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Bonhomme
Archaeological Survey
1988

An Archaeological Survey and Preliminary Assessment of Sites in the Proposed North Tuncurry Development Area, NSW

A Report to the Great Lakes Shire Council, Forster, NSW

by
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January 1988

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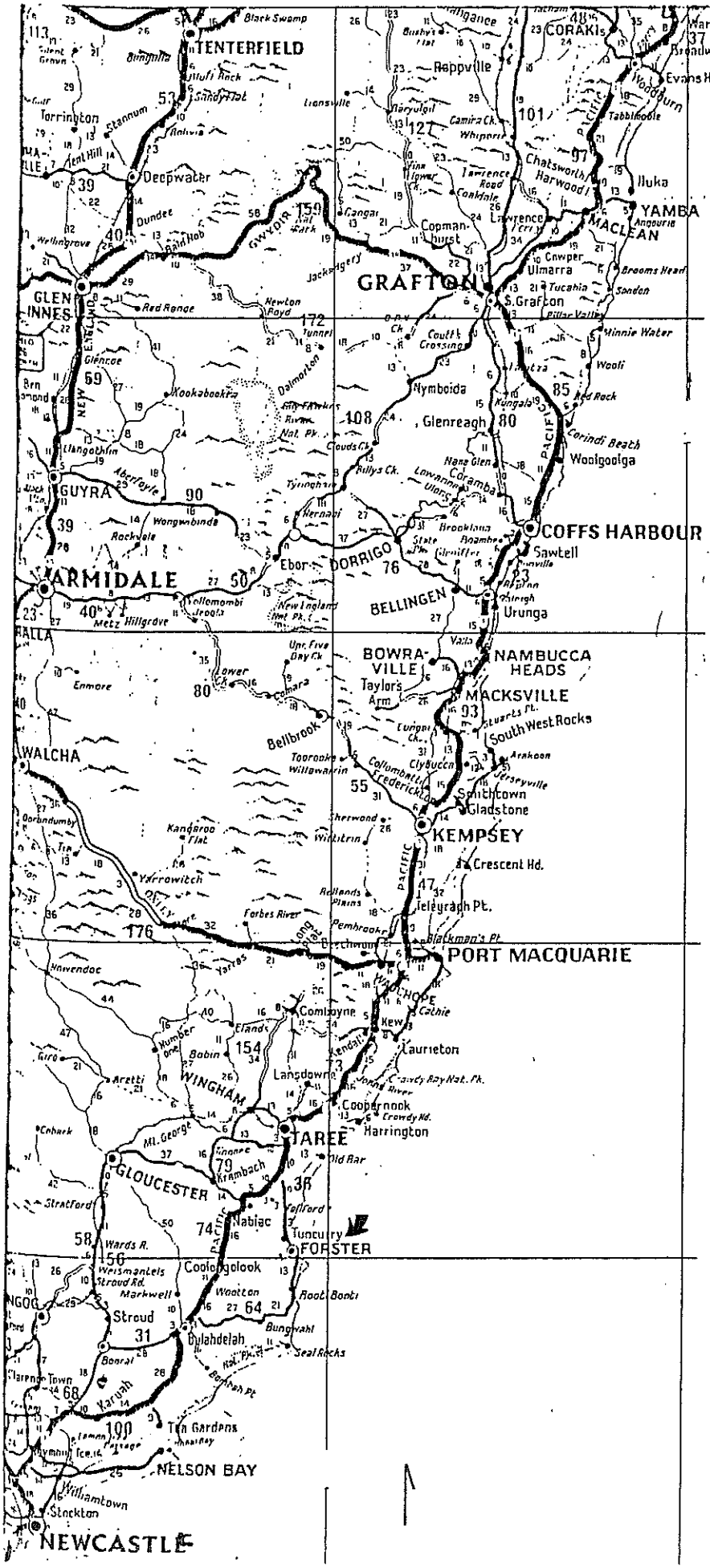


FIG 1 General Location Map (Scale 1cm = 50 km)

Section 1 Introduction

The Great Lakes Shire Council commissioned an archaeological survey of an area of Crown land adjacent to Nine Mile Beach, north of Tuncurry, New South Wales (Figures 1 and 2). The survey was conducted on January 4th to 6th, 1988 by Theresa Bonhomme, assisted by Dr.John Craib (Research Fellow, The Department of Archaeology, La Trobe University). Aboriginal consultation was conducted with Mr. John Clark and Bob Davis of the Purfleet Community at Taree and with Mr. Cal Davis of the Cabarita Land Council at Forster.

The archaeological survey located three large shell midden sites. This report concludes that it will be necessary to conduct further work (detailed surface recording and test excavation initially) to determine the archaeological significance of the sites. At that time the Local Aboriginal community should also be given an opportunity to participate in the assessment of the sites and determine their significance for Aboriginal people (See Section 4.4).

1.1 The Proposed Development

In 1982 and 1983 a planning study of rural land north of Tuncurry, NSW was carried out for the Great Lakes Shire Council and the Department of Local Government and Lands. The study indicated that the opportunities for urban development were mainly confined to a strip of Crown Land 1.2 kilometres wide and extending for 7 kilometers north from Tuncurry between the main road and Nine Mile Beach. This area was defined by the parallel physical constraints of beach dunes to the east and wetland to the west. A further study has now been planned to provide a draft LEP to provide for urban releases in the designated area.

The North Tuncurry Study provided a broad overview of Aboriginal settlement in the area. Although sites were predicted to be common behind the frontal dune along the coast, much of this landform has been disturbed by past logging/mining operations. The aim of the survey was to identify any archaeological sites present in the area, to establish the significance of the sites and to prepare appropriate recommendations for the sites in relation to the future development of the study area.

The survey area will be developed for residential and tourist use. The existing Golf Course is incorporated in the plan. The proposed Structure Plan is presented in Appendix 3. The Structure Plan shows the proposed routes of access roads some of which cross the dune adjacent to the Tuncurry Road and others which run parallel to the foredunes. The proposed development will involve extensive clearing and landscaping which will substantially alter the local topography.

1.2 Management principles

There are many reasons why it is important to protect Aboriginal sites. Bowdler (1983:9) recognises three major reasons why archaeological sites should be of concern and interest to all Australians. These are for their:

a) Scientific value - archaeological research has revealed a long and complex history of successful occupation of the Australian continent by Aboriginal people.

b) Heritage value - Some sites, such as art sites and carved trees have special aesthetic value. Other sites have particular historical and educational value.

c) Cultural value - Aborigines are now becoming more aware and assertive of their cultural identity. Part of their sense of identity is tied to areas of particular traditional or historic importance. Unlike sites of scientific or heritage value, sites of cultural value need not have any physical presence. Natural features of mythical significance, mission and massacre sites are considered to have a high cultural value.

Although Aboriginal sites are protected in New South Wales it is clear that the resource is being impacted upon by development. The legislation governing Aboriginal sites does not intend to prevent any disturbance of the archaeological resource. Rather it is recognised that the aim for resource managers should be to preserve a body of sites which is representative of the resource at a regional level while allowing considered development to proceed.

1.3 Current Legislation and Aboriginal Sites

The responsibility for the protection of Aboriginal sites in New South Wales whether on Crown land or not rests with the National Parks and Wildlife Service. The policies of the National Parks and Wildlife Service are set out in the Service booklet 'Planning for Aboriginal Site Management - A Handbook for Local Government Planners' (1986).

All Aboriginal archaeological sites and places of contemporary significance to Aborigines in NSW are protected under the National Parks and Wildlife Act (as amended 1974) and the Environmental Planning and Assessment Act (1979), with Regulations (1980). Sites of significance to contemporary Aborigines are also protected by the Environmental Planning and Assessment Act. In addition the Federal Government has enacted the Aboriginal and Torres Islander Heritage (Interim Protection) Act 1984 to preserve and protect areas and objects of particular significance in accordance with Aboriginal tradition. This act is not intended to exclude or limit the operation of State Acts of Parliament, rather it is capable of operating concurrently with such Acts. In June 1986 Federal parliament voted to make this legislation permanent.

1.4 Aboriginal Consultation

Aborigines have an obvious interest in the management of both archaeological and sacred/significant sites. In the case of the latter Aborigines are the only people capable of making a meaningful assessment of their value. It has long been accepted that it is appropriate to involve Aboriginal communities represented by the Local Aboriginal Land Council, in site management decisions. The value of sites to Aborigines as a link with the traditional past and as a symbol of identity has been emphasized by the Aboriginal community as a whole. Morris and Cook (1986) state that 'all sites are important to Aboriginal people, not just sites of traditional sacred significance, because they are a link with our ancestral past and a tool for our childrens future '(Ibid:37)

Aboriginal Land Councils

The Cabarita Local Aboriginal Land Council is concerned with sites in the Great Lakes area. The lead in time to the Tuncurry survey was short and attempts to contact local Aboriginal communities had to take place during the Christmas and New Year period. The former Regional Sites Curator, Mr John Clark, was contacted by phone on the 29th December 1987. He advised that Mr. Cal Davis was the representative for the Cabarita Local Aboriginal Land Council which was responsible for the North Tuncurry area. Mr. Davis was contacted, but he was not available to participate in the survey because he had begun a new job and would be away in Newcastle. He also believed that the boundaries of the Taree Land Council extended to the North Tuncurry survey area and that it would not be appropriate for members of the Cabarita community to inspect sites in the area. He suggested that his brother Mr. Bob Davis, who works at the Purfleet Health Centre, might be able to provide a suitable assistant.

Mr. Bob Davis was contacted and after conferring with Mr. John Clark said that the Purfleet community could not be involved because their Land Council boundary did not extend further south than Blackhead. The archaeologist then spoke to Mr. Clark who said he would try to arrange an assistant, but if none could be found a copy of the report should be sent to the Cabarita Land Council. Unfortunately it proved impossible to field an assistant in time for the survey.

A copy of this report will be sent to the Cabarita Aboriginal Land Council.

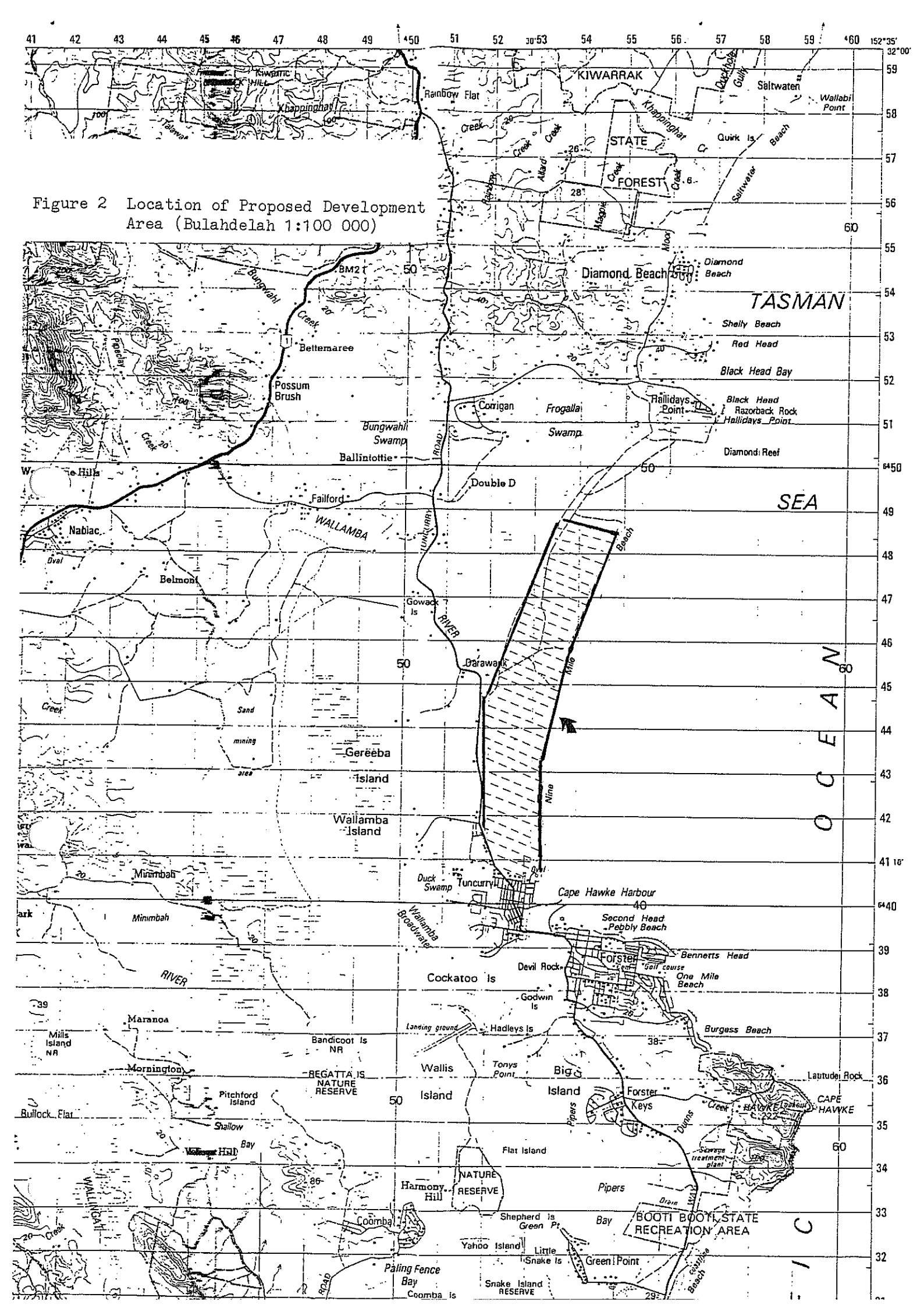


Figure 2 Location of Proposed Development Area (Bulahdelah 1:100 000)

Section 2 Environmental Context

2.1 The Study area

The proposed development area lies immediately north of Tuncurry and is adjacent to Nine Mile Beach. The survey area is approximately 1.2 km wide and 7 kilometers long and is contained within the beach ridge landform west of the beach foredunes. The Wallamba River runs parallel to the survey area on the western margin. The river floodplain contains extensive swamps, lagoons and wetlands. The Wallamba River flows into Wallis Lake which is a large estuarine lake open to the sea through a small channel but blocked to the south east by the barrier dunes of Seven Mile Beach.

2.1.1 Land forms

Typically an undisturbed beach may have an incipient dune, a frontal dune (also known as a foredune) and hind dunes. An incipient dune is a newly forming dune being supplied with wind blown sand. The frontal dune is generally higher and lies between the incipient dune and the hind dunes. In broad shallow embayments where there has been an abundant sand supply, frontal dunes have been sucessively formed over several thousand years. These dunes, known as beach ridges, lie parallel to the coast and extend a considerable distance inland.

2.1.2 Soils

Windblown sand which has been held in the dune system by vegetation for a long period of time can develop a recognisable soil profile. The major soil types present in the dune system are:
- Siliceous Beach Sands
- Siliceous Dune sands
- Sand Podzols and
- Acid Peats

The dunes found in the study area have two forms and soil types which relate to their age and formation. The inner barrier deposits date to the Pleistocene and are estimated to be no older than 120,000 BP (Chapman et al 1982:40). These dunes are recognised by their leached greyish colour and high organic content. The outer dunes date to the Holocene and began to form when the sea level reached its present level 6000 years ago. These dunes are recognised by their distinct yellow colour and lack of well developed soils. It is clear that any archaeological sites located on the outer dunes can only be Holocene in age and date from no more than 6000 years ago. Sites found on dunes of the inner barrier system may also be Holocene in age but there is the possibility that Pleistocene sites may occur.

2.1.3 Vegetation

The vegetation present in the study area is a result of the changes which have occurred since settlement. It is unlikely that much original vegetation remains. The Eucalypt forest has been logged periodically. Large portions of the area have been sand mined and restabilised with native vegetation. Shrubs found on

the dunes include coastal wattle (Acacia longifolia), tea tree (Leptospermum laevigatum) and the horsetail oak (Casuarina equisetifolia). The taller trees on the inland beach ridges are mainly coast banksia (Banksia integrifolia), and Eucalypt spp.

2.2 Types of Soil disturbance Present within the Study area

2.2.1 Natural

In 1970-71 a survey of the Central and North Coast sand bodies was conducted (Starling 1974). The report gives a detailed assessment of pipi middens and is useful in the attention given to the issues of dune movement and redistribution of midden materials. All middens situated in the foredunes are vulnerable to erosion and reworking by storm waves. This issue is taken up by Hughes and Sullivan (1974) who warn that midden-like deposits within six to seven metres of the upper limit of wave swash may comprise a mixture of reworked midden and natural shell deposit.

2.2.2 Sand Mining

Tuncurry has been a major source of mineral sands, typically rutile, zircon, monazite and ilmenite. Heavy mineral mining removes only a small portion (typically 1 - 3% by volume) of the total sand mass from any mined area. However it changes the geomorphology and the soil structure of the dune system. The mineral sands are transferred to a concentration plant either by dredge or bulldozer, where they are separated and the waste sand is pumped back to the mined area. The area is contoured and the original topsoil is replaced and revegetation is undertaken.

The changes to the landforms that occur may include
- a broadening and lowering of the frontal dune, or destruction of the morphology of mined inland dunes
- destabilisation of the frontal dune by removal of protective vegetation
- destabilisation of inland dunes through destruction of the vegetation formerly protected by the frontal dune

The affects of these changes on the archaeological resource are obvious. In the mined areas there is likely to be a total loss of archaeological material. In adjacent areas, destabilisation of the dunes and vegetation will lead to loss of sites through erosion.

According to information provided by the Department of Mines (Sydney), the study area contains high quality deposits of heavy minerals. Unfortunately the information concerning which areas have been mined is incomplete. However, it is possible to determine these areas by changes in vegetation evident on the air photos and from a field inspection of the geomorphology of the area. Areas which have been mined show a lack of the pronounced dune and swale formation typical of the inner dune system; rather the mined areas are flat or hummocky. The vegetation is low, predominantly grasses and shrubs and is clearly distinguishable on the air photos as regrowth.

Figure 3 shows the areas which have been mined. It is to be expected that archaeological material will not be found in these areas.

Sites in the boundary areas may also have been impacted upon by the mining activities. It is likely that the beach foreshore has been mined. The morphology of the largest foredune and its vegetation cover suggests that this dune has not been disturbed however the seaward dunes and the berm area do show evidence of disturbance. Any archaeological material on the seaward side of the foredune is likely to have been destroyed.

2.2.3 Sand Extraction

Sand extraction has significant affects on an area since total removal of large volumes of sand occurs. Sand extraction pits were found on the north-west boundary of the survey area.

2.2.4 Other European Activity

Midden sites have been destroyed in the past to provide lime and road fill. Bowdler (1982) reported the use of modern Oyster shell (Crassostrea commercialis) for road fill in the Hastings River area. She found concentrations of the shell as dumps and was told they came from commercial oyster farms. The dumps consisted only of oyster shells, which were of a uniform and large size and appeared fresh, light coloured and unstained by any darker matrix material. Because of the possibility of European activities creating shell dumps or disturbing existing middens, enquiries were made into the road building practices in the Great Lakes Shire. Mr. Emmerton, (Engineer - Taree Shire Council) was contacted about the possible use of shell material in road building. To his knowledge no shell material has been used for works in the Shire so the presence of large concentrations of shell in the study area are not likely to have resulted from European activities. In the light of Bowdler's findings dumps of pure oyster shell should be regarded with some suspicion.

Ruins of an old prison camp were found in the north east part of the study area. This area has been used as a dump in the past and is disturbed. A golf course and an old airstrip are located in the southern part of the study area and it is likely that earth moving works associated with their construction destroyed a number of archaeological sites.

Section 3 Archaeological Context

Between 300 and 500 km north of Sydney, a series of large river estuaries, with ocean shore sand dunes and extensive back-dune swamps provide a rich estuarine environment. McBryde's studies (1978) have shown that Aboriginal tribes used these resources extensively, though probably on a seasonal basis. Population density seems to have been high with an overall aggregate ranging from one person/3km 2 in the north to one person/8km2 in the south. Since these estimates include large areas of relatively unproductive forest the actual densities around the coastal swamps were probably much higher.

The fullest archaeological information for the North Coast comes from the Macleay and Richmond River estuaries (McBryde 1974, 1976). More recent studies have been conducted by Sullivan (1982), Barz (1982) and Byrne (1986). The focus of much of this research has been the recording and occasional excavation of archaeological sites. The excavation and radio carbon dating of some north coast middens has established that they are up to 6000 years old. This research provides us with information concerning the age of Aboriginal occupation, the seasonal movements and diet of Aboriginal groups as well as indicating the relationship over time between food and technology (Bowdler 1982:7).

When compared with the archaeological studies already conducted along the Macleay, Clarence and Hunter Rivers it is clear that very little work has been carried out in coastal environments south of the Hasting River. While a range of sites including ceremonial sites, contact sites, quarries, fishtraps and open stone scatters have been recorded along the coast most of the sites that have been excavated are either rock shelters or open shell middens.

Open camp sites/ open midden sites

Rock shelters sometimes contain stratified deposits of daily living debris; open midden sites are places where Aborigines have camped and eaten shell fish. Sometimes these have accumulated with other camp site debris to form stable stratified sites. These can be of considerable size such as those at Ballina and Stuarts Point on the Macleay River. Others are only small superficial scatters of shell. Archaeologists have established some guidelines for distinguishing Aboriginal shell middens from other shell accumulations (Bowdler 1982).

The kinds of shell fish species in middens is obviously usually related to the adjacent littoral environment. There are three major kinds of shellfish habitat on the New South Wales coast: open rocky coastal, estuarine and sandy beach. Some middens are located so as to take advantage of more than one of these, but most are located adjacent to a single habitat. Estuarine middens contain a predominant species which may be oyster (Crassostrea commercialis) or Sydney cockle (Anadara trapezia), together with a lower proportion of other species.

An oyster midden will usually also contain cockles and vice versa; the Hercules Club whelk (Pyrazus ebeninus) is usually also present in rather smaller numbers. Open rocky coastal middens usually have a mixture of gastropods found in those habitats and mussels.

The National Parks and Wildlife Register contains hundreds of midden sites along the Central and North coast. Many of the sites were located during a 1971 survey of the sand bodies of the Central and North Coast (Starling 1971). The main kinds of sites containing shell/occupation debris that are found have been described as 'base camps' and short stay or 'dinner time camps'.

'Dinner time camps'

Pipi shell middens are the most common site type and often extend for hundreds of metres in length. Starling described them as discontinuous shell horizons in the dune faces (Starling 1971) while Sullivan described them as 'almost invariably a single shell horizon sitting on a stable but not very old dune surface, now covered by recent windblown sand' (Sullivan 1982:124) . Sullivan believes these middens represent the remains of shellfish processing and preparation of meals associated with 'dinner time camps' a term that derives from Meehan's observation of shell gathering and consumption practices among people on the Blythe River in the Northern Territory (Meehan 1982).

According to Meehan people went to the shore for specific shell gathering purposes and often consumed most of the produce at the beach. Large deposits could sometimes be created as a result of the use of a preferred location for these meals. However most dinner time camps were small and limited in area and reflected a one time event. They are fragile deposits and unless stabilised in some way many would have been scattered and destroyed by natural processes within a short time. The concensus of opinion seems to be that pipi middens, while they are present in considerable numbers do not represent a very significant part of the Aboriginal economy. They are seen as single use sites, in contrast to the base camp sites.

'Base Camps'

Meehan (1982) identified a seasonal pattern in the occupation of Gidjingali base camps on the Blythe River , in the Northern Territory. For every base camp there were many other sites such as 'dinner time camps'. The location of the base camps seems to have been governed by the proximity of a variety of food resources. One base camp was located 1km from the coast 'where the inland sand dune complex with its alternating parallel dunes and swales meets the eucalypt forest' (Meehan 1982:26). The camp occupied an area 300m by 100m on the crest of the dune in a location described by Meehan as a 'resource boundary zone'. A string of fresh water holes some excavated 1.5m into the shelly deposits surrounded the site. Another site was located on an inland dune adjacent to a tidal creek running into the Blythe River. The land around this site is varied, including estuarine creeks and mangrove, typical dune complexes, jungle and forest areas and black soil plains. Fresh water comes from several waterholes excavated in the dunes, or from small billabongs nearby.

From her work on sites north of the Hastings River, Coleman has argued that coastal Aboriginal groups moved between major base camps. The archaeological and historic evidence suggests that some of these camps could be described as semi-permanent villages (Coleman 1982). North Coast base camp sites have been shown to be situated within easy access to a range of marine/estuarine and shellfish resources. Sites of this type contain a high proportion of mud flat shell fish species which are contained in layers 5-50cm thick. They also include some rocky platform and sandy beach species together with fish , bird and mammal bone.

A base camp was excavated at Sandon Head south of Maclean (Rowland 1977). This site was located at the south end of the beach and covered 10,000 sq. metres and had stratified layers of material up to 90cm thick. Stone artefacts were found in significant quantities. Sullivan (1982) found similar camps west of the beach dunes south of Evans Head. The sites were found adjacent to perched lagoons and contained flaked stone, hearth stones and pipi shells which had been carried up to three kilometres from the nearest beaches (Sullivan 1982:105).

Although not common other kinds of sites have been recorded in Foster-Tuncurry coastal zone. Appendix 1 lists the sites recorded between Hallidays Point and Forster (NPWS Register). These include carved trees and scarred trees, burials, Bora grounds, stone arrangements, sacred/significant sites and Contact Period sites.

Carved Trees

Carved trees are associated either with burials or Bora Grounds. A goanna carved tree associated with a ceremonial ground was reported at Hallidays Point. The site has not been relocated and the tree has probably been destroyed (Bell, 1980 NPWS Site Card).

Burials

Prehistoric and contact period Aboriginal burials ranging from single burials to groups of up to 30 are on record for the North Coast. They are commonly found on well-drained ground, in sand dunes and even in middens. Most of the burials on record have eroded out of sand dunes or creek banks or have been disturbed during road construction. Aborigines throughout New South Wales are opposed to the disturbance of burials irrespective of their age. This attitude involves spiritual values and a respect for the dead in which time is not considered to be relevant.

A Mission cemetery is located at Forster. According to informants burials began there in 1900 and the grounds contain 50 traditional burials. At least 30 burials are also known to have occurred close by but outside the cemetery area.

Bora Grounds and Stone Arrangements

These sites usually have ceremonial significance. Few are in existence today however the past locations of some are recorded. A ceremonial ground was reported at Hallidays Point and is believed to be associated with a carved tree.

Sacred/ Significant Sites

These are sites which are of spiritual signficance to living Aborigines. They are often the natural features of the landscape, such as hills, rivers and coastal headlands which are connected to myths describing Dreamtime events. A sacred fig tree has been reported in the area at Saltwater (Wallabi Point). According to informants this tree was believed to have magical powers.

Contact Period Sites

Aboriginal settlement patterns and lifestyles changed dramatically after European settlement. The destruction of the natural habitat forced the Aborigines into partial and then complete dependence on Whites. Many Aborigines lived in fringe camps close to European settlement and these places are remembered by people living today. Because of the close and personal historic contact Aborigines have with these camp locations they regard them as signficant and as a part of their history to be documented and in some cases preserved.

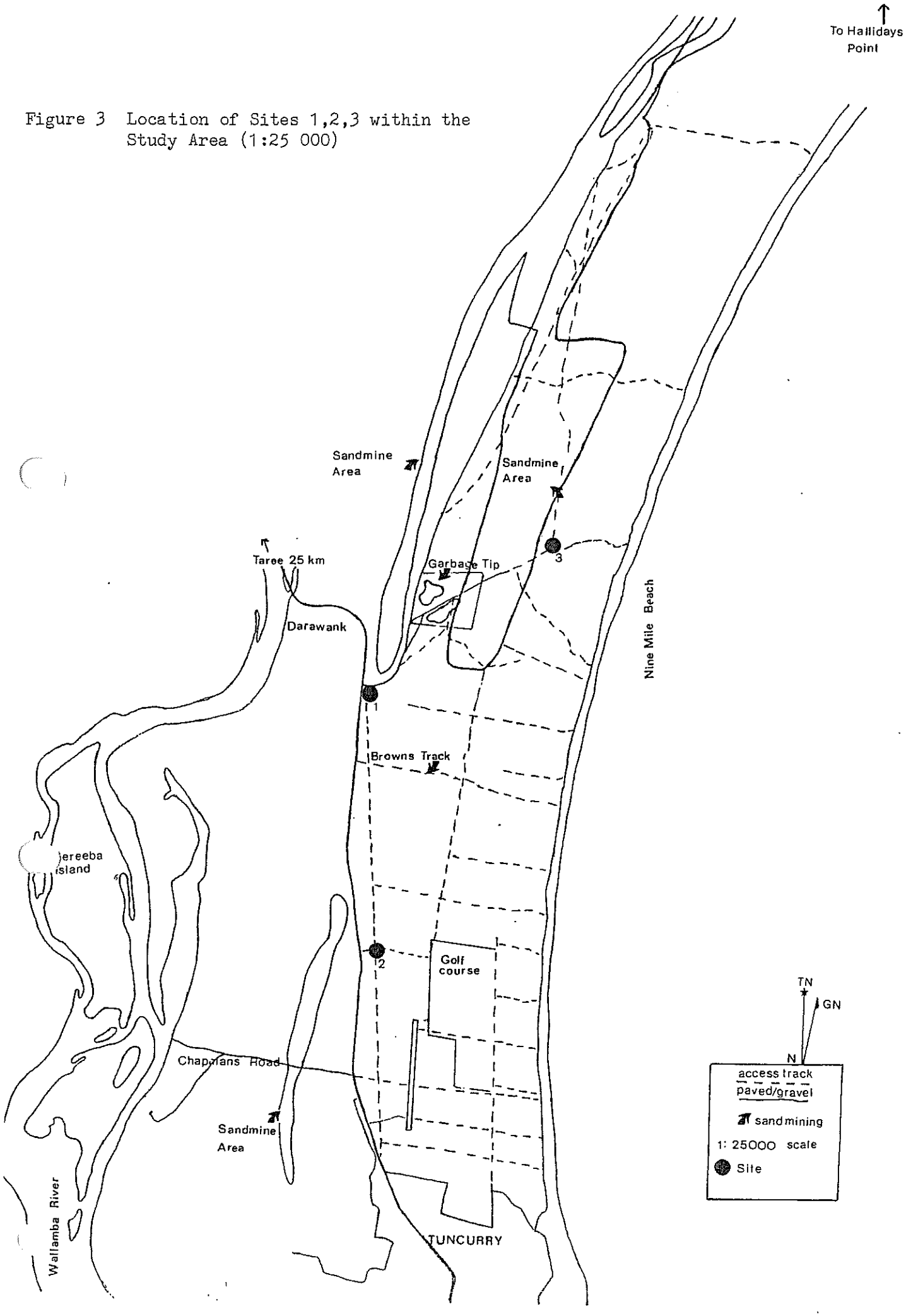
In documenting the history of the Yamba people Creamer (1980) was shown 'good food places'. It is interesting that these were concerned with fishing and shellfishing. The sea was least affected by European activities and the Aborigines kept this part of their traditional economy alive right through the contact period, up to and including the present day. It is possible that historic shell middens could be associated with Aboriginal fringe camps.

Summary

In the past there were two zones which were repeatedly used for Aboriginal occupation. The frontal dunes bodering the beaches were used for short stay camps such as dinner time camps. These sites would reflect Aboriginal use of marine fish, shellfish and other coastal resources. A great many sites were also destroyed as a result of natural beach erosion through storms and beach building.

Sites would also have occurred on the inner dunes especially those in easy reach of the swamps and wetlands. The contents of these sites reflect the use of interdunal swamp foods and the highly food productive wetlands which border the estuaries. The existence of sites in the North Tuncurry area will be greatly affected by past mining and logging activities and the density of the vegetation cover which affects their visibility (see Section 4.1).

Figure 3 Location of Sites 1,2,3 within the Study Area (1:25 000)



Section 4 The Field Survey

4.1 Visibility

The dune barrier systems are a moving landscape and this fact has important implications for the archaeology of the North Tuncurry area. Dunes usually form under a grass cover and are later stabilised with a cover of larger bushes and trees. Storm waves however often disturb parts of the foredune sometimes obliterating them entirely. Archaeological material found in foredunes may have been reworked and redeposited and many have younger natural organic material incorporated into them. Blowouts often occur on dunes and this can cause archaeological material to deflate forming lags on new and lower sand levels. This new material may subsequently be covered again by windblown sands.

On stable dune systems the succession of grass/heath/woodland vegetation will typically provide a groundcover the thickness of which makes archaeological sites invisible and often makes access on foot difficult. Almost all recorded coastal sites have been identified only because the vegetation has been disturbed. Where the foredunes have been exposed sites are sometimes found in profile in the sand cliff faces; this is particularly so of pipi shell middens. Visibility and the nature of the disturbance means that the spatial location of archaeological sites recorded on the coast is biased in favour of sites exposed in dune cliffs, in creek banks and on head lands, which are by nature erosional rather than depositional features. In areas where the vegetation has stabilised the sands, sub surface sites may exist but they cannot be found by surface survey methods. In these cases it is clear that an absence of visible sites does not necessarily mean an absence of sites. Other testing methods must be used to locate such sites.

The North Tuncurry survey area has a dense cover of vegetation. The dunes have been stabilised and the high frontal dune is protected from most wave action by the wide grassed berm. Blowouts and exposures occurr along the frontal dune in places where there is car and foot access. The survey area is crossed by 14 4WD tracks which form effective transects from the western road to the frontal dune and beach. Visibility along these tracks is 100% and the erosion often exceeds 30cm in depth in some areas. Power lines have been constructed north south on the western margin of the study area. The route for the power lines has been bulldozed and is periodicallly slashed to limit vegetation growth and an access track runs along the entire length of the power line route. Visibility in the sand access tracks was 100%.

4.2 Survey Methods

The survey was conducted on the 4th, 5th and 6th of January, 1988. Orthophoto maps and air photos (NSW 3521 Run 22.6.86, Nine Mile Beach 1:10000 Colour) of the area were provided by the Great Lakes Shire Council. The 1:25000 maps (Coolongolook, Forster and Hallidays Point); 1:100000 (Bulahdelah) were used to plot sites.

The survey method was determined by the density of vegetation across the area and the visibility of the ground surface. Because access to most of the area was severely restricted by dense bushland the access tracks were used as a primary source of surface exposure. All access tracks were driven across and were inspected for shell, stone material and bone or other evidence of Aboriginal material. The frontal dunes were searched for exposed areas and these were inspected and narrow foot paths through the dunes were walked.

The field recording of sites included a description of

- the site type e.g. midden, open site, isolated find
- the size of the site and the estimated extent and depth of the archaeological material
- visibility
- nature of the soil, vegetation and general topography
- estimated number of artefacts/sqm
- general description of the artefacts present including raw materials, size range and types found
- faunal material such as shell, species and size range and presence of bone or other organic materials.
- condition of site
- degree and type of disturbance evident across sites.

National Parks and Wildlife Site Cards for all sites located during the survey have been completed and will be forwarded to the National Parks and Wildlife Service with copies of the report.

4.3 Survey Results

Three sites containing shell and stone artefacts were found in the study area (Figure 3). Detailed descriptions and locations of the sites are given in Appendix 2.

a) Beach and Foredune

No sites were found in the foredune areas. The absence of sites in the beach dunes may be explained by past sand mining or present surface visibility. Pipi shells are still being used by fishermen and are collected as food. Many of the small dumps of pipi shell found were strongly associated with European camp sites on the dunes and were obviously of recent origin. The foredune is well vegetated and the only exposures occur where vehicles have crossed the dune onto the beach. It may be that undisturbed sites exist in the foredunes especially if sand mining has not disturbed this dune. The foredunes must still be considered sensitive in terms of archaeological material because of the limited visibility of the ground surface at the time of the survey and the apparent stability of the dune.

b) Inner Sand Barrier

Three sites (Midden 1 - 3) were found on the dune crests within this formation. Two were located on a dune overlooking the wetlands of the Wallamba River. One was found on an inner barrier dune 700m west of the beach, however the course of the Wallamba River brings it close to the beach in the north of the study area giving the people occupying Site 3 easy access to the riverine and estuarine resources.

The three sites consist predominantly of shell material but significant numbers of stone tools are present. The types of shell occurring in the middens were mainly estuarine species. Sydney Cockle (Anadara trapezia) predominated in all sites with Hercules Whelk (Pyrazus ebeninus) a significant but secondary species. Oyster (Crassostrea commercialis) was present at all sites but in smaller numbers. Pipi shells (Plebidonax deltoides), an open beach species were found only at Site 3, located approximately 700m behind the beach dunes but they were not visible in significant numbers.

Glycymeris flammeus was found at Site 3. This species lives beyond the surf zone. According to Philip Coleman (Malacologist - The Australian Museum) it is very rare for living examples to be collected from the beach, however dead shells are often found after storms. This species is a particularly strong shell and the item identified at Site 3 had several flakes removed from the pallial margin consistent with it having been used as a tool. The occurrence of these shells in the deposit suggests that some were collected not as food but mainly for use as tools. Many of the Anadara shells at all three sites also showed signs of heavy wear on the pallial margins.

Comparing the size, location and contents of Sites 1 and 2 with 'base camps' excavated elsewhere on the North Coast (see Section 2 for discussion) it is clear that the North Tuncurry sites are similar. Both sites are located on the inner barrier dune overlooking the wetlands of the Wallamba River. The height of this dune at the 6m contour means that it would be relatively protected from the flooding that would occur periodically in the Wallamba River wetlands. The sites are located equidistant from the beach coastal zone and the Wallamba River in the west; ideal for easy access to the widest possible range of resources.

Site 3 is located 700m west of the beach dunes and at first this location seemed problematic because the predominant shell species found in the midden were estuarine. However, at Darawank the Wallamba River swings eastward in a wide meander bringing the resources of the wetlands closer to the beach zone than they are in the south of the study area. It would have been just as easy to exploit wetland resources from Site 3 as it was from Sites 1 and 2 and the resources of the beach zone were much closer. It can be expected that more beach species will be present in the Site 3 midden than in the other sites, reflecting the ease of access to the beach zone.

4.4 Assessment of Significance

The assessment of significance or heritage value of a site is central to cultural resource management decisions. A site is judged on the basis of its 'aesthetic', historic, scientific or social significance. The primary aspects of heritage significance with which most consultant archaeologists are concerned is scientific and Aboriginal significance. The most appropriate means of assessing the archaeological or scientific significance of sites is well defined in the archaeological literature (Sullivan and Bowdler 1984). Aboriginal significance on the other hand can only be assessed by the Aborigines and must be determined in consultation with them.

Scientific Significance

Two approaches are commonly used in the assessment of the archaeological significance of sites. The first involves assessing the potential of a site or group of sites to answer current research questions; the second involves assessment of a site's representativeness to provide for future research needs.

Three aspects of a site's research potential; integrity, structure and contents are considered before a decision on the representativeness of the site both locally and regionally can be made. Irrespective of what value is given to an individual site itself it may assume considerable importance when placed in its regional context. One of the most important aspects of a site's scientific value is the frequency of other sites of this type in the area. The assessment of significance of archaeological sites in a local and wider regional context necessarily depends on a representative picture of the distribution of sites across the landscape.

Open sites, like Sites 1-3 which occur in disturbed locations, often pose a problem in terms of their assessment with regard to research and management planning. Individual sites may only have local and small signficance, however taken as a whole each site adds to the evidence of Aboriginal adaptation to a particular environment or region. It is important then to recognise that disturbed sites are often sources of significant archaeological data. Such sites can give information concerning site location, activity loci or site structure and chronology. While there is evidence that portions of the midden sites in the North Tuncurry study area have been disturbed by European activities there is still the potential for sub surface in situ material to exist in undisturbed parts of the sites.

Part of the management of the archaeological resource of an area involves ensuring the preservation of a representative sample of types of sites for current and future research. The sites at North Tuncurry have the potential for fulfilling that need and warrant further investigation on scientific grounds.

Aboriginal Significance

Aboriginal significance of an area or a site can only be decided by the Aboriginal community. While most Aborigines agree that they are interested in all sites generally as a record of the past,

they are often more concerned with particular types of sites. These sites need not be sacred but they have assumed an importance due to the current needs of the community. Sites such as campsites and middens are evidence of Aboriginal occupation of the land. Aborigines are aware of the loss sites through natural and man made processes and are concerned to preserve some for their children. As the older members of the community die the links with the past are broken and local knowledge is often irretrievably lost. Oral histories are now being recorded and Aboriginal leaders are trying to involve young people in site surveys and recording. In this way knowledge of where sites are in the area is retained within the community (John Clark pers comm). The Cabarita Aboriginal community is concerned with preserving a representative sample of sites as a tool for educating their children and as physical evidence of a long and successful occupation of the land.

4.5 Archaeological Sensitivity of the Survey area

The survey area can be divided into three zones of archaeological sensitivity:

1. The beach foredunes and back slopes - this area is considered to have high archaeological sensitivity. There is no clear information on which parts of the dune have been mined and visibility is low. The results of surveys conducted in similar dunes in the North Coast region suggest that there is a high potential for middens/campsites to occur.

2. The inner sand barrier- this area generally appears to have a low archaeological sensitivity. Despite the comprehensive visibility provided by the access tracks no archaeological material was found with the exception of Site 3 which is located in the northern part of the study area. Portions of the northern part of the study area has been mined and any archaeological material occurring in those areas will have been destroyed.

The location of sites in the study area seems to be strongly associated with easy access to estuarine resources. Site 3 is located in an area where the river meander brings these resources closer. As the distance from these resources increases across the inner sand barrier the occurrence of sites apparently decreases. The area around Darawank is most likely to have contained sites, however this area has been heavily impacted upon by sand mining (Figure 3).

3.The western most sand dune overlooking the Wallamba River wetlands (Tuncurry Road) - this area has a high archaeological sensitivity and contains at least two sites. There is potential for other buried sites to occur along this dune. Visibility along the dune is poor except where access tracks have been made. Any development on this dune will destabilise the deposits and possibly expose buried material.

4.6 Conclusions

While the occupation of home bases and short stay camps has been identified for areas further north (Coleman 1982) it is unclear if

such a pattern of occupation was operating in the Tuncurry area. The initial inspection of the sites, their location area and contents suggests that they may be base camps. The presence of these sites in this area indicates that the North Tuncurry beach ridges were a boundary between two rich resource zones which probably supported a large pre-contact Aboriginal population. Excavation of Sites 1 - 3 should answer questions regarding the differences between the sites , the kinds of economic strategies employed at them over time and the age of the deposits and Aboriginal use of the area.

Large midden and open campsites such as are found in the Tuncurry study area are not common. Other midden sites have been recorded in disturbed contexts in the Foster-Tuncurry townships, on Wallis Island and in the Booti Booti Reserve to the south (Appendix 1). Sites are also known to have existed around Hallidays Point but the Aborigines maintain these have been destroyed by sand mining.

Sites 1 - 3 have potential scientific significance and are considered to be important examples of Aboriginal occupation by the local Aboriginal community (Cal Davis pers comm). They are endangered by erosion caused by the present use of the area and the activities planned in the development. The sites require further investigation to determine their areal extent and depth, and their actual scientific and Aboriginal significance. Appropriate management decisions for the sites can then be made based on these findings.

Section 5 Recommendations

All Aboriginal sites are afforded protection under the National Parks and Wildlife Act (1974 as amended). It is an offence to knowingly damage, deface or destroy an Aboriginal relic without the prior written consent of the Director of the National Parks and Wildlife Service.

The following recommendations are based on the results of the survey, the background study concerning sites in the Great Lakes Shire and the North Coast region and consultation with members of the Local Aboriginal community.

1. Visibility in the survey area was considered to be poor. There is a possibility that undisturbed sites not yet exposed still exist in the survey area. If any further sites are uncovered during the course of the development of the area, work should cease at that location and an officer of the National Parks and Wildlife Service should be contacted for advice concerning appropriate management procedures. It is the responsibility of the Great Lakes Shire Council to ensure that personnel involved in the development of the area are adequately briefed on the nature of Aboriginal sites that are likely to occur, the location of the recorded sites (as described in this report) and the requirement that any new sites be reported.

2. The foredunes and their back slopes are regarded as an area of potentially high archaeological sensitivity. Pedestrian and vehicular access can lead to the destruction of the dunes and their vegetation. This can be avoided to a large extent by providing formal pathways and roadways for pedestrians and beach vehicles and constructing short lengths of fence to direct pedestrians and discourage unplanned access.

The most appropriate form of accessway across dunes is the board and chain path or road way; these pathways are designed to be flexible and are able to withstand slight changes in shape of the dune caused by erosion or sand accretion. The board walks trap sand and prevent blowouts forming.

A buffer zone of at least 50m west of the back slope of the fore dune should be incorporated in the Structure Plan. This zone should be landscaped and stabilised. Low impact development should be planned for the area immediately adjacent to the buffer zone.

3. The Inner Sand Plain is generally an area of low sensitivity. The exception to this is the westernmost dune overlooking the Tuncurry Road which contains Sites 2 and 3. The sand mined areas on the inner sand plain (Figure 3) have the least potential for archaeological sites. High impact construction and landscape modification should be concentrated on the main sand plain.

Care should be taken around Site 3, since the presence of this site indicates that this portion of the sand plain through to the river may have been a preferred location for occupation.

4. The western dune is an area of demonstrated high sensitivity. No development should take place on the dune, especially in the area of Sites 2 and 3. Access through the dune from the main road should be confined to the Garbage Tip road in the north and existing access tracks in the extreme south of the survey area. The track to the Golf Course opposite Chapmans Road (as shown on the Structure plan) would be a suitable main access route.

5. Sites 1, 2 and 3 require further recording and test excavation to determine their areal extent, contents, age and scientific and Aboriginal signficance. All sites will be severely impacted upon by the proposed development and until the actual dimensions and significance of the sites is known appropriate management recommendations cannot be made.

As a result of these test investigations the sites may be designated as

a) not significant and an application for a Consent to Destroy could be made to the National Parks and Wildlife Service
b) significant, and requiring protection/management without further investigation
c) significant, requiring further investigation, protection and management

If after the results of the test excavations are known, the sites are determined to be of minimal archaeological or Aboriginal significance a Consent to Destroy application could be made to the Director of the National Parks and Wildlife Service. If the application was successful the site could be developed.

If the sites are determined to be significant on Aboriginal or scientific grounds but require no further investigations they may still be required to be protected from the development. In such a case three management options may be appropriate:

(i) After the extent of each site is determined (through surface recording and test excavation) the area of the sites could be isolated from the development and left undisturbed. To achieve this a buffer zone of approximately 50m around the site would be established. The area must then be stabilised and covered with top soil to prevent further erosion. No subsequent construction or development could take place on the site.

This option may be possible for Site 1, however Sites 2 and 3 lie well within the proposed development impact area and could not be successfully isolated.

(ii) Each of the sites may be retained within the development area as open spaces in passive recreational areas. The site area would need to be completely covered with sterile top soil and turf and no subsequent construction should take place at the site locations. During the process of landscaping the site areas it would be appropriate to have the operations supervised by a designated member of the Cabarita Local Aboriginal Land Council.

(iii) In the event that changes to the proposed Structure Plan cannot be made and the sites are directly affected by the construction of buildings, roads or other landscape modification then extensive salvage investigations must be undertaken prior to any development activity across the sites.

These investigations must occur before a Consent to Destroy application can be made. The results of those investigations will have a bearing on the granting of the application.

6. It is recommended that the Cabarita Local Aboriginal Land Council receive a copy of this report. The Chairman Mr. Davis should be kept informed of any further planning concerning the sites and that the Local Land Council be involved in any future archaeological work or management of sites in the area.

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APPENDIX 1 SITES RECORDED IN NPWS REGISTER (NSW)
FORSTER - HALLIDAYS POINT
(as of December 1987)

Site No.	Location	Type	Situation Description
38-2-10	Wallis Island	Midden	North shoreline, midden Area 100m x 10m, depth 30cm
38-2-11	Wallis Island	Midden	Area 10m2
38-2-18	Wallis Lake	Midden	
38-2-21	"	Midden	Area 10m x 15m, depth 10cm
38-2-22	"	Open campsite	
38-2-23	"	Midden	
38-3- 3	Forster	Midden,	reported 1966
38-3- 4	172 Wharf St.	Midden	reported 1968
38-3- 6	Wallis Lake	Midden	East side of lake, reported 1941
38-3- 7	Hallidays Pt.	Carved tree	Bora/Ceremonial
38-3-24	Forster	Aboriginal Mission Cemetery	
38-3-25	South St. Tuncurry	Midden	
38-3-30	Hallidays Pt.	Open site	
38-3-32	Blackhead	Shelter with midden	

APPENDIX 2 DESCRIPTIONS OF SITES LOCATED IN NORTH TUNCURRY SURVEY (January 1988)

Site Name: Open Midden/campsite 1
Grid Reference: 518447
(1:25000 - Coolongolook)
Land Category: Inner Sand Barrier Dune
Site Type: Shell Midden with stone artefacts

Location: The site is located approximately 5km north of the Tuncurry Cemetery on the Tuncurry- Taree Road. A road which has been constructed into the Tuncurry Garbage Tip cuts through a dune overlooking the main road and the wetlands to the west. Artefacts are exposed in the cut face on the south side of the Garbage Tip road and extend along the dune crest to the south. A Transmission line access track runs along the crest of the dune and archaeological material is exposed in the track. The site is located approximately 800 metres from the Wallamba River. Fresh water and a variety of food resources would have been obtained from the river and nearby floodplain swamps and lagoons.

Exposure: Vegetation cover is patchy and varies from 0% on the eroded access track to 75% on the dune crest. Visibility along the dune crest is generally 30-50%.

Site Dimensions: Site exposure is linear running north south along the crest of the dune. Shell is exposed over an area of 100m by 100m although the density is variable. Stone material occurs in significant numbers.

Condition of the site: The site has been partially destroyed by the construction of the Garbage Tip Road and the Transmission line and access track which follows the crest of the dune. The route of the Transmission line is periodically cleared of vegetation and this has the potential for destroying exposed surface material and accelerating erosion across the site. The northern most extension of the site has probably been destroyed during sand mining (see Figure 3).

Site Contents:

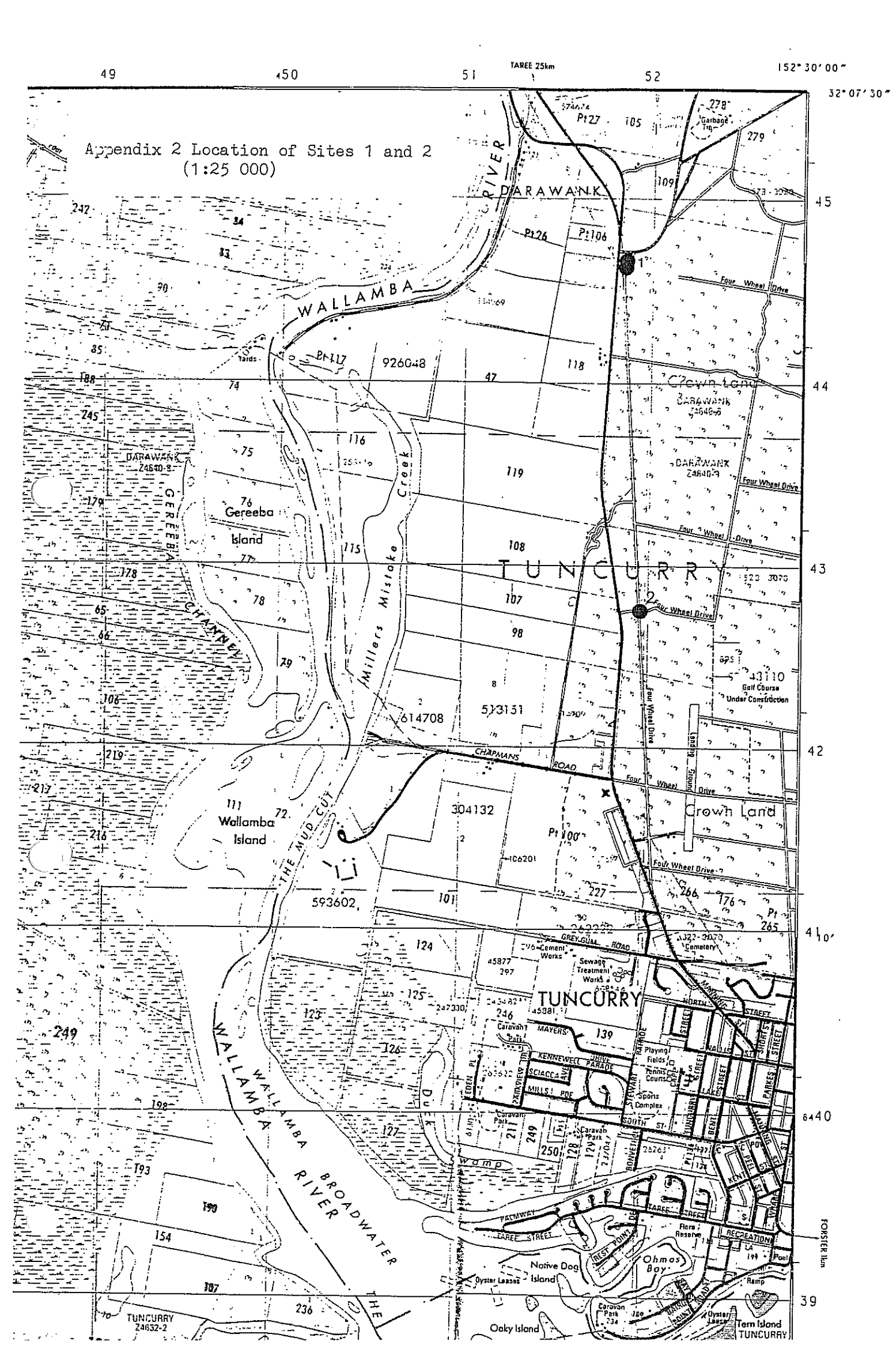
The material exposed in the cut face on the southern side of the road is mainly stone artefact material with a thin scattering of shell. Along the dune crest to the south over a distance of approximately 100m the density of shell material increases dramatically. Distribution of shell is not uniform and it is clear that quite dense loci of shell occur against a background scatter of shell material. Shell species identified at the site included cockle (Anadara trapezia), Mud Whelk (Pyrazus ebeninus) and some Oyster (Crassostrea commercialis). Anadara was the dominant species present.

Stone artefacts were found in low numbers across the site. The location of artefacts results from erosion onto the dune face. Only excavation will indicate if in situ artefacts do exist across the site. The deposit containing artefact material does not appear to be deeper than about 10-20cm below the surface.

Only one area exposed on the dune face contained more than 1 artefact per square metre. In an area 2m by 2m 14 stone artefacts were recovered.

Sample of artefacts found at the site: Area of sample 2m2

Type	Raw Material	Colour	L	W	B	Remarks
				(mms)		
Core	Chert	Grey	83	65	50	multiplatformed LS 29mm
Core	Chert	Yellow	55	33	21	Pebble with cortex, single platform, LS 18mm
Artefacts with Retouch/Usewear (R/U)						
Flake	Chert	Grey	27	30	11	Retouch on distal margin
Flakes without retouch/use wear						
Flakes	Chert	Grey	22	20	5	
			24	23	11	
			26	21	9	
			25	18	6	
			21	18	4	
			38	36	16	
Debitage	Chert	Grey	23	13	4	
			16	13	6	
			18	15	3	
		(1)	< 1cm			


Appendix 2 Location of Sites 1 and 2
(1:25 000)
49
50
51
52
TAREE 25km
152° 30' 00"
32° 07' 30"
45
44
43
42
41 10'
40
39
FORSTER 11m
WALLAMBA RIVER
DARAWANK
WALLAMBA
Pt127
105
Pt126
Pt106
Pt117
926648
47
118
Crown Land
DARAWANK
Z4640-8
Four Wheel Drive
Gereeba Island
GEREEBA CHANNEL
Millers Mistake Creek
119
108
TUNCURRY
107
98
614708
513151
43110
Golf Course Under Construction
CHAPMANS ROAD
Wallamba Island
THE MUD CUT
304132
Pt100
106201
593602
227
266
176
Pt 265
GREY GUM ROAD
Cement Works
Sewage Treatment Works
Cemetery
TUNCURRY
NORTH STREET
MAYERS
KENNEWELL
SCIACCA AVE
MILLS PDE
EDEN PL
Caravan Park
Playing Fields
Tennis Courts
Sports Complex
SOUTH ST
BENT
PARKES
MORRIS
PACIFIC HWY
TAREE STREET
Flora Reserve
RECREATION
REST POINT
Ohmas Bay
Native Dog Island
Oyster Leases
Ramp
Caravan Park
Oaky Island
Tern Island
TUNCURRY
WALLAMBA BROADWATER
THE CUT
Swamp
TUNCURRY Z4632-2
Garbage Tip
Tanks
Four Wheel Drive
Sandy Beach
Boundary

Site Name: Open midden/campsite 2
Grid Reference: 519427
(1:25000 Coolongolook)
Land Category: Inner Sand Barrier dune

Location: The site is located one kilometer north of Chapmans Road on the Taree-Tuncurry Road, on the inner barrier dune. The material is exposed in an access track which intersects with a service track for the transmission line. Shell concentrations continue for 50m across the transmission line route and onto the next seaward dune. The site is located approximately 1.2 km east of the Wallamba River with a similar access to resources as occurs at Site 1.

Exposure: Shell and stone artefact material are exposed along the access tracks and across the cleared Transmission line route. The density of shell is not uniform across this area but occurs in patches. Visibility on the tracks was 75 - 100% while in vegetated areas along the Transmission Line it decreased to 30% - 50% . In the dense bush that covered the dune crests visibility was 0% - 25%. Fragmentation of the shell material varies and is not consistently associated with the access tracks. Patches of very fragmented shell occur while in other areas concentrations of large, whole shells are found.

Site Contents

The site consists of shell and stone material in a compact, black greasy soil. Stone material included pebbles (flaked/unflaked) and cores. Shell species included cockle (Anadara trapezia) which predominated and Whelk (Pyrazus ebeninus), as a small percentage but an obvious second species. A great many of the Anadara shells show possible use wear on the pallial margins.

Artefact density appears to be less than 1 per m2, however this may be due to visibility as there are a number of suitable pebbles contained within the deposit which may have been brought in for use as tools themselves or to provide material for making tools.

Only one core was located on the surface.

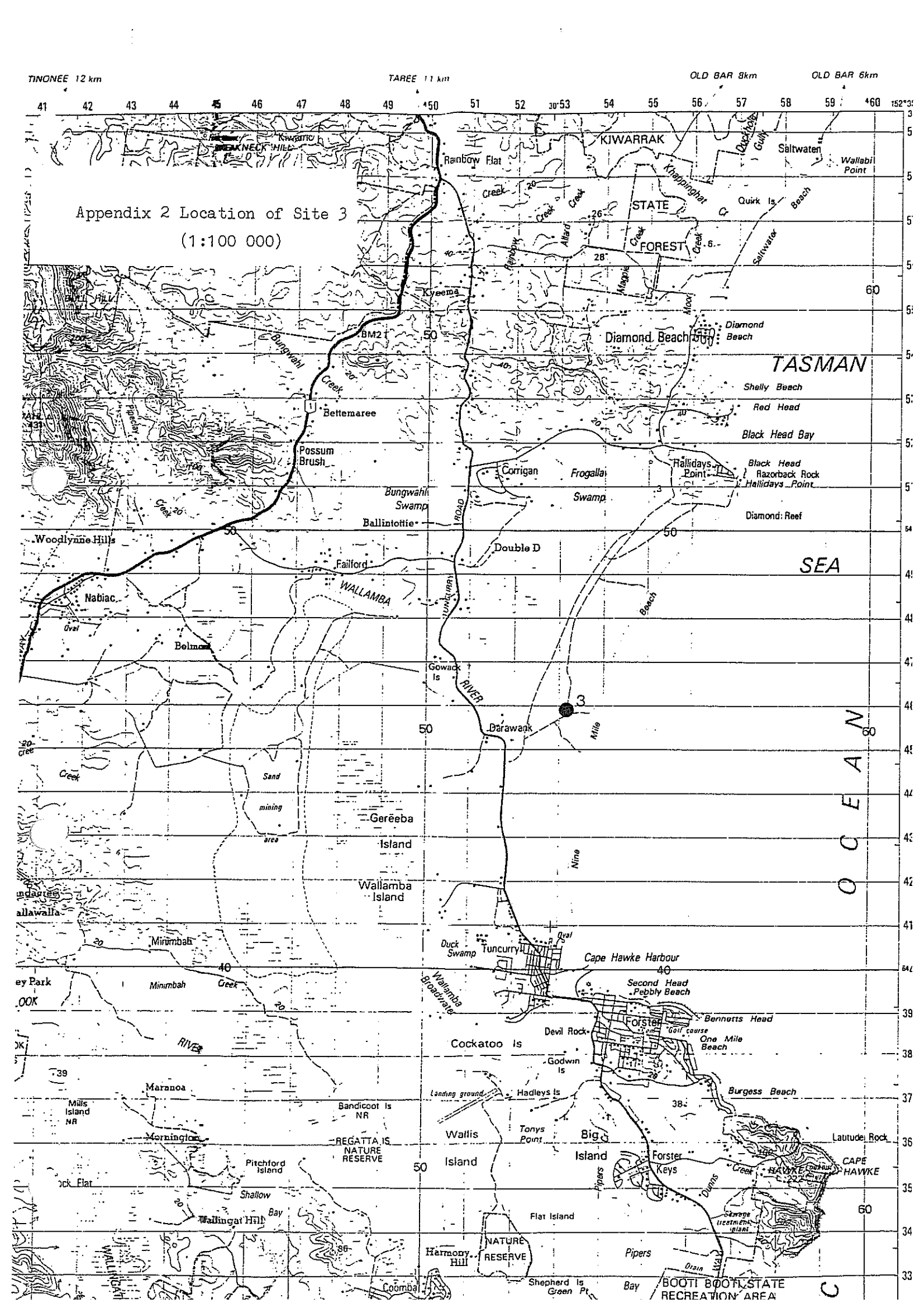
			L	W	D	
				(mm)		
Core	Chert	Grey	62	46	29	Step flaking on all margins LS 21mm

Site Dimensions:

Shell debris extends over an area of approximately 100m by 100m but the densest least disturbed concentrations are found on the dune crests. The deposit is exposed in profile in the access tracks and appears to vary in depth from 10 - 20cm. Since these cut faces occur on the flanks of the dune it is possible that material extends to greater depth on the dune crest in undisturbed areas.

Condition:

The site is very eroded in the intersection of the two tracks and across the transmission line route. Vegetation is periodically cut back and it is clear that bulldozer activity across this area has mixed European dump material and shell midden deposit. Apparently in situ material is found on the dune crests on either side of the Transmission Line in the access tracks and on either side of the tracks beneath the dense vegetation.


Appendix 2 Location of Site 3
(1:100 000)
TINONEE 12 km
TAREE 11 km
OLD BAR 8km
OLD BAR 6km
KIWARRAK
Saltwaten
Rainbow Flat
STATE FOREST
Diamond Beach
TASMAN SEA
OCEAN
Bettemaree
Possum Brush
Kyeema
Bungwahl Swamp
Ballintottie
Woodlynne Hills
Failford
Double D
Nabiac
Belmore
Gowack Is
Darawank
Gereeba Island
Wallamba Island
Minimbah
Duck Swamp
Tuncurry
Cape Hawke Harbour
Second Head
Pebbly Beach
Forster
Bennetts Head
One Mile Beach
Devil Rock
Cockatoo Is
Godwin Is
Hadleys Is
Burgess Beach
Maranoa
Mills Island NR
Bandicoot Is NR
Mornington
REGATTA IS NATURE RESERVE
Wallis Island
Tonys Point
Big Island
Forster Keys
Lattitude Rock
CAPE HAWKE
Pitchford Island
Shallow Bay
Tallingat Hill
Flat Island
Harmony Hill
NATURE RESERVE
Pipers Drain
Coomba
Shepherd Is
Green Pt
Bay
BOOTI BOOTI STATE RECREATION AREA
Corrigan
Frogalla
Hallidays Point
Black Head Bay
Red Head
Shelly Beach
Diamond Reef
Razorback Rock
Hallidays Point
Quirk Is
Saltwater
Wallabi Point
Rainbow Creek
Allard Creek
Magpie Creek
Knappinghat Ck
Bungwahl Creek
Pipeclay Creek
Sand mining area
Nine Mile Beach
Wallamba Broadwater
Landing ground
Sewage treatment plant
Oval
Golf course
WALLAMBA RIVER
TUNCURRY ROAD
BM2
3

Site Name : Open midden/campsite 3
Grid Reference:532458
1:100000 Bulahdelah
Land Category: Sand dune on sand plain behind beach foredunes

Location: The site is located 1.2 kilometres north east of the Tuncurry Garbage Tip along a gravel road. The gravel road turns north to Hallidays Point and a narrow sand access track continues east onto the beach. The beach foredunes lie approximately 700m east of the site.

The site is located 1.7km east of the Wallamba River. At Darawank the river meanders in a wide easterly loop which brings it closer to the beach than in the south of the study area. Site 3 then occupies a similar spatial relationship to river and estuarine resources as Site 2. However, it is better located to exploit open beach resources since it is lies only 700m west of the beach.

Condition of the Site:

According to local informants the area was used as a Prison camp from the early 1900's to the 1930's. Evidence of European occupation is found in the concrete house floors and the rubbish dumps. The area has been used more recently for dumping cars and other rubbish and some sand extraction has occurred on a small scale. The site is very disturbed and there is evidence of bull-dozer activity for road maintenance along the margins of the gravel track. It is this activity which has apparently exposed the archaeological material which lies approximately 50cm below the present road surface.

Approximately 500m west of the site a large strip of the sand plain has been mined for heavy minerals. The mining is evident on the air photos for the area and field inspection shows the dune morphology to have been destroyed in the mined area. The dune and swale landform is preserved at the site location so it is presumed no sand mining occurred over the site area.

Site Contents:

Shell and stone artefacts were found exposed in a small track approximately 50cm below the present road surface. It is possible that material from the site location has been taken to build up the road surface. The shell was contained in a compact black greasy deposit and appeared to have a depth of approximately 20cm. Distribution of the shell was patchy. The greatest concentration of shell was found adjacent to the road over an area 20m by 10m. No European material was found associated with the main shell deposit although shell was scattered widely throughout the area.

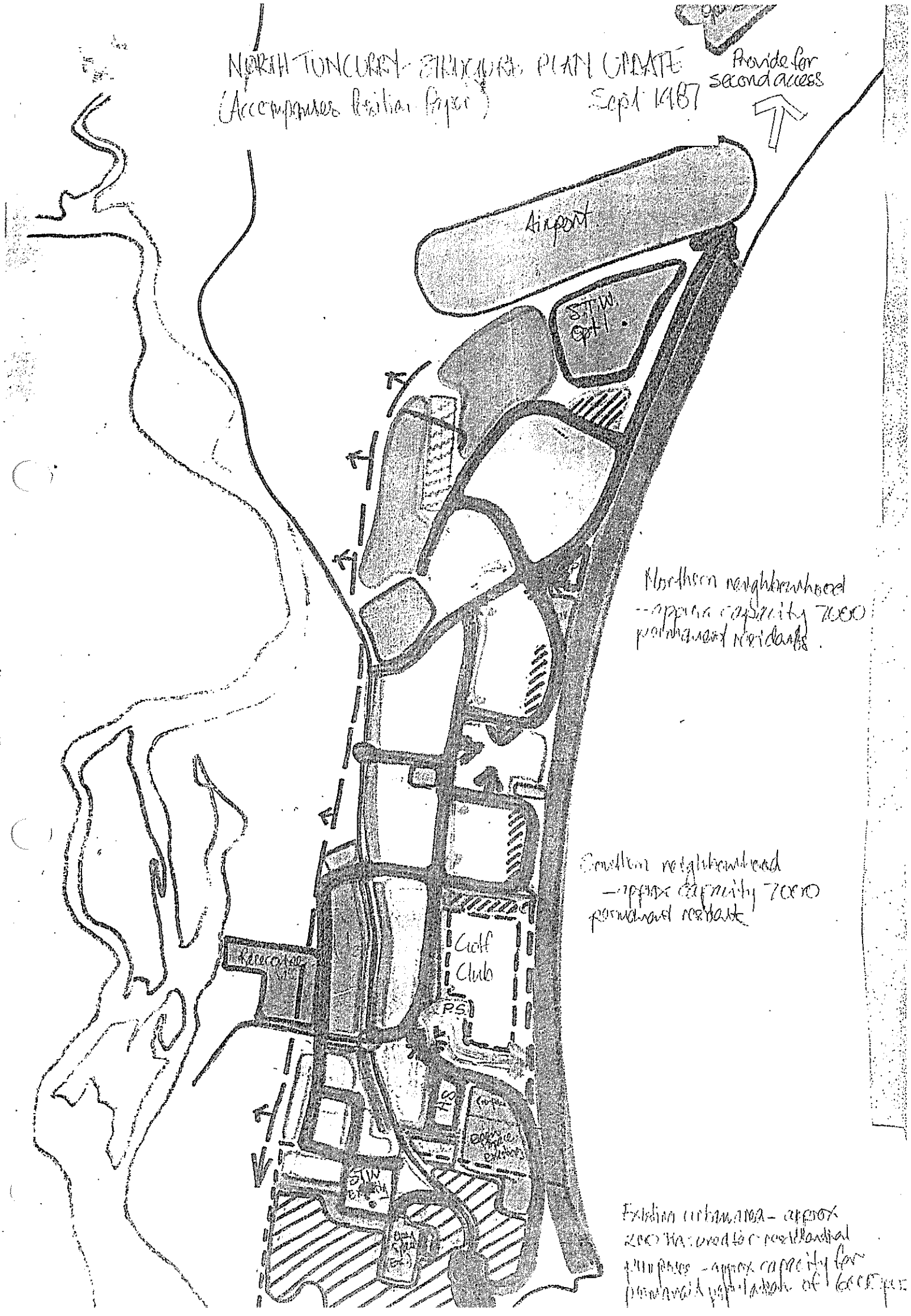
Shell species present in the midden were cockle (Anadara trapezia), Mud Whelk (Pyrazus ebeninus) and Oyster (Crassostrea commercialis). The oyster and the cockle shell appeared to be represented in equal proportions in this midden. A pipi shell (Plebidonax deltoides) and a Glycymeris flammeus shell were found at the site. The pipi shell is an open beach species associated with small dinner time camps usually found on the foredune. Given the close proximity of the beach more of these shells would be

expected to occur. The Glycymeris shell is not easily gathered since it lives beyond the surf line. It is likely that this shell was brought to the site for use as a tool as its size and shell strength make it ideal for that purpose. The shell had several flakes removed from its pallial margin however whether these resulted from use or post depositional abrasion is yet to be tested. Stone artefact numbers were small although when they were found they were usually found close together rather than widely separated across the site.

Type	Raw material	Colour	Dimensions (mm)		
			L	W	D
Flake	Chert	Grey	17	21	5
			25	16	3
			18	9	3
Flaked Piece	Chert	Red	19	14	5
Debitage			21	11	2
			13	7	2
			8	7	3
			11	5	2

APPENDIX 3 PROPOSED STRUCTURE PLAN - NORTH TUNCURRY

NORTH TONCURRY - STRUCTURE PLAN CONCEPT
(Accompanies Position Paper)
Sept 1987



Northern neighbourhood
— approx capacity 7000 permanent residents.

Southern neighbourhood
— approx capacity 7000 permanent residents

Existing urban area — approx 200 Ha zoned for residential purposes — approx capacity for permanent population of 6000 ppl


Existing Urban area – mainly residential

Proposed Urban area – mainly residential – mixed density

Existing commercial centre

Proposed commercial centre – high density tourist accom & recreation & retail

Tourist accommodation – recreation emphasis proximate to node

Industrial, commercial recreation retail bulky goods

Horticultural centre – small retail, community facility

Consolidation sand extraction – designate dam remains

Rural residential – some visitor recreation parks in association with tourism.

Proposed main traffic routes

Roundabouts

Major pedestrian links – beaches

Active open areas (primarily associated with same boulevard

Potential for possible future connecting beach road.

Land subject to 1:100 year flooding.

APPENDIX 4 PHOTOGRAPHIC RECORD

1. View south to Tuncurry across beach and well vegetated fore dune.

2. Exposure of ground surface in access track in fore dune.

3. View south along the Transmission line, note the disturbance to topography and the vegetation.

4. View east across the sand mined area, 1km north east of the Garbage Tip

5. Site 1 - view west to the road cut which exposes Site 1. The main shell concentrations occur on the crest of the dune on the south side of the road

6. Site 2 - view west to the dune containing shell material. Note the scatter of shell in foreground and disturbance along the access track.

7. Site 2 - view of exposed shell on the crest of the dune. Looking west.

8. Site 2 - exposed midden profile in access track. The thickness of the deposit at this point is approximately 10 -20cm.

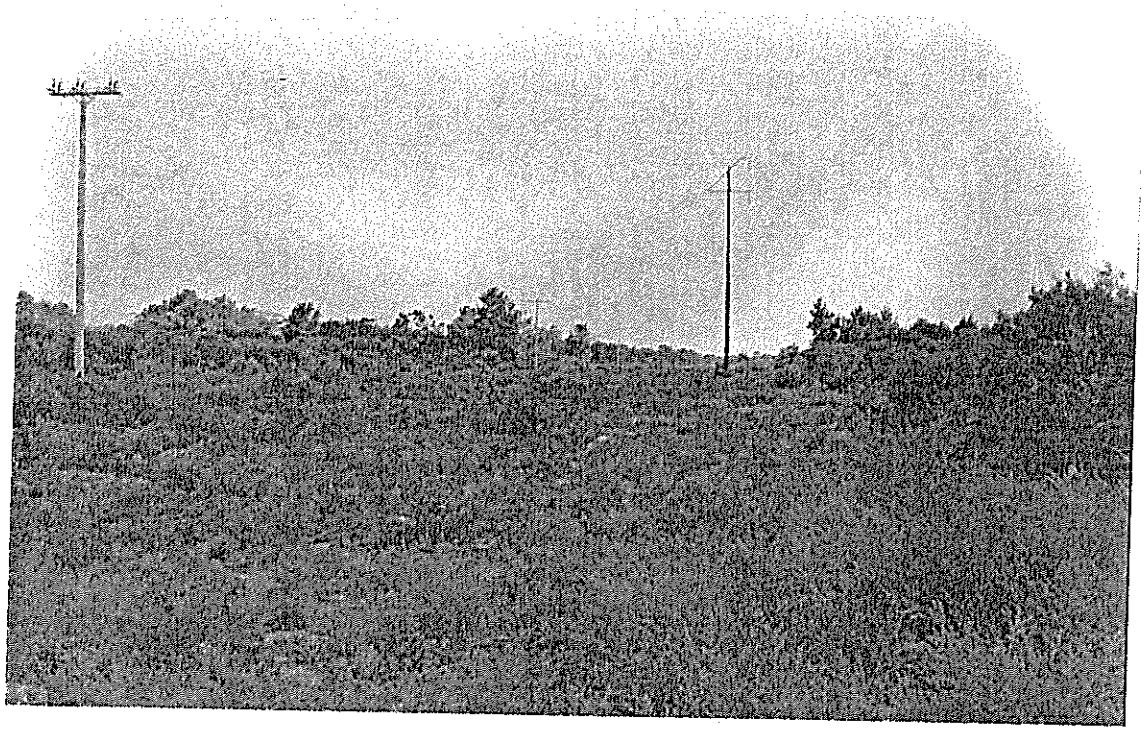
9. Site 3 - view north along the road and cleared area which contains the shell material and stone artefacts.

10. Site 3 - view east along the disturbed cut which has exposed the shell midden

2

1

3



4

5

6

7

8

9

10