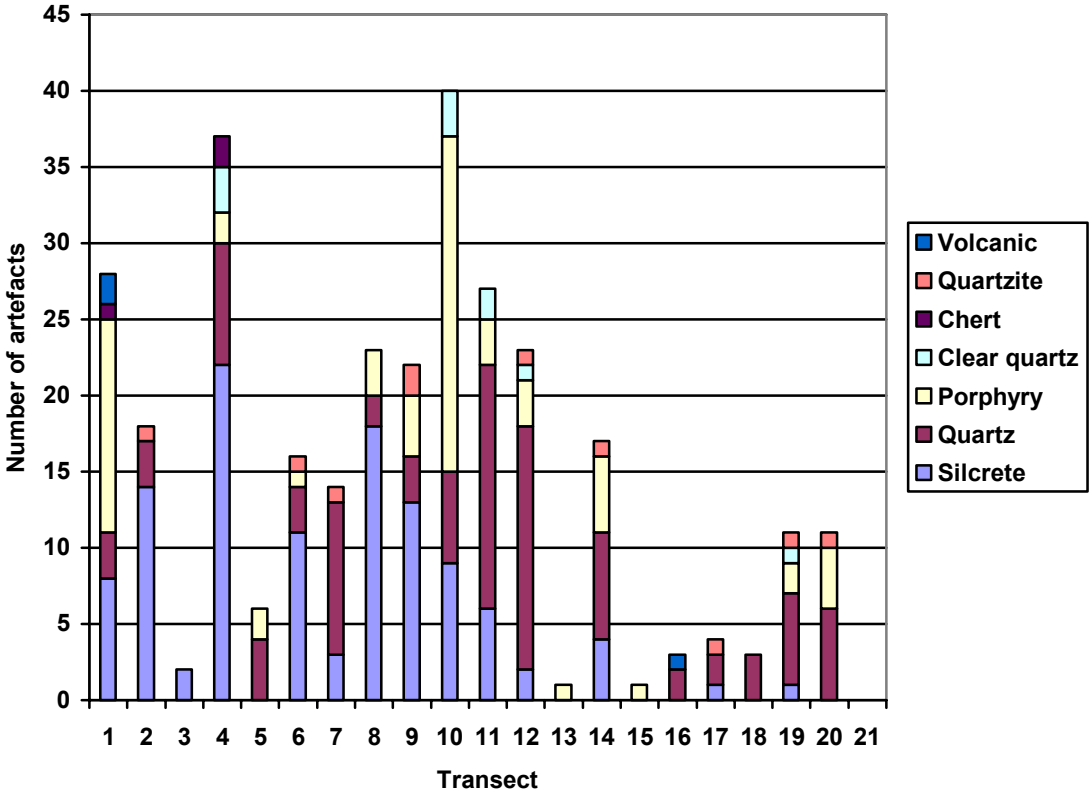

Figure 11. Distribution of raw material types within and between transects

Vertical distribution

Each of the 50 x 50 cm pits were excavated by removing 10 cm thick spits until clay was reached. The full depth of the excavated square was dependent upon the nature of the sediments. The bottom spit, usually Spit 4 was therefore of variable depth. In this examination of vertical artefact distribution the spits are treated as equal units however in the following section the total volume of each pit will be used to calculate artefact densities. In Table 26 the total numbers of artefacts excavated from each spit of the 7 to 11 pits excavated along each transect is listed. A graph of these data expressed as percentage of artefacts by spit within each transect is presented in Figure 12.

Artefact distribution peaks in Spit 2 when the data from all transects is considered but individual transects vary from this trend. Transects 4, 9 and 10 had more artefacts in Spit 3 than Spit 2. Transects 1 and 10 are located in lower slope contexts where deeper sediments were encountered probably as a result of colluvial transport of sediment (possibly post European). This result is therefore possibly due to European induced sediment transport covering the original depositional context of the archaeological deposits. It is however less easy to explain this anomaly in regard to Transect 9 which is situated in an upper slope context where soils exhibited no obvious colluvial deposition. These transects also contain more artefacts compared to the remaining transects. The histogram in Figure 12 graphically illustrates this clustering in Spit 2 within many transects. It also shows considerable variation between transects. There appears to be no consistent pattern of the vertical distribution of artefacts between transects.

Transect Number	**Spit Number**				**Total Number**
	1	**2**	**3**	**4**	
1	4	24			28
2	3	14	1		18
3	2				2
4	5	13	17	2	37
5	2	4			6
6	5	8	2	1	16
7	7	5	2		14
8	5	15	3		23
9	5	7	10		22
10	4	9	23	4	40
11	6	10	9	2	27
12	11	11	1		23
13	1				1
14	6	8	3		17
15	1				1
16	1		2		3
17	1	2	1		4
18		2	1		3
19	2	9			11
20	3	8			11
Total number	**74**	**149**	**75**	**9**	**307**
% of total	**24%**	**48.5%**	**24.4%**	**2.9%**	

Table 26. Total number of artefacts excavated from each 10 cm thick spit along the 20 transects which contained artefacts.

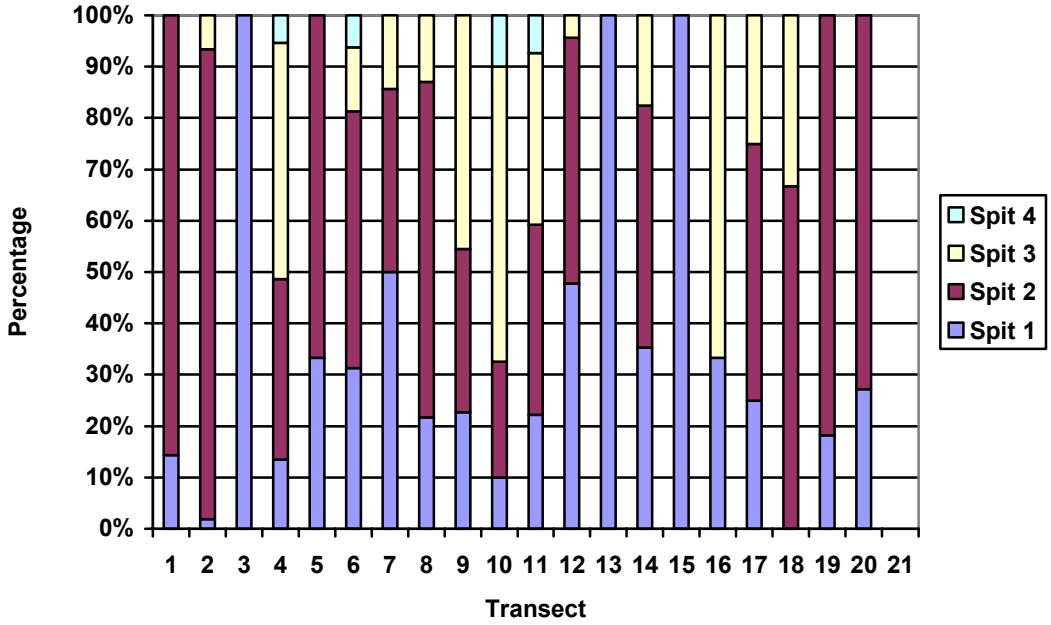

Figure 12. Vertical distribution of artefacts by percentage in each spit within transects.

Artefact density

Another measure of abundance is artefact density expressed as either number or weight by volume. In this study artefact number per cubic metre extrapolated from the number of artefacts from each 50 x 50 cm pit is employed as a measure of density. This relative measure adjusts for uneven spit depth between pits and provides a means of comparison with other excavated sites in the region. Artefact densities for each transect are listed in Table 27 which also provides the area and volume excavated along each transect. A plot of the relative densities is illustrated in Figure 13.

Artefact densities vary from between 40.2 per cubic metre to 1.2 per cubic metre, excluding Transect 21 where no artefacts were found. Over the 21 transects the average density was 18.2 artefacts per cubic metre. The histogram in Figure 13 shows a wide variation in artefact densities between transects. To explore the possible explanations for this variability the next section will focus on the differences in artefact density between transects in similar landform units.

Transect	Area m^2	Volume m^3	Number of Artefacts	Mean density $/m^2$	Mean density $/m^3$	Peak # Artefacts per Pit	Peak # Artefacts per spit
1	2.5	0.95	28	11.2	29.5	7	7
2	2.25	0.675	18	8	26.7	7	6
3	2.25	0.675	2	0.9	3	1	1
4	2.75	0.9375	37	13.5	39.5	16	6
5	2.75	0.825	6	2.2	7.3	2	2
6	2.75	0.825	16	5.8	19.4	5	3
7	2.75	0.825	14	5.1	16.9	3	2
8	2.75	0.825	23	8.4	27.9	8	7
9	2.75	0.825	22	8	26.7	9	8
10	2.75	0.995	40	14.5	40.2	20	20
11	2.75	0.9125	27	9.8	29.6	5	3
12	2.75	0.8	23	8.4	28.8	7	4
13	1.75	0.625	1	0.6	1.6	1	1
14	2.75	0.725	17	6.2	23.5	3	2
15	2.75	0.825	1	0.4	1.2	1	1
16	2.75	0.775	3	1.1	3.9	2	1
17	2.75	0.825	4	1.5	4.8	1	1
18	2.75	0.775	3	1.1	3.9	2	2

Transect	Area m^2	Volume m^3	Number of Artefacts	Mean density $/m^2$	Mean density $/m^3$	Peak # Artefacts per Pit	Peak # Artefacts per spit
19	2.75	0.8	11	4	13.8	5	5
20	2.75	0.74	11	4	14.9	4	4
21	2.75	0.75	0	0	0	0	0
Total	55.5	16.91	307	5.5	18.2		

Table 27. Artefact densities for each transect.

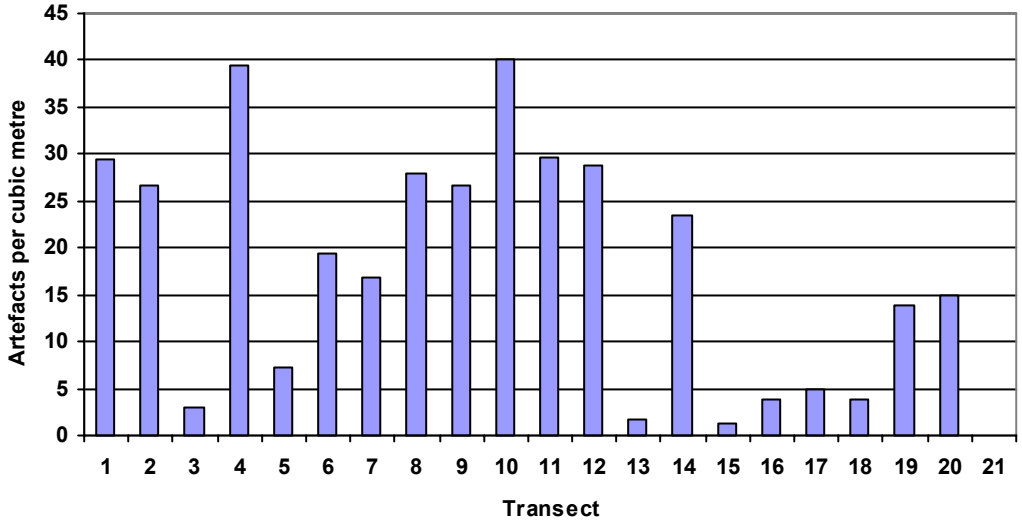

Figure 13. Artefact density expressed as number per cubic metre in all transects.

Section Summary

A summary of the findings of this spatial analysis is presented below.

- Flaked stone artefacts were recovered from 112 of the 222 pits excavated along 21 transects.
- The number of artefacts per transect varied between 40 and 1 in the 112 containing artefacts.
- The highest number in one pit was 20.
- Both artefact numbers and combined weight of artefacts varies within and between transects.
- Highest combined weight of artefacts was 218 grams from Transect 9.
- A wide variation exists in the relationship between artefact numbers, total and average weight per transect.
- A cluster of backed artefacts was recovered from Square 1 in Transect 4.
- The horizontal spread of raw material types does not follow a single trend with very different proportions of materials located within individual transects
- There is no consistent pattern in the vertical distribution of artefacts between transects although the overall trend is for a peak in Spit 2.
- Artefact densities vary from 40.2 m^3 to 1.2 m^3 with an average over all transects of 18.2 m^3.

8.5. Artefact analysis – Variability between landscapes

A critical aspect of management strategies for archaeological sites is determining the relative abundance in different landscape units. The survey and excavation strategy employed in this study divided the landscape into units reflecting geomorphologic characteristics based on landform element and slope. It is recognized that slope is an important factor in the distribution of archaeological sites due not only to Aboriginal use of the landscape but also to site preservation influences such as sediment erosion or accumulation. The range of landforms in which excavation transects were located in the Moruya study area is listed in Table 28. The table is arranged to place similar landforms together from the highest to the lowest landscapes. Also provided in this table are the numbers of artefacts recovered from each transect and the density of artefacts per cubic metre calculated from these figures. These data provides the basis for a comparative analysis of artefact distribution

based on landscape features. To assist in the interpretation of these results a plot of the artefact density per cubic metre for individual transects has been presented (Figure 14). This graph is arranged so that transects in similar landforms are adjacent.

Survey Unit	Transect #	Artefact #	Mean density /m^2	Mean density /m^3	Gradient	Landform	Comparative density
10	14	17	6.2	23.5	very gentle	ridge crest	Medium/high
10	8	23	8.4	27.9	gentle	spur crest	Medium/high
10	2	18	8	26.7	very gentle	spur crest	Medium/high
2	1	28	11.2	29.5	very gentle	spur crest	Medium/high
5	6	16	5.8	19.4	gentle	spur crest	Medium
11	7	14	5.1	16.9	gentle	spur crest	Medium
11	12	23	8.4	28.8	very gentle	spur crest	Medium/high
11	9	22	8	26.7	gentle	spur crest	Medium/high
17	17	4	1.5	4.8	very gentle	spur crest	Medium/low
19	19	11	4	13.8	gentle	spur crest	Medium
19	20	11	4	14.9	gentle	spur crest	Medium
9	3	2	0.9	3	gentle	simple slope	Low
18	18	3	1.1	3.9	very gentle	simple slope	Low
16	21	0	0	0	gentle	simple slope	Nil
16	16	3	1.1	3.9	gentle	basal simple slope	Low
4	5	6	2.2	7.3	very gentle	basal simple slope	Medium/low
12	10	40	14.5	40.2	very gentle	basal simple slope	High
12	11	27	9.8	29.6	very gentle	basal simple slope	Medium/high
7	13	1	0.6	1.6	gentle	drainage depression	Low
4	4	37	13.5	39.5	very gentle	basal slope/flat	High
14	15	1	0.4	1.2	flat	flat/wetland	Low

Table 28. Summary of the results of the excavation program within each landform

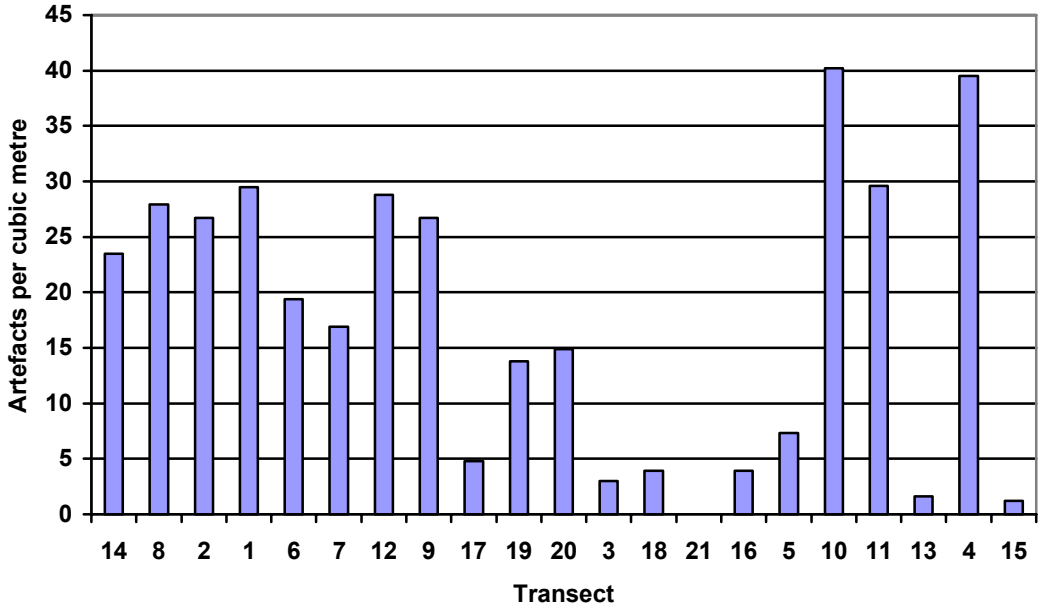

Figure 14. Artefact density per cubic metre for individual transects arranged according to landform.

A discernible pattern of artefact distribution is illustrated in Figure 14. Moderately high average artefact densities exist in Transect 14 on the ridge crest and many of the transects on spur crests. Moderately low densities were recovered from only one transect on a spur crest (Transect 17). All three transects on simple slopes (Transects 3, 18 and 21) contained either low average densities or no artefacts. Two of the four transects on basal simple slopes contained moderately low or low densities while the other two yielded high artefact densities. The higher densities were from the same survey unit while the other two were in separate survey units. Two transects in the lowest landforms, a drainage line and wetland flat, contained low average artefact densities. This result contrasts with the high artefact density in Transect 4 on the basal slope adjacent to the same drainage line.

There were three sets of transects that were placed parallel to each other at a distance of 5 metres. These were Transects 7 and 12 on a spur crest, Transects 19 and 20 on another spur crest and Transects 10 and 11 on a basal slope. The first pair, 7 and 12 in Survey Unit 11 on a spur crest between 2 drainage lines contained different artefact densities (16.9m^3 and 28.8m^3), but these were medium to medium high.. Roughly comparable densities were recovered from Transect 19 and 20 in survey unit 19 to the north of the study area close to the main watercourse. At 13.8 m^3 and 14.9 m^3 these were moderately dense deposits in comparison. One of the last pair of transects (Transect 10) contained the highest average artefact density at 40.2 m^3. The other (Transect 11) yielded a moderately high average density of 29.6 m^3.

Section Summary

- The highest average artefact densities per transect were recovered from basal simple slope and basal slope/flat archaeological terrain units.
- Medium to medium high average artefact densities were found in transects on spur crest archaeological terrain units.
- Transects with low average artefact densities were located on simple slopes, the drainage depression and wetland/flat archaeological terrain units.
- Pairs of transects 5 metres apart yielded roughly comparable average artefact densities.

8.6. Summary and discussion

A number of issues were targeting for review in the preceding analysis of the flaked stone artefacts excavated from the Moruya study area. These were listed at the beginning of Section 8.3 as:

- Technological and behavioural activities represented by the lithic material;
- Artefact density;
- The organisation and use of stone resources in the Moruya area.

To examine these topics the results of the artefact analysis was presented in three parts. The first provided a profile of the assemblage, the second examined the spatial distribution and relative density of this material and the third investigated the variability in assemblage content and distribution within landscape units. A summary and discussion of these findings in relation to the issues listed above concludes this analysis.

Technological and behavioural activities

In terms of technological features the assemblage of 307 artefacts is dominated by unretouched flakes (272) with single surface platforms, conchoidal initiations and feather terminations. All bipolar flakes and cores are quartz. The 191 complete flakes were on average 13.5 mm in length and weighed an average of 1.8 grams. An average elongation index of 1.3 shows that these relatively small flakes were mainly slightly longer than wide. Only 4 of the 18 retouched flakes were backed artefacts, although another two unfinished backed artefacts were also recorded. Platform and initiation features indicate a low incidence of platform preparation. Termination features indicate relatively strong force application in predominantly outward directions. A wide range of raw material types and colours is a key indicator of the assemblage being a compilation of material accumulated over time as a result of numerous unrelated events. Although the split of raw materials for the entire assemblage is roughly equal amounts of silcrete (37.1%) and quartz (35%) with another 22% porphyry that pattern of raw material use is not seen in individual transects. Cores and retouched flakes show a different pattern of raw material use to flakes. The low incidence of either alluvial or terrestrial cortex on platform or dorsal surfaces indicates that either primary reduction of raw material did not occur in the study area or non cortical forms of material were used. Flakes less than 10 mm in length account for 46% of the whole flakes which reinforces the evidence for *in situ* artefact manufacture dominated by small flakes.

In summary, the profile of the assemblage suggests widespread discard of flaked stone artefacts that represent basic reduction strategies and raw material utilisation. One cluster of backed artefacts made from a range of raw materials is unlikely to indicate a backed artefact knapping floor but may be the result of one discard event.

Artefact Density

Artefact abundance measured as density per cubic metre is commonly used to assess the relative intensity of Aboriginal occupation and/or landscape utilisation. Both artefact numbers and combined weight of artefacts varies within and between transects in the Moruya study area. A wide variation exists in the relationship between artefact numbers, total and average weight per transect. The number of artefacts per transect varied between 40 and 1 with a peak of 20 in one pit in Transect 10. Average artefact densities per transect varied from 40.2 m^3 to 1.2 m^3 with an average of 18.2 m^3 over the 21 transects.

A pattern in the distribution of material between landforms is evident when artefact densities from transects in the same environmental setting are compared. The highest average artefact densities per transect are from basal simple slopes and basal slope/flats. Medium to medium high average artefact densities were found in transects on spur crest settings and the lowest densities were from simple slopes, the drainage depression and flats near the wetland.

Organisation and use of stone resources

Evidence on artefact attributes and distribution within the study area has been compiled from material excavated from 112 of the 222 pits along 21 transects. This relatively small sample of the study area provides a window into the use of the landscape. There appears to be a highly variable distribution of archaeological material with higher densities on lower slopes and spur crests than in settings close to flats and watercourses. The assemblage is composed predominantly of unretouched flakes made from a wide range of materials but with higher proportions of silcrete, quartz and porphyry than any other type. Although numerous very small flakes are evidence of *in situ* knapping there is little evidence for knapping locations dominated by individual raw materials. A cluster of backed artefacts was found in one pit but these were made from a range of materials. This may however represent a single discard event.

Discussion

The excavation results indicate that stone artefacts are present in a widespread distribution across the Moruya proposal area. There is however considerable variability in artefact density between the different archaeological terrain units sampled during the subsurface test excavation program. Furthermore the distribution of artefacts is patchy within survey units; nearly half of the test pits did not contain artefacts. This patchy distribution is not unexpected however given the relatively low density of the artefact distribution and the nature of the assemblage.

A limited range of artefact types were identified with unretouched flakes dominating the assemblage. A wide range of raw material types and colours is a key indicator of the assemblage being a compilation of material accumulated over time as a result of numerous unrelated events.

The low incidence of either alluvial or terrestrial cortex on platform or dorsal surfaces indicates that either primary reduction of raw material did not occur in the study area or non cortical forms of material were used. Flakes less than 10 mm in length account for 46% of the whole flakes which reinforces the evidence for *in situ* artefact manufacture dominated by small flakes. The profile of the assemblage suggests widespread discard of flaked stone artefacts that represent basic reduction strategies and raw material utilisation.

Compared to other subsurface test excavation programs conducted in the local area and wider region the Braemar Farm proposal area indicates relatively low levels of artefact discard and complexity. Average artefact densities (conflated square area) per transect at Braemar Farm varied from 14.5/m² to 1.1/m² with an average of 5.5/m² over the 20 transects (one transect did not contain artefacts).

Williams (2005) has recently completed subsurface excavation at the proposed Bangalay Estate subdivision area situated approximately two kilometres to the east near Moruya Heads. The Bangalay Estate site is located in a highly comparable environmental context to that of the Braemar Farm proposal area. Bangalay Estate to situated approximately 750 m to the south of the Moruya River, consists of gently undulating land and is drained by ephemeral streams. The obvious difference between the two sites is that Bangalay Estate is situated closer to the ocean (c. 3 km).

Williams (2005) conducted a similar subsurface test excavation program to that which has been conducted at Braemar Farm; 50 x 50 cm test pits were excavated, located 5 metres apart, were excavated in transects located in different archaeological terrain units across the site. Williams (2005) excavated 88 pits (22 conflated square metre) in 8 transects, recovering 590 artefacts. The full report describing this work is not yet complete and the information below has been accessed from a draft report kindly provided by Mr Williams.

Average artefact densities (conflated square area) per transect at Bangalay Estate varied from 93.5/m² to 0.4/ m² with an average of 26/m² over the 7 transects which contained artefacts (similarly one transect at Bangalay Estate did not contain artefacts - calculated per Williams in prep report). The highest artefact density recovered by Williams (2005) was on a flat to very gently sloping saddle of a ridge situated in the north of the Bangalay Estate. Over 100 artefacts were retrieved by Williams (2005) from two other transects both of which were situated in the crest of elevated landforms, a spur and a knoll.

A number of test excavation programs have been conducted in a late Holocene sand body at Moruya Heads. Hughes (2000a) excavated two locations on late Holocene sand at Moruya Heads. MS1 was assessed to be a highly disturbed artefact scatter and midden. Artefacts were predominantly made of quartz. MS2 was found to contain sand fill and artefacts imported to the site as road construction fill from the vicinity of site MS1 (Hughes 2000a). At site MS3 15 artefacts and a small amount of shell were retrieved from a 1.14m² excavation (13 artefacts per m²). At MS4 a quartz knapping floor was excavated.

The site MS4 was excavated again by Hughes (2002a) when the site was predicted to extend into a proposed residential allotment (Lot 101). Shell midden was found to be concentrated on a sand ridge crest. Shell species included mud whelk, cockle and rock oyster, with minor frequencies of triton, pipi and black periwinkle. Quartz was found to be the dominant raw material in the lithic assemblage. The site was found to possess high stratigraphic integrity and a high density of artefacts.

At Native Way Allen (2004) excavated 39 pits measuring 25 cm x 25 cm by shovel on a dune. One hundred and ten stone artefacts were recovered from 20 of the 39 pits. Given a conflated 2.4 m² area of excavation artefact density is calculated to be on average 45/m² across the site. Artefact density per volume of excavated sand is calculated to be 74.88/³. These density calculations are not entirely comparable to the Braemar Farm site given Allen passed excavated material through a 6 mm sieve whereas a 3 mm sieve was used at the Moruya site. Accordingly it is likely that had a 3 mm sieve been utilised at Native Way artefact density calculations would be considerable higher. Clearly the Native Way site possessed higher artefact densities to that recovered from Braemar Farm.

The predominant raw material recovered from the site is fine grained translucent quartz (Allen (2004). Some pebble cortex on this material is suggestive of an alluvial source. Similar material was retrieved from Braemar Farm where two of the backed flakes were made from this material. Allen (2004) recovered five raw materials including quartz (74.6%), silcrete (18.2%), quartzite, chert and undifferentiated volcanics. The majority of the silcrete was grey in colour suggestive of being possibly sourced from the Congo quarries. However, other colours were noted and additionally the presence of one instance of pebble cortex.

Further to the south Lake Navin Officer Heritage Consultants (2003) excavated eight mechanical auger test pits each of which were distributed 20-50 metres apart on a landform at Coila Lake situated between two estuarine lakes. 204 artefacts were retrieved from the site. Average artefact density was calculated at 97.7/m² with a range between 22.2/m² and 318/m² per pit. Silcrete was found to dominate the assemblage followed by quartz and chert.

The above review indicates that the Braemar Farm proposal area contains very low artefact density compared to other south coast sites.

9. SIGNIFICANCE ASSESSMENT

The information provided in this report and the assessment of significance of archaeological deposits provides the basis for the proponent to make informed decisions regarding their management. The table below provides a summary of the results of the study.

Survey Unit	Test Transect	Impacts Proposed	Relative Artefact density
SU1	-	Possible future development	Artefact density extrapolated from results to be low
SU2	1	Possible future development	Medium/high
SU3	-	Impacts Unknown	Artefact density extrapolated from results to be low
SU4	4 & 5	Impacts Unknown	T 4: High T 5: Medium/low
SU5	6	Development area	Medium
SU6	-	No impacts given flora constraints	Predicted to be low
SU7	13	Development area	Low
SU8	-	Development area	Artefact density extrapolated from results to be low
SU9	3	Development area	Low
SU10	2, 8 & 14 (and part of 9)	Development area: However impacts may be partial and/or low given flora constraints	T2: Medium/high T8: Medium/high T14: Medium/high T9: Medium/high
SU11	7, 12 (and part 9)	Development area	T7: Medium T9: Medium/high T12: Medium/high
SU12	10 & 11	Impacts Unknown	T10: High T11: Medium/high
SU13	-	Development area	Artefact density extrapolated from results to be low
SU14	15	No impacts	Low
SU15	-	Impact only at south end	Artefact density extrapolated from results to be low
SU16	16 &21	Development area (although Transect 16 is outside)	Low
SU17	17	Development area	Medium/low
SU18	18	Development area	Low
SU19	19 & 20	Partial impacts only at west end	T19: Medium T20: Medium

Table 29 Summary of results and proposed impacts in respect of survey units.

9.1 Significance assessment Criteria

The NPWS (1997) defines significance as relating to the meaning of sites: "meaning is to do with the values people put on things, places, sites, land".

The following significance assessment criteria are derived from the relevant aspects of ICOMOS Burra Charter and NSW Department of Urban Affairs and Planning's 'State Heritage Inventory Evaluation Criteria and Management Guidelines'.

Aboriginal archaeological sites are assessed under the following categories of significance:

- cultural value to contemporary Aboriginal people,
- archaeological value,
- aesthetic value,
- representativeness, and
- educational value.

Aboriginal cultural significance

The Aboriginal community will value a place in accordance with a variety of factors including contemporary associations and beliefs and historical relationships. Consultation with the local Aboriginal community is necessary to identify the cultural significance attached to heritage sites and the broader landscape. Most Aboriginal heritage sites have cultural value to the local Aboriginal community given that they provide direct physical and symbolic linkages to their ancestral past and to the landscape.

Archaeological value

The assessment of archaeological value involves determining the potential of a place to provide information which is of value in scientific analysis and the resolution of potential archaeological research questions. Relevant research topics may be defined and addressed within the academy, the context of cultural heritage management or Aboriginal communities. Increasingly, research issues are being constructed with reference to the broader landscape rather than focusing specifically on individual site locales. In order to assess scientific value sites are evaluated in terms of nature of the evidence, whether or not they contain undisturbed artefactual material, occur within a context which enables the testing of certain propositions, are very old or contain significant time depth, contain large artefactual assemblages or material diversity, have unusual characteristics, are of good preservation, or are a part of a larger site complex. Increasingly, a range of site types, including low density artefact distributions, are regarded to be just as important as high density sites for providing research opportunities.

Representativeness

Representative value is the degree to which a "class of sites are conserved and whether the particular site being assessed should be conserved in order to ensure that we retain a representative sample of the archaeological record as a whole" (NPWS 1997). Factors defined by NPWS (1997) for assessing sites in terms of representativeness include defining variability, knowing what is already conserved and considering the connectivity of sites.

Educational value

The educational value of cultural heritage is dependent on the potential for interpretation to a general visitor audience, compatible Aboriginal values, a resistant site fabric, and feasible site access and management resources.

Aesthetic value

Aesthetic value relates to aspects of sensory perception. This value is culturally contingent.

General

The principal aim of cultural resource management is the conservation of a representative sample of site types and variation from differing social and environmental contexts. Sites with inherently unique features, or which are poorly represented elsewhere in similar environment types, are considered to have relatively high significance.

The significance of a place can be usefully classified according to a comparative scale which combines a relative value within a geographic context. In this way a site can be of low, moderate or high significance within a local, regional or national context. This system provides a means of comparison, between and across places. However it does not necessarily imply that a place with a limited significance is of lesser value than one of greater significance rating. All places irrespective of significance are representative of a variety of contexts and accordingly potentially contribute to the wider archaeological understanding of human behaviour.

9.2 Significance Value of Recorded Aboriginal Objects in the Study Area

Stone artefact scatters are a common site type in the local area and wider region. Stone artefacts are distributed in a virtual continuum in most landscape element contexts. The density of this background artefact scatter is

related to factors such as terrain (landform element, gradient and aspect), the permanence or otherwise of local water sources and the proximity of other resource features.

Open artefact scatters will contain differences in terms of their artefact density and composition. These differences will potentially reflect differences in site function ie different activities undertaken in different places. Therefore, these site types, while common, will each have the potential to provide unique archaeological data and hence interpretive value within a research context.

Most Aboriginal heritage sites have cultural value to the local Aboriginal community given that they provide direct physical and symbolic linkages to their ancestral past and to the landscape. Written documentation from Cobowra Local Aboriginal Land Council which may address cultural value will accompany this archaeological report.

Survey Unit	Test Transect (and previously recorded artefacts)	Significance	Criteria
SU1	-	Potentially low local scientific significance	Low research potential: predicted to have potential to contain very low density subsurface deposit
SU2	1	Moderate local scientific significance	Common Moderate research potential: subsurface deposit in medium to high density. Low density compared to other sites in local area
SU3	-	Potentially low local scientific significance	Low research potential: predicted to have potential to contain low density subsurface deposit
SU4	4 & 5	Moderate local scientific significance	Common Moderate research potential: subsurface deposit varies according to transects from high to medium/low density. Low density compared to other sites in local area
SU5	6 Site 1	Low/moderate local scientific significance	Common Low/moderate research potential: subsurface deposit medium density. Low density compared to other sites in local area
SU6	-	Potentially low local scientific significance	Low research potential: predicted to have potential to contain very low density subsurface deposit
SU7	13	Low local scientific significance	Common Low research potential: subsurface deposit very low density. Very low density compared to other sites in local area
SU8	-	Potentially low local scientific significance	Low research potential: predicted to have potential to contain very low density subsurface deposit
SU9	3 Site 2	Low local scientific significance	Common Low research potential: subsurface deposit very low density. Very low density compared to other sites in local area
SU10	2, 8 & 14 (and part of 9)	Moderate local scientific significance	Common Moderate research potential: subsurface deposit medium/high density. Low density compared to other sites in local area
SU11	7, 12 (and part	Moderate local scientific	Common

	9)	significance	Moderate research potential: subsurface deposit varies from medium to medium/high density. Low density compared to other sites in local area
SU12	10 & 11	Moderate local scientific significance	Common Moderate research potential: subsurface deposit medium/high to high density. Low density compared to other sites in local area
SU13	-	Potentially low local scientific significance	Low research potential: predicted to have potential to contain very low density subsurface deposit
SU14	15	Low local scientific significance	Common Low research potential: subsurface deposit very low density. Very low density compared to other sites in local area
SU15	-	Potentially low local scientific significance	Low research potential: predicted to have potential to contain low density subsurface deposit
SU16	16 &21	Low local scientific significance	Common Low research potential: subsurface deposit low density. Very low density compared to other sites in local area
SU17	17	Low local scientific significance	Common Low research potential: subsurface deposit very medium/low density. Very low density compared to other sites in local area
SU18	18 Site 3: however this work has confirmed that the shell is not representative of midden material	Low local scientific significance	Common Low research potential: subsurface deposit low density. Very low density compared to other sites in local area
SU19	19 & 20	Low/moderate local scientific significance	Common Low/moderate research potential: subsurface deposit medium density. Low density compared to other sites in local area

Table 30. Scientific significance assessment of Survey Units in proposal area (artefact density is described in terms relative to other survey units in the proposal area).

10. STATUTORY INFORMATION

Two pieces of legislation provide the primary basis for Aboriginal heritage management in NSW, the National Parks and Wildlife Act 1974 (NPW Act) and the Environmental Planning and Assessment Act 1979 (EP&A Act) (NPWS 1997).

The Environmental Planning and Assessment Act 1979 (EP&A Act), its regulations, schedules and guidelines provides the context for the requirement for environmental impact assessments to be undertaken during land use planning (NPWS 1997).

The NPW Act provides statutory protection for all Aboriginal objects and Aboriginal Places.

An 'Aboriginal object' is defined as

> 'An Aboriginal object is any deposit, object or material evidence (not being a handicraft for sale) relating to Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains'.

Under s90 of the NPW Act a person must not knowingly destroy, damage or deface or knowingly cause or permit the destruction, damage or defacement of an Aboriginal object or Aboriginal Place without first obtaining the consent of the Director-General of the NSW DEC. Consents which enable a person to impact an Aboriginal object are issued by the DEC upon review of a s90 application.

Under s87 of the NPW Act a person must not excavate or disturb land for the purposes of discovering an Aboriginal object without first obtaining the consent of the Director-General of the NSW DEC. Permits which enable a person to excavate land for the purposes of determining whether or not an Aboriginal object is present are issued by the DEC upon review of a s87 application.

11. MITIGATION AND MANAGEMENT STRATEGIES

The aim of this study has been to identify archaeological deposits within the proposal area, to assess their significance and thereafter, to given consideration to their management within the context of the proposed development.

In the following sections a variety of strategies that can be considered for the mitigation and management of development impact to the identified and predicted Aboriginal sites present within the study area are listed and discussed.

11.1 Management and Mitigation Strategies

Conservation

Conservation is a suitable management option in any situation, however, is not always feasible. Such a strategy is generally adopted in relation to sites (or survey units) which are assessed to be of high cultural and scientific significance, but can be adopted in relation to any site type.

When conservation is adopted as a management option it may be necessary to implement various strategies to ensure sites and 'Aboriginal objects' are not inadvertently destroyed or disturbed during construction works or within the context *of the life* of the development project. Such procedures are essential when development works are to proceed within close proximity to identified sites.

None of the Survey Units at Braemar Farm have been identified to surpass scientific significance thresholds which would act to preclude the development proposal. Accordingly there is no imperative for the implementation of a conservation strategy.

However, given that a number of Survey Units which are possibly situated either entirely or partially outside the areas of proposed direct impacts there is an opportunity within the context of the proposal for a conservation strategy to be implemented.

Accordingly a management strategy of Active Conservation could be considered in regard to the following Survey Units:

- Survey Unit 2 if feasible but not essential;
- Survey Unit 4 if feasible but not essential;
- Parts of Survey Unit 10 if feasible but not essential;
- Survey Unit 12 if feasible but not essential;
- Survey Unit 19 if feasible but not essential.

Unmitigated Impacts

Unmitigated impacts to a site or Survey Unit can be given consideration when it is assessed to be of low or low/moderate archaeological and cultural significance and otherwise in situations where conservation is simply not feasible. In order to conduct unmitigated impacts to a site or Survey Unit the proponent must apply for and obtain a Section 90 Consent from the Director-General, NSW DEC. Section 90 Consent applications must be accompanied by documentation from the local Aboriginal community.

In the case at hand, if necessary, unmitigated impacts are a suitable management strategy in regard to the following Survey Units which have been identified as possessing subsurface artefact distributions:

- Survey Unit 5;
- Survey Unit 7;
- Survey Unit 9;
- Survey Unit 11 (if conservation outcomes are obtained elsewhere);
- Survey Unit 14;
- Survey Unit 16;
- Survey Unit 17;
- Survey Unit 18.

Mitigated Impacts

Mitigated impact usually takes the form of partial site destruction only (ie conservation of part of the site or Survey Unit) and/or salvage prior to destruction. Such a management strategy is appropriate when sites or Survey Units are assessed to be of moderate or high scientific significance to the scientific and/or Aboriginal community and when avoidance of impacts and hence conservation is not feasible. Salvage can include the surface collection or sub-surface excavation of artefacts as a condition of a Section 90 Consent issued by the Director-General, NSW DEC.

Mitigated impacts in the form of salvage excavation as a condition of a Section 90 Consent is not justified in respect of any of the Survey Units given the low artefact densities present, the nature of the assemblage and that there may be an opportunity for conservation strategies to be implemented at the proposal site. However, if a strategy of conservation is unable to be implemented in regard to the Survey Units listed above under the heading Conservation, mitigation of impacts via salvage excavation may be an appropriate alternative.

11.2 Management options - Summary

The table below summarises the management strategies considered to be relevant to proposal area.

Survey Unit	Impacts Proposed	Relative Artefact Density	Potential Management Strategies	Rationale
SU1	Possible future development	Artefact density extrapolated from results to be low	**No constraints**	Predicted very low density of any subsurface deposits; low research potential
SU2	Possible future development	Medium/high	Consider option of **conservation;** otherwise **salvage excavation as a condition of a s90 Consent**	Moderate research potential
SU3	Impacts unknown	Artefact density extrapolated from results to be low	**No constraints**	Probably no impacts; however any subsurface deposits are predicted to be of low density; low research potential
SU4	Impacts unknown	T 4: High T 5: Medium/low	Consider option of **conservation;** otherwise **salvage excavation as a condition of a s90 Consent**	Moderate research potential
SU5	Development area	Medium	Conservation not warranted; Proponent should seek to obtain **s90 Consent** from NSW DEC	Low/moderate research potential only
SU6	No impacts	Predicted to be low	**No constraints**	No impacts; however any subsurface deposits are predicted to be of very low density; low research potential
SU7	Development area	Low	Conservation not warranted; Proponent should seek to obtain **s90 Consent** from NSW DEC	Low research potential only
SU8	Development area	Artefact density extrapolated from results to be low	**No constraints**	Predicted very low density of any subsurface deposits; low research potential
SU9	Development area	Low	Conservation not warranted; Proponent should seek to obtain **s90 Consent** from NSW DEC	Low research potential only
SU10	Development area: However impacts may be partial and/or low given flora constraints	T2: Medium/high T8: Medium/high T14: Medium/high T9: Medium/high	Full conservation not warranted; however conservation of part of the Survey Unit could be considered: if parts of this survey unit are to be	Moderate research potential

			exempt from development impacts active measures should be taken to ensure no inadvertent impacts occur to archaeological deposits. Proponent should seek to obtain **s90 Consent** from NSW DEC for survey unit if impacts proposed	
SU11	Development area	T7: Medium T9: Medium/high T12: Medium/high	Conservation not warranted; Proponent should seek to obtain **s90 Consent** from NSW DEC; however a **salvage excavation as a condition of a s90 Consent** may be appropriate	Moderate research potential
SU12	Impacts unknown	T10: High T11: Medium/high	Consider option of **conservation;** otherwise **salvage excavation as a condition of a s90 Consent**	Moderate research potential
SU13	Development area	Artefact density extrapolated from results to be low	**No constraints**	Predicted very low density of any subsurface deposits; low research potential
SU14	No impacts	Low	Conservation not warranted; Proponent should seek to obtain **s90 Consent** from NSW DEC if impacts proposed	No impacts proposed; however very low density subsurface deposits; low research potential
SU15	Impact only at south end	Artefact density extrapolated from results to be low	**No constraints**	No impacts proposed in north end of the survey unit; Predicted very low density of any subsurface deposits; low research potential
SU16	Development area (although Transect 16 is outside)	Low	Conservation not warranted; Proponent should seek to obtain **s90 Consent** from NSW DEC	Low research potential
SU17	Development area	Medium/low	Conservation not warranted; Proponent should seek to obtain **s90 Consent** from NSW DEC	Low research potential
SU18	Development area	Low	Conservation not warranted; Proponent should seek to obtain **s90 Consent** from NSW DEC	Low research potential
SU19	Full impacts unknown: possibly partial impacts only at west end	T19: Medium T20: Medium	Consider option of **conservation;** otherwise **salvage excavation as a condition of a s90 Consent**	Low/moderate research potential.

Table 31 Summary of recommendations.

12. RECOMMENDATIONS

The following recommendations are made on the basis of:

- Legal requirements as set out under the National Parks and Wildlife Act 1974 (as amended) which states that that it is illegal to knowingly destroy, damage or deface or knowingly cause or permit the destruction, damage or defacement of an Aboriginal object or Aboriginal Place in NSW without first obtaining consent of the Director-General of the NSW Department of Environment and Conservation (see Section 10 Statutory Information).

- The results of the investigation as documented in this report.

- An analysis of the results.

- Consideration of the type of development proposed and the nature of potential impacts.

It is recommended that:

1. The proponent should give due consideration to management and mitigation options as outlined in Section 11.

2. It is recommended that the proponent consult further with the Cobowra Local Aboriginal Land Council in regard to the management of the Aboriginal objects present within the study area.

3. A management strategy of active conservation should be considered in relation to the following Survey Units: SU2; SU4; part of SU10; SU12 and SU19. If a strategy of conservation is not feasible mitigated impacts (salvage excavation) is an appropriate alternative management strategy; accordingly s90 Consent with Salvage would need to be sought from the Director-General NSW DEC. An archaeologist would need to be engaged to conduct a salvage excavation in the Survey Units in question.

4. A management strategy of unmitigated impacts is appropriate in relation to the following Survey Units: SU5; SU7; SU9, SU11 (if conservation outcomes achieved elsewhere); SU14; SU16; SU17 and SU18. A s90 Consent would need to be sought from the Director-General NSW DEC.

5. There are no constraints in regard to the remainder of the Survey Units present in the proposal area.

6. A copy of this report should be forwarded to:

   Norman Parsons
   Cobowra Local Aboriginal Land Council
   PO Box 204
   Moruya NSW 2537

7. Three copies of this report should be sent to:

   Dr Phil Boot
   NSW Department of Environment and Conservation
   PO Box 2115
   QUEANBEYAN NSW 2620

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Appendix 1
Lithic Data Base

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12th June 2007

Mr David Goodrich
Silver Spirit Partners
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2 Chifley Square
Sydney NSW 2000

Re: Proposed Residential Subdivision and Community Titled Seniors Living Development at South Head Road, Moruya (Moruya East Village) – Aboriginal Archaeological Assessment – *Supplementary Information*

The following information is provided in response to a request from Mr John O'Grady, Edaw, for a supplementary letter in respect of the Aboriginal Archaeological Assessment conducted by NSW Archaeological within the Moruya East Village property and the current development proposal. The information provided below is furnished for the purposes of updating the archaeological assessment and recommendations in line with the current proposal and relevant legislative context.

NSW Archaeology Pty Ltd, in partnership with the Cobowra Local Aboriginal Land Council, has conducted a comprehensive assessment of the Aboriginal Archaeological Values of the property in question. This work has been conducted in accordance with the DECC Guidelines for Aboriginal Archaeological reporting and is documented in two reports as follows:

1. Julie Dibden 2004 Proposed Residential Subdivision, Moruya NSW. Aboriginal Archaeological Assessment. A report to Patent Developments.
2. Julie Dibden 2005 Braemar Farm Proposed Residential Subdivision, Moruya, NSW. Subsurface Test Excavation s87 Permit #2249. A report to Melocco & Moore.

The archaeological assessment as documented in these reports was undertaken in respect of an earlier residential subdivision proposal. The following information is provided in response to the current proposal.

It is noted that the work conforms to the most recent guidelines relevant to Part 3A applications: DEC 2005 *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* as follows:

- A preliminary assessment was undertaken in partnership with the Aboriginal community to determine if the project was likely to have an impact of Aboriginal cultural heritage (as documented in Dibden 2004).
- An additional subsurface test excavation assessment was undertaken in partnership with the Aboriginal community to clarify the nature and significance of the Aboriginal archaeological resource (Dibden 2005).
- The significance of the Aboriginal cultural heritage values was documented in both Dibden 2004 and Dibden 2005. Significance of the archaeological resource was found to vary from low to moderate across the property. It was found that the

archaeological resource did not surpass significance thresholds which would act to preclude impacts.

- As noted below the current proposed on-ground impact to the archaeological resource is similar to that as originally proposed and documented in Dibden 2004 and Dibden 2005. Further information is provided below in order to define the nature of the current proposal.
- The proposed outcomes are described and justified in Table 2 below (further to that as documented in Dibden 2005):
- The Aboriginal cultural heritage impact assessment, conclusions and recommendations have been documented in Dibden 2004 and Dibden 2006 and are summarised again below in respect of the current proposal.

Proposed Impacts

It is understood that Silver Spirit Partners is seeking Concept Plan Approval for the entire Moruya East Village development and Project Application for Stage 1 under Part 3A EP&A Act 1979.

The proposed subdivision is located within two discrete areas of the property and have been designated the **south eastern** and **north eastern** sectors. Impacts proposed will include the construction of infrastructure (roads, service easements etc) and houses, buildings and associated facilities. Both sectors include small areas of open space however the majority of the ground surfaces (and any archaeological deposits present) can be expected to undergo high levels of impact as a result of construction.

The low lying portion of the property which is the Environmentally Constrained Zone (ECZ) is situated outside the **south eastern** and **north eastern** sectors. Impacts proposed for this area include environmental restoration and low impact sporting facilities including a network of walking trails and community facilities. It is expected that impacts resulting from this aspect of the proposal will be relatively minor.

The current development footprints generally correspond to those as originally defined at the time the original archaeological assessments were conducted (Dibden 2004 and 2005). A minor variation however exists in both the **south eastern** and **north eastern** sectors at their interface with the environmental constrained zoning line: both sectors extend slightly further into the environmental constrained zoned land in some places than originally planned (see Figure 1). Nevertheless the original assessment and recommendations made in respect of the first development proposal for the property remain relevant. The following information outlines the relevant assessment and recommendations relating to Aboriginal heritage in respect of the current proposal.

Archaeological Status

The property has been divided into Survey Units, defined on the basis of a combination of environmental variables. The status of the archaeological resource present in each Survey Unit has been established during test excavation (Dibden 2005). Ensuing from this analysis the scientific significance of each Survey Unit has been defined.

Survey Unit locations are shown below on Figure 1. Survey Units are listed in Table 1 and their archaeological status and scientific significance is outlined.

Survey Unit	Relative Artefact density	Significance
SU1	Artefact density extrapolated from subsurface test results to be low	Potentially low local scientific significance
SU2	Medium/high	Moderate local scientific significance
SU3	Artefact density extrapolated from subsurface test results to be low	Potentially low local scientific significance
SU4	T 4: High T 5: Medium/low	Moderate local scientific significance
SU5	Medium	Low/moderate local scientific significance
SU6	Predicted to be low	Potentially low local scientific significance
SU7	Low	Low local scientific significance
SU8	Artefact density extrapolated from subsurface test results to be low	Potentially low local scientific significance
SU9	Low	Low local scientific significance
SU10	T2: Medium/high T8: Medium/high T14: Medium/high T9: Medium/high	Moderate local scientific significance
SU11	T7: Medium T9: Medium/high T12: Medium/high	Moderate local scientific significance
SU12	T10: High T11: Medium/high	Moderate local scientific significance
SU13	Artefact density extrapolated from subsurface test results to be low	Potentially low local scientific significance
SU14	Low	Low local scientific significance
SU15	Artefact density extrapolated from subsurface test results to be low	Potentially low local scientific significance
SU16	Low	Low local scientific significance
SU17	Medium/low	Low local scientific significance
SU18	Low	Low local scientific significance
SU19	T19: Medium T20: Medium	Low/moderate local scientific significance

Table 1 Survey Units: location in respect of artefact density and scientific significance: T denotes Test Transect.

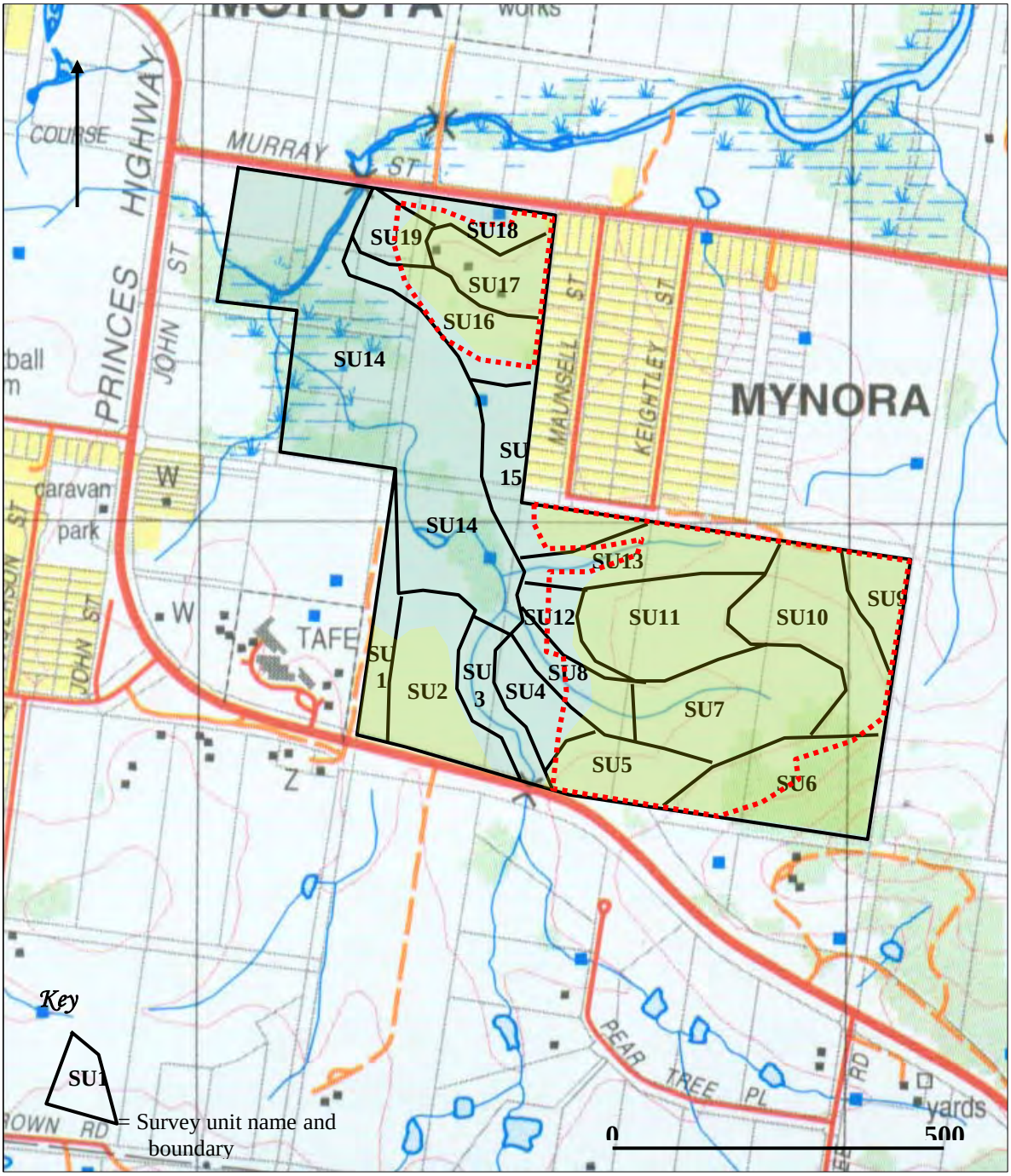

Figure 1 Location of Survey Units as previously defined by Dibden 2004 and 2005: Note yellow areas define original proposed impact areas; hatched red line denotes approximate boundaries of **south eastern** and **north eastern** sectors (Moruya 8926-3S 3rd ed. Topographic map: GDA).

Conclusions and Recommendations

In summary the archaeological resource in the proposed Moruya East Village property does not surpass significance thresholds which would act to preclude the proposal.

A number of Survey Units including SU1, SU3, SU6, SU8, SU13 and SU15 are not known to possess Aboriginal objects. Based on the subsurface test excavation conducted across the property the artefact density in these Survey Units is predicted to be very low. Accordingly there are no constraints in regard to proposed impacts in these areas.

The majority of Survey Units are assessed to be of low or low/moderate archaeological significance only and unmitigated impact in these areas is therefore appropriate.

However a number of Survey Units are assessed to be of moderate archaeological significance given their moderate research potential. Accordingly mitigation of development impacts in these areas is therefore recommended.

In the following section a variety of strategies that can be considered for the mitigation and management of development impact to the Aboriginal archaeological resource present within the property are listed and discussed.

Conservation

Conservation is a suitable management option in any situation, however, is not always feasible. Such a strategy is generally adopted in relation survey units which are assessed to be of high cultural and scientific significance, but can be adopted in relation to any site type.

When conservation is adopted as a management option it may be necessary to implement various strategies to ensure sites and 'Aboriginal objects' are not inadvertently destroyed or disturbed during construction works or within the context *of the life* of the development project. Such procedures are essential when development works are to proceed within close proximity to identified sites.

None of the Survey Units at the proposed Moruya East Village have been identified to surpass scientific significance thresholds which would act to preclude the proposed impacts. Accordingly there is no imperative for the implementation of a conservation strategy.

However, given that a number of Survey Units are situated either entirely or partially outside the areas of proposed direct impacts there is an opportunity within the context of the proposal for a conservation strategy to be implemented.

Accordingly a management strategy of Active Conservation for either part or the whole Survey Unit should be considered in regard to the following (see Table 2):

- Survey Unit 2;
- Survey Unit 4 if feasible but not essential;
- Survey Unit 10 if feasible but not essential;
- Survey Unit 12 if feasible but not essential;
- Survey Unit 19 if feasible but not essential.

Unmitigated Impacts

Unmitigated impacts to Survey Units can be given consideration when it is assessed to be of low or low/moderate archaeological and cultural significance and otherwise in situations where conservation is simply not feasible.

In the case at hand unmitigated impacts are a suitable management strategy in regard to the following Survey Units which have been identified as possessing subsurface artefact distributions (see Table 2):

- Survey Unit 5;
- Survey Unit 7;
- Survey Unit 9;
- Survey Unit 14;
- Survey Unit 16;
- Survey Unit 17;
- Survey Unit 18.

Mitigated Impacts

Mitigated impact usually takes the form of partial site impact only (ie conservation of part of Survey Unit) and/or salvage prior to impact. Such a management strategy is appropriate when Survey Units are assessed to be of moderate or high scientific significance to the scientific and/or Aboriginal community and when avoidance of impacts and hence conservation is not feasible. Salvage entails the sub-surface excavation of artefacts and subsequent analysis and reporting.

Mitigated impacts in the form of salvage excavation is not justified in respect of the majority of the Survey Units given the generally low artefact densities present, the nature of the assemblage and that there may be an opportunity for conservation strategies to be implemented at the proposal site.

However, if a strategy of conservation is unable to be implemented in regard to the Survey Units listed above under the heading Conservation, mitigation of impact via salvage excavation may be an appropriate alternative. Additionally mitigation of impact via salvage excavation is desirable in Survey Unit 11.

The table below summarises the management strategies considered to be relevant to proposal area.

Survey Unit	Impacts Proposed	Recommended Management Strategies	Rationale
SU1	No impacts	**n/a**	No recorded Aboriginal objects; Predicted very low density of any subsurface deposits; low research potential
SU2	No impacts	**Active Conservation**	Moderate research potential
SU3	Environmental Constraints Zone (ECZ): Possible impacts: environmental restoration and low impact sporting facilities including a network of walking trails and community facilities; Impacts: possibly relatively minor	No constraints: **Unmitigated impact**	No recorded Aboriginal objects; Predicted very low density of any subsurface deposits; low research potential
SU4	Part Subdivision impacts and part Environmental Constraints Zone: Possible impacts in ECZ: environmental restoration and low impact sporting facilities including a network of walking trails and community facilities; Impacts: ranging from relatively minor to high	Consider option of **Active Conservation** for area of SU situated outside subdivision area and in ECZ**;** otherwise **mitigated impact** in form of salvage excavation in impact areas	Moderate research potential
SU5	Subdivision Impacts: high	No constraints: **Unmitigated impact**	Low/moderate research potential only
SU6	Part Subdivision impact	No constraints: **Unmitigated**	No recorded Aboriginal

Survey Unit	Impacts Proposed	Recommended Management Strategies	Rationale
		impact	objects; Predicted very low density of any subsurface deposits; low research potential
SU7	Subdivision including open space Impacts: ranging from relatively minor to high	No constraints: **Unmitigated impact**	Low research potential only
SU8	Part Subdivision including open space and part Environmental Constraints Zone: Possible impacts in ECZ: environmental restoration and low impact sporting facilities including a network of walking trails and community facilities Impacts: ranging from relatively minor to high	No constraints: **Unmitigated impact**	No recorded Aboriginal objects; Predicted very low density of any subsurface deposits; low research potential
SU9	Subdivision Impacts: high	No constraints: **Unmitigated impact**	Low research potential only
SU10	Subdivision including some open space: Impacts: high	If parts of this survey unit are to be exempt from development impact **Active Conservation** measures should be taken to ensure no inadvertent impacts occur to archaeological deposits. Elsewhere **Mitigated impact** in the form of salvage excavation is desirable but not essential	Moderate research potential
SU11	Subdivision: Impacts: high	**Mitigated impact** in form of salvage excavation is desirable but not essential	Moderate research potential
SU12	Part Subdivision impacts and Botanica and part Environmental Constraints Zone: Possible impacts in ECZ: environmental restoration and low impact sporting facilities including a network of walking trails, community facilities Impacts: ranging from relatively minor to high	Consider option of **Active Conservation** for area of SU situated outside subdivision area and in ECZ**;** otherwise **Mitigated impact** in the form of salvage excavation in impact areas including Botanica	Moderate research potential
SU13	Part Subdivision and part Environmental Constraints Zone: Possible impacts in ECZ: environmental restoration and low impact sporting facilities including a network of walking trails and community facilities Impacts: ranging from relatively minor to high	No constraints: **Unmitigated impacts**	No recorded Aboriginal objects; Predicted very low density of any subsurface deposits; low research potential
SU14	Environmental Constraints Zone:	No constraints: **Unmitigated**	Very low density subsurface

Survey Unit	Impacts Proposed	Recommended Management Strategies	Rationale
	Possible impacts: environmental restoration and low impact sporting facilities including a network of walking trails and community facilities; Impacts: relatively minor	**impact**	deposits; low research potential
SU15	Part Subdivision and part Environmental Constraints Zone: Possible impacts in ECZ: environmental restoration and low impact sporting facilities including a network of walking trails and community facilities Impacts: ranging from relatively minor to high	No constraints: **Unmitigated impact**	No recorded Aboriginal objects; Predicted very low density of any subsurface deposits; low research potential
SU16	Subdivision: Impacts: high	No constraints: **Unmitigated impact**	Low research potential
SU17	Subdivision: Impacts: high	No constraints: **Unmitigated impact**	Low research potential
SU18	Part Subdivision Impacts: ranging from relatively minor to high	No constraints: **Unmitigated impact**	Low research potential
SU19	Part Subdivision and part Environmental Constraints Zone: Possible impacts in ECZ: environmental restoration and low impact sporting facilities including a network of walking trails and community facilities Impacts: ranging from relatively minor to high	Consider option of **Active Conservation** for area of SU situated outside subdivision area and in ECZ**;** otherwise **mitigated impact** in the form of salvage excavation in impact areas	Low/moderate research potential.

Table 2. List of mitigation and management options for each Survey Unit.

I trust this information is of assistance to you. Please do not hesitate to call if clarification is required.

Yours faithfully

Julie Dibden
Director
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16th October 2007

David Goodrich
Executive Director
Silver Spirit Partners
Level 25, Chifley Tower
2 Chifley Square
Sydney NSW 2000

Dear David

Re: Aboriginal Archaeological Assessment Moruya East Village

Further to your email dated 4th October 2007 the following information is provided in response to the Department of Planning's request for clarification in regard to the Aboriginal Cultural Heritage report relating to the Moruya East Village proposal.

The subsurface excavation report dated September 2005 and my letter to you dated 12th June 2007 consolidates all earlier reports relating to the Aboriginal heritage assessment of the site.

In respect of the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC July 2005) the guidelines have been met with reference to the steps as outlined on page 2 as follows:

- A preliminary assessment was undertaken in partnership with the Aboriginal community to determine if the project was likely to have an impact of Aboriginal cultural heritage (as documented in Dibden 2004).
- An additional subsurface test excavation assessment was undertaken in partnership with the Aboriginal community to clarify the nature and significance of the Aboriginal archaeological resource (Dibden 2005).
- The significance of the Aboriginal cultural heritage values was documented in both Dibden 2004 and Dibden 2005. Significance of the archaeological resource was found to vary from low to moderate across the property. It was found the significance of the archaeological resource did not surpass significance thresholds which would act to preclude impacts.
- An assessment of development impact was outlined in Dibden 2004 and Dibden 2005. Given the relatively low significance values impacts were not assessed to be high. However it was recommended that mitigation of impacts be implemented for a

number of survey units located in the proposal area (noted in letter dated 12th June 2007).

- The proposed outcome was described and justified in Dibden 2004 and Dibden 2005.
- The Aboriginal cultural heritage impact assessment, conclusions and recommendations have been documented in Dibden 2004 and Dibden 2005 (and letter dated 12th June 2007).

I trust this information is of assistance to you.

Yours faithfully

Julie Dibden BA (Hons)
New South Wales Archaeology Pty Limited