10.0 PREDICTIVE MODELLING

This section outlines the landscape archaeology approach employed in this study as well as archaeological site location predictions.

10.1 Landscape Archaeology Approach

One useful approach to generating predictive models for site location employs the notion of landscape archaeology (see Rossingnol and Wandsnider 1992). This approach follows the tenets of predictive modelling in hunter-gatherer archaeology whereby different environmental zones are seen to have provided distinctive sets of constraints on land-use patterns, particularly in terms of foraging behaviour and camp placement. Predictions are based on the known pattern of site distribution in similar environmental zones. The division into environmental zones relies on factors such as landforms, soils, vegetation, etc (see Section 80). These factors are assumed to have provided distinctive sets of constraints, which influenced prehistoric land use patterns in each zone. Hence, site types and their distribution should differ between zones. Additionally, the detection of sites in each zone often depends on the following factors:

- **Ground Surface Visibility**

This factor is determined by the nature and extent of the ground cover (e.g. vegetation).

- **Burial of Original Land Surfaces** (e.g. by aggrading flood alluvium or slope wash).

- **Exposure of Prior Land Surfaces** (e.g. surfaces eroded by water or wind erosion forming features such as gullies and sheet-eroded surfaces or washouts along vehicle tracks).

Exposure can also be enhanced by activities which disturb the ground surface (and at the same time disturb the site). Flooding episodes tend to disperse artefacts by size or weight. Rather than destroy a site (unless the site is immediately adjacent to a watercourse bank that erodes totally away) the artefacts can be dispersed over an area more extensive than the original location.

- **Site Obtrusiveness**

Some sites such as stone arrangements are easier to detect than (for example) sparse scatters of flaked stone artefacts, especially where the latter occur on well-vegetated surfaces.

- **Archaeological Visibility**

This factor relates to how observable archaeological material is on a given land surface. For example, stone artefacts will be easily observed on gravel free soils, where as on stony terrain these artefacts will be less easily detected.

10.2 Predictive Models

A predictive model is defined as “hypotheses or sets of hypotheses which simplify complex observations whilst offering a largely accurate predictive framework for structuring these observations” (Sebastian and Judge 1988:1). Before discussing the

Predictive Site Location Model for this study, some caution is offered regarding this approach to site location. Location modelling is based on the results of archaeological surveys in similar and adjacent regions. Therefore, restricted survey strategies based on such prior distributions may only tend to confirm an already biased pattern. The accuracy of predictive models is reliant upon the standards of data from which they are derived. Given the constraints under which the major body of data are often collected (i.e. through limited field surveys), the level of understanding required to achieve the sort of heuristic, higher level framework, defined above is rarely achieved. Due to the fact that these surveys usually examine non-probabilistic samples and are restricted by variables such as topography and ground surface visibility, it is unavoidable that certain areas are not sampled. Therefore, although we may learn more about the nature of the record in certain areas of specific terrain, we learn little about the record that exists in areas that were under-represented in field surveys due to the constraints noted above. While techniques built into data collections such as testing of initial hypotheses and collection of independent data sets are avenues to address these problems, any study conducted with a low percentage sample coverage for a large area over a comparatively short time period will contain biases and inaccuracies which can become amplified when extrapolated. Thus, the identification of certain 'archaeologically sensitive' areas does not necessarily rule out the possibility that other areas also have archaeological potential. While recognising this in-built bias in the data base which provides the basis for predictive models of site location, they are employed for reasons of practicality.

10.2.1 Preliminary Predictive Model for the Study Area

Section 7.0 outlined aspects pertinent to the archaeological record that may be present within the study area and Section 8.0 described the environmental of the study area. Using this information this Sub-section goes on to consider in more detail the potential distribution of site types within the study area. These predictions will be tested by the field survey to be undertaken in Stage 2 of the study.

Macdonald and Collins (1999:87) (see Sub-section 7.2), divided their study area into several Land Systems. The present study area is within the Coastal Plain defined by Macdonald and Collins (1999) who predicted that the main site types present would include open campsites, middens and isolated finds. Site location within this Land System would generally occur on dry elevated landforms, particularly dune systems, lower slopes of subcoastal ridges and spurs interfingering with swamps. These features are considered to have moderate to high archaeological sensitivity. It is predicted that stone artefacts would relate to the 'pebble tool industry' as described by McBryde (1967, 1972) (see Sub-section 7.2) and include choppers, cores and flakes. Although stone quarries may not be located specifically within the study area, cobbles from the beach (particularly from the rocky headland to the south of the study area) may have been transported to the study area for reduction.

There is also a high potential that archaeological material may be present in a sub-surface context, particularly the dune system. This land system is a depositional environment and relatively undisturbed portions have the potential to contain subsurface occupation deposits and human burials.

Ground surface and immediate sub-surface disturbance has occurred throughout the majority of the study area. Such disturbance would place constraints on locating *in situ* material. Additionally, prior vegetation clearance has significantly reduced the potential for scarred trees to be present.

The area of highest archaeological potential is the dune system in the eastern portion of the study area.

11.0 SURVEY BACKGROUND

This Section of the report outlines the methodology of the field work phase of the study and includes Sub-sections outlining the survey aims (Sub-section 11.1), site definition (Sub-section 11.2) and site recording methods used (Sub-section 11.3).

11.1 Survey Aims

The aim of the field survey was to locate and document Indigenous archaeological / cultural sites / items / places that may be present within the study area. Based on the results of the survey, predictive statements regarding the unknown portion of the archaeological record within the study area could be generated. Another aim was to record basic data on site form and content for all sites located so that significance assessment of sites could be undertaken and the appropriate recommendations for each site determined.

11.2 Site Definition

For this study, should archaeological material be located, the individual artefact (or shell material) would taken as the basic unit of analysis and areas of higher artefact or shell density would be regarded as only a part of the total pattern. As a result, isolated stone artefacts or sparse shell scatters would be given a separate location number. Hence, for this study, an archaeological site would be defined as any location exhibiting physical evidence of past Aboriginal activity.

Discreteness of a site would be determined by defining a site as being spaced a distance of more than 25m from the nearest other location exhibiting evidence of past Aboriginal activity.

11.3 Site Recording

The recording of the location of any identified Indigenous sites / items / places would be undertaken with a Gamin GPSII Plus GPS Unit using AGD ‘66. Information recorded would include easting and northing of location, site type, site description, site area, environmental setting and site condition. For stone material, maximum density of stone artefacts scatters as well as raw material, artefact types and size of artefacts would also be recorded. Sites would be numbered sequentially as recorded.

12.0 FIELD SURVEY

This section of the report details the archaeological field work conducted in the study area on the 16th March, 2007, by Su Davies (Davies Heritage Consultants Pty Ltd), Mark Flanders (Coffs Harbour and District LALC) and Kenny Craig (Gumbalar Julipi Elders).

12.1 Survey Method

The survey of the study area was conducted on foot. The survey team meandered through the property focusing on undeveloped areas and particularly areas where the ground surface was exposed. Due to thick vegetation in the far north east section, full coverage of the study area was not possible (see Sub-section 11.2).

12.2 Survey Constraints

The major constraints to the survey were disturbance and limited ground surface exposure. The vast majority of the terrain within the study area has been modified and is covered by buildings and bitumen (see **Plate 1**). Other areas have been modified by excavation and landscaping (e.g. pool, water features, sporting facilities, etc.).

Plate 1. View West from Southeastern Section of Property.

12.3 Survey Coverage

It is conservatively estimated that approximately 10,000 square metres was subjected to an archaeological survey. The remaining 26,503 square metres (approximate) were not subjected to an archaeological survey as the ground surface was covered by bitumen, buildings or had been excavated for other development features (e.g. swimming pool, water features, etc). **Table 1** provides a general estimate of the percentage of area that was actually available for site detection within the study area.

Table 1. Percentage of Area Available for Site Detection

Size of Study Area (sq m.)	Exposure %	Area of Exposure (sq m.)	Average Visibility (%)	Area avail. for Site Detection (sq m.)	% of area available for Site Detection
41,503	25	10,375	5	518.75	1.25

All areas of exposure within the surveyed portions of the study area were subjected to a ground surface inspection (see Sub-section 13.3).

13.0 RESULTS OF THE FIELD SURVEY

This section outlines the results of the survey (Sub-section 12.1 and 12.2) and provides a general discussion of the results in relation to the known archaeological record (Sub-section 12.3).

13.1 Survey Results

No Indigenous archaeological items or material were located within the study area during the survey.

It should be noted that this result can not be taken as a comprehensive statement about all archaeological materials within the study area. Rather the result provides guidelines as to the archaeological sensitivity of the various locations within the study area from which informed cultural resource management recommendations may be made.

All areas with ground surface exposure within the surveyed portions of the proposed study area were inspected.

13.2 Results in Relation to Cultural Sites / Places

Kenny Craig advises that, although no cultural sites/places are located within or in the vicinity of, a cultural site is located to the south the study area (see Sub-section 7.3 and **Figure 5**).

13.3 General Discussion of Results

It is stressed that while all areas of good ground surface visibility within the proposed development area were inspected, extensive disturbance placed severe constaints on locating archaeological material.

As noted in Sub-section 10.2.1, the area of highest potential was considered to be the dune long the eastern section adjacent to Campbells Beach. This section was thoroughly inspected resulting in observation that the top surface of the dune has been removed/levelled along the majority of the length put particularly within the southern half of the study area where the tennis courts and pool complex is located. The northern portion has been modified but possibly not as extensively. Within the northern portion a volleyball court and children's playground are located (see **Plates 2** and **3**).

Plate 2. View South of Volleyball Court

Plate 3. View North towards Children's Playground.

Small patches of good ground surface visibility were present within this northern portion, particularly under and around the isolated trees. Although dense vegetation bordered the northern portion of the dune to the east, the vegetation is regrowth and it is considered that prior ground surface disturbance activities have occurred within this area. The eastern side of the dune adjacent to Campbells Beach was also inspected (see **Plate 4**).

Plate 4. View South along Campbells Beach

The inspection did not locate shell or stone that reflected past Indigenous use of the area. Kenny Craig noted that Campbells Beach was not a favoured area for the collection of pipi shells.

It is considered that there is a very low potential that archaeological material (primarily sub-surface) may be present within the study area, particularly the area of the dune in the north eastern portion. There is an extremely low potential that any earthworks in this area may expose archaeological material.

14.0 ASSESSMENT OF SURVEY RESULTS

This Section of the report assesses the cultural significance values of the study area. As Indigenous archaeological material was not located during the survey, an assessment from a scientific (archaeological) perspective is not required.

14.1 Indigenous Cultural Assessment

From discussions with the representatives of the Registered Stakeholders present during the survey, there is no indication that the study area has cultural significance values.

15.0 IMPACT ASSESSMENT

One of the objectives of this study is to assess the impact that the proposed development activities would have on the cultural resources within the study area. A number of points need to be raised with respect to this assessment. First, both cultural and natural processes impact upon the archaeological record and have done so ever since its formation. Second, as a resource the archaeological record is entirely unrenewable and is therefore in need of careful management. Third, that such management calls upon an awareness of the various components of the archaeological record in a particular area, as well as of the varying impact that an activity may have on these components. Ultimately, however, it is possible that mitigation strategies may be implemented alongside such activities to lessen any (potential) damage caused.

15.1 Impact of the Proposed Development

The proposed development can impact on both the known and unknown components of the cultural record. Both components are discussed separately below.

15.1.1 Impact on the Known Archaeological Record

As no Indigenous archaeological sites / items / material were located during the survey there will be no impact on the known resource.

15.1.2 Impact on the Known Cultural Record

As no Indigenous cultural sites / places are located within the study area there will be no impact on the known record.

15.1.3 Impact on the Unknown Archaeological Record

Consideration needs to be given to the possibility that undetected archaeological material may be present in the study area. The unknown portion of the archaeological record is perhaps the most vulnerable, as it is liable to inadvertent damage.

Given the prior land use activities within the study area it is considered that there is negligible potential that undetected surface archaeological materials are present. It is also considered that there is an extremely low to negligible potential for the presence of sub-surface material to be present (particularly in the northern half of the dune along the eastern boundary of the study area). Nevertheless, the potential cannot be totally dismissed.

16.0 MITIGATION STRATEGIES

Mitigation strategies were discussed in Sub-section 3.4; this Section pursues this topic with regards to the proposed development

16.1 Mitigation and the Archaeological Record

Although there was a general lack of ground surface exposure, prior ground surface disturbance has considerably reduced the potential for undetected surface archaeological material to be present within the study area. There is only a very low potential that sub-surface archaeological material may be present. This material would primarily be either dispersed midden material or stone artefacts which would not be *in situ*. There is a very low potential for burials to be present.

The most appropriate mitigative strategy for this development would be for workers employed on the site during the construction activities (primarily within the area of the sand dune) be made aware (via an Indigenous Cultural Heritage Induction) of the possibility of uncovering Indigenous items during ground disturbance activities and be advised of the appropriate action that must be undertaken. That is, should any Indigenous items be uncovered, such finds should immediately be reported to NSW Department Environment and Conservation (Coffs Harbour) and the Coffs Harbour and District LALC. The Induction should also clearly outline the types of and provide identification criteria for cultural heritage material that may be uncovered. A representative from this Land Council should present the Induction.

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17.0 RECOMMENDATIONS FOR THE INDIGENOUS ARCHAEOLOGICAL AND CULTURAL RECORD

The recommendations in Sub-section 16.1 below are based on the following:

- Background research as discussed in this report (see Sections 5.0; 6.0 and 7.0);
- The results of the field survey (see Section 12.0);
- Consultation with the Registered Stakeholders for the project (see Sub-sections 4.2 , 13.3, 13.4; **Appendix 1**); and
- Legal requirements under the provisions of the *National Parks and Wildlife Service Act 1974* which states that "a person who, without first obtaining the consent of the Director General, knowingly destroys, defaces or damages, or knowingly causes or permits the destruction or defacement of or to, a relic or Aboriginal place is guilty of an offence against the Act".

As Indigenous archaeological sites / items or cultural places were not identified within the study area, the following recommendations address the unknown archaeological record and cultural record.

17.1 The Unknown Indigenous Archaeological Record and the Cultural Record of the Study Area

It is recommended that:

1. **All construction personnel involved in initial ground surface disturbance activities within the area of the dune in the north eastern portion of the study area should undergo an Indigenous Cultural Heritage Induction before commencing any construction activities. The Induction should be presented by the Coffs Harbour LALC and provide specific information in relation to the processes to be followed should any Indigenous items be uncovered as well as the types of and identification criteria for cultural heritage material that may be uncovered; and**

2. **Should future activities associated with the development of Lot 100 and 101 DP629555 and Lot 2 DP800836 (Sapphire Beach Resort), uncover anything which may be interpreted as Aboriginal in origin, work in the vicinity of the find should cease immediately and the developer should inform the Department of Environment and Climate Change (NSW), Coffs Harbour, and the Coffs Harbour and District Local Aboriginal Land Council as soon as possible, for further discussion and negotiation. The provisions of the *National Parks and Wildlife Act of 1974* (as amended) state that it is illegal to damage, deface or destroy a relic without written permission of the Director of the Service. Those failing to report a discovery and those responsible for the damage or destruction occasioned by unauthorised removal or alteration to a site or to archaeological material may be prosecuted under the *National Parks and Wildlife Act 1974*, as amended.**

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19.0 APPENDICES

19.1 Appendix 1: Report from Coffs Harbour and District LALC

Coffs Harbour & District
Local Aboriginal Land Council
PO Box 6150, Coffs Harbour Plaza NSW 2450
Phone (066) 52 8740 Fax (066) 52 5923

20th March 2007

Attention: Su Davies

Davies Heritage Consultants
PO Box 208
Red Hill QLD 4059

Re: Proposed Pelican Beach Resort Redevelopment
Cultural Heritage assessment report response.

Dear Su,

I refer to your draft Cultural Heritage report for the proposed redevelopment of Pelican Beach Resort, Coffs Harbour.

After having reviewed the report it has been ascertained that the report recommendations reflect the views expressed by the Coffs Harbour and District Local Aboriginal Land Council and the Gumbula Julipi Elders group.

The Coffs Harbour and District Local Aboriginal Land Council and the Gumbula Julipi Elders group have no constraints for this redevelopment proceeding provided that the recommendations detailed in your report are adhered to.

The Cultural Heritage induction can be arranged through the Coffs Harbour and District Local Aboriginal Land Council office by contacting the undersigned on the above number.

If you have any questions please do not hesitate to call me.

Yours truly,

Chris Spencer
Coordinator