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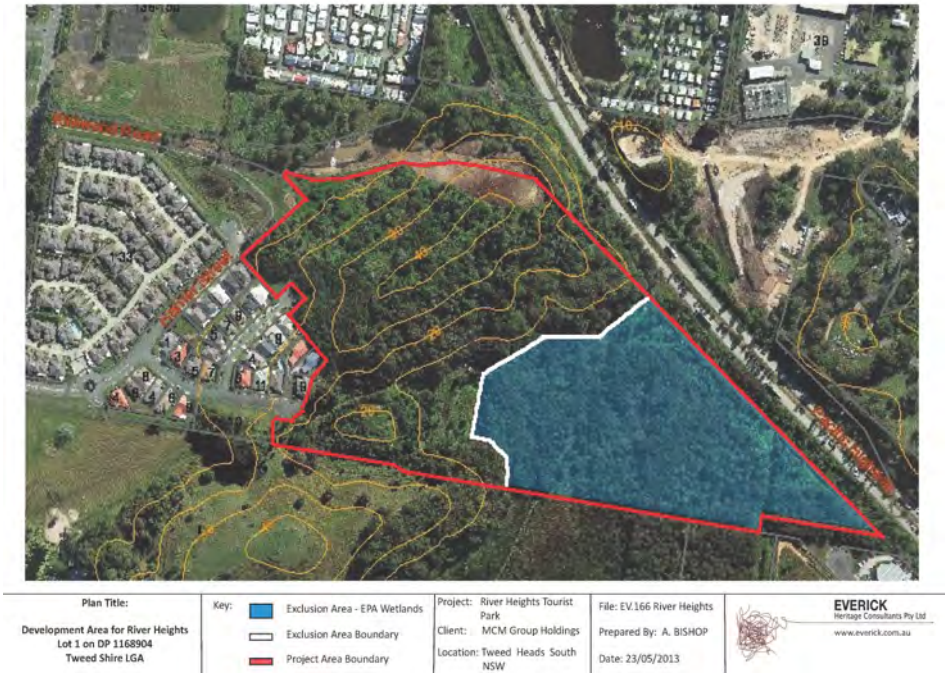
TEST EXCAVATION REPORT



LOT 1 DP 1168904
TWEED HEADS SOUTH
NSW

PREPARED FOR MCM GROUP HOLDINGS

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EXECUTIVE SUMMARY

The following report presents the results of archaeological excavations of Aboriginal sites, undertaken at River Heights (the 'Project Area'), Tweed Heads in northern coastal New South Wales. The test excavations were carried out on the 18 April 2013 and lasted for eight days in preparation for a proposed residential development.

Three distinct physiographic zones in the River Heights Project Area were designated for archaeological excavation. For the purposes of distinguishing the three locations in this report they have been called the Upper Ridge Crest, the Hill Slopes, and the Lower Melaleuca Margins. All sites have been highly disturbed through a variety of factors including forest clearing, ploughing and cropping, grazing, and erosion.

The excavations were originally aimed to provide additional information on aspects of Aboriginal life ways such as occupation patterns and technology. A total of 36 test pits were excavated and no artefacts were found. This report is intended to provide the Aboriginal community of the Tweed with important information to allow them to make an informed decision on how to manage cultural heritage within River Heights.

In summary, no areas were found to retain cultural material or be Culturally Sensitive based on archaeological evidence. However, there are community concerns about the intangible significance of sections of the project area. There is no archaeological evidence to suggest that the proposed development will cause harm to cultural heritage, however the intangible significance of the Project Area will need to be addressed in a stakeholders meeting in order to determine how the development should proceed with the interests of the community in mind.

RECOMMENDATIONS:

The following recommendations are cautionary in nature, and based upon the desktop review, the results of the field assessment and consultation with the Aboriginal Stakeholders and the Tweed Byron LALC. There are no recommendations for historic heritage.

Recommendation 1: Removal of AHIMS Site

The 'axes' collected from the monitoring of the Kirkwood Road extension and deposited within the Project Area do not fit the definition of an Aboriginal Object. There is no evidence to suggest these stones have been modified by humans, such that an archaeologist might identify them as artefacts.

There is no evidence for any stone arrangements on the Project Area. The likelihood of stone arrangements surviving the extensive European impacts that have occurred over at least the last 100 years is considered extremely unlikely. There is no ethnographic evidence for stone arrangements having occurred within the Project Area.

It is therefore recommended that AHIMS Site #04-2-0184 is removed from the AHIMS register. An AHIP may be required as a legal technicality, although this would appear unwarranted as there is no heritage to which the AHIP might apply.

Recommendation 2: Aboriginal Human Remains

It is recommended that if human remains are located at any stage during earthworks within the Project Area, all works must halt in the immediate area to prevent any further impacts to the remains. The Site should be cordoned off and the remains themselves should be left untouched. The nearest police station, the Tweed Local Aboriginal Land Council and the OEH Regional Office, Coffs Harbour are to be notified as soon as possible. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the Site for criminal activities, the Aboriginal community and the OEH should be consulted as to how the remains should be dealt with. Work may only resume after agreement is reached between all notified parties, provided it is in accordance with all parties' statutory obligations.

It is also recommended that in all dealings with Aboriginal human remains, the Proponent should use respectful language, bearing in mind that they are the remains of Aboriginal people rather than scientific specimens.

Recommendation 3: Aboriginal Cultural Material

It is recommended that if it is suspected that Aboriginal material has been uncovered as a result of development activities within the Project Area:

(a) work in the surrounding area is to stop immediately;
(b) a temporary fence is to be erected around the site, with a buffer zone of at least 10 metres around the known edge of the site;
(c) an appropriately qualified archaeological consultant is to be engaged to identify the material; and
(d) if the material is found to be of Aboriginal origin, the Aboriginal community is to be consulted in a manner as outlined in the OEH guidelines: *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010).

Recommendation 4: Notifying the OEH

It is recommended that if Aboriginal cultural materials are uncovered as a result of development activities within the Project Area, they are to be registered as Sites in the Aboriginal Heritage Information Management System ('AHIMS') managed by the OEH. Any management outcomes for the site will be included in the information provided to the AHIMS.

Recommendation 5: Conservation Principles

It is recommended that all effort must be taken to avoid any impacts on Aboriginal Cultural Heritage values at all stages during the development works. If impacts are unavoidable, mitigation measures should be negotiated between the Proponent, OEH and the Aboriginal Community.

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DEFINITIONS

The following definitions apply to the terms used in this report:

AHIMS means the Aboriginal Heritage Information Management System of the NSW Cultural Heritage Unit.

Burra Charter means the International Council of Monuments and Sites ('ICOMOS') *Burra Charter* (1999).

Cultural Material means Aboriginal Objects, as defined in the NPW Act.

OEH means the New South Wales Office of Environment and Heritage.

Developer means MCM Group Holdings and all employees and contractors of the Developer.

Development means all activities associated with the proposed subdivision within the Subject Lands, including activities undertaken by subsequent landholders.

DOP means the New South Wales Department of Planning.

EPA Act means the *Environmental Planning and Assessment Act 1979* (NSW).

LGA means Local Government Area.

ICCR Guidelines means the OEH *Interim Community Consultation Requirements for Applicants* (2005).

NPW Act means the *National Parks and Wildlife Act 1974* (NSW).

Subject Lands means the area identified in Figure 2, described as: Lot 1 DP 1168904

The Consultant means qualified archaeological staff and/or contractors of Everick Heritage Consultants Pty Ltd.

Tweed Byron LALC means the Tweed Byron Local Aboriginal Land Council.

1. INTRODUCTION

Everick Heritage Consultants ('Everick') was engaged by MCM Group Holdings ('the Developer') to prepare a Cultural Heritage Assessment and accompanying Cultural Heritage Management Plan for the proposed Residential Community Development at River Heights, north-eastern NSW (Figures 1 & 2). This report presents the results of archaeological survey and excavations that form the basis of the management plan.

1.1 Location

The Subject Lands are located south of the Gold Coast within the Tweed Shire Council Local Government Area (LGA) in north-eastern coastal New South Wales. It is approximately 3.5 km from the present coastline, and is bounded by the Pacific Motorway on the east side and Kirkwood Road to the north. The mouth of the Tweed River lies 4.5 km north-east of the Subject Lands, and the Terranora Broadwater is 2.5 km to the south-west. An extensive network of creeks, lakes and swamps that link to the Tweed River, lies directly to the north and north-east of the Subject Lands.

1.2 Property Description

The River Heights Development contains one parcel of land, with a total area of 17 hectares (Figure 2). The Subject Land is Lot 1 on DP 1168904.

1.3 Proposed Development

This report accompanies a Development Application for the construction of a tourist accommodation development comprising at total of 355 units, ancillary communal recreation facilities and on-site car parking for 375 vehicles at the subject site. . The proposal provides a communal facilities building located adjacent to the site entry which will provide swimming pools, barbeques, a kiosk, dining area, games room and administration offices. Within the site, the accommodation units are accessed via the internal driveway network and car parking is provided adjacent to each unit. A significant portion of the Project Area will be dedicated to future open space / parkland. The risk to any cultural material in these areas is generally lower than within the areas of proposed tourist accommodation.

The proposed earthworks include maximum cuts in the order of 27m in the centre of the site. However, at the 'edges' of the proposed earthworks pad the height of batters is generally between 2m – 8m with a small length of batter along the western side being up to approximately 14m in height.

The eastern part of the site containing the ecologically significant vegetation will be retained with no access to these areas. A 50m buffer will be provided to the SEPP 14 wetland and a further APZ area comprising allowable low fuel vegetation will be provided beyond the buffer area.

Figure 1: General Location of Subject Lands (Google 2008)

Figure 2: Aerial View of Subject Lands with Survey Units

Figure 3: Development Concept Plan, River Heights (Paul Ziukelis Architects 2011)

1.4 Legislative & Planning Context

1.4.1 Prior Development

In addition, twenty earthworks approvals have been issued (Figure 4), and extensive earthworks have commenced.

1.4.2 OEH Consultation Requirements

As part of the Director General's Requirements, the Department of Planning requires that a heritage assessment be undertaken in accordance with the OEH *Guidelines for Aboriginal Cultural Heritage Impact Assessment (2005)* and *Interim Community Consultation Requirements for Applicants* (2005) ('the ICCR Guidelines'). This assessment has been structured to conform to these standards.

The ICCR Guidelines provide an acceptable framework for conducting the Aboriginal community consultation process. It requires public notice of the assessment, preparation of a proposed methodology, undertaking site meetings and collection and/or excavations where required, the production of a draft report that is distributed to the registered Aboriginal groups, and the production of a final report. Although not strictly required, a thorough consultation process will treat the ICCR Guidelines as a minimum standard of community consultation. Generally, consultants must go to further in an effort to identify the significance of a given site to the Aboriginal community. This will likely include undertaking additional site inspections, fully resourcing the community by providing copies of past archaeological and environmental assessments in the region, and meeting with community members to ascertain their opinions of the site.

1.5 Aims of this Report

The aims of this Report are to:

- Describe the results of surveys and excavations undertaken on the Subject Lands; and,
- Provide a basis for ongoing planning and implementation of the CHMP.

1.6 Report Authorship

The site survey was undertaken by qualified archaeologists Adrian Piper, assisted by Cyril Scott, Sites Officer for the Tweed Byron LALC. The desktop study and community consultation was overseen by Tim Robins. This report was written by Dr Richard Robins assisted by Tim Robins and Anna Bishop.

2. ABORIGINAL COMMUNITY CONSULTATION

A consultation process with the Aboriginal community has been undertaken in accordance with the OEH ICCR Guidelines. A comprehensive report detailing the consultation process can be found in Appendix A. The Department of Planning consented for Everick undertaking archaeological test excavations in March 2013. Works commenced on 18 April 2013 and ran for eight days intermittently, ending on May 9. A review of the excavation results is provided in Section 8 of this report. As an outcome of the consultation process, Aboriginal Stakeholders representing the Tweed Byron Local Aboriginal Land Council and the Minjungbal descendants were all invited to participate.

3. ENVIRONMENT

3.1 Landscape and Geological Setting

3.1.1 Catchments and General Physiography

The Project Area measures approximately 15.17 ha at Tweed Heads South and is situated in the centre of a coastal landform pattern of wetland areas and low rolling hills (Speight et al 1990: 34), bounded by the Tweed and Terranora Rivers.

The Subject Land comprises hill slopes in the south and west facing north and east respectively on to a floodplain extending to the north. Local relief ranges from <1m on the flood plain to 60 m on the hill slopes. Elevations range from 30 m AHD to 90 M AHD. The flood plain contains three topographic features: low boggy ground at the base of the hill slopes, a tidal mudflat/wetland (SEPP 14- Wetland) in the northwest and a filled former sand rise bordering the SEPP 14 wetland.

Due to land clearing, most of the vegetation on the Project Area can be considered regrowth, with the possible exception of an ecotone of subtropical rainforest on the lower southeast slope of the central ridge and remnants of sclerophyll forest on the upper southeast slope of the central ridge and at the southern boundary fence. The southeast portion of the Project Area is predominantly Melaleuca swamp wetlands. This part of the Project Area is subject to development constraints. The slopes of the ridge and most of the northern portion have been cleared for grazing in the past. Fill and concrete culverts have been used to build up the corridor alongside the motorway at the southern end of the eastern boundary.

Four distinct and smaller physiographic units with different archaeological potential can be recognised on the subject land (Figure 4):

1. The Upper Ridge Crest running south-west to north-east through the middle of the Project Area in Survey Unit B (maximum height 42 m, maximum relief 42 m);
2. The Hill Slope surrounding the Upper Ridge Crest and within Survey Unit E, which vary in their grades of steepness;
3. The Lower Melaleuca Margins, which occupy Survey Units A, D, and southern portions of C; and
4. The Wetlands, which make up the majority of Survey Unit D and are classified as an Environmental Protection Area.

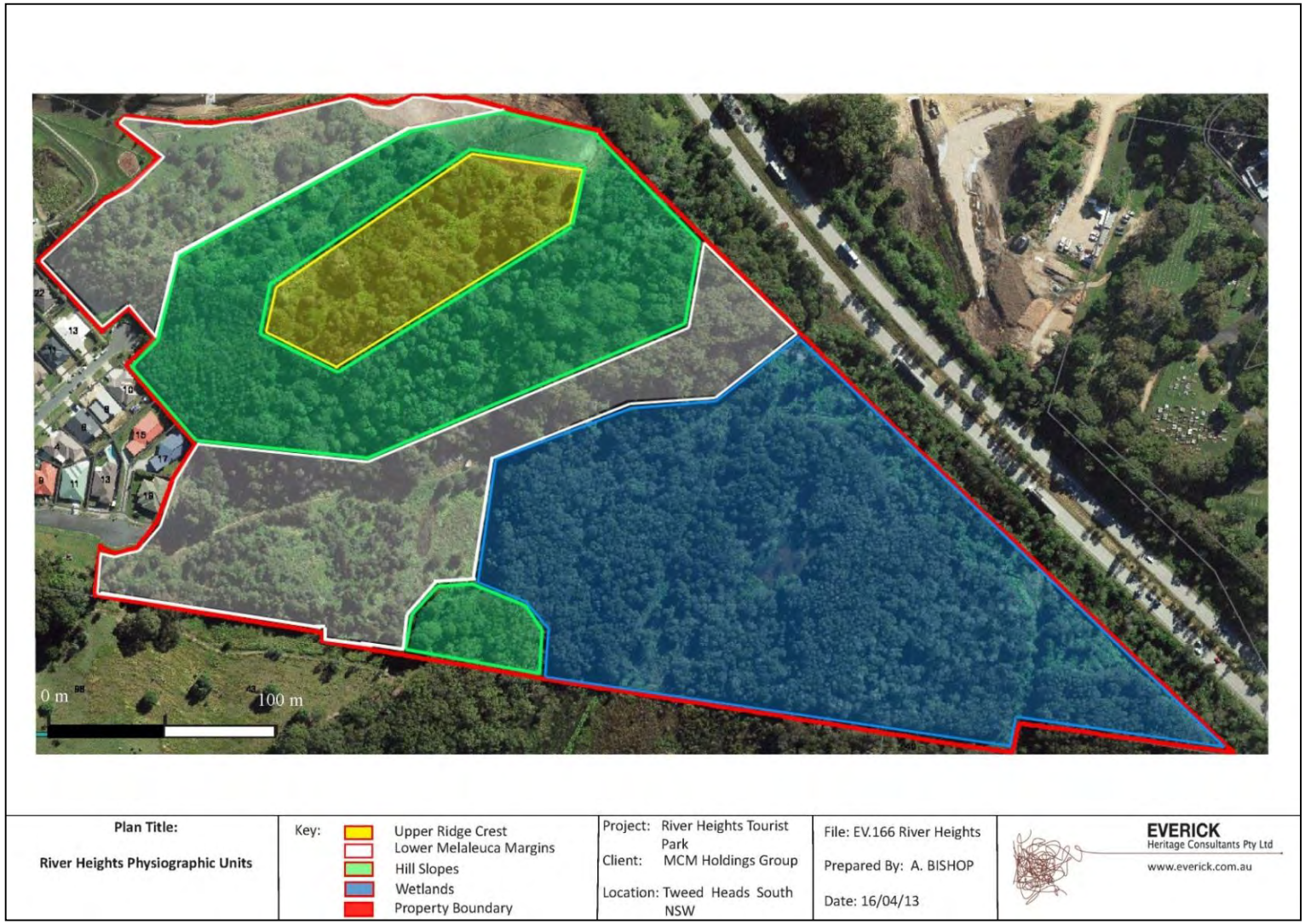


Figure 4: Physiographic Units of the Subject Land

3.1.2 Geology, Landscape and Soils

Rock types in the area are basalts of the Lamington Series on the higher levels, overlying Neranleigh-Fernvale Beds. These lower level rock types include greywacke, quartzites and slates. Soils derived from these rock types are red /brown krasnozems at the upper slopes and red/brown/ yellow clays on the lower slope. At the base of the foot slopes, floodplain soils beneath the introduced fill are colluvial. The remainder are dark loamy sands over grey and yellow/grey sands overlying peat and alluvium (Morand 1996:152). Pasture grasses and regrowth rainforest species grow on the southern slopes and floodplain. Sclerophyll/brushbox forest grows in the northern slope. The SEPP 14 Wetland has Swamp sclerophyll forest, Mangrove Forest Woodland and Coastal salt marsh (Fraser Drive, South Tweed Environmental Assessment 2007:33).

3.1.3 Two Landscape Units of Subject Land

1. **Ridges and slopes** of the subject land are developed on meta-sedimentary rocks of the Neranleigh-Fernvale beds (Devonian to Carboniferous in age). Lithologies[1] of this group in southern Queensland and northern New South Wales include: interbedded fine- to medium-grained, grey-brown greywacke; very fine-grained argillite; phyllite; quartzite; and, massive cobble conglomerates (Brunker and Tweedale 1972; Morand 1996; Gilbert and Southerland 2008a). The ridges and slopes in this area were developed on the exposed bedrock after most of the Tertiary basalts and rhyolites of the Mt Warning shield volcano were removed by erosion. However, some parts may be rejuvenated forms of a Tertiary-age landscape exhumed after it was buried some 25 million years ago.

Today's ridges and slopes unit are associated primarily with the *Billinudgel erosional landscape* (bi map code) and the Burringbar erosional landscape (bu map code) (Morand 1996). Erosional landscapes are those formed by erosive activity of running water. Soils are formed by weathering in situ or from slope wash materials. Soil depth is usually shallow or may be absent. Vegetation is partially to extensively cleared, open wet sclerophyll forest.

[1] Lithologies of the bedrock meta-sediments and Tertiary volcanics are important to landscape development and in assessment of artefacts. Variants of the main lithologies could be used as artefacts, including, for example, harder versions of the fine-grained meta-sediment argillite and some chalcedonies from within volcanic amygdales. The Glossary has brief notes on some of these rock and mineral types.

Billinudgel - deep (>100 cm), moderately well-drained Red Podzolic Soils on crests; moderately deep (70 - 100 cm), moderately well-drained Yellow Earths and Yellow Podzolic Soils on slopes and better-drained areas (Morand 1996).

Australian Soil Classification (Isbell 1996) equivalents of these Great Soil Group (Stace et al. 1968) soils are:

ASC	GSG
Red-Yellow Podzolics	Kurosols
Yellow Earths	N/A

2. **Swamp** areas, enclosed by ridges and slopes of the subject land, are developed on marine, estuarine and alluvial sediments of Quaternary age. Lithologies of these sediments in southern Queensland and northern New South Wales include: muds and silts and minor fluvial deposits of sand and gravel (Tugun Bypass EIS Geotechnical Assessment 2004). Vegetation is extensively cleared close-swamp complexes and areas of grass sedge and bushland (Morand 1996).

The low-elevation drainage basin areas are associated with the *Cobaki estuarine landscape* swamps (**cbc** map code). Estuarine soil landscapes are those formed where rivers enter large bodies of water such as the sea, saline coastal lagoons/lakes of (saline and fresh) inland lakes. Sediments carried by the rivers and streams are usually deposited relatively rapidly in the lower-energy receiving waters. Soils formed in these sub-aerial conditions are commonly affected by water inundation, and this can influence soil formation, especially if the waters are saline. Soils are formed by weathering in situ or from slope-wash materials. Soil depth is usually shallow or may be absent.

Cobaki – deep (>200 cm), poorly drained Humic Gleys on the plain; deep, poorly drained Humic Gleys and Acid Peats on very low-lying areas; Podzols and sands overlying Humic Gleys in inter-barrier stream alluvial plains.

Figure 5: Acacia woods on west Hill Slope

Figure 6: Toe Slope

Figure 7: Open area at the top of the Upper Ridge Crest

Figure 8: Southwest view down 'road' from Upper Ridge Crest

Figure 9: Lower Melaleuca Margins facing southeast

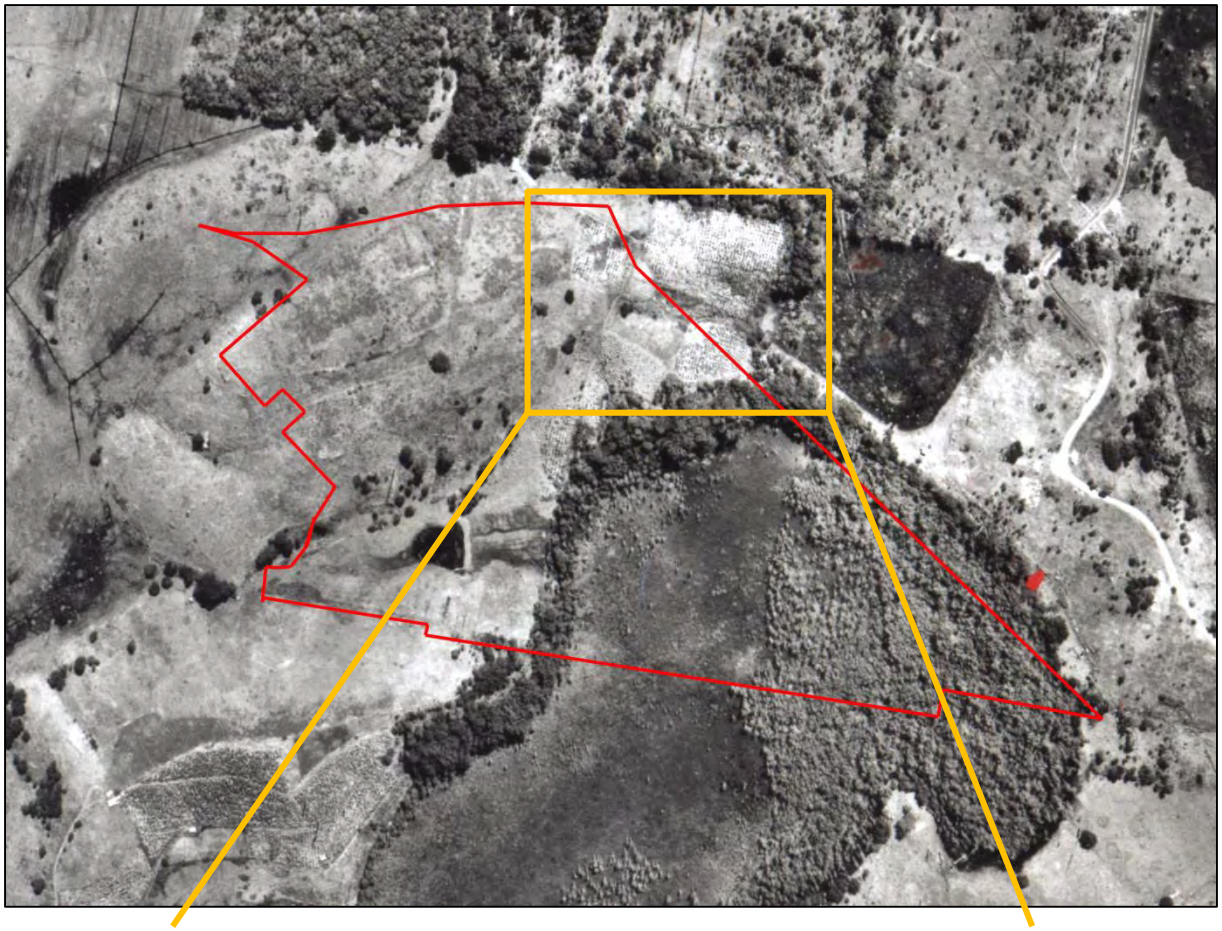
Figure 10: Northeast view of track in Southwest corner

3.2 Past Land Use History

3.2.1 Historic Record of River Heights

Previous land use in the area would have been generally small rural holdings (Morand 1996:30). The Project Area was part of land owned by Annie Sullivan until it was transferred to W.R. Sullivan in the early 1900s. Historic Parish maps dating from 1894 to 1959 were reviewed to gather a recent history of the property. The earliest maps showed that the property was bordered by an easement on the north, east, and south boundaries. By 1913 Fraser drive was built, crossing through the south-western half of the property. A small road that headed northeast connecting Fraser drive and Kirkwood road was attributed to the Sullivan family. However this road appears to have closed by 1913 and was not on the Sullivan property. By 1918 a further road was built on the Sullivan property, heading southwest connecting to Fraser road. Additionally, the easements surrounding the property were terminated by this point. Beyond this, little change was seen in later maps.

A site history done by HMC Environmental Consultants in 2011 discusses agricultural land use of the site in the 1960s and later (Mark Tunks 2011). Historic aerials from 1962 revealed banana farms that ran through the Project Area and expanded over approximately 6000 m^2 of land. The extent of banana cultivation in this photo took place in the northeast portion of the Project Area (Figure 11).



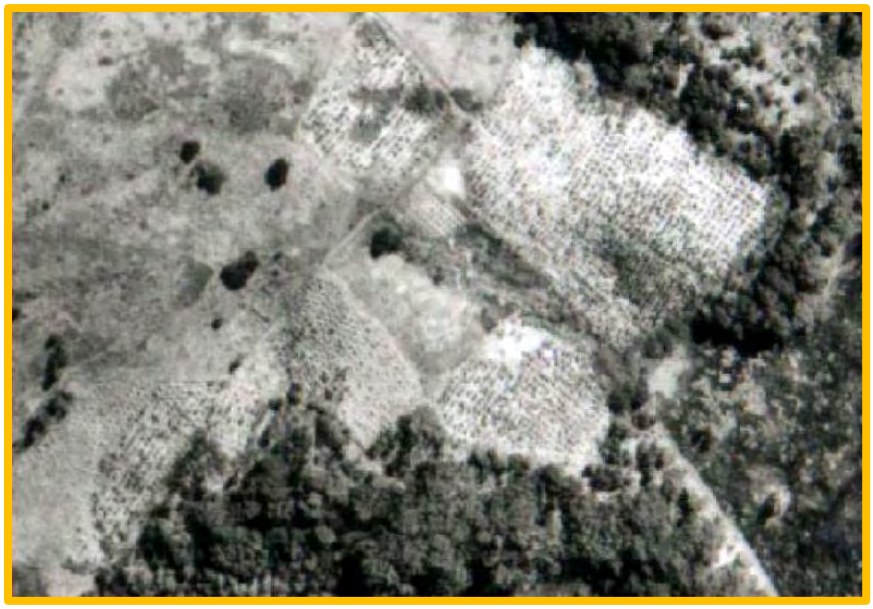


Figure 11: 1962 Historic aerial of Project Area and location of banana farming

(Tweed Shire Council 2011, Mark Tunks 2011)

Aerial photographs from 1970 show a continuation of banana cultivation, as well as the construction of an associated shed (Figure 12).

Figure 12: Location of Banana Cropping and Shed (Mark Tunks 2011)

However, the banana farm is gone in later photos from 1987. Banana agricultural activity was confirmed by the previous land owner and through a ground inspection performed by Everick Archaeologist Adrian Piper, which revealed the environmental footprints specific to banana farming activities.

3.2.2 A Review of Historic Aerial Photography

Aerial photographs from 1962, 1976, 1987, and 1995 were reviewed in order to assist in the identification of original environmental / topographic features and the degree of site disturbance post European settlement. These aerial photographs are shown in Appendix B.

The 1962 aerial photograph shows the majority of the Project Area, with the exception of the Environmental Protection Zone, has been almost totally cleared of vegetation. The majority of this clearing was probably done for grazing, with the exception of the banana farming in the north-eastern portion of the site, as discussed above.

A dam is located in the southwest section of the site. A creek line running through the southern portion of the Project area, just above the dam, is lined with trees and undergrowth. Aboriginal Objects and sites are often located close to such water resources. An area to the south of the creek line shows ground level vegetation most likely due to an increase in moisture common to low lying areas.

The 1976 aerial photograph shows a slight reduction of vegetation along the creek line. This would likely have resulted in disturbance to any Aboriginal Objects located in this area. Additionally, there appears to be tracks running through the low lying portion of the Project Area.

The 1987 photograph shows a greater level of disturbance within the site. A number of clear paths and dirt roads run through the site at this point, along the southern boundary and through the southeast corner of the Project Area, as well as along the tree line of the wetlands in the centre of the site. The land surrounding the Project Area indicates an increase in development around the site.

The 1995 aerial photograph shows the construction of the Pacific Motorway close to the eastern boundary of the Project Area, and a road that runs along south of the main ridge, bisecting the Project Area in half at a 45 degree angle. The southern portion of the Project Area shows a slight increase in vegetation.

Conclusions: The Project Area has a history of moderate to extensive ground disturbances since European settlement. The initial clearing activities were likely to have caused ground disturbance, and subsequent erosion would have likely had a significant impact to the depositional integrity of any Aboriginal Objects. Additional disturbance would have been caused by grazing and farming activities, as well as the construction of roads.

4. PREVIOUS ARCHAEOLOGICAL STUDIES

4.1 Regional Studies

The purpose of a review of previous archaeological and cultural heritage assessments "... is to provide a context and baseline for what is known about Aboriginal cultural heritage in the subject area. This contributes to the assessment of archaeological significance of the proposed development area. " (OEH, COPAI: 6).

For the purpose of this desk top review of relevant literary sources the review is confined to assessments conducted north of the Tweed River. These include Appeleton (1993), Barz (1980), Benton (2006),

Bonhomme and Craib (2005), Collins (1999, 2005), Hall (1990a, 1990b), Lamb (2004), Lilley (1981) and Piper (1976, 1980, 1991, 1993, 1994, 1996, 2000, 2004), Piper and Robins (2006). All of these assessments with the exception of the Collins (2005), Piper (2004) and the Piper and Robins (2006) assessments in the Bilambil/Terranora hills have concentrated on estuarine waterways, old coastal dune formations and the Tweed River floodplain. Recent studies in relation to the extension of the Coolangatta Airport and the Tugan to Tweed Heads Bypass route, east of the Cobaki Broadwater include Collins (1999), Bonhomme and Craib (2000), Eastern Yugembeh Limited (2005) and Benton (2006a, 2006b, 2007).

Previous archaeological assessments in the vicinity of the Project Area have sampled all of the major landforms in this area, these being the banks of estuarine waterways of Terranora Creek and Terranora Broadwater and the low hills and floodplains that partially encircle these waterways. Only assessments of the waterways (Piper 1991) in the immediate vicinity of the Subject Land, i.e. within c. 3km have located and recorded Aboriginal sites.

Studies that have included both the low hills and floodplain landforms of South Tweed Heads include the Flametree Park Estate 1.0 km to the south (Piper 1995), the Vintage Lakes Estate 0.1 km to the south (Piper 1994), the Kirkwood Road 0.2 km northeast (Piper 1998) and in Dry Dock Road 1.0 km to the northeast (Lamb 2004). None of these studies have produced sites of Aboriginal or European heritage.

4.1.1 Previous Aboriginal CH Assessments: Terranora Broadwater

The study of the foreshores of Terranora Creek and Terranora Broadwater (Piper 1991) recorded nine midden sites between Barneys Point Bridge and Tommys Island in Terranora Broadwater a distance of approximately 5.0 km. These sites ranged in content from thin bands of estuarine shell eroding from slopes falling to the river to compacted (20–50 cm) deposits of shell and stone artefacts many metres in extent. The shell contents of these sites were estuarine shell species; oyster, cockle and whelk. A small number of stone artefacts comprising a retouched flake were observed at Site 5 (# 04-02-79) and a bevelled pounder and stone axe recorded at Site 10 (# 04-02-83).These sites are separated from the study area by a high ridge, which forms the eastern shore of Terranora Creek and Terranora Broadwater. Poor visibility due to dense vegetation bordering the waterways hampered the effectiveness of the survey. However, 14 estuarine shell middens were located. The bank of midden sites (Sites 6–13) on the eastern shore of Terranora Broadwater was considered to be of high archaeological and Aboriginal significance (Piper 1991:16-18) because of there being few sites of concentrated deposits remaining. Four other middens (Sites 1, 2, 3 and 5) were assessed as being of low to moderate

archaeological significance. A shell midden on Ukerebagh Island (Site 14) was also considered to have a high archaeological and Aboriginal significance.

Information on two additional sites were located in the files of the Bunjalung Mapping Project. These were a burial ground for both Aboriginal and non-Aboriginal people on Phillip Drive (Figure 11) and a possible ceremonial ground on Lakeview Drive. This site was observed in 1974 after a bushfire, but now has houses on it (Figure 11).

4.1.2 Previous Aboriginal CH Assessments: The Tweed River- Northern Banks

The Piper assessment (1980, 1991) located ten shell middens on the northern bank of the Tweed River. These ranged from low-density shell scatters to large raised mounds of shell and artefactual materials. One site (Terranora 19) known to contain skeletal material, was the subject of a salvage excavation by Barz (1980).The study also recorded four open campsites containing stone artefactual material and six isolated instances of edge ground axes. Nine bevel pounders, used in the preparation of fern rhizome, were in the recorded sites. The shell content of each midden site was estuarine species, particularly oyster, cockle and whelk. All of the sites were located in a 3 km strip on the northern banks of the Tweed River extending above Barneys Point Bridge. The condition and content of these sites was further reviewed by Piper (1994) as part of an archaeological assessment of the upper Tweed River.

4.1.3 Previous Aboriginal CH Assessments: Cobaki Broadwater

Studies in the vicinity of Cobaki Broadwater have included Lilley (1981), Hall (1990) and Collins (1999).These studies were in relation to proposed residential development, planning proposals at Coolangatta Airport and road route options for the Pacific Highway. These studies inspected large parcels of land to the north of Cobaki Broadwater and the south western banks, (Lilly 1981, Hall 1990).An archaeological area was found to extend on higher dune plain between the eastern margins of Cobaki Broadwater and the runway at Coolangatta Airport. A midden (# 04-02-0039) described by Hall (1990:11) contained dense concentrations of surface and sub-surface shell, mainly estuarine (oyster, cockle and whelk) with a small proportion of beach pipi. Stone artefactual material consisted of cores, flakes and flaked pieces on chert, quartz, silcrete and pebbles of volcanic origin. Bevel pounders used in the preparation of fern root were described as common. This site is considered to have

a high archaeological significance as well as a high cultural social significance to Aboriginal organizations north and south of the State border.

A study by Collins (1999) reassessed the area in relation to a Route Selection Study for the Pacific Highway through the area. In addition to the archaeological material recorded by Hall, three open campsites and an isolated artefact were recorded on the elevated dune plain between Cobaki Broadwater and the Coolangatta Airport runway. The sites are low-density scatters of stone artefacts, fragments of oyster shell and a nodule of ochre. Raw materials were cherts, silcrete and sandstone (Collins 1999:34-35).

The archaeological content and Aboriginal cultural heritage significance of the Coolangatta Airport lands, northern shores of Cobaki Broadwater and areas of Tweed Heads west have recently been reviewed by Collins (1999) Bonhomme, Craib (2000) Eastern Yugambeh Limited (2005) and Benton (2006a, 2006b, 2007).

4.1.4 Previous Aboriginal CH Assessments: Coastal Uplands - Terranora

The result of previous field assessments indicate the main concentration of recorded Aboriginal sites is in the immediate vicinity of the waterways of the Tweed River estuary, be it a small proportion of the original number. A far lesser concentration of recorded sites occurs in the upland areas of Terranora, Bilambil, Carool and Tumbulgum which form catchments adjacent to the coastal plain and the creek systems, which flow from them. Few studies have been conducted in these areas where the impact of land clearing is arguably greatest and the spread of urban development less concentrated.

A study (Piper 1994) of an earth/rock quarry site above Duroby Creek could find no evidence of Aboriginal materials. The quarry located is 7 km southwest of the study area on a ridgeline terminating at the Duroby Creek flats. A study (Piper 1996) over 100 ha of ridge crest and slopes on red/brown krasnozem soils overlooking Cobaki Creek 9 km southwest of the study area produced a similar result. An assessment by Piper (2004) and Collins (2005) of areas of the Bilambil hills also produced a nil result. A study (Robins and Piper 2006) of 14.0 ha of the Terranora plateau investigated an area where a stone axe had been recorded, collected by a collector (Piper 1980).The total evidence of Aboriginal use/occupation of the coastal uplands of the Terranora plateau is restricted to a small number of isolated stone artefacts. The effectiveness of archaeological assessments in these uplands is invariably diminished by poor surface visibility.

4.1.5 Previous Archaeological / Cultural Heritage Assessments

Everick (2009) undertook a survey and archaeological excavations at the proposed Cobaki Lakes Development Site, approximately 3.5 km north west of the Project Area. The development area for the project was adjacent to the western shoreline of the Cobaki Broadwater (580 ha. in area). The Everick assessment identified three topographic land forms within the development area, these being low foothills/slopes ('mid to lower back slopes') in the west and north, a sand ridge in the south and low lying marsh lands in the east and south. Extensive disturbance following past development applications meant only 100 ha. of the 580 ha. development site retained a reasonable possibility of retaining Aboriginal cultural heritage. The survey of these areas identified 19 Aboriginal artefacts/sites. Five of these were single artefacts in the mid to lower back slopes and the remaining 14 were located on the sand ridge. Subsequent test excavations revealed extensive subsurface deposits over most areas of the mid to lower back slopes and sand ridge. Approximately 700 artefacts were identified in 270 m2 of trenching in the mid to lower back slopes. Approximately 3,100 artefacts were identified in 180 m2 of trenching in the sand ridge. It is estimated that well in excess of one million artefacts are located within this landscape. In particular, the sand ridge retained a high concentration of artefacts.

An assessment of the Rise residential development at Bilambil Heights (former Terranora Country Club) was undertaken in 2009 by Everick Heritage Consultants (Robins and Piper 2009). This assessment identified a number of stone terraces that had been built in the 1950s and 1960s to support a cropping industry similar to that within the Subject Lands. The crop terraces were used for growing beans, tomatoes, sweet potatoes, zucchini and bananas. The terraces were constructed by dozer, and did not demonstrate particularly high levels of ingenuity or aesthetic appeal. Using the NSW Heritage Manual Criteria, they were assessed as potentially being of local heritage significance under Criteria G. Items that fulfil Criteria G have a strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons. In the instance of the stone terraces of Bilambil Heights, the group with the special association was identified as the Aboriginal and Islander communities who worked in the fields.

An assessment of the Banora Point upgrade of the Pacific Highway was undertaken by Navin and Officer in 2007 for the NSW Road and Traffic Authority. The upgrade comprised a 2.5 km length of road between the northern end of Barneys Point Bridge and the southern end of the Tweed Heads Bypass. These works are approximately 3.0 km to the north-east of the Subject Lands. The report was prepared for a proposed Pacific Highway alignment with six lanes and associated works. It details the results of their investigation of three archaeological features representing sites of Indigenous and non-Indigenous cultural heritage.

Ozark (2006 and 2007) undertook archaeological survey and excavations in preparation for the Tugun Bypass, running approximately 3 km north of the Project Area. The excavations were undertaken on Pleistocene sand ridges similar to those that once ran through the Project Area. The May 2006 report recommended that test excavations and possibly salvage excavations should be conducted in two zones (7 & 10) of the proposed route. Monitoring of vegetation clearance and ground disturbing works should take place in five zones (5, 7, 10, 11, and 13) of the proposed route (Ozark 2006a, b, 2007).

An archaeological test excavation at a site in Zone 7 produced an assemblage of 388 stone artefacts and 132 manuports or otherwise unidentifiable fragments from 28 excavation squares. These comprised 26 assemblage elements (different categories of stone artefacts) and 12 varieties of raw material (Ozark 2006b:28). The site was considered to possess a number of unusual features: the richness of the assemblage was high; the site was intact and showed patterning that could indicate an intact cultural stratigraphy; the number of backed blades point to areas of the site likely used as knapping floors for backed artefacts (an extremely rare find in the region), the preponderance of large red, yellow and black ochre crayons with abundant signs of use suggest decorative activities were an important part of the use of the site (Ozark 2006b:52-53). A radiocarbon determination of a charcoal sample returned a relatively modern age for the site at 298 BP (Before Present) (or c. 1600AD) (Ozark 2006b:50).

A subsequent salvage excavation programme at pier construction impact points across the Zone 7 site produced 389 stone artefacts from 24 excavation squares, which comprised 12 classes of artefacts on nine types of raw materials. From the mean artefact density of the 1x1 m excavated squares it was estimated that 76,418 artefacts and ochre fragments were contained in the pier cluster areas (Ozark 2007:29,30). A radiocarbon determination of 7,258 BP was obtained from a charcoal sample. However the authors urged caution in accepting the date as one that necessarily related to Aboriginal occupation as there were no intact archaeological features from which a date could be obtained. Early dates (9,000 – 15,000 years ago) are referenced in the report as providing a possible context for the Tugun sites if the dates can be accepted (Ozark 2007:37).

Adrian Piper undertook an archaeological survey and assessment of the River Heights Project Area for the Kirkwood Road Alignment Project in 1998 (Piper 1998). The survey was undertaken with TBLALC Sites Officer Cyril Scott, and inspected the low level river flat, the lower slopes of the ridgeline, and the upper slopes and crest of the ridge in the Project Area. It was noted that the riverflats were cleared grazing land dissected by

drains. Spoil from the drains showed no cultural material. The mid and lower slopes contained exposed surfaces along vehicle tracks and cattle trails which showed no indication of artefacts. The upper slopes and ridge crest had moderate surface visibility assisted by exposed soil from the excavation of large basalt boulders and vehicle tracks. Photographs from the survey show the ridge to be extensively cleared. No artefacts, features, or other Aboriginal objects were identified during this site inspection, and the TBLALC expressed no Aboriginal significance attached to the Project Area (Piper 1998). This report was written before investigations by Everick at the Cobaki Lakes began, which changed the perception of archaeological significance for cleared open woodlands in the Tweed region.

4.2 The OEH Aboriginal Heritage Information Management System

Care should be taken when using the AHIMS database to reach conclusions about site prevalence or distribution. For example, a lack of sites in a given area should not be seen as evidence that the area was not occupied by Aboriginal people. It may simply be an indication that it has not been surveyed, or that the survey was undertaken in areas of poor surface visibility. Further, care needs to be taken when looking at the classification of sites. For example, the decision to classify a site an Open Campsites containing shell rather than a Midden can be a highly subjective exercise, the threshold for which may vary between archaeologists. There are also errors with the data.

A search was conducted on 12 April 2011 of the OEH Aboriginal Heritage Information Management System (AHIMS service number 32722) over 25 km^2 centring on Tweed Heads. The search identified 83 registered Aboriginal sites within the search area (Figure 4). The majority of the registered sites are Open Campsites. Twenty three are listed as containing artefact scatters or single artefacts. An additional three Open Campsites contained shell material as well as artefacts, but were not classed as Middens. One Open Site was listed as a PAD (Potential Archaeological Deposit), although whether it would contain shell, artefacts, burials or other types of evidence of human occupation is unknown. The search identified 17 middens within the search area. As is consistent with the archaeological record for other parts of the region, the middens are located close to the resource. Five burial sites are listed in the search area. No listed sites are within the Project Area.

An updated search was later conducted on 11 March 2013. This search covered the Project Area and the maximum 1 km buffer area around it. The results showed an additional site to the previous AHIMS search, site 04-2-0184, described as an artefact/stone arrangement. This site is located in the Project Area, on the east end of the Upper Ridge Crest, near to where a large cut has been made into the ridge. This site was given a 10

m buffer during excavations. This specific site was not noted as a place of community concern during the site inspection by Des Williams (TBLALC representative) on 7 May 2013.

Figure 13: AHIMS Search Results from 12/4/2011 Search

4.3 The Bundjalung Mapping Programme (BMP)

The BMP is a privately run cultural heritage database for the Tweed Region. It is accessed with the permission of the Tweed Byron LALC and participating Traditional Owners. The BMP has records for the northern Tweed from anecdotal sources of Aboriginal cultural heritage information as well as the data derived from the DECCW AHIMS.

No sites are listed on the BMP within the Project Area. In addition to the New South Wales DECCW AHIMS registered sites in that database, four artefact scatters and one possible resource tree had been recorded in the bushland between the Cobaki Broadwater and the Tugun Bypass (I. Fox pers. comm. April 2008).Information on two additional sites was located in the files of the Bundjalung Mapping Project. These were a burial ground for both Aboriginal and non-Aboriginal people on the south bank of the Tweed River at Phillip Drive, and a possible ceremonial ground at Lakeview Drive on a ridge overlooking Terranora Broadwater. This site was observed in 1974 after a bushfire, but now has houses on it.

A request was made to re-inspect the BMP database prior to issuing this report. However, due to the transition of responsibility for the BMP over to the Tweed Byron LALC, access has not been available. It is of note that the BMP has no records a burial ground or stone arrangement within the Project Area.

4.4 Other Heritage Registers: Indigenous & Historic Cultural Heritage

The following heritage registers were accessed on 18 March 2013 for Indigenous and historic places within the Tweed Shire LGA:

- **The World Heritage List**: Contains one place listing for the Tweed LGA. The Gondwana Rainforests of Australia – Shield Volcanoes Group. This place is not with close proximity to the Project Area.
- **The National Heritage List** (Australian Heritage Council): Contains one place listing for the Tweed LGA. The Gondwana Rainforests of Australia – Shield Volcanoes Group. It is not within close proximity to the Project Area.
- **Commonwealth Heritage List** (Australian Heritage Council): Contains no place listings for the Tweed Shire LGA.

- **Register of the National Estate** (Australian Heritage Council): Contains 16 place listings for the Tweed Shire LGA. The Ukerebagh Nature Reserve has been determined as having Indigenous values of National Estate significance. It is approximately two kilometres from the Project Area. No other places listed within proximity.
- **The State Heritage Register** (NSW Heritage Office): Contains two place listings, neither close to the Project Area.
- **Tweed Shire Council Local Environment Plan 2010**: No listed places are in close proximity to the Project Area.

5. PRELIMINARY ARCHAEOLOGICAL SURVEY

5.1 River Heights Archaeological Survey

An archaeological survey was undertaken by Everick Heritage Consultants and Cyril Scott, a representative of the Tweed Byron Local Aboriginal Land Council, on 17 May 2011. Due to dense vegetation ground surface visibility was very poor.

In such a small area as this an intensive survey in systematic transects of the whole site would be feasible if not for heavy vegetation cover and two wetland areas. As a result, the only option available was a foot survey through the various landform elements and a 'spot check' search of all possible exposed soils. These are several vehicle, livestock and foot tracks running through the area, and cuttings and embankments associated with the tracks.

Each Survey Unit was inspected and elements of the Upper Ridge Crest, Hill Slope, Lower Melaleuca Margins, and Wetlands were all sampled.

5.2 Results

No physical evidence of Aboriginal Cultural Heritage was identified as a result of the field inspection. However, the inspection was significantly hampered by extremely poor survey conditions and ground surface visibility. The results of the survey are not considered to be indicative of a lack of Aboriginal Objects within parts of the Project Area.

5.3 Potential Site Types and Site Locations

On the basis of the results of the 2011 survey, a review of previous studies in the region (including previous ones of most of the Subject Lands), a search of the OEH AHIMS database and the history of site disturbance, a basic predictive model of potential archaeological site types and site locations for each of the physiographic units was developed (Table 1). This analysis was also informed by the results of the recent excavation conducted for the Cobaki Lakes Development (Everick 2012), 3 km northeast of the Subject Lands, where significant archaeological sites were identified through excavation. The predictive model shown in Table 1 was used to guide the excavation strategy detailed below.

Table 1: Table of Archaeological Site Sensitivity for Subject Lands

Site Type	Upper Ridge Crest	Hill Slope	Lower Melaleuca Margins	Wetlands
Single artefacts	High	Low	Moderate	Low
Open Campsite	Moderate - High	Low	Low - Moderate	Low - Nil
Midden	Low	Nil	Low	Low - Nil
Scarred Tree	Nil	Nil	Nil	Nil
Quarry	Low - Moderate	Low - Moderate	Low	Nil
Bora/Ceremonial site	Low	Low	Low	Low
Burial	Low - Nil	Low - Nil	Low - Nil	Low – Nil

There is a moderate potential for archaeological materials to be within the Project Area. If they do exist they are likely to be single artefacts and/ or scatters of stone artefacts. The existence of campsites is low due to the fact that these are uncommon on ridge crests. However, Traditional Owners believe that the topography of the hill at

River Heights still would have made it a point of interest and of spiritual significance. Middens are seen to be as unlikely; however they cannot be ruled out due to the fact that a midden was located in the greater surrounding area on Fraser Drive. Due to the high levels of disturbance over much of the Subject Lands there is little likelihood that undisturbed Aboriginal archaeological sites or objects will exist on previously disturbed/cleared land or eroded surfaces.

There is no possibility that cultural materials of organic materials such as wood, fibre or cordage would survive and there is an extremely low possibility that above ground earth mounds or stone arrangements could remain 'in situ' due to clearing activities. However, the community are of the opinion that there may have been a stone arrangement at River Heights on the top of the main hill.

As there are no visible suitable rock outcrops or known sources of siliceous material in the Project Area the potential for a quarry site to be located is low. While basalt is known as a raw material source for stone artefacts, it has not been known to be found in a quarried situation, but rather a case of collection of isolated, suitable pebbles. The potential for quarry sites to be located within the Project Area is low, however it cannot be completely ruled out, with a slightly higher chance along the Upper Ridge Crest and Hill Slope.

Due to extensive clearing of trees in the proposed area of residential subdivision, scarred or carved trees will have a low probability of being found.

In the Project Area, Bora/Ceremonial grounds, which consist of above ground earth or rock structures, would have long since been cleared and levelled had they existed. Additionally, there was no oral history of such structures being located on the Subject Lands.

The shallowness and the acidic nature of the soils, as well as the additional impact of land clearing in the greater area over time all contribute to the very low potential for there to be burials located within the Project Area

6. ARCHAEOLOGICAL EXCAVATIONS

6.1 Excavation Rationale

The general predictive model, derived from the desktop study and field survey, required testing. The implications of this assessment were that the surface archaeological manifestations on the Upper Ridge Crest, Hill Slope, and Lower Melaleuca Margins were a reflection of the subsurface distribution of artefacts in these locations. The sandy clay soils of the upper horizons of the Podsols on the Slopes and Ridge were likely to contain any cultural material and features that had become buried over time, partly because of the sandy nature of the soil and partly due to the disturbance caused by clearing and grazing. It was unlikely that these manifestations could be dated.

The three areas within the Subject Lands targeted for investigation were the Upper Ridge Crest, the Hill Slope, and the Lower Melaleuca Margins (Figure 4).

The excavations had three broad aims. The first was to explore the model in more detail to improve information about the types of sites represented at River Heights in terms of their archaeological potential. The second was to recover Aboriginal artefacts from the Project Area. This was done at the request of the Traditional Owners. The third was to locate *in situ* deposits from which dated sequences might be obtained, again, in order to contribute to the story of Aboriginal occupation. However, within each of the three broad aims, specific excavation strategies were undertaken to address specific questions. These are identified in the appropriate sections.

The results of the excavations are to be used as the basis for identifying appropriate further management strategies for the Project. Further mitigating strategies may include induction of contractors on how to identify cultural material, post clearing surveys or monitoring, or the retention of areas of the project. Had a site of high archaeological or cultural significance (e.g. a well preserved hearth or campsite) been identified during the excavations, consideration would have been given to preserving the site as a park or in open space.

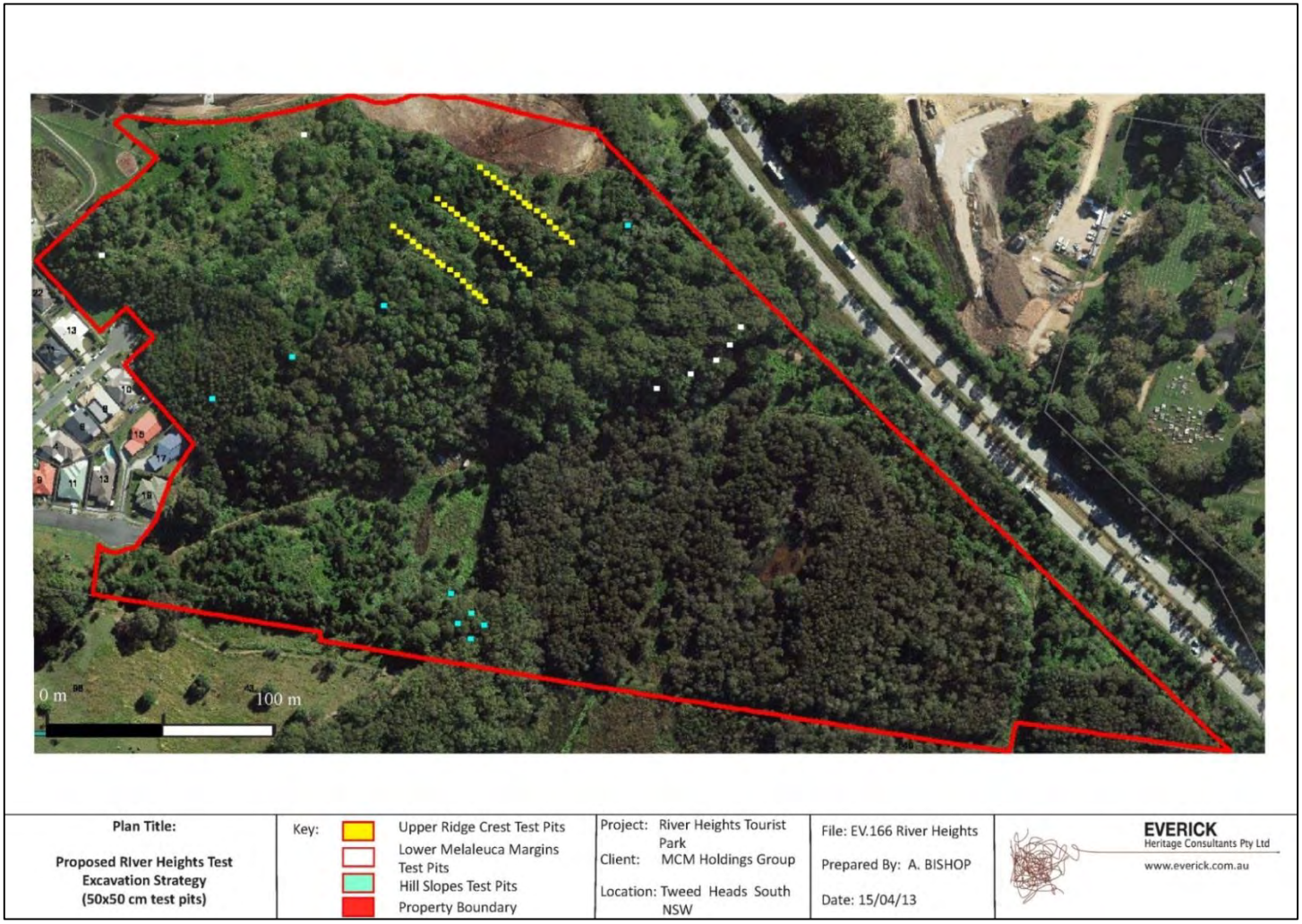


Figure 14: Test Excavation Strategy

During the survey of the Upper Ridge Crest no artefacts were located. The basic assumption that required testing here was whether the artefact distribution from the survey was representative of subsurface materials at the site. While this is a generally accepted model it has been negated in previous studies, specifically in test excavations carried out by EYL (2005) for the Tugun Bypass project. In this case, the surface distribution of cultural materials on the podsolic soils the Subject Lands was a poor indicator of the subsurface distribution of cultural material, and up to 30 subsurface artefacts were excavated from a 50 x 50 cm pit, where none were visible on the surface. This is one of the models that was tested during excavations.

It is unlikely that any *in situ* sites of high archaeological significance are located within this area as it has sandy clay topsoils through which artefacts can move downwards, and the surface has been extensively disturbed through grazing and clearing. The opportunity to obtain materials for dating was expected to be limited. Test excavations were undertaken to confirm these assumptions and develop appropriate mitigation strategies where required.

Based on the model for potential site types and locations (Section 5.3), the Upper Ridge Crest, Hill Slopes, and Lower Melaleuca Margins are predicted to be areas of Low-to-Moderate Archaeological Sensitivity that will be used for residential development. Without any mitigating measures, the River Heights development would likely cause the loss and/or destruction of any cultural material in these areas. When formulating appropriate excavation strategies consideration was given to:

- the probable variation in density of cultural material;
- the different physiographic zones and their potential uses; and
- community advice regarding areas of high potential.

The most efficient method to test the assumption was to hand excavate a series of test pits to sample a range of environments that might have been used by Aboriginal people in the past. These test pits were dug according to the OEH Code of Practice and sieved through 5 mm sieves. The rationale for sampling varied between the Upper Ridge Crest, Hill Slopes, and Lower Melaleuca Margins, and is included in the discussion below.

6.2 Project Personnel

Clearing and excavations were conducted over a period of 8 days intermittently (15 – 19 April and 7 – 9 May 2013). The excavations were led by archaeologist Adrian Piper, with assistance by Anna Bishop. Aboriginal community involvement included the following endorsed parties/Aboriginal Stakeholders who participated in the excavations programme: Lyndon Combo, Trevor Smith, and Warren Phillips, (Tweed Byron Local Aboriginal Land Council); and Jason McDonald and Levi McDonald (representing local Aboriginal families and the AAC). This report was prepared by Dr Richard Robins, Adrian Piper, Tim Robins, and Anna Bishop.

6.3 Methods

As per the OEH Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW, test pitting was the favoured excavation method (Figure 24). 50 x 50 cm test pits were dug by hand. Each excavation unit was approximately 15-30 cm deep, with every 5 cm increment representing an excavation unit ('XU'). Contamination of material from the surface was kept to a minimum. All excavated material from each spit was dry sieved through 5mm sieves.

All suspected cultural material was retained, bagged and labelled for further examination. GPS coordinates were obtained to mark test pit positions. A detailed field log was kept with observations on each excavated unit and test pit and any features noted. Colour photographs and exposed profiles were taken of test pits. All test pits were backfilled with the sieved spoil.

No artefacts were found during excavations.

Figure 15: Excavation team digging Lower Melaleuca Margins test pit

Figure 16: Excavation team setting up transects on Upper Ridge Crest

7. UPPER RIDGE CREST EXCAVATION

7.1 Site Description

The Upper Ridge Crest is approximately 1.3 hectares of the ridge peak that runs through River Heights. It has been extensively cleared for grazing in the past, and has been identified as the area in which an extensive cut and residential development will be undertaken. Most of the cleared area is bounded by Eucalyptus forest on the hill slopes and Melaleuca swampland below. This open area consists of extensively disturbed soils mixed with roots, grasses and rocks that have been churned up and displaced by machinery. This soil is most heavily disturbed towards the edges of the Upped Ridge Crest. The soils are predominantly podsolics with a silty clay loam 'A' horizon between 10-30cm and a natural clay 'B' horizon that is characterized by heavily compacted dirt and orange-clay. In some cases this 'B' horizon was also characterized by a dense layer of rock which the clay is formed around.

Figure 17: View south Upper Ridge Crest. Top of ridge showing boulders and vegetation

7.2 Excavation Approach

The pre-clearance vegetation at European contact would have been a wet-sclerophyll with no grass on a rocky ground cover. Slope was the prime variable within which to identify variation in the distribution of archaeological evidence. Evidence of change through time could not be obtained due to the soft shallow nature of the topsoils, and the impact of tree clearing resulting in significant soil disturbance.

The questions asked of the archaeological evidence related more to spatial distribution of the archaeological evidence. The questions asked were basic ones designed to identify patterns in the archaeological record.

They were:

1. Is there a significant difference in the amount and nature of artefact distribution that is found at the peak of the Upper Ridge Crest in comparison to the bottom of the Upper Ridge Crest?

   Traditional Owners believe that the Upper Ridge Crest was culturally significant to their ancestors. If this was the case then there may be a correlation between the amount of cultural material found at the Upper Ridge Crest and the elevation it was found at. Under this model the peak of the Upper Ridge Crest would be the most likely to produce cultural material in comparison to lower elevations.
2. Is there a pattern of distribution of artefacts across the ridge crest that could be explained by erosion, particularly mass movement?

   The podsol soils of the Upper Ridge Crest (in which most of the artefacts are found) are thin, highly disturbed and rest on a clay base. Because of this they are susceptible to erosion, particularly mass movement.
3. Is there a difference in the assemblages from those found at the Hill Slope and the Lower Melaleuca Margins?

   Because Traditional Owners believe that the Upper Ridge Crest was culturally significant to their ancestors, there may be a correlation between the amount and type of cultural material found at the Upper Ridge Crest in comparison to the other zones with varying elevations and landscapes. Under this model the Upper Ridge Crest would be the most likely to produce cultural material in comparison to the Hill Slopes and Lower Melaleuca Margins.

Three localities were originally identified:

- 1 upper ridge crest east (15 test pits)
- 1 upper ridge crest centre (15 test pits)
- 1 upper ridge crest west (15 test pits)

These localities were determined during the Test Excavation Strategy. However, after consultation with Des Williams representing the Tweed Byron LALC, Everick agreed to instead excavate five transects in order to cover a greater breadth along the ridge crest. Test pits were placed along the transects at 3 m intervals, up until dense vegetation or extensively disturbed materials were reached.

While it was originally thought that 15 test pits could fit across the ridge crest, it became apparent that between the dense vegetation and largely uprooted materials surrounding the ridge crest, there was not enough room for this number of test pits. For this reason, instead of having a defined number of test pits per transect, each transect was extended as far as possible until the boundaries of the ridge crest were reached. This area, the area of the ridge crest capable of being excavated, was significantly smaller than originally thought. Transects had a range of three to six test pits each.

Five localities were identified in the field:

- 1 upper ridge crest 1 (5 test pits)
- 1 upper ridge crest 2 (5 test pits)
- 1 upper ridge crest 3 (6 test pits)
- 1 upper ridge crest 4 (5 test pits)
- 1 upper ridge crest 5 (3 test pits)

Excavations in this zone were carried out from 7 to 9 May 2013. An excavation strategy based on 50 x 50 cm test pits was adopted, as per the Code of Practice. All the test pits were located on podzolic soils characteristic of the ridges and slopes in that region. Twenty four test pits were placed in five parallel transects (localities) crossing the ridge crest. This was done to assure extensive coverage of the Upper Ridge Crest in the search for Aboriginal Objects, and for a thorough distribution analysis. Transects were positioned at a perpendicular angle to ensure a proper sampling of the Upper Ridge Crest across the slope. This was done to reveal any relationship between elevation of the slope and artefact density.

Each excavation unit (XU) was approximately 5 - 10 cm deep. The deposits were excavated through the upper silty clay loam to an average depth of 21 cm, and terminated in the upper units of the compact clays. The

deposits were sieved through 5mm mesh sieves. All finds from each XU were to be recorded and placed in a labeled bag for further analysis. These bags were to be put into the test pit's designated storage cylinder for proper reburial.

After three days of excavation and 24 test pits in this zone, Everick felt confident that enough information had been recovered to adequately characterize the nature and significance of the Upper Ridge Crest and all of the objects found within this zone. Hence, the excavation was stopped after the fifth transect was test pitted.

7.3 Excavation Results

7.3.1 Surface Collection

No artefacts were found from surface collection.

7.3.2 Test Pits

Twenty four test pits were excavated across the Upper Ridge Crest and no artefacts were recovered from them. A plan of the test pit locations is provided in Figure 18. Table 2 shows test pit dimensions.

Table 2: Upper Ridge Crest test pit dimensions

Locality	Test Pit	Test Pit depth (cm)
URC 1	1	0-26
URC 1	2	0-18
URC 1	3	0-21
URC 1	4	0-24
URC 1	5	0-25
URC 2	1	0-30
URC 2	2	0-26
URC 2	3	0-29
URC 2	4	0-26
URC 2	5	0-29
URC 3	1	0-22
URC 3	2	0-26
URC 3	3	0-22
URC 3	4	0-17
URC 3	5	0-22
URC 3	6	0-27
URC 4	1	0-23
URC 4	2	0-14
URC 4	3	0-5
URC 4	4	0-8
URC 4	5	0-22
URC 5	1	0-19
URC 5	2	0-17
URC 5	3	0-10

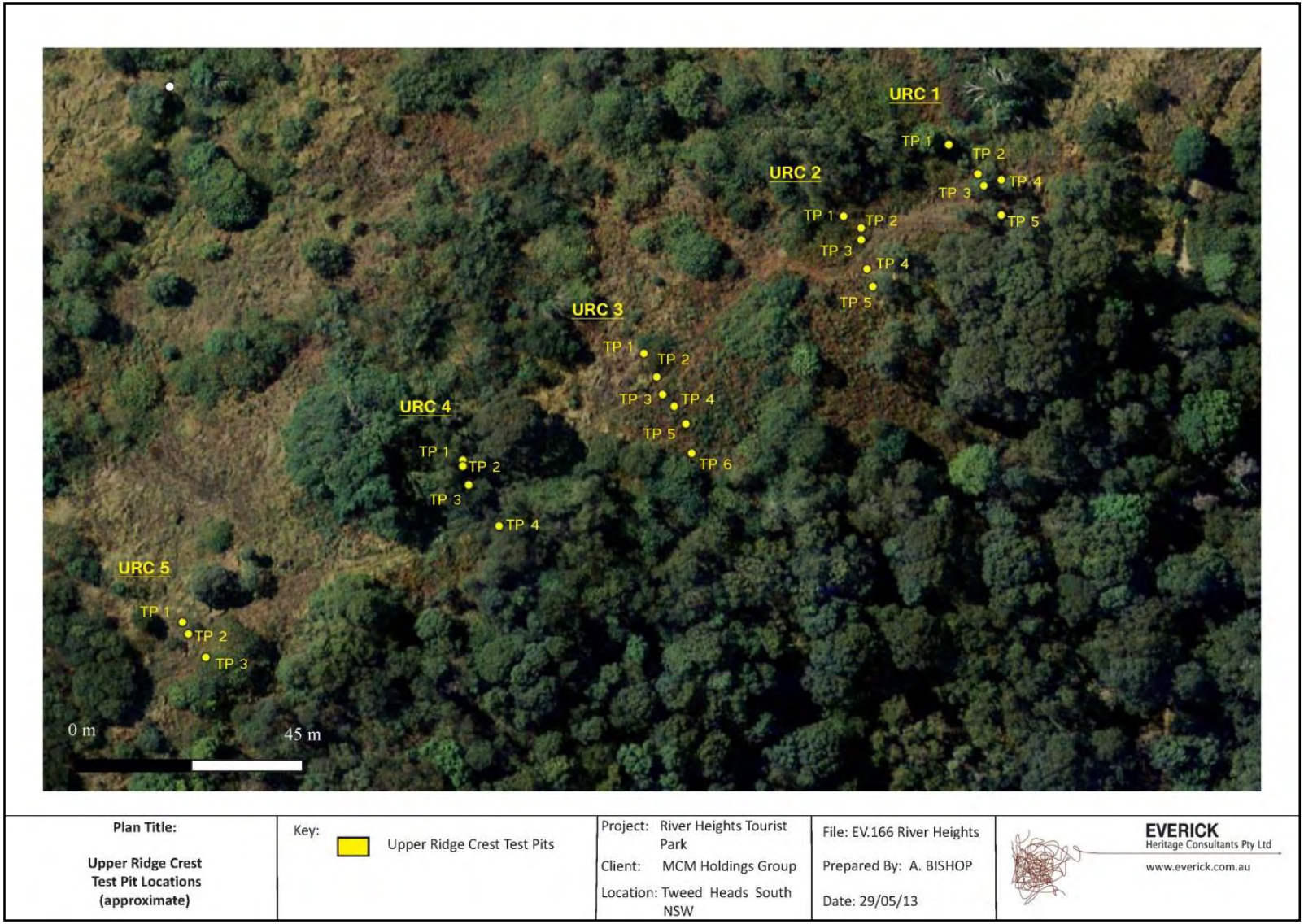


Figure 18: Test pit locations along Upper Ridge Crest

Upper Ridge Crest 1-5

Transects were placed across the main ridge. The starting point for each transect was marked along a 230 degree angle across the top of the ridge crest. Each transect then ran down the slope at a 140 degree angle, bisecting the ridge crest at a 90 degree angle.Test pits were excavated at a distance of at least 3 m from each other, as 5 m was not possible in order to fit a substantial sampling along each transect. The vegetation in this area was characterized as a cleared eucalypt woodland forest with no canopy coverage. Ground cover was light with scattered grass, roots and leaf litter over a vast amount of exposed dirt that had been disturbed during the process of mechanical clearing (Figure 19). There were also scattered piles of basalt boulders. The soil in this area was a brown basalt derived krasnozem loam with stony inclusions.

Figure 19: Upper Ridge Crest facing southwest

Upper Ridge Crest 1

Test pits 1 and 2 (TP 1, TP 2) These test pits were characterized by a silty clay 'A' horizon with heavy organic material and small to large rocks. The 'B' horizon was a distinct orange-yellow clay approximately 21 cm below the surface. Materials found within these test pits included leaf litter, roots, quartz fragments, and clay.

Test pits 3 and 5 (TP 3, TP 5) These test pits were characterized by a silty clay 'A' horizon with heavy organic material and small to medium rocks. This soil become progressively harder and more compact until it reached a clay consistency at the 'B' horizon, approximately 23 cm below the surface at which point it was too dense to dig through. Materials found within these test pits included leaf litter, roots, quartz fragments, and clay.

Test pit 4 (TP 4) This test pit was characterized by a silty clay 'A' horizon with heavy organic material and small to medium rocks. The 'B' horizon was an orange-yellow clay shale approximately 24 cm below the surface. Materials found within these test pits included leaf litter, roots, quartz fragments, and clay.

Upper Ridge Crest 2

Test pit 1 (TP 1) This test pit was characterized by a silty clay 'A' horizon with heavy organic material and small to medium rocks. This soil become progressively harder and more compact until it reached a clay consistency at the 'B' horizon, approximately 30 cm below the surface at which point it was too dense to dig through. Materials found within these test pits included leaf litter, roots, quartz fragments, and clay.

Test pits 2 and 3 (TP 2, TP 3) These test pits were characterized by a silty clay 'A' horizon with heavy organic material and small to medium rocks. The 'B' horizon was an orange-yellow clay shale approximately 27 cm below the surface. A dense layer of basalt rock also accompanied the clay shale in TP 2. Materials found within these test pits included leaf litter, roots, quartz fragments, and clay.

Test pits 4 and 5 (TP 4, TP5) These test pits were characterized by a silty clay 'A' horizon with heavy organic material and small to large rocks. The 'B' horizon was a distinct orange-yellow clay approximately 27 cm below the surface. Materials found within these test pits included leaf litter, roots, quartz fragments, and clay.

Upper Ridge Crest 3

Test pits 1, 3, and 4 (TP 1, TP 3, and TP 4) These test pits were characterized by a silty clay 'A' horizon with heavy organic material and small to medium rocks. This soil become progressively harder and more compact until it reached a clay consistency at the 'B' horizon, at which point the test pit also hit a dense layer of rocks.

This was at approximately 20 cm below the surface. Materials found within these test pits included leaf litter, roots, and clay.

Test pits 2, 5, and 6 (TP 2, TP 5, TP 6) These test pits were characterized by a silty clay 'A' horizon with heavy organic material and small to large rocks. The 'B' horizon was a distinct orange-yellow clay approximately 25 cm below the surface. Materials found within these test pits included leaf litter, roots, and clay.

Upper Ridge Crest 4

Test pits 1, 2, and 5 (TP 1, TP 2, TP 5) These test pits were characterized by a silty clay 'A' horizon with heavy organic material and small to medium rocks. The 'B' horizon was an orange-yellow clay approximately 18 cm below the surface. A dense layer of rock also accompanied the clay in TP 1 and 2. Materials found within these test pits included leaf litter, roots, quartz fragments, and clay.

Test pits 3 and 4 (TP 3, TP 4) These test pits were characterized by a shallow silty clay 'A' horizon with heavy organic immediately overlying a distinct orange-yellow clay The 'B' horizon, approximately 6 cm below the surface. Materials found within these test pits included leaf litter, roots, and clay.

Upper Ridge Crest 5

Test pits 1 and 2 (TP 1, TP 2) These test pits were characterized by a silty clay 'A' horizon with heavy organic material and small to medium rocks. The 'B' horizon was an orange-yellow clay approximately 18 cm below the surface. Materials found within these test pits included leaf litter, roots, iron stone, and clay.

Test pit 3 (TP 3) This test pit was characterized by a shallow silty clay 'A' horizon with heavy organic immediately overlying a distinct orange-yellow clay The 'B' horizon, approximately 10 cm below the surface. Materials found within these test pits included leaf litter, roots, and clay.

Figure 20: URC 3 TP 4 dark compacted soils layer

Figure 21: URC 2 TP 3 layer with rock inclusions

Figure 22: URC 5 TP 3 orange-clay layer

7.3.3 Summary of Test Pit Soil Profiles

Soils were yellow podsols predominantly comprising brownish - black silty clay loam topsoil overlying yellow - orange hardsetting clay with varying amounts of parent material. The podzolic soil 'A' horizon was consistent across the 24 test pits, while the 'B' horizon varied in character. In many test pits the soil gradually became more compact until they reached a clay form, while in others there was a distinct orange clay horizon. Many test pits also ended in a dense layer of rocks set into the clay 'B' horizon. Sediment samples were collected from 13 of the test pits. A summary of the soil profile information is provided in

Table 3.

Figure 23: URC 4 TP 4 northwest wall

Figure 24: URC 4 TP 1 northwest wall

Table 3: Test Pit Dimensions and Soil Profile Summary

Locality	*Test Pit Number*	*Test Pit depth (cm)*	*pH*	*Soil Profile Summary*
URC 1	*1*	*0-26*		Very dark greyish brown (10YR 3/2) silty clay loam topsoil with heavy organic content (roots and rootlets) and some quartz gravel overlying reddish hardsetting clay.
URC 1	*2*	*0-18*		Very dark brown (10YR 2/2) silty clay loam topsoil with heavy organic content (roots and rootlets) and small to large rocks overlying reddish hardsetting clay.
URC 1	*3*	*0-21*	5	Dark brown (10YR 3/3) silty clay loam topsoil with heavy organic content (grass, roots, and rootlets), small to medium rocks, and quartz gravel overlying compact clay soil.
URC 1	*4*	*0-24*		Very dark greyish brown (10YR 3/2) silty clay loam topsoil with heavy organic content (grass, roots, and rootlets), small to medium rocks, and quartz gravel overlying clay shale
URC 1	*5*	*0-25*		Very dark greyish brown (10YR 2/2) silty clay loam topsoil with heavy organic content (grass, roots, and rootlets) and small to medium rocks overlying a dense layer of rocks and compacted soils.
URC 2	*1*	*0-30*		Very dark greyish brown (10YR 3/2) silty clay loam topsoil with heavy organic content (grass, roots, and rootlets) and small to medium rocks overlying compact clay soil.
URC 2	*2*	*0-26*		Dark brown (10YR 3/3) silty clay loam topsoil with heavy organic content (grass, roots, and rootlets) and small to medium rocks and clay shale gravel overlying a dense layer of basalt rock and clay shale
URC 2	*3*	*0-29*	5	Dark Brown (7.5YR 3/4) silty clay loam topsoil with organic content and small to medium rocks overlying reddish (10YR 5/6) compacted clay soils and clay shale
URC 2	*4*	*0-26*		Very dark greyish brown (10YR 3/2) silty clay loam topsoil with heavy organic content (grass, roots, and rootlets), small to medium rocks, and clay shale inclusions overlying reddish hardsetting clay.
URC 2	*5*	*0-29*		Very dark brown (10YR 2/2 - 2/3) silty clay loam topsoil with heavy organic content (grass, roots, and rootlets), small to medium rocks, and clay shale inclusions overlying reddish compacted clay soils.

Locality (Cont.)	Test Pit Number	Test Pit depth (cm)	pH	Soil Profile Summary (Cont.)
URC 3	1	0-22		Black (10YR 2/1) silty clay loam topsoil with heavy organic content (grass, roots, and rootlets) and small to medium rocks overlying a dense layer of rocks and compacted soils.
URC 3	2	0-26		Very dark greyish brown (10YR 3/2) silty clay loam topsoil with some organic content (grass and rootlets) and small to large rocks overlying reddish hardsetting clay.
URC 3	3	0-22		Very dark greyish brown (10YR 3/2) silty clay loam topsoil with many rocks and compacted dirt overlying a compacted clay soil.
URC 3	4	0-17		Very dark brown (7.5YR 2.5/2) silty clay loam topsoil with organic content (grass, roots, and rootlets) and small to medium rocks overlying compact clayey soils
URC 3	5	0-22		Very dark greyish brown (10YR 3/2) silty clay loam topsoil with heavy organic content (leaf litter, roots, and rootlets) overlying dense, compact organge-ish clay soils
URC 3	6	0-27		Very dark brown (7.5YR 2.5/2) silty clay loam topsoil with organic content (grass, roots, and rootlets), becoming hard and compact over depth, overlying a reddish hardsetting clay.
URC 4	1	0-23		Very dark greyish brown (10YR 3/2) shallow silty clay loam topsoil with organic content (grass, roots, and rootlets) overlying a dense layer of rocks, clay, and roots.
URC 4	2	0-14		Very dark brown (7.5YR 2.5/2) shallow silty clay loam topsoil with organic content (grass, roots, and rootlets) overlying a dense layer of rocks and red and yellow clay.
URC 4	3	0-5		Dark brown (10YR 3/3) very shallow silty clay loam topsoil with roots and grass immediately overlying yellow and orange clay.
URC 4	4	0-8		Dark reddish brown (5YR 2.5/2) very shallow silty clay loam topsoil with roots and grass immediately overlying red clay.
URC 4	5	0-22		Very dark brown (10YR 2/2) silty clay loam topsoil with heavy organic content (grass, roots, and rootlets) and small to medium rocks and quartz gravel overlying reddish hardsetting clay.
Locality (Cont.)	Test Pit Number	Test Pit depth (cm)	pH	Soil Profile Summary (Cont.)

URC 5	*1*	*0-19*		**Very dark brown (7.5YR 2.5/2) silty clay loam topsoil with heavy organic content (grass, roots, and rootlets) and small rocks and iron stone overlying dark clay soils and clay shale.**
URC 5	*2*	*0-17*	5.5	**Very dark greyish brown (10YR 3/2) silty clay loam topsoil with heavy organic content (grass, roots, and rootlets) and small rocks overlying dark clay soils.**
URC 5	*3*	*0-10*		**Very dark brown (7.5YR 2.5/2) shallow silty clay loam topsoil with many rocks overlying dark clay soils.**

7.3.4 Discussion

Test pits across the Upper Ridge Crest were placed perpendicular to the ridge crest to determine whether there was a relationship between elevation and artefact density, and to test the degree of intra- sample unit variability. All of the test pits were excavated to a maximum depth of 30 cm, owing in most part to the clay 'B' horizon.

Test excavations in this area revealed a high level of variation between soil profiles in terms of the depth of the 'B' horizon, soil characterized by the 'B' horizon, and other factors such as the presence of clay shale and dense rock layers. With no obvious pattern linked to test pit location, topography or erosional forces, the high variation in soils is most likely the result of significant ground disturbance. When combined with evidence from historic aerials and previous archaeological reports, the excavations in this zone confirm that the area was highly disturbed through a combination of processes which included clearing and grazing at the very least.

Because no test pits contained artefacts, the excavations at the Upper Ridge Crest found no correlation between landform, test pit location, and artefact density. Furthermore, the fact that no artefacts were found at all demonstrates a lack of occupation and a lack of archaeological significance in this zone, previously thought to have been a landform that would have attracted Aboriginal peoples.