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***Proposed development at  
Rainbow Beach, Bonny Hills  
NSW mid-north coast***

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**Aboriginal cultural heritage reassessment**

July 2006

*Prepared on behalf of :*

*Luke and Company NSW Pty Ltd  
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# I INTRODUCTION

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## I.1 Background

In 1996, a 130 hectare property between Lake Cathie and Bonny Hills was surveyed for archaeological evidence in response to a residential development proposal (Collins 1996). The 1996 survey resulted in the recording of ten Aboriginal artefact occurrences within and immediately adjacent to the property boundaries. Management recommendations for these sites were made in light of the residential subdivision concept plan current at that time. The subdivision development is yet to proceed, and recent changes to the concept plan have in some cases altered proposed impacts to the recorded sites. In addition, the development area has been extended south to incorporate approximately eight further hectares of land.

This report was commissioned by Luke and Company NSW Pty Ltd to address the revised concept plan. Impacts on the Aboriginal heritage resource are reassessed and management recommendations amended as warranted to comply with the provisions of the National Parks and Wildlife Act 1974 and Environmental Planning and Assessment Act 1979. A field survey was also conducted in the southern extension area.

## I.2 Location of the study area

The study area lies between the townships of Lake Cathie and Bonny Hills around 18 kilometres south of Port Macquarie on the NSW mid-north coast. It is bounded to the north and west by Ocean Drive, and encompasses approximately 138 hectares of land between 350 and 1,800 metres inland of Rainbow Beach (Figure 1).



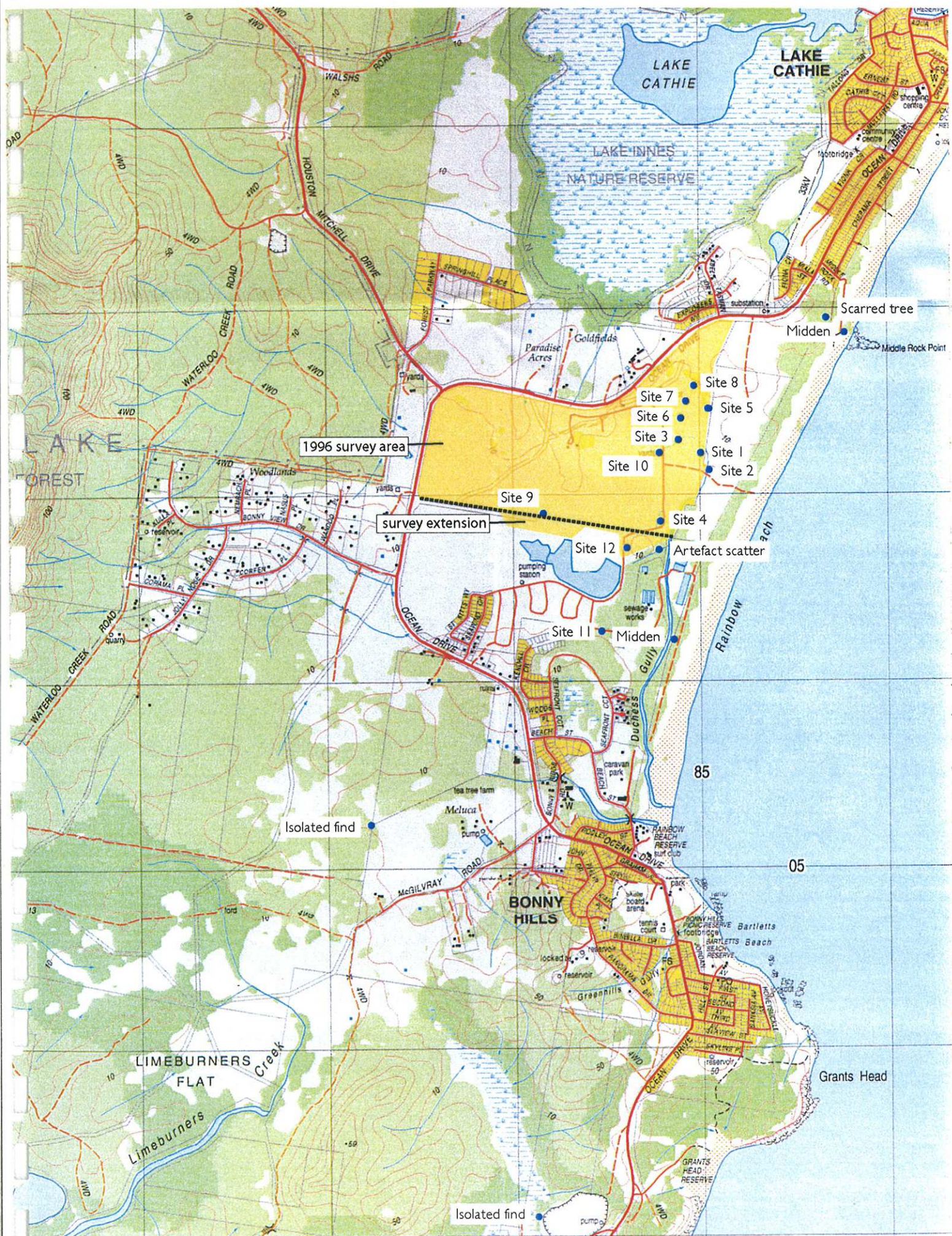


Figure 1. Location of the study area (yellow) and recorded Aboriginal sites  
(excerpt from Grants Head 9434-IN 1:25,000 CMA map, Edition 3, NSW Land Information Centre, 2000)



Table 1. Study area location details

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Local Government Area:	Port Macquarie-Hastings
County:	Macquarie
Parish:	Queenslake
1:25,000 topographic map:	Grants Head 9434-1N
Local Aboriginal Land Councils:	Birpai and Bunyah

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## 2 ABORIGINAL INVOLVEMENT

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The 130 hectare property assessed in 1996 lies within the territory administered by the Birpai Local Aboriginal Land Council (LALC). The southern boundary of this area coincides with the boundary between the Birpai and Bunyah LALCs. The 1996 survey was conducted with the assistance of a Birpai LALC representative. Site management recommendations developed in liaison with this representative were subsequently endorsed at a full Land Council meeting. The Birpai LALC assessed the Rainbow Beach sites, as a group, to be of general heritage (Aboriginal social) value (Collins 1996:36). The Bunyah LALC was also contacted and informed of the development proposal, survey results and site management recommendations (Collins 1996:17-18).

As the only person identified with traditional knowledge of the Port Macquarie-Bonny Hills coastal stretch, Birpai Elder (the late) William ('Gulah') Holten was consulted in 1996 to determine the area's anthropological values. Mr Holten advised that a large traditional campsite was known to have been situated somewhere in the Rainbow Beach locality, but that the area was not known to contain any ceremonial, mythological or sites of other spiritual significance (Collins 1996:18). This information was verified by his son, Lindsay Moran (Birpai LALC Senior Sites Officer), during the present reassessment.

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On commission by Luke and Company to undertake the reassessment, the consultant contacted Jack Beetson and Mike Dibbs, respective Coordinators of the Birpai and Bunyah LALCs. It was arranged that the southern extension area would be surveyed with the assistance of Bunyah LALC Sites Officers Trevor Roberts and Stan Chatfield on the 14<sup>th</sup> of June 2006, and that Birpai LALC Senior Sites Officer Lindsay Moran would represent Birpai interests in an inspection and reassessment of Sites 1-10 in the northern section of the study area on the 20<sup>th</sup> of June 2006. The revised management recommendations presented in Section 10 of this report were formulated on the basis of discussions with these Aboriginal representatives and are consistent with their advice.

### 3 ENVIRONMENT AND LANDUSE EFFECTS

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The study area lies within the North Coast Bioregion (Mitchell 2002), where it includes coastal hills, coastal alluvial plains and an inner coastal barrier towards the southern limit of the subtropical zone (Cox and Corkill 1983:20). The locality would have been climatically conducive to year-round Aboriginal occupation, but periodic inundation of the alluvial plains stemming from heavy summer rains is likely to have influenced site placement choices.

A series of low rolling coastal hills followed by Ocean Drive along the northern boundary reach a maximum elevation of 24 metres AHD. Low and moderate gradient hillslopes (8-10 percent) fall south from the crests to meet low-lying alluvial plains. These slopes comprise more than two thirds of the study environment. The hills are based on schist, phyllite, greywacke and slate of the Port Macquarie Block (Tamworth-Hastings 1:250,000 metallogenic mapsheet), which have decomposed to produce clay soils with a compact yellow or grey A horizon, littered in places with fragments of the parent rocks. The coastal hills are also represented by an outlying knoll that rises to around 15 metres AHD on the south-east corner, in the southern extension area. In contrast to the northern hills, this knoll is based on rocks of the Lorne Basin, which include chert, jasper, quartz and quartz-feldspar porphyry. Small pebbles of these materials occur on eroded pans of rich red-orange clay on

the knoll footslopes. Larger-sized pebbles are also distributed along the length of nearby Rainbow Beach.

Alluvial plains between the hill footslopes and southern study boundary predominantly lie below the 1:100 year flood level (Staniland Mounser Consulting 1994) and are variously composed of yellow to grey duplex soils and dark drainage-impered organic loams. Excavated drainage channels and lakes divert runoff into Duchess Creek, suggesting that much of this landform would have originally been covered in swamp. Duchess Creek is a short, narrow, lightly-incised permanent watercourse that rises in the central eastern part of the study area before running south along the eastern boundary to discharge into the ocean at Bonny Hills. Although tidal towards Bonny Hills, the upper reach of this creek is fresh.

On the study area's central east and south-eastern extremities, the alluvial plains adjoin a degraded inner coastal barrier of gently-undulating to flat Pleistocene sands. This barrier is of very low relief, but is well-drained and stands above the 1:100 year flood limit (Staniland Mounser Consulting 1994).

Virtually all of the study area has been cleared, either during the course of former development activities or for agricultural purposes, and currently supports cattle grazing pastures. Apart from a few isolated mature specimens, tree cover is restricted to pockets of regrowth. A vegetation survey conducted prior to large-scale clearing (Clancy and Ayres 1983:3-5) indicates that the hills originally supported dry open forest dominated by grey gum, grading to moist flooded gum forest with rainforest elements along the margins of Duchess Creek. The alluvial plains were covered in swamp forest, mainly paperbark, tea-tree and swamp mahogany with an understorey of grass trees, ferns, sedges and rainforest shrubs and vines. Oak forest occurred in areas prone to prolonged inundation. Littoral rainforest remains on dune sands north-east of the study area and Happ and Bowdler (1983:3) describe rainforest remnants along the northern reach of Duchess Creek in 1983. A 1:6,000 airphoto series taken in 1977 suggests that the study area's inner coastal barrier was once covered in similar rainforest.



Despite clearing and grazing, the coastal hills are topographically intact, with development disturbance restricted to a few graveled vehicle tracks (including a downcut track up the south-east knoll), an existing house and a small disused hard rock quarry on the crest of the central northern hill, and the site of a former house and roadway on the eastern slope of this hill. The alluvial plains and sand barrier have been more substantially altered, featuring a network of excavated drainage channels, an artificial lake in the central east, and a house and plant nursery in the north-east section. Sand has been extracted from at least two separate locations. The alluvial plains (including those within the southern extension area) have suffered high-level mechanical disturbance as a result of earthworks associated with an abandoned golf course development

## 4 CULTURAL BACKGROUND

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It is generally accepted that the traditional inhabitants of Lake Cathie-Bonny Hills belonged to the Birpai tribe, speaking a closely related variant of the Kattang language (Holmer 1966). By all accounts the family was the basic socio-economic unit in Birpai society and usually several families would co-operate as a highly flexible band. In turn, bands made up loose clans that regularly exploited a specific parcel of land, the boundaries of which were defined and generally known. In resource-rich coastal areas clan estates were reasonably small (for instance, estates 32 kilometres in diameter were reported on the lower Macleay River during the early contact years [Henderson 1851; Hodgkinson 1845]). During the course of everyday life clan groups remained within their own estates, their constituent bands seasonally aggregating and dispersing in tune with the availability of water, and the types and abundance of available resources (Lilley 1984). As stated by McDougall (1900:116), "each tribe kept its own belt of country, and separated into small camps, and only collected together on special occasions".

With the possible exception of the immediate coast, shifting camp seems to have been frequent, "occurring about monthly as the game in the immediate vicinity became

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exhausted ... it took several months to give each ground in the locale its turn" (McFarlane 1934-5). According to Dawson (1935), "the middle of each day was spent around the fire where the venison or game was procured, and the remnant of the meal ... was carried back to camp for evening consumption". On the basis of this description it seems that base camps would have been situated in sheltered areas offering suitable conditions, with a large number of small resource-specific sites scattered between.

Many of the Hastings region's material items were made from the wood or bark of various trees. These include shields, spears, boomerangs, clubs, digging sticks, containers and canoes. The Birpai people controlled the natural fracture properties of fine-grained stones to produce a variety of cutting and scraping tools, many of which were used to manufacture and maintain these types of wooden items. Pebbles of high flaking quality stone are common along Rainbow Beach and are likely to have been collected for this purpose.

Although Captain Cook reported smoke from Aboriginal campfires on the Camden Haven in 1770 (extract from the log book of Captain Cook in Camden Haven Historical Society 1991:7), it was not until John Oxley's party traveled down the Hastings Valley in 1818 that the first direct contact between Europeans and the traditional Birpai inhabitants occurred. On his journey south, Oxley (1820) camped near a freshwater spring at Bonny Hills, but no reference is made to Aboriginal people in this locality.

Following initial exploration, sustained and unavoidable contact with Europeans was introduced with the establishment of Port Macquarie as a penal settlement in 1821. By 1828 limeburners' camps were operating further south at Laurieton (Camden Haven Learning Exchange 1987:5; Camden Haven Historical Society 1991:13). Little information is available for the Lake Cathie-Bonny Hills-Camden Haven district between the late 1820s and 1860, and it is thought to have remained an isolated outpost of Port Macquarie, visited by limeburners, cedar cutters, escaped convicts and graziers in search of free pasture (Camden Haven Learning Exchange 1987:6). Traveling along the western

shore of Queens Lake near Laurieton in 1845, Hodgkinson met Aboriginal people who were well acquainted with Europeans and whom spoke some English (Camden Haven Historical Society 1991:6).

Historical information suggests that Birpai clans in the Lake Cathie-Bonny Hills area could have maintained their traditional lifestyle with little disruption up until the 1870s. However, the population is likely to have already been decimated by measles (Blomfield 1981:61) and smallpox, which reached Port Macquarie as early as 1831 (Campbell 1985:337). There is a belief that at least some of the Aboriginal people at Bonny Hills were massacred by early European settlers near Greenhills Gully, approximately 2.3 kilometres south of the study area (cf Collins 2003a:10). During the late 1930s, around six Aboriginal families camped for an extended period beside this gully while the men mustered cattle for a local landowner (Bartlett 1991).

A valuable photographic record of local Aboriginal life has been left by Thomas Dick, who employed Birpai people to re-enact various tasks using traditional equipment. The Dick photographs were taken between 1910 and 1927 (McBryde 1985) and include shots of Aborigines grinding axes on a sandstone outcrop at Bonny Hills, and men spearing fish beside a bark canoe near the mouth of Duchess Creek.

## 5 ARCHAEOLOGY OF THE STUDY AREA

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### 5.1 Study area surveys prior to 1996

In 1981, Coleman inspected a proposed pipeline route between Port Macquarie and Laurieton that traversed the study area close to Duchess Creek. No sites were recorded in the Lake Cathie-Bonny Hills area.

A land parcel totaling approximately 225 hectares that included the study area subject of this report was surveyed by Happ and Bowdler in 1983 for a previous development proposal. "Ground visibility was almost nil in all situations ... although some exposures did exist and were inspected" (Happ and Bowdler 1983:4). Recordings were restricted to two silcrete cores and a silcrete flake on a gravel lag in the bed of a small tributary of Duchess Creek south of the present study boundary, and a silcrete flake in a spill of sand down the northern bank of the tributary 15-20 metres further downstream (Site #30-6-32).

## 5.2 Other relevant surveys

In 1970, Starling included Rainbow Beach in her extensive survey of the northern NSW coastline which aimed to assess the impact of sandmining on archaeological sites. Starling recorded Site #30-6-12 along this stretch of the beach, stating that "shelly horizons outcrop for up to 10 yards over 4.5 miles of dune. Some have small talus deposits below them, most appear to follow an old surface. Narrow low dune partly stabilised by scrub with eroding east face above indurated sand cliff. Soaks behind c 200 yards. Pipi shell deposit, occasionally charcoal, fire-shattered pebbles, few flakes, unworked pebbles" (Starling 1971).

When inspected by Happ and Bowdler in 1983, evidence of Site #30-6-12 was restricted to four *in situ* pipi shell lenses, each 1-3 centimetres thick and 10-100 centimetres long, sitting in a dark grey organic layer 50-100 centimetres below the top of the foredune scarp. No diagnostic artefacts were observed, although one lens contained charcoal and split cobbles (Happ and Bowdler 1983:15). The locations of these materials in relation to the 1.6 kilometre stretch of the foredune surveyed were not defined.

## 5.3 The 1996 survey

The 1996 survey, conducted by the consultant on behalf of Luke and Company (Collins 1996), targeted all reasonably level well-drained ground, including the inner coastal barrier, bedrock hillcrests and low-gradient footslopes. Due to their assessed low sensitivity, less



attention was paid to drainage-impered alluvial plains. In contrast to the poor detection conditions reported by Happ and Bowdler (1983), by 1996 the area supported a substantial herd of cattle and surface exposures were common, especially on the inner coastal barrier, which offered a mean 20 percent archaeological visibility. In all, an estimated 33.5 percent of the area was inspected in 1996, of which 13 percent was subject to effective survey coverage (Collins 1996:24-5).

The 1996 survey resulted in the recording of eight stone artefact scatters and two isolated artefacts of relevance to this reassessment. These sites are described in Section 6 in relation to the revised development concept plan. The artefact assemblage comprised flakes, flaked pieces, cores, split pebbles, pebble and flake tools made on a range of raw stone materials dominated by siltstone, quartz and chert. Almost half of the artefacts carried pebble cortex. All typically reflected an unspecialised stone technology centred on the production of large amorphous pebble 'choppers' and smaller flake implements, resulting in the discard of reasonably small expanded flakes and low profile multi-platform (and occasionally single platform and bipolar) cores that had generally ceased to be used well before reaching exhaustion levels.

The 1996 survey results demonstrate that Aboriginal people used the study area, bringing with them water-worn pebbles, probably collected from Rainbow Beach. These pebbles were used to manufacture stone tools at campsites established on the inner coastal barrier adjacent to backswamps. A number of artefacts discovered on the alluvial plains were thought representative of a general background artefact distribution that focuses on land above the 1:100 year flood level, in the eastern part of the study area. A scatter of three stone artefacts was detected on a bedrock footslope in the north-east, but the coastal hills were assessed to have a low overall level of archaeological sensitivity. This assessment is consistent with the results of more recent surveys on the same hill system north of Ocean Drive (Collins 2003a) and immediately east of the study boundary (Collins 2003b), where recordings were restricted to a scarred tree within a relict stand of littoral rainforest near Middle Rock Point.

Given that the development proposal includes a pedestrian access to Rainbow Beach utilising an existing track downcut through foredunes 900 metres south of Middle Rock Point, this area was inspected for evidence of Site #30-6-12 in 1996. The inspection revealed a sparse horizon of fragmented pipi shell 200 metres north of the existing track. No cultural materials were detected in the track cutting or its immediate surrounds, and it was concluded that any small-scale track upgrading works would be unlikely to intersect with the surviving remnants of Site #30-6-12.

## 6 THE RECORDED SITES AND PROPOSED DEVELOPMENT IMPACT

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The locations of sites recorded during the 1996 survey are plotted in relation to the revised development concept plan on Figure 2. Descriptions of these sites (given by Collins 1996) are presented below, supplemented by the results of the re-inspection undertaken in conjunction with this report. Note that Site 11 (#30-6-116), also recorded in 1996, lies well beyond the southern study boundary (cf Figure 1) and is not within the scope of the present development proposal.

### 6.1 Site 1: Artefact scatter/Open campsite (#30-6-106)

AMG Grid reference: 484910.6507020 Grants Head 1:25,000 mapsheet

In 1996, 18 stone artefacts and several unmodified beach pebbles were found scattered across the 200 square metre surface of a shallow disused sand extraction pit 14 metres south of Duchess Creek in the eastern part of the study area. Two additional artefacts were recorded on the northern bank of the creek, 17 metres further north. The artefacts included flakes, flaked pieces, cores and nuclear tools, all manufactured on siltstone, quartz, greywacke and chert beach pebbles.

Although previously recommended for stabilisation work (Collins 1996:39), the re-inspection revealed that the site has naturally stabilised as a result of reduced grazing effects and vegetation regeneration. No exposed artefacts were detected.

Site 1 would not be affected by the revised development proposal.

## **6.2 Site 2: Artefact scatter/Open campsite (#30-6-107)**

AMG Grid Reference: 484930.6506900 Grants Head 1:25,000 mapsheet

In 1996, two nuclear tools and three multi-platform cores made on siltstone beach pebbles were recorded on the eastern bank of Duchess Creek, approximately six metres north of a small bridge that crosses the creek. The artefacts were found within a two square metre area on the recently cleared sand barrier. A wider scatter of unmodified pebbles also occurred.

No artefacts were detected during the present re-inspection due to grass regeneration and a negligible level of archaeological visibility.

Site 2 lies just beyond the eastern study boundary but the bridge and its associated lightly graveled vehicle track may be upgraded to provide beach access for subdivision residents. The site would not be affected by this proposal providing suitable precautions are taken during the course of upgrading works.

## **6.3 Site 3: Artefact scatter/Open campsite (#30-6-108)**

AMG Grid Reference: 484830.6507100 Grants Head 1:25,000 mapsheet

Site 3 encompasses two artefact locations- one on either side of Duchess Creek. At 'location 1' on the southern side of the creek and three metres from its bank, a siltstone unifacial pebble tool and a quartz multi-platform core were recorded on the surface of a small depression excavated into the sand (Collins 1996:26). A narrow drain runs north

from Duchess Creek opposite 'location 1'. Here, 20 metres north of Duchess Creek, nine stone artefacts were found eroding from the drain cutting approximately 20 centimetres below the surface ('location 2'). These included flakes, flake tools and a bifacial pebble tool distributed along a 10 metre length of the drain. In contrast to the sand substrate south of Duchess Creek ('location 1'), lowlands to its north are composed of dark brown alluvium ('location 2').

No Site 3 artefacts were detected during the present re-inspection due to grass regeneration and a negligible level of archaeological visibility.

No disturbance is planned in 'location 1'. However, 'location 2' is intercepted by a roadway proposed to connect the development with another proposed residential area east of the study boundary (Figure 2). Management recommendations in relation to this site have been amended as a result of this new proposal.

#### **6.4 Site 4: Artefact scatter/Open campsite (#30-6-109)**

AMG Grid Reference: 484650.6506640 Grants Head 1:25,000 mapsheet

This site is located on the sand barrier in the south-eastern corner of the study area, immediately north of the bedrock knoll. In 1996, 115 stone artefacts were recorded at four separate locations within the Site 4 area. Drained alluvial plains extend further west, and it thus appears that the site was established close to or on the forest/swamp ecotone.

'Location 1': On the eastern side of the main gravel road that runs generally north-south through the study area, the northern footslopes of the knoll are overlapped by the inner coastal barrier. Here, seven stone artefacts and a low-density scatter of pipi shell fragments were recorded on sand exposures within a five metre wide and 28 metre long area stretching along the footslope (Plate 1).



'Location 2': On the western side of the gravel road opposite 'location 2' sand has been extracted from an elevated rise. In 1996, an area some 100 metres long (N/S) and 30 metres wide (E/W) was almost fully-exposed as a result of this sand extraction. One hundred and three stone artefacts were recorded on the exposure, and while none were observed stratified within the 1.2 metre high quarry cutting, many of the artefacts were eroding down the cutting face. The (grassed) sand rise extends for around 15 metres west from the extraction pit and there is a high likelihood of potentially undisturbed subsurface evidence occurring on this landform.

'Location 3': 20 metres north-west of 'location 2' a small elevated sand 'island' has been left (or built) amidst surrounding excavated and drained lowland. In 1996, four stone artefacts were detected on the disturbed and denuded surface of this feature.

'Location 4': Across drained and very disturbed lowland some 20 metres north-west of 'location 3', two additional artefacts were detected on the exposed surface of an artificial mound, a 'green' for the abandoned golf course development. This mound contained a mixture of grey sand and black-brown alluvium. The artefacts had obviously been transported to this location along with the soil matrix and it is likely that both the 'location 3' and 'location 4' materials originated closer to 'location 2'.

The site assemblage comprised flakes, flaked pieces, cores and nuclear tools made on a range of raw materials including siltstone, sandstone, quartz, quartzite, chert, jasper, chalcedony, and unidentified fine-grained volcanic stones, all of which appeared to derive from beach pebbles. Much of the debitage occurred as discrete clusters of the same raw material along the western edge of the quarry pit, suggesting that knapping floors had eroded from the cutting without experiencing major horizontal disturbance.

The present re-inspection revealed much of Site 4 to have stabilised with grass since 1996 (Plate 2). Visible artefacts were restricted to one chalcedony flake in 'location 1', and three quartz flakes in 'location 2'.

Although not subject to development impact under the 1996 proposal (cf Collins 1996:28), locations 2, 3 and 4 are now within an area proposed for construction of artificial wetlands (cf Figure 2). Management recommendations in relation to Site 4 have thus been amended in line with the revised concept plan.

## **6.5 Site 5: Isolated find (#30-6-110)**

AMG Grid Reference: 484940.6507250 Grants Head 1:25,000 mapsheet

This site comprises a greywacke multi-platform core, found on the disturbed surface of an underground pipeline alignment that traverses alluvial lowlands close to the eastern study boundary. No further artefacts were detected in the locality in 1996, despite 40 percent visibility across the slashed grassland.

The Site 5 artefact would not be affected by the current development proposal and was not located during the re-inspection.

## **6.6 Site 6: Artefact scatter/Open campsite (#30-6-111)**

AMG Grid Reference: 484760.6507200 Grants Head 1:25,000 mapsheet

Site 6 comprises two pebble tools with bifacial end flaking and step retouch discovered on either side of a narrow drain approximately 100 metres east of the graveled access road on the eastern alluvial plains. Both artefacts were eroding down the face of the drain cutting and their original stratigraphic location remains unknown. In 1996, visibility along the edge of the drain was very good (50-100 percent), but no other cultural material was observed.

No artefacts were detected during the present re-inspection, although exposure levels had fallen to approximately 20 percent due to vegetation regeneration (Plate 3).

Site 6 lies within an area proposed for residential development under both the previous and revised concept plans (Figure 2). Management recommendations for this site remain

unchanged.

## **6.7 Site 7: Artefact scatter/Open campsite (#30-6-112)**

AMG Grid Reference: 484780.6507270 Grants Head 1:25,000 mapsheet

The two Site 7 artefacts, a greywacke flake and a siltstone unifacial pebble tool, were recorded 20 metres apart on the eastern cutting of the same drain 77 metres north of Site 6. Again, stratigraphic context remains unknown, but it seems likely that the artefacts originated from beneath the alluvial surface.

Neither artefact could be located during the present re-inspection, nor were any additional artefacts apparent in the 10 percent exposed drain cuttings.

Site 7 lies within an area proposed for residential development under both the previous and revised concept plans (Figure 2). Management recommendations for this site remain unchanged.

## **6.8 Site 8: Artefact scatter/Open campsite (#30-6-113)**

AMG Grid Reference: 484910.6507370 Grants Head 1:25,000 mapsheet

This site comprises two pebble tools and a siltstone flake, found along a 30 metre section of the low-gradient bedrock footslope, adjacent to a freshwater spring in the north-eastern section of the study area. The compact grey clay soils support oak regrowth. In 1996, the footslope featured a network of fully-exposed cattle tracks and the grass had been recently slashed, offering overall visibility in excess of 40 percent.

No artefacts were detected during the present re-inspection due to vegetation regeneration and a negligible level of archaeological visibility.

Site 8 would not be affected by the revised development proposal.

## 6.9 Site 9: Isolated find (#30-6-114)

AMG Grid Reference: 484070.6506700 Grants Head 1:25,000 mapsheet

Site 9 is represented by a small greywacke flake detected on the dark silt surface of the alluvial plain near the study area's central southern boundary in 1996. This section of the plain supports reeds and small regrowth paperbarks and appears to have been disturbed, probably during excavation of a nearby drain.

The artefact would not be affected by the revised development proposal and was not located during the present re-inspection.

## 6.10 Site 10: Artefact scatter/Open campsite (#30-6-115)

AMG Grid Reference: 484680.6507020 Grants Head 1:25,000 mapsheet

In 1996, a scatter of 13 stone artefacts was recorded on a disturbed 50 square metre exposure on the slightly elevated inland rim of the inner coastal barrier, 25 metres south-east of Duchess Creek and immediately west of the graveled access road. One additional artefact was found on the nearby southern bank of the creek. Cattle yards border the southern margin of the site and despite search of these and the sparsely grassed sand plain south of the yards, no further artefacts were detected. The recorded artefacts included flakes, multi-platform cores and a flake tool made on siltstone, greywacke, chert and quartz beach pebbles.

Due to reduced grazing effects and grass regeneration, the present re-inspection revealed no surface artefacts in the Site 10 area (Plate 4).

Although not targeted for development impact under the 1996 proposal (Collins 1996:30), Site 10 now lies on a proposed road alignment (Figure 2). Management recommendations in relation to this site have thus been amended in line with the revised concept plan.



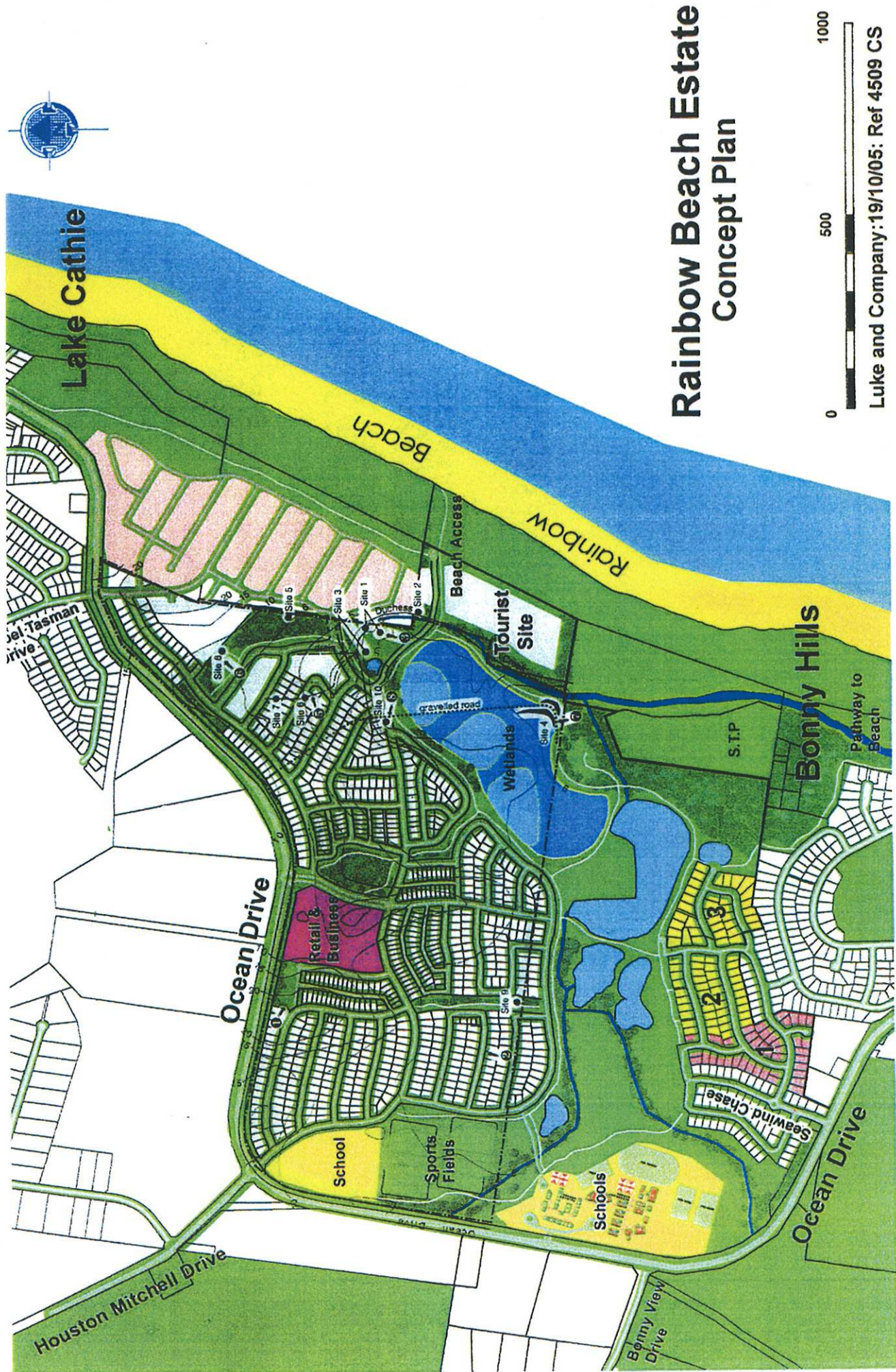


Figure 2. Location of Aboriginal sites recorded in 1996 in relation to the revised concept plan





Plate 1. Site 4 (#30-6-109). View east from 'location 2', across gravelled road to sand exposure at 'location 1'.



Plate 2. Site 4 (#30-6-109). View south across the regenerating and now reasonably well-stabilised 'location 2' quarry cutting.





Plate 3. Site 6 (#30-6-111). View west from drain across alluvial plains.



Plate 4. Site 10 (#30-6-115). View south-east across former sand exposure.





Plate 5. Southern extension area. Typical low visibility on alluvial plains.



Plate 6. Southern extension area. View east to low bedrock knoll (Site 12 located within oaks in middle distance).





Plate 7. Example of Site 12 artefacts, on eroded knoll footslope.



Plate 8. Southern extension area. Existing downcut track on knoll south of the Site 12 artefact scatter. Recommended knoll access route.

## 6.11 Additional sites and survey requirements

Searches of the Commonwealth and National Heritage lists and the Register of the National Estate maintained by the Department of Environment and Heritage (DEH) revealed no registered cultural heritage sites in or near the study area.

Apart from Sites 1-10 described in Sections 6.1-6.10 above, and the Rainbow Beach midden (#30-6-12) discussed in Section 5.3, no sites listed on the Department of Environment and Conservation (DEC) Aboriginal Heritage Information Management System (AHIMS) database would be threatened by the development proposal.

The 1996 survey entailed a three day inspection of the 130 hectare property by two experienced archaeologists (the consultant and former Birpai LALC Coordinator Athlea Sullivan) to record both exposed archaeological sites and potential archaeological deposits. Almost five percent of the total area was subject to effective surface coverage. On the basis of field observations and the recorded site distribution it was concluded that any significant archaeological materials would be limited to the general locations where surface sites had been discovered (Collins 1996:38).

The present re-inspection revealed the study area to offer a substantially lower level of archaeological visibility than in 1996, and detectable surface evidence was restricted to four stone artefacts at one of the ten previously registered sites. This deterioration in visibility is attributed to revegetation stemming from less intensive cattle grazing. Given the extent and overall effectiveness of the 1996 survey and the poor survey conditions now available, further field survey work is not considered warranted, nor is it likely to be effective. As such, no further field survey requirements are recommended.

## 7 SOUTHERN EXTENSION AREA- FIELD SURVEY

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### 7.1 Method and procedure

Field survey of the southern extension area was undertaken with the assistance of Bunyah LALC Sites Officers Trevor Roberts and Stan Chatfield on the 14<sup>th</sup> of June 2006. The weather was fine and lighting was conducive to the detection of archaeological materials.

Given the small size of the extension area (approximately eight hectares), it was decided to undertake as comprehensive a survey as visibility conditions allowed. All exposed surfaces were inspected, including drain and dam margins and cuttings, cattle and vehicle tracks, animal diggings, lightly grassed surfaces and other mechanical and erosion disturbances. The survey involved variable traverses by the three surveyors walking up to five metres apart, inspecting all surface exposures within their line of sight. All three surveyors inspected vehicle tracks and wider exposures until such time as all were satisfied that any surface evidence had been identified.

### 7.2 Survey coverage

The entire eight hectares was covered during the survey but only a small proportion of this provided conditions suitable for detecting surface sites.

The concept of coverage analysis has been developed as a means of specifying the proportion of a survey area that permitted site detection. To generate data sufficient for evaluating the potential for and distribution of undiscovered sites, variables constraining site detection were estimated for all landform elements. These include an estimation of the mean frequency with which surface exposures were encountered, as well as an estimation of the quality of visibility on those exposures (mean frequency of bare ground suitable for artefact detection).