

3 Working Paper

Aboriginal Heritage

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***Pacific Highway Upgrade
Sapphire to Woolgoolga***

***Working Paper
Aboriginal Heritage Assessment***

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Report to
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SUMMARY

Background

The NSW Roads and Traffic Authority (RTA) proposes to upgrade the Pacific Highway from Sapphire to Woolgoolga, north of Coffs Harbour on the NSW mid-north coast. This report was commissioned by Connell Wagner on behalf of the RTA and forms the Aboriginal heritage component of the Pacific Highway Sapphire to Woolgoolga environmental assessment. The Proposal, which will be assessed under Part 3A of the NSW *Environmental Planning and Assessment Act 1979*, involves an upgrade/duplication of the 15 kilometre length of the existing highway between Sapphire and south Woolgoolga, and a 10 kilometre bypass of Woolgoolga.

A comprehensive route selection study for the proposed Pacific Highway Sapphire to Woolgoolga Upgrade has been completed by Connell Wagner in conjunction with the RTA. The study included an Aboriginal heritage report (Collins 2002) that assessed the sensitivity of primary upgrading options in liaison with representatives of the Coffs Harbour and District Local Aboriginal Land Council, Yarrawarra Aboriginal Corporation and the Gumbula Julipi and Garby Elders. A preliminary overview of the present Proposal was also undertaken with the assistance of these Aboriginal groups (Collins 2003).

A number of anthropological and archaeological sites and constraints were recorded during the route selection process. Of these, one culturally-significant historic campsite east of the existing highway reserve south of Moonee Creek (S2W-4) was identified as having the potential to be directly affected by the Proposal. Impacts to this site have been mitigated through a revision of the concept design during the course of the environmental assessment process. Major concerns were expressed in relation to the westernmost option (Option A), which traversed a highly sensitive cultural landscape. This option was subsequently not selected for further investigation in part because of its severe Aboriginal heritage and biophysical impacts.

Assessment objectives and components

This assessment aims to identify and assess Aboriginal cultural heritage sites and values, and to develop impact mitigation strategies and management recommendations appropriate to the significance and extent of the Aboriginal heritage resource. It has involved the participation of Aboriginal community representatives in determining and assessing impacts, developing management options and finalising management recommendations to achieve acceptable cultural heritage outcomes.

In addition to Aboriginal consultation that commenced with route selection studies in 2002, the assessment includes a review of relevant heritage registers and background literature, construction of a predictive archaeological site location model, field survey assisted by nominated Aboriginal community representatives, and an assessment of the cultural/social and scientific/archaeological significance of the identified sites and values to identify the potential impacts of the Proposal on Aboriginal heritage.

Aboriginal involvement and concerns

The Proposal lies within the area administered by the Coffs Harbour and District Local Aboriginal Land Council (CHLALC). The section south of Moonee Creek is also within the territory of the Gumbula Julipi Elders Council Aboriginal Corporation, and is of interest to the former Mudjay Elders group. The section north of Moonee Creek is within the territory of the Yarrawarra Aboriginal Corporation, and within the traditional country of the north-eastern Gumbaingirr people, who are represented by the Garby Elders. Most of the Proposal thus falls within Garby Elders' country. The CHLALC and Gumbula Julipi Elders work closely together, as do the Yarrawarra AC and the Garby Elders.

Because Aboriginal involvement in the Proposal has been in train since route selection studies commenced in 2002, there was no requirement to apply the '*Interim Community Consultation Requirements for Applicants*' introduced by the DECC in 2005. However, a comprehensive program of Aboriginal consultation has been undertaken, which accords with the general principles of the *Interim Community Consultation Requirements*. All potential Aboriginal stakeholder groups have been identified, and their cultural values and concerns appropriately considered throughout the route selection and environmental assessment process. Aboriginal Participants provided information as to the location and significance of ceremonial, mythological, historical, archaeological and other types of sites and landscape values to facilitate the selection of a preferred option and a finalised concept design that minimises impacts on Aboriginal heritage.

The Aboriginal Participants advised that they have no fundamental objections to the Proposal providing construction-related disturbance is confined to the presently defined impact area, and the recommendations of this report are implemented. Of primary concern is the potential impact on two areas of high cultural significance. These include the spur occupied by the Coffs Harbour Clay Target Club south of Moonee Creek, which is significant as one of the last known traditional camping places of the Moonee people. The second area lies in the Arrawarra Creek/Embankment Road locality towards the northern limit of the Proposal, where a ceremonial/sacred site and an historic campsite have been reported (Collins 2002:43, 2003). Although these latter sites lie well to the west, the nature and extent of their associated archaeological assemblages are not known, and there is thus a perception that construction works could lead to the accidental damage of significant artefacts. As a means of alleviating these concerns, the Garby Elders have requested that subsurface archaeological testing be conducted on/in the vicinity of the Clay Target Club campsite (S2W-4) and Arrawarra Creek/Embankment Road (S2W-10 and S2W-11), and that these areas be subject to initial construction monitoring and fenced for the duration of works.

Participants also raised concerns in relation to the necessary clearance within Wedding Bells State Forest, and the adverse effect that bridge construction may have on water quality and the survival of downstream aquatic/marine flora and fauna in the several creeks and estuaries traversed by the Proposal. The welfare of both forests and waterways is of fundamental importance to the Aboriginal community, whose ancestors have utilised wild resources for many thousands of years. Even though wild resources are no longer relied upon for subsistence, their collection is seen as an on-going cultural tradition.

Heritage registers

Four sites registered on the Department of Environment and Climate Change (DECC) Aboriginal Heritage Information Management System would be directly affected by the Proposal. Of these, one scatter of three stone artefacts (#22-1-192) south of Split Solitary Road has already been subject to a DECC Heritage Impact Permit (Consent to Destroy) issued to the Coffs Harbour City Council for installation of a water main. No artefacts were detected in this locality during the present survey, and further undetected artefacts are unlikely.

The western extent of a widespread scatter of subsurface artefacts (S2W-12) is intercepted by the proposed Fiddaman Road interchange south of Fiddaman Road. A DECC Heritage Impact Permit with Permit to Salvage has been issued for this site. The salvage was conducted by Davies (2007), and entailed the recovery of artefacts from a one square metre area within each 225 square metres of the site, yielding a sample of less than 0.5 percent. As such, it is clear that many additional unsalvaged artefacts will occur.

The two other DECC registered sites comprise an isolated stone artefact (S2W-3) within the Pacific Highway reserve south of Skinners Creek, and the potential western periphery of a larger artefact scatter (S2W-4) located on the Coffs Harbour Clay Target Club spur.

Searches of the Commonwealth and National Heritage Lists, the NSW State Heritage Register, the RTA Heritage and Conservation Register, Schedule 2 (Heritage Items) of the North Coast Regional Environmental Plan 1988 and Schedule 5 (Heritage Items) of the Coffs Harbour Local Environmental Plan 2000 revealed no listed Aboriginal sites or places on or close to the Proposal.

Of most relevance is a listing on the Register of the National Estate for the Woolgoolga-Solitary Islands area, including the coastal strip between the hills and coast from Moonee Beach to Corindi Beach. This area is listed as an Indicative Place (not on the register but identified as important) due primarily to its environmental values, but also owing to its potential Aboriginal resource use values. However, Aboriginal values are yet to be fully determined or assessed.

Field survey coverage

In view of archaeological site location predictions based on known site distributions, and the disturbance history of the Proposal, the field survey was directed towards reasonably intact well-drained landforms, particularly those of potentially high and moderate archaeological sensitivity. Disturbed areas of low potential sensitivity such as the existing highway reserve, banana plantations and cleared alluvial plains were selectively sampled. The survey preferentially targeted exposed ground surfaces suitable for artefact detection. The trunks of all mature trees in and near the Proposal were inspected for signs of Aboriginal marking.

The field survey was conducted on foot with the assistance of sites officers from the CHLALC/ Gumbula Julipi Elders and Yarrowarra Aboriginal Corporation/Garby Elders in May 2005. Although some property owners denied access to the survey team, this is not considered to have prejudiced the assessment results (which take these areas into account). Approximately 46 percent of the Proposal was inspected, of which 9.2 percent was subject to effective survey coverage. Of the 54 percent of the Proposal not inspected, the vast majority had been highly disturbed and/or modified as a result of past highway construction, residential development or banana cultivation and was assessed in liaison with Aboriginal Participants to have a low level of cultural and archaeological sensitivity. Most of the remaining areas had been subject to previous surveys considered to be reliable in reflecting a low to negligible level of further archaeological potential.

Results and site impacts

Seven archaeological sites and eight areas of potential archaeological deposit (PADs, two associated with the recorded sites) were identified within the Proposal. The confirmed sites comprise four scatters of stone artefacts (S2W-2, 4, 7 and 12) and three isolated artefact finds (S2W-3, 5 and 6).

Of these, all or parts of four identified sites and six PADs would be directly impacted by the Proposal. Four of the remaining sites/PADs may be indirectly affected. The Proposal also has the potential to adversely affect the natural and resource-use values of Wedding Bells State Forest and waterways. Several other nearby sites and values would need to be taken into account and avoided by any construction-related infrastructure or ancillary works.

Recommendations

Detailed recommendations are presented in Section 11 of this report. In summary, it is recommended that surface artefacts on two of the sites (S2W-2 and S2W-7) be salvaged/ collected, and re-located to a defined place in the undeveloped section of highway reserve once construction is complete.

Prior to construction, subsurface archaeological testing and any necessary subsequent artefact salvage should be conducted on the affected sections of S2W-4, S2W-5, S2W-6, S2W-8, S2W-9, S2W-10 and S2W-11. Temporary protective fencing and Aboriginal construction monitoring are recommended in some of these areas (S2W-4, S2W-5, S2W-6, S2W-10 and S2W-11). With the

exception of works necessary for construction of the (revised) Coffs Harbour Clay Target Club property access road, all construction-related activities east of the highway between Chainages 16750 and 17130 should be confined to the existing Pacific Highway reserve to avoid impact on S2W-4.

Initial ground disturbance/topsoil stripping on the S2W-1 location should be monitored by an archaeologist and Aboriginal group representatives. In the event that Aboriginal objects are exposed, work should cease pending the completion of an archaeological salvage investigation.

The affected S2W-12 locality should be inspected by Aboriginal community representatives following removal of the existing buildings, and initial ground disturbance/topsoil stripping monitored by these representatives with a view to supplementing the sample of artefacts already salvaged from this site.

The S2W-13 historic Aboriginal burial is reportedly located in the south-eastern corner of Portion 41, Parish of Moonee. Although the Proposal has been modified to avoid the site, consultation with Holder family descendants and a field inspection with Aboriginal Participants should be undertaken in an endeavor to confirm the S2W-13 location. All construction-related activities should avoid the south-eastern corner of Portion 41, and temporary protective fencing erected. Aboriginal construction monitoring is recommended in the S2W-13 locality. In the event that any evidence of a burial is detected, work should cease pending advice from the DECC.

To mitigate the adverse effects of forest clearance and bridge construction on Aboriginal landscape and resource-use values, clearance through Wedding Bells State Forest should be minimised. To offset losses and maintain cultural attachments, it is recommended that highway cuttings through Wedding Bells State Forest be re-vegetated with locally-indigenous plant species, and that opportunities be offered to Aboriginal community representatives to be employed in the re-vegetation program. The RTA should ensure that best practice methods of containing sediment run-off are implemented and maintained during and following bridge construction.

To avoid inadvertent disturbance/destruction, all identified archaeological sites and potential archaeological deposits within and near the Proposal should be clearly marked and annotated on construction drawings, and their management requirements detailed in the Environmental Management Plan for Construction (Indigenous Heritage Management Sub Plan). RTA project and construction management staff and construction contractors should be informed of the site locations, conservation management requirements, and legal obligations in regard to Aboriginal cultural materials.

Additional field survey and/or assessment will be required where any machinery compound, stockpile, concrete batching plant, water retention pond and/or other construction-related infrastructure is to be established beyond the boundaries of the Proposal assessed in this report.

In the event that any Aboriginal objects (as defined by the *National Parks and Wildlife Act 1974*) not identified in this report are discovered or exposed during construction, work must immediately cease in the vicinity of the find. The DECC, the CHLALC and the appropriate Elders group/s should then be contacted for management advice and clearance given by these organisations before work resumes in the subject area.

In conclusion, it is recommended that the RTA continue to liaise closely with the identified Aboriginal stakeholders in relation to Aboriginal heritage issues. These stakeholders should be kept informed of the timetable for any works associated with planning and construction of the Pacific Highway Sapphire to Woolgoolga Upgrade.

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1 INTRODUCTION

The NSW Roads and Traffic Authority (RTA) proposes to upgrade the Pacific Highway between Sapphire and Woolgoolga, north of Coffs Harbour on the NSW mid-north coast. Following an investigation of feasible alternatives, a preferred upgrading option ('the Proposal') has been selected for detailed assessment. The Proposal involves an upgrade/duplication of the 15 kilometre length of the existing highway between Sapphire and south Woolgoolga and a 10 kilometre bypass of Woolgoolga. This report was commissioned by Connell Wagner on behalf of the RTA and forms the Aboriginal heritage component of the Pacific Highway Sapphire to Woolgoolga environmental assessment.

1.1 The Proposal

The Proposal commences from approximately eight kilometres north of Coffs Harbour at Sapphire, extending for approximately 25 kilometres to the vicinity of Arrawarra Beach Road north of Woolgoolga (Figure 1). The Proposal can be broken down into the southern 'upgrade' section from Sapphire to south Woolgoolga, and the northern 'bypass' section (ie Woolgoolga bypass).

From Sapphire to south Woolgoolga, the Proposal entails the amplification of the existing highway to a dual carriageway, controlled access highway. This section of the Proposal includes an access road for local traffic alongside or near the highway. The Proposal ties into the existing dual carriageway highway at Korora, with a left-in/left-out intersection at Campbell Close on the western side and a right-in/left-out intersection with the eastern local access road (the existing highway) opposite Campbell Close. North of Campbell Close, access to and from the highway would be restricted to grade-separated interchanges.

The Woolgoolga bypass section of the Proposal is also a dual carriageway standard upgrade, with the existing highway becoming the local access road. The bypass would deviate from the existing highway just north of Graham Drive North, and rejoin the existing highway at the grade-separated interchange at Arrawarra. Two interchanges, one at south Woolgoolga and another at Arrawarra, would provide access to and from the bypass.

1.2 Legislative background

The Proposal will be assessed under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), which provides an approval process specific to major projects.

Under the auspices of Part 3A, authorisations for an approved project, including permits and consents under Section 87 and Section 90 of the NSW *National Parks and Wildlife Act 1974*, are not required for project-related works that may impact on Aboriginal cultural heritage. However, the NSW Department of Planning will take account of heritage issues and consult with the NSW Department of Environment and Climate Change (DECC) to ensure that any such issues are duly considered prior to granting project approval.

In the absence of the requirement for Section 87 permits and Section 90 consents, the RTA will need to manage Aboriginal cultural heritage in accordance with the specific conditions of approval imposed by the Department of Planning. These could include the management procedures recommended in Section 11 of this report. In view of its acknowledged and valued role in cultural heritage resource management, the RTA has nevertheless resolved to engage in consultation with the DECC with respect to any activities that would normally require Section 87 permits and/or Section 90 consents under the *National Parks and Wildlife Act 1974*.

1.3 Assessment background

A comprehensive route selection study for the Pacific Highway Sapphire to Woolgoolga Proposal has been completed by Connell Wagner in conjunction with the RTA. This study included an Aboriginal heritage report (Collins 2002) that assessed the sensitivity of four primary upgrading options (A,B,C and D) in liaison with representatives of the Coffs Harbour and District Local Aboriginal Land Council, Yarrawarra Aboriginal Corporation and the Gumbula Julipi and Garby Elders. In response to a request by Coffs Harbour City Council to investigate additional options that would alleviate future urban development concerns at Woolgoolga, a modified Option C (Option C1) and an option incorporating Options B and C (Option E, the current Proposal) were later assessed via a preliminary overview with the assistance of these Aboriginal organisations (Collins 2003).

A number of anthropological and archaeological sites and constraints were recorded during the route selection process. Of these, one culturally-significant historic (and probably pre-historic) campsite east of the existing highway reserve south of Moonee Creek (S2W-4 of this report) was identified as having the potential to be directly impacted by development of Option E. As

discussed in Section 9, impacts to this site have been mitigated through a revision of the concept design during the course of the environmental assessment process.

1.4 Assessment objectives and components

This assessment aims to identify and assess Aboriginal cultural heritage sites and values, and to develop impact mitigation strategies and management recommendations appropriate to the significance and extent of the Aboriginal heritage resource.

To satisfy Department of Planning requirements and provide a level of information suitable for determination of the Proposal approval, this assessment includes-

- Consultation with the Coffs Harbour and District Local Aboriginal Land Council (CHLALC), Elders groups and knowledge-holders to determine whether sites, places or values of particular significance or concern would be either directly or indirectly affected.
- A review of relevant heritage registers and literature to determine the location and character of known sites, and establish a context for the assessment of sites that would be affected by the Proposal.
- A predictive model of site type and location for the Proposal, based on the results of past studies and a consideration of its environmental and disturbance context.
- Field survey assisted by nominated Aboriginal community representatives to identify archaeological sites and potential archaeological deposits (PADs).
- Assessment of the cultural/social and scientific/archaeological significance of identified sites, places and values.
- Assessment of the potential impacts of the Proposal on Aboriginal cultural heritage.
- Management recommendations developed in consultation with Aboriginal community representatives to mitigate or avoid potential impacts.



Figure 1. The Proposal alignment

1.5 Assessment participants

This assessment has involved the participation of Aboriginal community representatives in determining and assessing the impacts of the Proposal on Aboriginal heritage values, developing management options and finalising the recommendations made in Section 11 of this report.

All detailed field survey, documentation and report preparation was undertaken by the project archaeologist (Jacqueline Collins), with the field assistance and advice of CHLALC sites officers Mark Flanders and Chris Spencer and Jalumbo Cultural Heritage Research Unit (Yarrawarra Aboriginal Corporation) sites officer Richard Preece. Gumbula Julipi Elders Tony Flanders and Ken Nayda, and Garby Elders Cecil Laurie, Keith Lardner and Ricki Cain also assisted with a field reconnaissance inspection. Further assessment of Aboriginal cultural values and concerns was provided by representatives of the CHLALC, Yarrawarra Aboriginal Corporation, Gumbula Julipi Elders, Garby Elders, and the (former) Mudjay Elders.

1.6 Native Title

Searches of the National Native Title Register, Register of Native Title Claims, Unregistered Claimant applications and the Register of Indigenous Land Use Agreements were performed for the Coffs Harbour Local Government Area (LGA) on the 23rd of June and 23rd of November 2005, and the 24th of April 2007. Advice provided by the National Native Title Tribunal indicates that at the time of these searches there were no entries relevant to the Proposal or the wider LGA.

2 ABORIGINAL COMMUNITY INVOLVEMENT AND CONSULTATION

2.1 Background

The Proposal traverses the area administered by the Coffs Harbour and District Local Aboriginal Land Council (CHLALC), a broad representative body incorporated under the *Aboriginal Land Rights Act 1983*. The section south of Moonee Creek is also within the territory of the Gumbula Julipi Elders Council Aboriginal Corporation, and is of interest to the former Mudjay Elders group. The section north of Moonee Creek is within the territory of the Yarrawarra Aboriginal Corporation of Corindi Beach, and within the traditional country of the north-eastern Gumbaingirr people, who are represented by the Garby Elders. Most of the Proposal thus falls within Garby Elders' country.

The CHLALC and Gumbula Julipi Elders work closely together, as do the Yarrawarra AC and Garby Elders.

Because Aboriginal involvement in the Proposal has been in train since route selection studies commenced in 2002, there was no requirement to apply the '*Interim Community Consultation Requirements for Applicants*' introduced by the DECC in 2005. However, as indicated below and in Appendix A, a comprehensive program of Aboriginal consultation has been undertaken, which accords with the general principles of the *Interim Community Consultation Requirements*. All potential Aboriginal stakeholder groups (as mentioned above) have been identified, and their cultural values and concerns appropriately considered in determining and assessing impacts, and developing management strategies and recommendations that will achieve acceptable cultural heritage outcomes.

As recorded in Appendix A, Aboriginal community consultation was conducted-

- During the route process, including field survey and reconnaissance with nominated Aboriginal community representatives and Elders to assess relative values, attachments and concerns with regard to the upgrading options.
- Prior to and during the environmental assessment field survey and reconnaissance with nominated Aboriginal community representatives and Elders to identify Aboriginal heritage sites and PADs and assess their cultural/social significance.
- Following the environmental assessment field survey to discuss and assess findings and other Aboriginal cultural heritage issues, and to develop management strategies/recommendations that would adequately address Aboriginal community concerns.

2.2 Route selection involvement and outcomes

The CHLALC, Gumbula Julipi Elders, Yarrawarra AC, Garby Elders and (former) Mudjay Elders were contacted at commencement of route selection studies, and following discussion of the aims, nature and scope of the Aboriginal heritage assessment, assistance with a sample field survey of the route options was provided by Land Council sites officers Mark Flanders and Gary Slater, and Yarrawarra AC sites officers Richard Preece and Ricki Cain between the 27th of June and the 4th of July 2002.

To assess Aboriginal cultural and social values and to determine whether the integrity of any significant sites/places would be threatened by highway construction along any option, consultation was undertaken with key representatives of the above Aboriginal organisations. To familiarise them with the options and facilitate an informed assessment of cultural/social values, a general field reconnaissance was conducted with Yarrawarra's senior sites officer Ian Brown and Garby Elders Cecil Laurie and the late Bruce Laurie. Participants provided advice regarding the location and significance of ceremonial, mythological, historical and other types of sites to facilitate the selection of a preferred option that would minimise impacts on Aboriginal heritage resources and the cultural landscape in general.

Due to major concerns with the westernmost option (Option A), a meeting was convened by the RTA on the 4th of September 2002. In attendance were then CHLALC Co-ordinator Dave Kennedy, Garby Elders Cecil Laurie, Bruce Laurie and Tony Perkins, Yarrawarra/Jalumbo staff Cheryl Perkins, Ian Brown, Richard Preece and Dee Murphy, RTA Sapphire-Woolgoolga Project Manager Chris Clark, RTA Aboriginal Liaison Officer Mary-Lou Buck, RTA Environmental Advisor Scott Laurence, Connell Wagner Senior Planner Rosemary Russell, Manager of the NPWS (now DECC) Northern Aboriginal Heritage Unit Hilton Naden, NPWS Northern Zone Archaeologist Rebecca Edwards-Booth, and the project archaeologist. Subsequent to the meeting, Option A was re-aligned approximately 650 metres to the west to avoid direct impact on a gazetted Aboriginal Place of outstanding spiritual significance. However, this re-alignment was not acceptable to the Aboriginal community, and the permanent constraints that the Aboriginal Place and other important cultural attachments posed for acceptance of Option A as a preferred option is detailed in the route selection assessment report (Collins 2002). The outstanding cultural values attributed to Option A were outlined in an address by Garby Elder Tony Perkins at Value Management Workshop 1 in early 2003. Option A was subsequently not pursued as the preferred option in part because of its severe Aboriginal heritage and biophysical impacts.

Owing to its high level of disturbance and relatively low level of cultural sensitivity, an upgrading/duplication of the existing highway (Option D) was preferred by the Aboriginal community. However, this option has not been selected for further investigation due to the social and economic impacts that it would have on the township of Woolgoolga.

Aboriginal Participants revealed that although some sites and values would be compromised by development of the two remaining primary options (Option B, incorporating sub-options B1 and B2, and Option C), impacts could be acceptably mitigated through the implementation of strategies such as minor re-alignment, protective fencing, subsurface archaeological investigation and artefact salvage where necessary.

The Proposal subject of this report (Option E) combines parts of Options B and C, and was explored following Value Management Workshop 1. Field survey of the primary options and preparation of the route selection Aboriginal heritage assessment report (Collins 2002) had been completed by this time. Assessment of Option E thus involved an overview of the Aboriginal heritage sites and issues previously identified in relation to the relevant portions of Options B and C, along with Aboriginal consultation aimed at identifying any previously undocumented constraints. This consultation was undertaken with Garby Elder Tony Perkins, Ian Brown, Ricki Cain and Dee Murphy of the Jalumbo Cultural Heritage Research Unit, Yarrawarra AC, and CHLALC sites officer (now Co-ordinator) Chris Spencer. The consultation revealed that no specific sites/places of spiritual, ceremonial or otherwise outstanding cultural significance would be directly affected by Option E. Because forested lands are highly valued by the Aboriginal community, there was a general concern for the clearance required in Wedding Bells State Forest on the northern end, a concern similarly extended to Options A and B.

The prime concern with respect to Option E, however, was the welfare of a highly significant sacred ceremonial site that lies north of Arrawarra Creek and approximately 700 metres west of its tie-in with the existing highway. This site is believed to contain material (archaeological) evidence of ceremonial activity. To preserve cultural and potential archaeological values, Aboriginal Participants advised that it would be necessary for all construction-related facilities (machinery compounds, stockpiles etc) to be located well away from this particular area. Given that the Proposal could proceed without affecting this significant site, Participants advised that Option E was preferred over Option B (B1 and B2), as Option B impinged on historical camping places and ceremonial grounds in the vicinity of Johnsons Road (cf Collins 2002).

2.3 Environmental assessment involvement and outcomes

Process of involvement

On commencement of environmental assessment investigations, the relevant Aboriginal stakeholder groups were contacted and an inception meeting held at the CHLALC office to discuss the Proposal and its Aboriginal heritage implications on the 3rd of March 2005. In addition to the project archaeologist, this meeting was attended by RTA Project Manager Chris Clark, Connell Wagner Project Manager Tim Paterson, Connell Wagner planners Barry Hancock and Nick Hearfield, CHLALC sites officer (and Gumbula Julipi Elder) Mark Flanders, Garby Elder and Yarrawarra AC representative Tony Perkins, and Steven Hart, spokesperson for the former Mudjay Elders group (currently the CHLALC Treasurer).

Subsequent to the meeting it was arranged that field survey assistance would be provided by CHLALC sites officers Chris Spencer and Mark Flanders, and Yarrawarra AC sites officer Richard

Preece on the 16th, 17th, 18th and 19th of May 2005. Options to avoid or mitigate impacts on cultural heritage sites and places were discussed with these sites officers as the survey progressed, and draft management recommendations developed in accordance with their advice. To familiarise them with the Proposal, field survey results and draft management recommendations, and allow an informed assessment of Aboriginal cultural and social values, a general field reconnaissance was conducted with Garby Elders Cecil Laurie, Keith Lardner and Ricki Cain on the 23rd of June, and Gumbula Julipi Elders Tony Flanders and Ken Nayda on the 24th of June, 2005. In a further effort to assess Aboriginal values, determine whether the integrity of any sites/places of particular significance, attachment or concern would be threatened by the Proposal, and discuss the draft management strategies, additional consultation was undertaken with Garby Elder Tony Perkins, and Steven Hart and Terry Carberry of the former Mudjay Elders group.

Draft copies of this report (prepared in 2005) were forwarded to the CHLALC/Gumbula Julipi Elders and Yarrawarra AC/Garby Elders, and comments invited (see responses, Appendix B). In addition to the draft report recommendations, the Yarrawarra AC/Garby Elders recommended archaeological test pitting in the Coffs Harbour Clay Target Club (S2W-4) and Embankment Road (S2W-10)/Arrawarra Creek (S2W-11) localities, as well as temporary fencing and initial construction-related monitoring of these areas. This final report has been duly amended to include the Yarrawarra AC/Garby Elders' recommendations. Management recommendations for S2W-12, which was recorded since the draft report was reviewed, have been discussed with and verbally endorsed by CHLALC/Gumbula Julipi Elders and Yarrawarra AC/Garby Elders representatives.

Results of involvement and consultation

Aboriginal Participants have advised that they have no fundamental objections to the Proposal providing construction-related disturbance is confined to the presently defined impact area, and the recommendations of this report are implemented.

Concerns were nevertheless expressed regarding potential impacts on two areas of high cultural significance. As discussed by Collins (2002:16), the spur occupied by the Coffs Harbour Clay Target Club south of Moonee Creek is significant as one of the last known traditional camping places of the Moonee people. In order to preserve this significance, the Aboriginal community requested that disturbance to this area be minimised.

A ceremonial/sacred site (Arrawarra Creek) and an historic campsite (Embankment Road) have been reported towards the northern end of the Proposal (Collins 2002:43, 2003). Although these sites lie well west of the proposed impact zone, the nature and extent of their associated

archaeological materials (if any) are not known, and there is thus a perception that highway construction could lead to the accidental damage of significant cultural resources. As a means of alleviating these concerns, the Garby Elders have recommended that subsurface archaeological testing be conducted on/in the vicinity of the Clay Target Club campsite and Arrawarra Creek/Embankment Road, and that these areas be subject to initial construction monitoring and fenced for the duration of construction works.

Mudjay Elders representatives Steven Hart and Terry Carberry also raised concerns in relation to the adverse effect that bridge construction may have on the water quality and survival of downstream flora and fauna in the several creeks and estuaries traversed by the Proposal. These Participants consider the welfare of waterways to be of fundamental importance to the Aboriginal community, whose ancestors have utilised aquatic and marine resources for many thousands of years. Some of the more productive estuaries (such as Moonee Creek, Hearn's Lake and Woolgoolga Lake) have been associated with post-contact camping activities and the historical and more recent use of wild resources. Steven Hart and Terry Carberry further advised that they would consider it appropriate to re-vegetate the margins of the new highway with locally-indigenous plants, and suggested that members of the Aboriginal community be employed to undertake tasks associated with the re-vegetation program.

3 ENVIRONMENTAL SETTING

3.1 The general environment

The Coffs Harbour region experiences a subtropical climate of warm humid summers and mild dry winters. Seasonally heavy rains are common in late summer and early winter due to tropical cyclone activity off the NSW north coast. The predominant wind direction during summer is from the north-east, and during winter from the south-west. Wind speed decreases with inland distance and is highest along the coastal margin where afternoon sea breezes are common (State Forests 1995:6-7). While factors such as localised flooding and adverse winds may well have influenced site placement choices, most parts of the region would have been conducive to sustained traditional Aboriginal occupation with little to no climatic discomfort. Mean annual rainfall is well above the threshold commonly regarded as the minimum for forest development under otherwise favourable conditions (Floyd 1980:9), and is likely to have been sufficient to supply fresh water in all seasons.

The Proposal essentially encompasses a shoreline-parallel transect of a narrow coastal zone backed by steep ranges. In the absence of a major river, the Sapphire-Woolgoolga area is drained by a number of shallow permanent channels that are tidal towards their mouths and discharge directly into the ocean. In addition to minor tributaries, those traversed by the Proposal include Cunninghams Creek, Skinners Creek, Moonee Creek, Double Crossing Creek and Arrawarra Creek.

Secondary ridges and spurs fall east from the inland ranges to interfinger with the coastal plain sediments, forming the watersheds of the coastal creeks, and terminating as rocky headlands separated by crescentic beaches at Sapphire, Moonee Beach, Emerald Beach, Sandy Beach, Woolgoolga and Arrawarra Beach. Some of these headlands, including those at Emerald Beach and Arrawarra Beach, feature in Aboriginal mythological traditions.

Devonian-Carboniferous metasediments of the Coramba Beds underlie the Sapphire-Woolgoolga area. Although composed chiefly of siliceous greywacke and argillite, the Coramba Beds also offer small quantities of chert and jasper (Korsch 1980:4-5). These four materials are well-suited to the production of Aboriginal flaked stone tools and outcrop on the coastal headlands and in pebble beds along the beaches and some of the more dissected streams. Habitable rockshelters and overhangs are rare, and none have been recorded in or near the Proposal.

The Sapphire to Woolgoolga area falls within the overlap between the Torresian region of tropical northern Australia and the Bassian region of temperate south-eastern Australia. This overlap is recognised as being particularly rich in flora and fauna species (State Forests 1995:11-14), and food, medicinal and material culture resources used by Aboriginal people would thus have been abundant. A number of plant species still utilised by the local Gumbaingirr, including blackbutt, swamp mahogany, bloodwood, paperbark, geebung, wombat berry, sarsaparilla vine, blady grass, bracken fern, cordyline and mat-rush, occur in the Proposal impact zone, and fish, shellfish, turtles, eels, prawns and cobra worms inhabit the creeks and estuaries. Kangaroos, wallabies, possums, echidna, goannas, snakes and birds are highly regarded fauna foods likely to have been commonly available (cf Perkins 1997).

3.2 The Proposal

The physical environment of the Proposal is represented by three broad land systems- coastal alluvial plains, coastal ramp, and escarpment foothills (cf Mitchell 2003), with altitudes varying from two metres Australian Height Datum (AHD) along the coastal plain streams to 78 metres AHD on escarpment foothills between Unwins Road and Greys Road on the Woolgoolga bypass (Figure 2). Topography of the upgrade section that roughly parallels the coastline between

Sapphire and Graham Drive North is characterised by low alluvial plains intersected at intervals by low bedrock spurs and rises. Given the westward sweep of the Woolgoolga bypass, its topography is generally higher and more dissected. North from Unwins Road, this bypass traverses several dominant east-trending ridges of the escarpment foothills and coastal ramp, along with more subdued undulating spurs and rises north of Bark Hut Road, mostly within the Wedding Bells State Forest on the northern extremity.

The coastal alluvial plains cover approximately 30 percent of the Proposal, and apart from the Woolgoolga Creek floodplain on the Woolgoolga bypass section, occur between Sapphire and south Woolgoolga as broad valley flats and depressions spanning Sugar Mill, Cunninghams, Skinners, Moonee, Fiddaman and Double Crossing creeks and their tributaries, as well as minor seasonal gullies in the Sapphire locality. The coastal alluvial plains comprise low, level to gently undulating floodplains based on the Quaternary sediments of the Newports Creek and Coffs Creek Soil Landscapes. Soils are predominantly poorly drained, of low fertility and strongly to very strongly acid (Milford 1999).

The coastal ramp comprises around 65 percent of the Proposal. The ramp includes low ridges, spurs and hills of the coastal fall that extend across the alluvial plains. The ramp forms part of the erosional Megan Soil Landscape, characterised by strongly acid, stony and highly erodible red and brown earths and podzolics (Milford 1999).

Approximately five percent of the Proposal traverses escarpment foothills between Unwins Road and Bark Hut Road on the Woolgoolga bypass. These foothills form part of the Suicide Soil Landscape, a landscape of steep hills and dissected valleys featuring well-drained, strongly acid and stony structured yellow earths on crests and upper slopes, and strongly acid, stony lithosols and red earths on mid-slopes and footslopes (Milford 1999).

A large proportion of the Proposal has been cleared to make way for the existing highway, residential allotments, grazing pastures and banana plantations. The natural vegetation communities remaining along and adjacent to the Proposal indicate that the ridge and spur crests once supported a dry coastal sclerophyll complex, with paperbark and wet sclerophyll forest on slopes, alluvial flats and drainage basins. Between Sapphire and south Woolgoolga, remnant forest is now largely restricted to the alluvial plains, and includes a number of mature trees within the existing highway reserve. The Woolgoolga bypass section is dominated by banana plantations and otherwise cleared and disturbed landholdings. However, approximately three kilometres of the bypass traverses forested land, including the Wedding Bells State Forest north of private properties fronting Bark Hut Road.

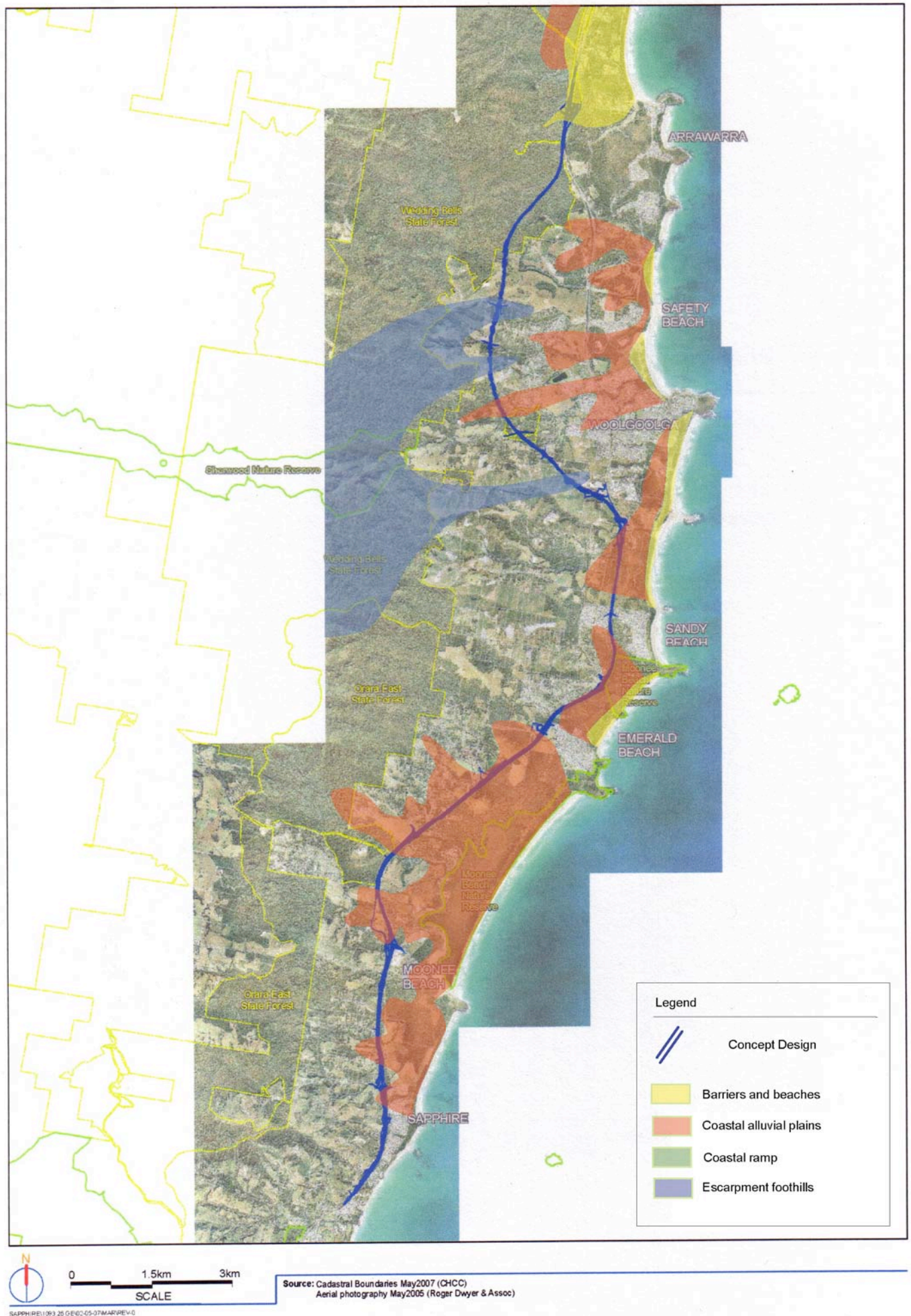


Figure 2. Land systems (after Mitchell 2003)

4 CULTURAL BACKGROUND

4.1 Traditional social and spatial organisation

At the time of first European settlement the Coffs Harbour region was occupied by Gumbaingirr speaking people whose traditional country extended over a wide area from the Clarence River to at least as far south as the Nambucca (Enright 1934; Smythe 1948; Hoddinott 1978; Eades 1979; Heron 1991; GL&CG 1992). The Gumbaingirr comprised several distinct but interrelated groupings of people, each associated with a separate geographical area. Historical accounts place the Jita Jita group between Sapphire and Woolgoolga, with lands stretching inland to the Orara River (England undated; North 1964). Gumbaingirr groups shared economic resources, trading and ceremonial occasions, intermarried, and spoke a mutually intelligible language, even though differences of dialect or speech, of local territorial association, and some cultural practices varied from one group or locality to another (Macdonald and Collins 1999:37-38). 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".

From a review of ethno-historical material, Coleman (1982) and Belshaw (1978) concluded that wide-ranging movement was usually undertaken in order to attend social gatherings and meet ceremonial obligations rather than to take up residence in another location. Early historical reports repeatedly mention the movement of Aboriginal people between the coast and interior, and between the river valleys. According to Secomb (1986:46), "they seem to have had tracks through the area to link the Dorrigo with the coast and between Bellingen and the Clarence". Oral evidence indicates that groups traveling between Moonee Beach and Bucca Bucca Creek used the low-gradient ridgelines now followed by Bucca Road (Collins 1994a:14). This association between low-gradient ridgelines and traditional transit routes is likely to have been repeated throughout the study region, where the exposed ridgelines support (or once supported) a drier and more open form of forest cover.

4.2 Settlement and landuse

During the course of everyday life, resource exploitation appears to have been undertaken by family groups (cf Henderson 1851; Lane 1970:5.2) and often several families would co-operate to form a highly flexible 'band' that would gather or disperse as conditions demanded (Godwin 1990:97). Away from the immediate coast, camps were shifted "about monthly as the game in the immediate vicinity became exhausted ... it took several months to give each ground in the locale

its turn" (McFarlane 1934-5). Base camps were established in areas protected from the elements by dense vegetation (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 task-specific sites scattered between. If group sizes in the order of 50 as claimed by England (1976:46) were the norm, then base camps are likely to have been reasonably large, even with a use-life as limited as a month.

During the early years of European settlement most of the Aboriginal population centred on the coastline, coastal alluvial plains and major river corridors, despite the rapid appropriation of these landsystems by timber-getters and farmers. The largest camps are said to have been situated at Bagawa near the confluence of Bucca Bucca Creek and the Orara River in the subcoastal hinterland (England undated; Holder 1984:20), but substantial coastal camps remained east of the Pacific Highway at Moonee (England 1976:46) and Woolgoolga (Yeates 1982:23).

With respect to the locations of individual campsites, the most useful information is provided by Holder (1984:20-22) for the Moonee Beach area. Holder maintains that the Moonee people followed a seasonal pattern, spending autumn and winter on the coast fishing, and summer in the Orara Valley hunting along the streams and up into the ranges. The main winter camps were established on the coastal ramp, including the low flat-crested spur now occupied by the Coffs Harbour Clay Target Club. Stone artefacts have been recorded on this spur (S2W-4). Daytime was spent in shelters erected near the dunes below Look-At-Me-Now Headland.

During their annual stay on the coast, the Moonee people speared fish, gathered pipis, rock platform shellfish and mangrove fruits, and used beach pebbles to produce a range of flaked and edge-ground tools. In 1885-6 a tribal fight and a corroboree were held on flats just north of the Clay Target Club campsite. One tribesman, known as 'Tommy Twohead', was wounded and later died as a result of the fight, and was buried by the Skinner family in the south-eastern corner of their property (Holder 1984:20-21). The Proposal has been modified to avoid the reported location of this burial (S2W-13).

Aboriginal landuse patterns were substantially modified in the decades following European settlement, as traditional lands were alienated and freedom to move through the country was progressively restricted. By 1885 a road had been built from Coffs Harbour to Grafton, timber mills and banana and sugar cane plantations established, local schools set up, and gold mining was underway in the Orara Valley (Goulding 2001). By the late 1890s the group of around 50

Aborigines that had frequented Moonee Beach during the autumn and winter months failed to return (Holder 1984:20), and no Aboriginal people remained at Woolgoolga (Yeates 1982:23).

Despite the apparent decline in population numbers and massive changes brought about by European settlement, many local Gumbaingirr were able to maintain traditional knowledge of and associations with the Sapphire-Woolgoolga area. In addition to important ceremonial and meeting places, information relating to such things as traveling routes, resource use and relationships to land has been handed down through the generations (cf Goulding 2001). Forested lands have always played a prominent role in Aboriginal life. The Gumbaingirr have maintained this close affiliation with the surrounding countryside and still know of and use a variety of bush tucker, bush medicines and other forest products (Ahoy and Murphy 1996:35-39).

Individuals and small family groups continued to occupy bush camps, often comprising clusters of earthen-floored bark huts (Perkins 1997:36), well into the 20th century, with many of the remembered camps dating from the 1940s, 50s and 60s. Both these camps and a range of other types of historic Aboriginal sites have been researched and mapped by Goulding (2001). An analysis of historic camp locations revealed the majority to have been situated on crown land within 1-2 kilometres of the coast, near a supply of fresh water. Camps further inland tended to be on public land in or near towns where there were accessible water supplies. A significant proportion of camps were established at a place of work or in walking distance of work, but others were used seasonally for recreation purposes, or in response to the availability of certain resources (Goulding 2001:64).

Two former 20th century camping places identified by Goulding (2001) lie near the Proposal, one on a spur crest west of the Pacific Highway opposite the Coffs Harbour Clay Target Club, and one on Embankment Road approximately 800 metres to the west. These camps were used by people with immediate kinship attachments to contemporary Gumbaingirr, including Garby Elders consulted during this assessment. Neither place would be directly affected by the Proposal.

5 ARCHAEOLOGICAL BACKGROUND

5.1 Previous archaeological surveys

In addition to research-based investigations along the Sapphire to Woolgoolga coastline (eg North 1964; Rogers 1975,1976,1977; McBryde 1972a,1972b; Smith 1998), numerous field surveys have been conducted for impact assessment ahead of development. As highlighted and

labeled on Figures 3a, 3b and 3c, these surveys have included substantial areas bordering the existing Pacific Highway reserve and provide an insight to the types, density and environmental contexts of sites that may occur within the Proposal. Numbers in brackets (#n) refer to Department of Environment and Climate Change (DECC) site identification codes.

In 2003, Dallas and Tuck surveyed an 80 hectare property that stretches for 1.3 kilometres along the eastern side of the Pacific Highway reserve north of Split Solitary Road at Sapphire. Two artefact scatters/open campsites (#22-1-168 and #22-1-169) and two isolated stone artefacts (#22-1-166 and #22-1-167) were recorded, and potential archaeological deposits (PADs) were considered likely to be present at three of these locations. The PADs were situated on spur/knoll crests and an elevated rise adjacent to swamps. Test excavations (Davies 2004) and later partial salvage (Davies 2006a) of both these and one additionally identified PAD confirmed their archaeological potential, recovering a total of 2,939 artefacts. The assemblage comprised flaked pieces, flakes, blades, cores, choppers, axes, microliths and hammerstones made primarily on volcanic stone materials, and reflected a concern for the early stages of tool manufacture. Owing to the high proportion of artefacts with pebble cortex, most of the raw materials appeared to have been locally sourced. Most of the subsurface artefacts were recovered within the topsoil at a depth of around 20 centimetres, close to its interface with the underlying B horizon. In the absence of shellfish and bone remains it was concluded that the regular consumption of food did not occur, and that the sites represented task-specific rather than main campsites (Davies 2006a:58).

A property adjoining the northern boundary of that investigated by Dallas and Tuck (2003) and Davies (2004, 2006a) was surveyed by Umwelt Environmental Consultants (2006). This resulted in the recording of two stone artefacts on a downcut mid-slope vehicle track above paperbark swamp (#18-1-024), artefacts and shell fragments associated with a previously registered midden (#22-1-051) near the confluence of Moonee and Sugar Mill Creeks, and a scatter of six artefacts on a broad low ridge on the southern boundary. These latter artefacts were held to form a northward extension of PAD 3 (#22-1-198) previously tested and salvaged by Davies (2004, 2006).

A 3.15 hectare area adjoining the eastern edge of the highway reserve south of Moonee Beach Road was surveyed by Dallas and Tuck in 2004(a). A scatter of four stone artefacts and two pebble manuports were recorded on a driveway traversing a narrow spur saddle 500 metres inland of the Moonee Creek estuary.

Nine land parcels fronting the Pacific Highway reserve between Moonee Beach Road and south Woolgoolga have also been subject to past archaeological surveys.

In 1986, Piper inspected a property between Bucca and Old Bucca Roads that included a natural drainage basin with a floor of paperbark swamp, enclosed to the north, south and west by low forested ridgelines. No archaeological evidence was detected.

Despite the absence of sites south of Bucca Road (Piper 1986), three artefact scatters (#22-1-072, #22-1-074 and #22-1-075), three isolated finds and two adjacent scarred blackbutt trees (#22-1-073) were recorded during survey of a 95 hectare area directly opposite, between the eastern highway margin and Moonee Creek (Collins 1994b). This area is dissected by a low spur flanked in the north and east by narrow alluvial flats bordering estuarine reaches of Skinners and Moonee Creeks, and in the south by an extensive poorly-drained alluvial plain. Of the recorded artefact scatters, one was exposed on a gently-sloping track below the spur crest, while the other two were found on the bank of Skinners Creek. Two isolated artefacts and the scarred trees were also associated with estuary banks. Following clearance of most of its forest, the area was re-surveyed by ERM in 2006. This re-survey resulted in the detection of artefacts in four of the six locations previously recorded by Collins (1994b).

North of Skinners Creek, Byrne (1987) made a preliminary assessment of a large land parcel that extends west across the highway from the Moonee Creek estuary to encompass low-lying alluvial plains and bedrock-soil knolls and spurs. The field inspection focussed on the bank of Moonee Creek and the more elevated landforms. A scatter of stone artefacts was detected on a level spur crest. Various sections of Byrne's (1987) study area were later inspected in more detail, resulting in the recording of a scarred swamp mahogany tree (#22-1-053) near Moonee Creek (Navin 1991), a small artefact scatter (#22-1-071) on the bank of Skinners Creek, an isolated artefact on a minor spur, and two larger scatters (#22-1-069 and #22-1-070) on the crest of a more substantial spur (Collins 1994a,1995). The survey areas were dominated by alluvial plains, but no archaeological evidence was found in such a context.

More recently, Davies (2006b) conducted a survey of a 14.4 hectare area south of Fiddaman Road, between the Pacific Highway and Emerald Beach village. This area comprised a low east-trending ridge fringed to the south by alluvial plains and Moonee Creek. A low-density distribution of 18 surface artefacts was found on the ridge crest (#22-1-220). Follow-up salvage excavations (Davies 2007) revealed artefacts within the topsoil of the entire ridge, with the highest densities occurring on the level crest, where up to 123 artefacts per square metre were recovered. The assemblage was dominated by flakes and cores, with small numbers of blades, microliths, backed blades, scrapers, choppers, hammerstones and split cobbles. Of the 1,277 salvaged

artefacts, almost half were derived from cobbles, mainly of volcanic origin. On the basis of the salvage results, Davies (2007:23) concluded that the site area had been used intermittently for the manufacture of artefacts, primarily for the initial stages of stone reduction. However, the presence of a few artefacts with usewear indicated that other tasks were probably also undertaken. The northern and southern slopes found to contain subsurface artefacts at the western end of the ridge, within the area salvage-investigated by Davies (2007), would be impacted by construction of the Fiddaman Road interchange (S2W-12).

In 1995, Appleton surveyed 13 hectares of land at Emerald Beach north of Fiddaman Road, comprising a sandmined dune system, an alluvial plain and paperbark swamp. No sites were detected within the survey area, but midden exposures associated with registered Site #22-1-052 were observed on the crest and slopes of Diggers Point headland beyond the eastern boundary.

During an initial survey of a 200 hectare property straddling the Pacific Highway at Hearn's Lake, archaeological evidence was confined to three small disturbed scatters of midden shell and an isolated stone artefact. Two of the shell scatters were associated with a large eroding coastal dune, while the third occurred near the mouth of a small estuary (Willis Creek). The isolated artefact was exposed on the margin of a dam dug into sand-based ground (Lilley 1983:5). Lilley's (1983) survey area has since been re-assessed by Bonhomme Craib and Associates (2003; desktop assessment of the northern section), Collins (2004; field assessment of the northern section) and Dallas and Tuck (2004b; field assessment of the southern section), and encompasses much of the land to be affected by interchanges between the upgraded highway, Graham Drive North and Hearn's Lake Road.

The Dallas and Tuck (2004b) survey between Sandy Beach and Double Crossing Creek/Hearn's Lake recorded two artefact scatters, two isolated artefacts and one PAD recommended for subsurface testing. This survey included land immediately south of Double Crossing Creek proposed for incorporation into the new highway reserve. Establishment of this reserve would not affect any of the recorded sites.

Aboriginal consultation and field survey north of Double Crossing Creek/Hearn's Lake (Collins 1994) resulted in the recording of two sites of mythological significance, one historic campsite and a scatter of artefacts extending along the crest of a prominent ridge. The survey included impact areas associated with the Proposal between Double Crossing Creek and Graham Drive North west of the existing highway, and between Double Crossing Creek and the northern extent of the proposed Hearn's Lake Road interchange east of the existing highway. No sites or other Aboriginal heritage constraints were identified in these areas. Collins (2000) also surveyed a

proposed water pipeline easement in the vicinity of Double Crossing Creek and Graham Drive North, but no archaeological evidence was found.

Also of relevance to this assessment are the results of a survey conducted within a 10 metre wide corridor bordering the western boundary of the Pacific Highway reserve from Coffs Harbour to Bucca Road, and the eastern reserve boundary from Bucca Road to the northern limit of the Coffs Harbour LGA near Corindi (Macdonald and Collins 1999). Much of the adjacent highway reserve was also inspected during this survey, which resulted in the detection of two artefact scatters/open campsites and an isolated artefact between Sapphire and Mullaway Drive. The open camps include one (#22-1-138) comprising 16 stone artefacts scattered across eroded clay exposures on the crest and upper slope of the spur occupied by the Coffs Harbour Clay Target Club (S2W-4). Although many further artefacts are likely on the spur, the adjoining highway reserve has been downcut and carries disused road pavement. The archaeological potential of this section of the reserve was thus assessed as negligible (Macdonald and Collins 1999:131). The second open camp (#22-1-143) contained three stone artefacts exposed on a track on the elevated banks of a semi-permanent tributary of Sugar Mill Creek south of Maccues Road, just west of the highway reserve. The isolated artefact (#22-1-137) was detected on a high gully bank 75 metres south of Skinners Creek in the eastern part of the highway reserve itself (S2W-3).

North of Mullaway Drive, archaeological inspection has included a six metre wide easement that follows the western edge of the Pacific Highway reserve, passing along the present Proposal between Embankment Road and Arrawarra Creek. No sites were detected on this alignment (Davies 1991).

The most wide-ranging survey work so far completed in the Coffs Harbour hinterland has been that done by Davies (1993) as part of the environmental impact assessment for the Coffs Harbour-Urunga forestry management areas. Davies divided the management areas into landsystems and conducted sample surveys in each. Some limited area inspection was undertaken, but Davies' survey was largely geared to locating open surface sites detectable on vehicle track exposures. Although targeting areas considered to have high archaeological potential, Davies' survey strategy was explicit in recording a wide range of site/environmental associations, and provides valuable data on the distribution and density of stone artefact occurrences.

Across the management areas as a whole, artefact scatters and isolated artefacts were generally found on flat to gently-sloping ground with eroding sandy soil. The majority occurred on the crests of spurs supporting dry sclerophyll forest. Site frequencies varied with inland distance, most associated with the more dissected escarpment ranges west of the Orara Valley and the fewest

with the coastal ramp. Despite the higher frequency of sites in the escarpment ranges, however, these tended to have fewer artefacts (most often only a single find) than those in other landsystems (Davies 1993:58-59).

Wedding Bells State Forest, traversed by the Woolgoolga bypass section of the Proposal, falls within Davies' 'coastal ranges' landsystem, where open artefact sites were detected at a density of 0.37 per kilometre of linear survey route ('trajectory'), or 16.59 artefacts per hectare (Davies 1993:Table 10). In all, three isolated artefacts and four artefact scatters were recorded in the 'coastal ranges'. Of the artefact scatters, two comprised three artefacts, while the other two comprised 12 and 31 artefacts. Given the low density of material at these sites, Davies believes them to most likely represent transitory camps. During her survey Davies (1993) covered 19 kilometres of forestry trails in the 'coastal ranges', including 4.7 kilometres in Wedding Bells State Forest. This inspection resulted in the recording of a scatter of 12 stone artefacts (#22-1-057) on a spur crest near Arrawarra Road, 1.75 kilometres west of the Proposal.

5.2 DECC Aboriginal Heritage Information Management System

In addition to those recorded during this assessment, 61 Aboriginal sites have been registered on the Department of Environment and Climate Change (DECC) Aboriginal Heritage Information Management System (AHIMS) between Sapphire and Arrawarra Creek, inland to the western boundary of Wedding Bells State Forest. These include 39 stone artefact scatters (open camps), nine shell middens, nine isolated artefacts, two scarred tree sites and two natural mythological sites.

Four of the DECC registered sites would be directly impacted by the Proposal.

Of these, a scatter of three stone artefacts (#22-1-192) south of Split Solitary Road has been subject to a DECC Heritage Impact Permit issued to the Coffs Harbour City Council, granting consent to destroy the site during installation of a reclaimed water main. No artefacts were detected in this locality during the present survey, and further undetected artefacts are unlikely.

The western extent of a widespread scatter of subsurface artefacts (#22-1-220; S2W-12) is intercepted by the proposed Fiddaman Road interchange south of Fiddaman Road. A DECC Heritage Impact Permit with Permit to Salvage has been issued for this site. The salvage was conducted by Davies (2007), and entailed the recovery of artefacts from a one square metre area within each 225 square metres of the site, yielding a sample of less than 0.5 percent. As such, it is clear that many further unsalvaged artefacts will occur.

The two other DECC registered sites comprise an isolated stone artefact (#22-1-137; Site S2W-3) within the Pacific Highway reserve south of Skinners Creek, and the potential northern periphery of a larger artefact scatter (#22-1-138; S2W-4) located on the spur occupied by the Coffs Harbour Clay Target Club premises south of Moonee Creek.

5.3 Other heritage registers

Searches of the Commonwealth and National Heritage Lists maintained by the Department of Environment and Water Resources, the NSW State Heritage Register, the RTA Heritage and Conservation Register, Schedule 2 (Heritage Items) of the North Coast Regional Environmental Plan 1988 and Schedule 5 (Heritage Items) of the Coffs Harbour Local Environmental Plan 2000 revealed no listed Aboriginal sites or places on or close to the Proposal.

Of most relevance is a listing on the Register of the National Estate for the Woolgoolga-Solitary Islands area, including the coastal strip between the hills and coast from Moonee Beach to Corindi Beach. This area is listed as an Indicative Place (not on the register but identified as important) due primarily to its environmental values, but also owing to its potential Aboriginal resource use values. However, Aboriginal values are yet to be fully determined or assessed.

6 ARCHAEOLOGICAL POTENTIAL

6.1 Constraints to site preservation

Apart from some limited stretches with scattered mature trees between Gaudrons Road and Moonee Creek, the existing Pacific Highway reserve has experienced a moderate to high level of disturbance. In many instances the entire width of the reserve has been downcut, and topsoil removed or used as fill beneath the road pavement. The Sapphire to south Woolgoolga upgrade section has also been affected by past re-alignments and carries numerous vestiges of the old winding pavement to either side of the existing carriageway. In this section, much of the Proposal beyond the present reserve boundaries has been cleared for residential, horticultural or grazing purposes, including the crests and slopes of prominent ridges between Sapphire and Gaudrons Road, which have been subject to current and/or past banana cultivation.

The Woolgoolga bypass section of the Proposal has been similarly subject to a variety of European landuses that will have variously affected the survival potential of Aboriginal sites. Of the entire length of the bypass, almost a quarter is covered by banana plantations and a further quarter cleared or otherwise disturbed for residential, road construction, grazing and other horticultural purposes.

Above-ground sites like ceremonial grounds and marked trees are likely to have been destroyed during the initial process of land clearing. Open surface sites (stone artefact scatters and middens) and subsurface archaeological deposits may have survived, their level of spatial integrity linked to the types and frequency of mechanical interference they have suffered. Open sites affected solely by clearing activities have the capacity to be as well preserved as any equivalent sites in logged forests. Those on ploughed land, on the other hand, will have been moved and segregated within the topsoil profile, and dispersed along the axis of cultivation. However, few of their constituent cultural materials are likely to have been broken, and despite disturbance, ploughed sites may still be of scientific significance (cf Boismier 1989:137-141; Dunnell and Simek 1995; Hawkins 1998; Lewarch and O'Brien 1981; Roper 1976).

Of probably least archaeological value is the land subject to intensive banana cultivation, involving not only tillage, but frequent movement of machinery across exposed ground surfaces, causing both cumulative spatial displacement and degradation of the archaeological materials themselves. Land surfaces across all of the (past and present) banana plantations sampled in the field had been modified to such an extent as to make the survival of intact archaeological sites virtually impossible, and the survival of even dispersed and redeposited artefacts unlikely.

Wedding Bells State Forest on the northern end of the Woolgoolga bypass is in a disturbed natural condition. Although some mature trees remain, this forest is predominantly the regrowth product of past intensive management for commercial timber production. Due to its logging history, the spatial integrity of archaeological sites within this forest will probably have been compromised by surface churning and compaction caused by tree felling and heavy machinery operation. While timber harvesting no doubt accelerates site degradation processes, natural taphonomic factors such as tree growth, soil perturbation and erosion have a similar effect and it is yet to be determined whether information loss from harvesting is significantly greater than that under non-harvesting conditions (cf Gollan 1992:44-45).

6.2 Potential site types

On the basis of information gained through Aboriginal consultation and a review of ethno-historical and archaeological sources, the potential exists for previously unrecorded Aboriginal sites to be impacted by the Proposal. In tandem with its environmental and disturbance context, known site distributions suggest that the types of sites defined in this section would be most likely to occur.

Isolated stone artefacts

These can be located anywhere in the landscape and represent either the remnant of a dispersed artefact scatter (open campsite), or the simple loss or random discard of artefacts.

Stone artefact scatters (open campsites)

This type of site can range from as few as two stone artefacts to an extensive scatter containing a variety of tools and flaking debris, sometimes with associated materials such as bone, shell, ochre, charcoal and hearth stones. An artefact scatter does not necessarily mark a place where actual camping was carried out, but may instead be the product of specialised and/or short-term activities involving some level of stoneworking (eg the manufacture or rejuvenation of a single tool during hunting, or whilst in transit from one camp to another) (Hiscock 1988:19). Artefact scatters may occur as surface concentrations or as dateable stratified deposits, and can provide information on such things as patterns of Aboriginal landuse, movement and exchange.

Shell middens

Middens are open campsites that are dominated by shellfish remains. They are generally found close to the shellfish source and contain predominantly mature specimens of edible species. In addition to shell, middens may contain stone tools and flaking debris, charcoal from cooking fires, ochre nodules and animal bone. In many places, including Sawtell (Sullivan 1980; Yeates 1990:14), human burials have also been recorded in direct association with midden deposits.

Middens vary considerably in size. Some are thin surface scatters that have constituted little more than a meal for a small group gathering food away from a main camp, while others are well consolidated deposits representing consistent use by large groups of people over long periods of time. Recent investigations of a midden on the estuarine reach of the Corindi River revealed a 20 centimetre thick cultural deposit dating from around 3,800 years ago (Smith 2000), while shell deposition at a midden lens near the mouth of Arrawarra Creek commenced around 1,300 years ago (Smith 1998).

Stone quarries/stone extraction sites

As the locations of stone sources exploited by Aboriginal people, quarry sites usually show evidence of procurement and preliminary processing activities, and may be found where outcrops of suitable rocks occur. Quarry sites may be represented by as little as one or two flaked boulders or a single extraction pit, but most contain a cluster of quarry pits and/or flaking floors where stones have been trimmed to sizes suitable for transport (NPWS 1988:18).

Scarred trees

These are trees that bear scars caused through the removal of bark or wood for making material items such as shelters, canoes, shields and containers, or which have been marked for other reasons (eg toe-holds to aid climbing). Because scarred trees are usually associated with domestic activities, their distribution often correlates with the distribution of artefact scatters, middens and other types of campsites (Long 1998:28).

Natural mythological/sacred sites

Unlike archaeological sites, natural mythological sites are unmodified features of the landscape that derive their cultural importance from myths associated with them. They are sacred areas and some, but not all, would have been restricted to certain members of the society (for instance, restrictions on age, gender or degrees of initiation). As noted by Radcliffe-Brown (1929:409), some sacred areas derive their significance "merely as being connected with the mythology".

While information for some sacred stories relating to the Coffs Harbour region has been made known (eg England 1960; Buchanan 1971; Hoddinott 1978; GL&CG 1992; Dunn 1994), due to the often secret nature of mythological sites it is sometimes the case that Aboriginal people are unwilling to reveal information, even when sites are directly threatened by development.

Memory sites and sites of 'presence'

The importance of memory in the valuing of places is one component of a culture that has relied on oral history as its primary means of transmitting information from one generation to the next. The significance of remembered places also applies to 'post-contact' sites, sites that take on their contemporary cultural significance from events that have occurred in recent decades. Places where there have been missions, reserves or camps often contain 'middens' of modern materials, all of which constitute protected 'Aboriginal objects' under the terms of the *National Parks and Wildlife Act 1974*. Camps used from the 1920s through to the 1980s near Corindi Lake, for example, have been found to contain a range of surviving material items (Brown *et al* 2000). Other locations, such as the 'good food places' described by Godwin and Creamer (1984:104), may be devoid of material evidence but of equally high cultural/social significance.

The extent to which remembered sites/places are given significance by Aboriginal people varies according to their personal history in a place, and to the number of such sites. Even so, post-contact camping areas in particular often hold great social and spiritual value. While pre-contact sites are generally valued as places of unknown ancestors, historic campsites may be similarly valued as places with immediate associations with known individuals. Such places thus become part of an on-going cultural heritage.

6.3 Predicting archaeological site locations

Method

It has long been recognised that archaeological sites tend to recur in favourable environmental settings. Predictive models take advantage of these redundancies by exploiting contrasts between environmental characteristics of places where sites do and do not occur. Providing the data is reliable, it is possible to extrapolate from a relatively small sample of known site locations to a much broader area (Warren 1990:201).

Predictions presented in this section draw on those developed by Collins (2001) using a sample of 180 pre-contact/traditional occupation sites (isolated artefacts, artefact scatters and middens) recorded in the DECC Coffs Coast Area. Collins divided the Coffs Coast Area into broad landsystems (coast/coastal alluvial plains, low hills and rises [coastal ramp], ranges, broad valleys) and compared the environmental context of known sites with characteristics of the landsystem's background environment. Environmental variables used in the analysis were landform element, geology, present vegetation, ground slope, elevation, aspect, horizontal and vertical distance to nearest water, and type of nearest water source. Due to the small size of the sample available for modeling purposes, all site locations were given equal weighting with no account paid to site size, complexity or artefact density.

Archaeological models predict 'typical' site locations and apply only to those sites that are 'representative' in terms of their environmental setting. Clearly, sites occurring in non-typical settings, where few sites are predicted, may be highly significant as uncommon examples of their type with the potential to provide information on aspects of the archaeological record that are presently unclear (cf Altshul 1990).

A predictive model for the Proposal

Coastal alluvial plains

Collins' (2001) analysis indicates that of the landform elements traversed by the Proposal, those with highest archaeological sensitivity are well-drained swamp and estuary banks, and the level to low-gradient crests of low rises and spurs.

Elements of lowest archaeological sensitivity are valley flats, plains and open depressions. Irrespective of their landscape context, areas developed for residential uses or otherwise intensively disturbed (eg road and services easements) will also have low archaeological sensitivity.

Most likely site types are isolated stone artefacts, small low-density scatters of stone artefacts, and shallow midden scatters composed solely of estuarine mollusc species. However, some large artefact scatters and stratified midden deposits containing a range of shellfish species and other cultural materials are associated with the coastal alluvial plains. Scarred trees may occur in any parts of the landscape where mature trees survive.

Coastal ramp

Predictions for the coastal ramp indicate that landform elements of highest archaeological sensitivity are the level to gently-inclined crests of low ridges, spurs and hills, particularly crests between 10 and 30 metres AHD supporting coastal sclerophyll forest.

Elements of lowest archaeological sensitivity are hillslopes with gradients greater than 10 degrees and valley flats supporting swamp forests. Irrespective of its topographic context, land developed for residential uses or otherwise intensively disturbed (eg road and services easements, banana plantations) will also have low archaeological sensitivity.

Site types most likely to occur are isolated stone artefacts and small low-density scatters of stone artefacts, although some small single-species shell scatters, large stratified midden deposits and large artefact scatters are associated with this landsystem. Scarred trees may occur anywhere mature trees survive.

Escarpment foothills

Predictions developed on the basis of existing site information indicate that landform elements of highest archaeological sensitivity are level to gently-inclined ridge and spur crests, especially dry forested crests with open or east to north-east aspects.

Landscapes of lowest archaeological sensitivity are those featuring dissected terrain, comprising hillslopes (particularly slopes above 10 degrees with southerly aspects), gullies and small streams. Irrespective of its topographic context, intensively disturbed land (eg road and services easements, banana plantations) will also have a low level of archaeological sensitivity.

Most likely site types are isolated stone artefacts and small low-density scatters of stone artefacts. Some large artefact scatters and small stone extraction sites (quarries) may also occur. Scarred trees may occur anywhere mature trees survive.

7 FIELD SURVEY

7.1 Survey strategy

In view of preservation constraints (Section 6.1) and the site location predictions outlined in Section 6.3, the field survey was directed towards reasonably intact well-drained landforms, particularly those of potentially high and moderate archaeological sensitivity. Disturbed areas of low potential sensitivity such as the existing highway reserve, banana plantations and cleared alluvial plains were selectively sampled.

The survey preferentially targeted exposed surfaces suitable for artefact detection, including unformed vehicle and livestock tracks, erosion scours, telecommunications easements, road cuttings and verges, and logging exposures. The trunks of all mature trees in and near the Project impact zone were inspected for signs of Aboriginal scarring.

7.2 Survey method and details

The field survey was conducted on foot with the assistance of sites officers from the CHLALC/Gumbula Julipi Elders and Yarrowarra Aboriginal Corporation/Garby Elders in sunny conditions on the 16th, 17th, 18th and 19th of May 2005. The survey involved variable traverses by four surveyors walking up to ten metres apart, inspecting all available natural ground surfaces within their line of sight. All four surveyors inspected unformed vehicle tracks and other substantial exposures until such time as all were satisfied that any surface evidence had been detected.

A series of largescale airphotos displaying the Proposal, property boundaries, elevation contours and the GDA map grid was supplied by Connell Wagner, and these were used for field orientation in conjunction with the 'GoTo' function on a hand-held Global Positioning System. The Woolgoolga bypass centreline through Wedding Bells State Forest had been blazed and flagged prior to the survey.

7.3 Survey coverage

Land covered during the survey, representing 46 percent of the Proposal, is shaded along with previously surveyed areas on Figures 3a, 3b and 3c. Table 1 gives summary details of the extent of inspection undertaken across each of the landform element types identified within the broad landsystems.

Although some property owners denied access to the survey team, this is not considered to have prejudiced the assessment results (which take these areas into account). Of the 54 percent of the Proposal not inspected, the vast majority had been highly disturbed and/or modified as a result of past highway construction, residential development or banana cultivation and was assessed in liaison with Aboriginal Participants to have little to no archaeological potential. Most of the remaining areas had been subject to previous surveys (cf Section 5.1) that were considered to be reliable in detecting archaeological sites and evaluating further archaeological potential.

Due to more recent concept design revisions, land to be affected by construction of the Arrawarra Beach Road interchange and a property access road west of the existing highway south of Moonee Creek (S2W-13) was not included in the field survey. It is understood that the Aboriginal cultural heritage values of the Arrawarra Beach Road interchange area would be addressed during investigations associated with the Pacific Highway Woolgoolga to Wells Crossing Upgrade proposal.

7.4 Definition of a site

Following DECC guidelines (NPWS 1997:20), the term 'site' is used in this report to group Aboriginal objects and to define a location where an object, group of objects, or place of otherwise cultural importance occurs. 'Site' is thus applied as a broad operational concept that includes all cultural materials regardless of their depositional history. To maintain comparability with many of the past local surveys, all artefacts detected within a 100 metre radius of each other were deemed part of the same site.

Table 1. Survey coverage data

Landsystem	Landform element	% of Proposal	% of element inspected	Mean % exposure	Mean % visibility	Mean % effective cover	Sources of disturbance/exposure	No sites/PADs
Sapphire-south Woolgoolga								
Coastal Alluvial Plains	Valley flats & depressions	29.3	34.3	7	100	7	residential development, roads/tracks, erosion	1*
	Stream banks	1.0	80.0	30	100	30	erosion, underground cables	1
Coastal Ramp	Dissected ridges & valleys/gullies	7.8	11.6	70	50	35	banana plantations, residential, roads/tracks	2
	Valley flats & depressions	7.3	39.3	5	100	5	roads/tracks, erosion, dams	0
	Stream banks	2.5	100.0	30	100	30	clearing, erosion, tracks	0
	Hillslopes	13.4	39.6	5	90	5	residential, grazing, underground cables, roads/tracks, erosion	0
	Crests	3.3	75.0	10	80	8	residential, grazing, underground cables, roads/tracks, erosion	2*
South Woolgoolga-Arrowarra Creek								
Coastal Ramp	Valley flats & depressions	7.5	85.2	5	100	5	residential, grazing, underground cables, roads/tracks, erosion	1
	Stream banks	0.4	100	10	90	9	erosion, underground cables	1
	Hillslopes	19.1	62.1	5	90	5	residential, grazing, tracks	1
	Crests	3.5	70.6	30	90	27	banana plantations, residential, erosion, clearing, roads/tracks	4
Escarpment Ranges								
	Dissected ridges & valleys/gullies	4.9	0.0	0	0	0	banana plantations, residential, horticulture	0
TOTAL		100.0	46.0			9.2% of sample		13

* Two sites/PADs identified as a result of background research. Not inspected in the field.

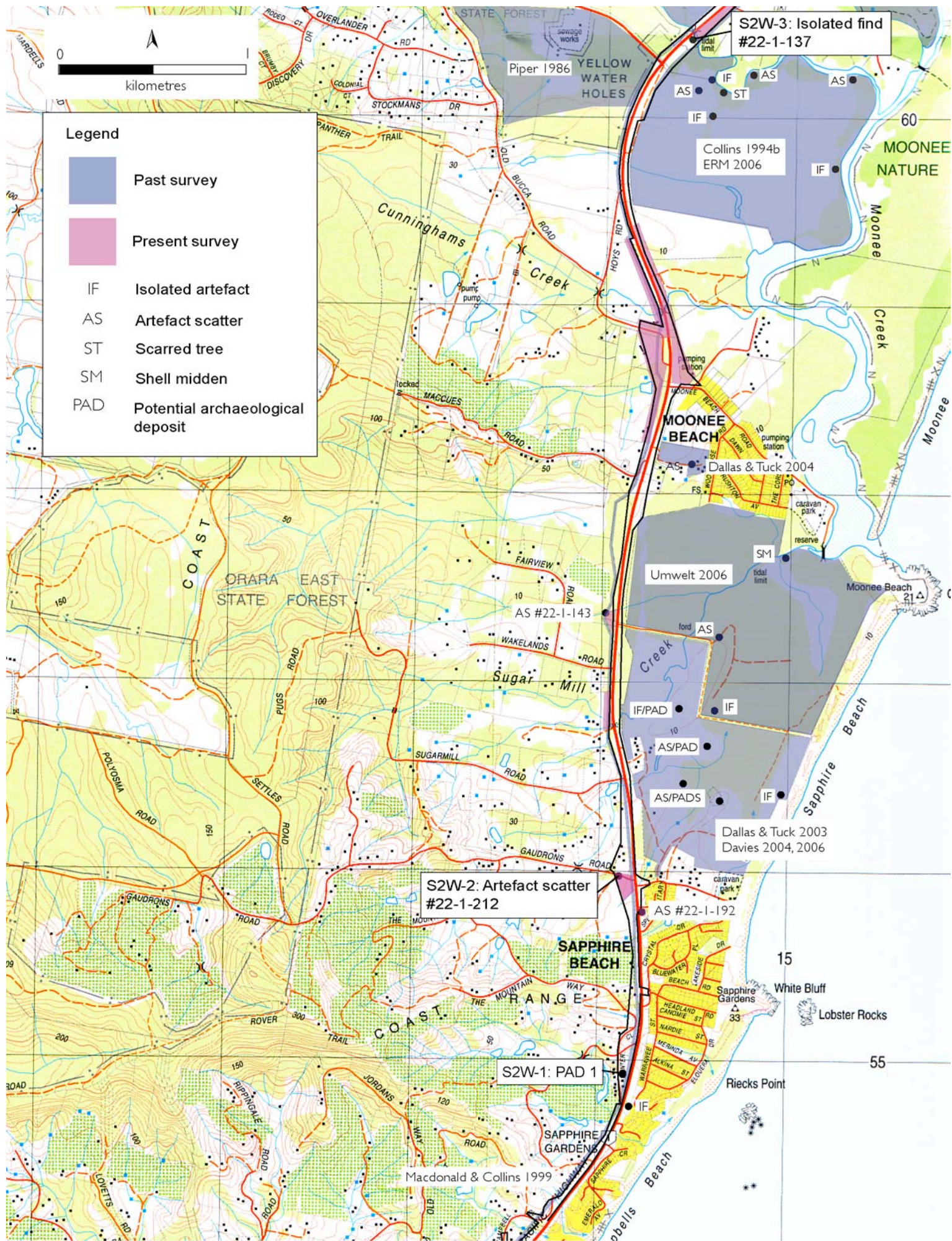


Figure 3a. Location of survey areas and recorded/reported Aboriginal sites and PADs
(Extract from Moonee Beach 9537-1S 1:25,000 map, Department of Lands, 2004)





View south to S2W-1: PAD 1 on spur crest adjacent to house in the middle distance



Location of the S2W-2: Artefact scatter adjacent to Gaudrons Road



Location of the S2W-4: Artefact scatter and historic campsite



Location of the S2W-5: Isolated find and potential archaeological deposit



Location of the S2W-7: Artefact scatter between house and banana plantation



Sample of the S2W-7 artefacts

7.5 Site recording

The following information was recorded for all identified site locations. This information was then transferred to standard DECC site recording forms for inclusion on the AHIMS register. DECC site identification codes (#00-0-000) attributed since recording forms were lodged are given in conjunction with individual site descriptions in Section 9.

- *Site designation.* Sites were designated Sapphire to Woolgoolga (S2W), followed by a numeric identifier.
- *Site type.*
- *Grid reference.* Determined using a Garmin non-differential Global Positioning System coupled with examination of largescale airphotos.
- *Environmental and disturbance context.* A description of the site environment, including factors such as landform, slope, aspect, vegetation and local hydrology. Disturbance factors that have or may have affected site condition and integrity were also recorded.
- *Site size.* The dimensions over which artefacts are visible and/or likely to occur.
- *Exposure and visibility.* An estimate of ground surface exposure and related visibility. These variables largely determine whether archaeological sites are detected and their full extent recognised.
- *Site contents.* A description of the on-site artefacts, including raw material, artefact type and dimensions, percent of cortex, and any other relevant technological variables.
- *Management considerations.* Anticipated impacts of the Proposal, and management strategies and recommendations developed in consultation with Aboriginal Participants to avoid or ameliorate impacts.

8 ASSESSING ABORIGINAL CULTURAL HERITAGE VALUES

The term 'significance' is used in this report to mean the degree to which a site/place possesses a certain valued attribute, and is used synonymously with the term 'value' (after Pearson and Sullivan 1999).

Unlike aspects of the natural environment, cultural heritage sites and places are social constructs that have no intrinsic significance- “cultural heritage places are not alive in themselves, people give them ‘life’ and meaning by the way they treat them and by the way they think and feel about them. ... their value lies entirely within human culture” (Byrne *et al* 2001:22-23). The degree and type of value of a place will be different for various groups and individuals. All places are not equally significant or important, and consequently are not equally worthy of conservation and management (Pearson and Sullivan 1999:17). Assessments of significance thus form the basis for management decisions and guide the development of impact mitigation strategies where these are warranted.

Aboriginal sites and places may have educational, tourism and other public values, but their primary values are generally those relating to their cultural/social significance to Aboriginal people, and scientific significance from an archaeological perspective (NPWS 1997:25). While sites considered to be scientifically significant are usually also significant to the Aboriginal community, others may be of outstanding Aboriginal cultural/social significance but have little or no scientific value.

Aboriginal cultural/social significance

As well demonstrated during the route selection study (Collins 2002), Aboriginal cultural heritage is by no means confined to physical (archaeological) evidence. The cultural environment contains an invisible overlay of attachments and meanings, and Aboriginal people can and do hold equally strong and equally legitimate attachments to natural, unmodified, features of the landscape, and to entire landscapes themselves. The preservation of sites and places of cultural/social significance can be fundamental to maintaining an Aboriginal community's integrity, sense of place and unique cultural identity.

The level of significance that an individual site or place may hold for the present-day Aboriginal community is often dependent upon a variety of factors, including the nature, type and integrity of the site/place, the spiritual, emotional, historical and/or contemporary attachments attributed to it, its setting and importance within the traditional and/or contemporary cultural landscape, and the perceived value of the site/place in connecting past, present and future generations.

Assessments of Aboriginal cultural/social significance are presented in conjunction with individual site descriptions in Section 9 of this report. In all instances, these assessments follow those communicated by nominated Aboriginal community representatives prior to and following fieldwork, as well as during the course of fieldwork itself.

Scientific/archaeological significance

This type of significance is essentially an assessment of a site's potential to add to our understanding of past human behaviour. Such assessment is made not only with regard to currently available knowledge, theories and data retrieval methods, but with consideration of likely future scientific developments. Sites have particular potential, and thus greater scientific significance, if there are few other sites that can contribute similar types of information, if they are in a good state of preservation, if they can provide a chronology extending back into the past, and/or if they form part of a larger site complex (NPWS 1997:26-28).

From a management and research perspective it is desirable that a representative sample of Aboriginal sites be maintained for the future. This means that not only are rare and unusual site types scientifically significant, but that a well-preserved site that provides a characteristic example of other sites common to its specific type, content and setting may also be of scientific significance. Any determination of representativeness must, by necessity, be based on the known sites in a region. Clearly, this will depend on the extent to which a region has been surveyed and as more work is completed and additional sites recorded, site representation (and significance) can change.

The assessments of scientific/archaeological significance presented in Section 9 are based on field observations/evaluations, background experience of the project archaeologist, who has worked in the Coffs Harbour region at regular intervals over the past 15 years, a review of local ethno-historical and archaeological literature, including the unpublished reports reviewed in Section 5.1, and the types and distribution of Aboriginal sites registered on the DECC AHIMS database.

9 RESULTS

9.1 The Proposal

Seven archaeological sites and eight areas of potential archaeological deposit (PADs, defined on the basis of Aboriginal advice, background research and/or predictions outlined in Section 6.3) were recorded within the Proposal area. The confirmed sites comprise four scatters of stone artefacts (S2W-2, 4, 7 and 12) and three isolated artefact finds (S2W-3, 5 and 6). Two of the PADs are associated with recorded isolated surface finds, giving a total of 13 separate site/PAD locations.

The identified site/PAD locations are plotted and numbered as referred to in the text on Figures 3a, 3b and 3c at a scale of 1:25,000. More precise site/PAD locations are provided relative to the concept design in Appendix C. Following site description and significance assessment, the impact of the Proposal is outlined below for each of the relevant sites/PADs. Table 2 gives a summary of the recorded sites/PADs and their assessed level of Aboriginal cultural/social and scientific/archaeological significance.

S2W-1: PAD 1

This potential archaeological deposit covers approximately 30 metres by 25 metres of land on the crest of a narrow spur between Hunter Close and the existing highway reserve at Sapphire, towards the southern end of the Proposal. The PAD comprises a vacant housing allotment supporting dense grass and offered no surface visibility. While the crest is considered to have moderate archaeological potential, the uneven surface relief suggests that it has been substantially disturbed in the past, probably by banana cultivation. As such, the PAD is unlikely to contain intact archaeological deposits.

Significance Assessment

Aboriginal Participants believe that PAD 1 has potential cultural significance because it may be situated on a traditional transit route between the Sapphire coastline and the hinterland ranges. Due to the inconclusive result of the surface inspection, Participants advised that the potential cultural/social significance of this PAD should be refined by an examination of subsurface sediments during the initial construction phase.

PAD 1 has moderate potential for subsurface artefacts, and further investigation would determine its archaeological status. However, due to its apparent high level of past disturbance, this PAD is unlikely to contain either *in situ* or stratified (ie chronologically distinct layers of) archaeological evidence. Any disturbed artefacts that may be present are unlikely to be of substantial scientific/archaeological significance.

Impact of the Proposal

S2W 1: PAD 1 lies within the area of proposed carriageway construction and would be destroyed.

S2W-2: Artefact scatter (#22-1-212)

This site comprises a low-density scatter of four stone artefacts in a highly disturbed context at a property gate and along the edge of a banana plantation south of Gaudrons Road. The site is located on the low-gradient upper northern slope of a broad spur. No additional artefacts were found despite a thorough search of the exposed plantation area (then free of bananas). However, further associated materials may be present on the compact eroded clay surface of a housing

allotment on a level section of the spur crest on the northern side of Gaudrons Road where survey access was denied. Subsurface materials are not expected.

Description of the recorded artefacts:

- 1 Greywacke flake, 54 x 45 x 44 mm
faceted platform with platform preparation, 1 dorsal negative scar
70 percent dorsal pebble cortex.
- 2 Siltstone flake, 22 x 25 x 7 mm
broad flaked platform, feather termination, 5 dorsal negative scars.
- 3 Siltstone flake, 27 x 30 x 10 mm
broad flaked platform, 5 dorsal negative scars.
- 4 Greywacke flake, 30 x 48 x 12 mm
broad flaked platform, overpass termination, 4 dorsal negative scars.

Significance Assessment

S2W-2 is assessed to be of low Aboriginal cultural/social and low scientific/archaeological significance. Aboriginal Participants advised that if collected, the site's four recorded artefacts would nevertheless be of some community educational value.

The S2W-2 artefacts occur in a highly disturbed eroded context and even though some additional dispersed artefacts are anticipated on an adjacent property, there is no potential for *in situ* or stratified archaeological deposits. The site is considered to have little further research value and provides a poor representative example of a small open campsite on the coastal ramp ridges. Similar sites of considerably higher research value and significance have been recorded on the eastern end of the same ridge system and parts of these have been flagged for permanent conservation (Davies 2004, 2006a).

Impact of the Proposal

The S2W-2 artefact scatter and its surrounds lie within an area of proposed interchange construction and would be destroyed.

S2W-3: Isolated artefact (#22-1-137)

In 1999, an isolated siltstone flake was recorded 75 metres south of Skinners Creek, on the bank of a deeply-incised tributary gully, within the existing Pacific Highway reserve. While land to the east supports regenerating blackbutt forest, much of the highway reserve itself was fully exposed and highly disturbed (Macdonald and Collins 1999:131-2). The subject artefact could not be detected during the present survey and is highly likely to have washed into the gully. No further artefacts are apparent in the S2W-3 locality.

Description of the recorded artefact (Macdonald and Collins 1999):

Siltstone flake, 34 x 30 x 8 mm
focal flaked platform with platform preparation
hinge termination, 3 dorsal negative scars.

Significance Assessment

The S2W-3 artefact does not appear to be part of a larger scatter and is no longer in its originally recorded context. As such, the artefact location has no further cultural or research value and is assessed to have a low level of Aboriginal cultural/social and scientific/archaeological significance. This assessment is consistent with that made by Macdonald and Collins (1999:147) and Collins (2002:62).

Impact of the Proposal

The S2W-3 location lies close to the southern abutment of the Skinners Creek bridge and would probably be affected by bridge construction works.

S2W-4: Artefact scatter/historic campsite (#22-1-138)

In 1999, 16 stone artefacts were recorded along a 30 metre stretch of an exposed water main easement that borders the eastern margin of the Pacific Highway reserve. The artefacts occurred on the crest and northern upper slope of a low east-trending spur cut by the highway. The terminal end of the spur is occupied by the Coffs Harbour Clay Target Club premises and is fringed by poorly-drained alluvial plains extending 600 metres east to Moonee Creek. The recorded artefacts had been disturbed by water main installation, but the potential for further, largely undisturbed, artefacts beneath grass and sediment cover over a wide part of the spur was assessed to be high (Macdonald and Collins 1999:131). The 1999 assessment is supported by observations made during the present survey, wherein a number of artefacts were noted on the northern footslope of the spur, along and beside the existing Clay Target Club access track.

Description of artefacts recorded in 1999 (Macdonald and Collins) east of the highway reserve:

- 1 Chert flake, 28 x 30 x 13 mm
focal flaked platform, hinge termination, 5 dorsal negative scars.
- 2 Chert flaked piece, 48 x 33 x 15 mm
5 negative scars, 50 percent pebble cortex.
- 3 Quartzite flake, 28 x 25 x 9 mm
broad flaked platform, feather termination, 3 dorsal negative scars.
- 4 Greywacke flaked (pebble) piece, 65 x 43 x 13 mm, 30 percent pebble cortex.
- 5 Quartz flake, 23 x 18 x 10 mm
broad flaked platform, feather termination, 6 dorsal negative scars.

- 6 Siltstone flake, 19 x 26 x 4 mm
broad cortical platform, hinge termination, 4 dorsal negative scars.
- 7 Greywacke single platform core, 75 x 65 x 25 mm
4 negative scars, 50 percent pebble cortex.
- 8 Greywacke flake, 26 x 50 x 8 mm
platform absent, feather termination, 3 dorsal negative scars.
- 9 Chert flake, 20 x 25 x 5 mm (distal snap)
focal flaked platform with platform preparation, 4 dorsal negative scars.
- 10 Greywacke flaked piece, 40 x 38 x 18 mm
6 negative scars, probable core fragment.
- 11 Siltstone flake, 50 x 43 x 8 mm
broad flaked platform with platform preparation
hinge termination, 5 dorsal negative scars.
- 12 Chert flake, 16 x 13 x 7 mm (distal snap)
focal flaked platform with platform preparation, 2 dorsal negative scars.
- 13 Chert flake, 24 x 19 x 5 mm
broad flaked platform with platform preparation
feather termination, 4 dorsal negative scars.
- 14 Chert flake, 15 x 15 x 4 mm
focal flaked platform, feather termination
2 dorsal negative scars, 30 percent dorsal pebble cortex.
- 15 Chert multi-platform core, 27 x 24 x 10 mm
9 negative scars, no cortex.
- 16 Greywacke flake, 25 x 35 x 12 mm
broad cortical platform, hinge termination, 3 dorsal negative scars.

Significance Assessment

S2W-4 represents one of the last known traditional campsites of the Moonee people (cf Section 4.2), and is assessed by Aboriginal Participants to be of high cultural heritage significance. Given that it occurs on private land, most of which has not been available for archaeological survey/ investigation, the full extent of this campsite is still to be determined. Although recordings to date have revealed a low to moderate density of artefacts on disturbed surface exposures, including the existing access track to the Coffs Harbour Clay Target Club premises, it is anticipated that the S2W-4 spur will contain a large number of artefacts beneath grass cover and within surface sediments.

As little as five percent of the coastal ramp within the 300,000 hectare region stretching from Corindi to Scotts Head has so far been surveyed for archaeological sites, and less than 40 stone artefact scatters are presently on record for this landsystem. S2W-4 is the only one of these sites

reliably documented to reflect post-contact camping activities. Most of the known coastal ramp artefact scatters comprise five visible artefacts or less, and very few have the potential for undisturbed subsurface materials (cf Collins 2001:35-36). While a more comprehensive investigation would be required to determine its full archaeological status, S2W-4 is provisionally assessed to have a high level of scientific/archaeological significance. It has the potential to offer reasonably intact archaeological evidence with respect to the period spanning first European settlement, and represents a rare site type in the local and regional context.

Impact of the Proposal

Adjacent to S2W-4, the Proposal would be confined to the existing Pacific Highway reserve. No artefacts or archaeological deposits could have survived within this reserve, which has been downcut and carries a section of relict highway pavement.

It was initially proposed to widen the existing highway reserve by approximately 20 metres along the eastern margin, thereby encompassing the recorded S2W-4 artefact scatter and exposing it to potential construction-related disturbance. It was also proposed to upgrade the existing access track to the Clay Target Club across the 20 metre increased width of the new highway reserve. Field survey inspection revealed that a number of artefacts scattered along and beside this track, which traverses the northern foot of the spur, would have been directly affected by the Proposal.

Revised impact of the Proposal

The concept design was revised during the course of the environmental assessment to avoid/minimise impacts on S2W-4 and preserve its Aboriginal cultural/social and scientific/archaeological values. In accordance with this revision, the eastern boundary of the highway reserve would be retained on its existing alignment, such that S2W-4 would no longer be incorporated into a new, wider, reserve. In addition, the proposed access road to the Clay Target Club was re-aligned to traverse lowland beyond the northern foot of the culturally and archaeologically sensitive S2W-4 spur.

S2W-5: Isolated artefact and PAD 2 (#22-1-210)

The S2W-5 isolated artefact was found on a level ridgeline bench of the coastal ramp, elevated at 36 metres AHD 300 metres north of Woolgoolga Creek. The site area supports open (slashed) grassy woodland and offered survey visibility in the order of 10 percent. There is moderate potential for further artefacts beneath grass cover and within the surface clay slopewash layer across the 300 square metre bench landform.

Description of the recorded artefact:

- 1 Retouched siltstone flake, 66 x 60 x 24 mm
focal flaked platform, feather termination
2 dorsal negative scars, retouch on one lateral margin.

Significance Assessment

The S2W-5 locality is not known to be of Aboriginal ceremonial, spiritual, historical or otherwise high cultural significance. In the absence of background cultural information, Aboriginal Participants advised that the potential cultural/social significance of this site/PAD should be refined by way of subsurface archaeological testing prior to construction.

Although the S2W-5 isolated artefact itself has no further research value, the ridgeline bench on which it occurs is considered to have moderate potential for largely intact subsurface artefacts beneath slope wash sediments, despite the adverse effects of past vegetation clearing. Further investigation would determine the archaeological status and scientific/archaeological significance of this landform.

Impact of the Proposal

The S2W-5 isolated artefact and PAD lie beyond the eastern boundary of a proposed highway cutting, but within the new highway reserve. It is anticipated that with appropriate management S2W-5 could remain intact and protected within this reserve.

S2W-6: Isolated artefact and PAD 3 (#22-1-208)

The S2W-6 isolated artefact was found on an erosion exposure at an elevation of 40 metres AHD, on the upper slope of the same grassy ridgeline north-west of the S2W-5 artefact and PAD. It is considered possible that the S2W-6 artefact is associated with occupation of a forested ridgeline knoll (50 metres north/south by 25 metres east/west), located approximately 50 metres further north-west. This knoll was not subject to survey inspection due to refusal of access, but has been recorded as PAD 3.

Description of the recorded artefact:

- 1 Greywacke flake, 41 x 41 x 10 mm
broad flaked platform, distal snap
1 dorsal negative scar, 20 percent dorsal pebble cortex.

Significance Assessment

The S2W-6 locality is not known to be of Aboriginal ceremonial, spiritual, historical or otherwise high cultural significance. In the absence of background cultural information, Aboriginal Participants advised that the potential cultural/social significance of this site/PAD should be refined by way of subsurface archaeological testing prior to construction.

The S2W-6 isolated artefact has no further research value in its own right. However, the nearby knoll is considered to have moderate potential for largely intact subsurface artefacts within its presumably shallow sediments. Further investigation would determine the archaeological status and scientific/archaeological significance of this knoll.

Impact of the Proposal

The S2W-6 isolated artefact lies beyond the eastern boundary of the proposed impact area, but within the new highway reserve. It is anticipated that with appropriate management the S2W-6 artefact could remain *in situ* and protected within the reserve. However, the associated S2W-6: PAD 3 lies within an area to be excavated for a cutting for the south-bound carriageway and would be destroyed.

S2W-7: Artefact scatter (#22-1-211)

S2W-7 comprises a scatter of at least 200 artefacts on the level southern end of a knoll along the same ridgeline, some 250 metres upslope of S2W-6, at an elevation of 56 metres AHD. The artefacts are dispersed across an eroded, disturbed, and almost fully-exposed 90 square metre area between a house and a banana plantation. This area also carries a substantial quantity of natural gravel. Several further artefacts were detected on an unformed driveway on the opposite (north) side of the house, where the ridgeline narrows. Given its disturbed and degrading context, the potential for subsurface material at this site is negligible.

Random sample of the identified artefacts:

- 1 Chert flake, 25 x 35 x 10 mm
broad faceted platform, feather termination, 4 dorsal negative scars.
- 2 Coarse siltstone flake, 43 x 35 x 7 mm
broad cortical platform, hinge termination, 3 dorsal negative scars.
- 3 Siltstone distal flake fragment, 19 x 19 x 4 mm
feather termination, dorsal ridge.
- 4 Chert core rejuvenation flake, 30 x 25 x 5 mm
old platform with platform preparation on dorsal surface,
7 dorsal negative scars.

- 5 Chert flake, 22 x 20 x 6 mm
broad flaked platform, feather termination, 1 dorsal negative scar.
- 6 Chert flake, 19 x 30 x 5 mm (distal snap)
broad flaked platform with platform preparation, 3 dorsal negative scars.
- 7 Siltstone flake, 35 x 14 x 8 mm
focal flaked platform, feather termination,
2 dorsal negative scars, 90 percent dorsal cortex.
- 8 Siltstone flake, 65 x 70 x 12 mm
focal flaked platform, 4 dorsal negative scars,
90 percent dorsal pebble cortex, possible distal retouch.
- 9 Siltstone flake, 30 x 18 x 5 mm
focal flaked platform with platform preparation, feather termination,
6 dorsal negative scars.
- 10 Volcanic grindstone, 45 x 40 x 30 mm
spherical pebble with single grinding groove on upper and lower face.

Significance Assessment

S2W-7 comprises at least 200 stone artefacts recorded at an average density of 2.2 artefacts per square metre across the site area. This places the S2W-7 artefact scatter amongst the largest so far recorded in the wider Coffs Harbour region (cf Collins 2001:35-36). However, S2W-7 occurs in a highly-disturbed context with no potential for undisturbed surface or subsurface materials. On advice from Aboriginal Participants, and in light of its disturbance history, S2W-7 is assessed to have a low-moderate level of Aboriginal cultural/social and low scientific/archaeological significance. Aboriginal Participants agree that subsurface archaeological investigation is not warranted, and that a detailed recording and collection of the surface artefacts could be expected to provide any further useful cultural and scientific information.

Impact of the Proposal

The western section of the S2W-7 artefact scatter lies within an area to be excavated for a cutting associated with the south-bound carriageway. At least half this site would be destroyed, and the remainder probably indirectly disturbed as a result of construction.

S2W-8: PAD 4

This potential archaeological deposit is located on the narrow (20 metre wide) level crest of a prominent coastal ramp ridge that continues further east between two semi-permanent tributaries of Darkum Creek. Although much of the crest has been affected by house construction, its eastern extremity (within the Proposal) comprises cleared grazing land with moderate potential to contain archaeological evidence beneath dense grass and within the topsoil sediments.

Significance Assessment

The S2W-8: PAD 4 locality is not known to be of Aboriginal ceremonial, spiritual, historical or otherwise high cultural significance. In the absence of background cultural information, Aboriginal Participants advised that the potential cultural/social significance of this PAD should be refined by way of subsurface archaeological testing prior to construction.

Given that no surface artefacts have been recorded on or near S2W-8, further investigation would determine the archaeological status and scientific/archaeological significance of this crest.

Impact of the Proposal

The western half of S2W-8: PAD 4 would be destroyed by a cutting associated with construction of the south-bound carriageway, while the eastern half falls within the proposed new highway reserve.

S2W-9: PAD 5

S2W-9: PAD 5 comprises alluvial deposits on a well-drained, flat peninsula of land at the confluence of two permanent tributaries of Darkum Creek. It covers a 600 square metre area and provided negligible survey visibility in the face of dense long grass. The presence of two mango trees and a relict outhouse suggests that a residence once stood in the area, but there is still moderate to high potential for undisturbed evidence of prior Aboriginal occupation beneath the aggrading alluvium.

Significance Assessment

The S2W-9: PAD 5 locality is not known to be of Aboriginal ceremonial, spiritual, historical or otherwise high cultural significance. In the absence of background cultural information, Aboriginal Participants advised that the potential cultural/social significance of this PAD should be refined by way of subsurface archaeological testing prior to construction.

No surface artefacts have been recorded on or near S2W-9, and further investigation would determine the archaeological status and scientific/archaeological significance of this peninsula.

Impact of the Proposal

S2W-9: PAD 5 lies within an area of proposed fill and carriageway construction and would be destroyed.

S2W-10: PAD 6

S2W-10: PAD 6 was identified by the Garby Elders and comprises the crest of a low spur that forms the watershed between Little Arrawarra Gully and Arrawarra Creek towards the northern end of the Proposal. The spur is traversed by Embankment Road in Wedding Bells State Forest.

As outlined in Section 9.2 below, an area on the northern side of Embankment Road approximately 800 metres west of the Proposal was used as an Aboriginal campsite after European settlement. A traditional ceremonial/sacred site is also located in this general locality. In view of the Aboriginal activity that these sites suggest, the Garby Elders consider it possible that subsurface archaeological materials may occur to either side of Embankment Road, along the 50 metre length of the spur crest to be affected by the Proposal. Field inspection revealed the crest to have been disturbed by logging and road construction and maintenance, and any materials present on S2W-10: PAD 6 are likely to have been disturbed/displaced as a result.

Significance Assessment

S2W-10: PAD 6 may contain archaeological evidence associated with Aboriginal ceremonial and/or historic camping activities in the Arrawarra Creek/Embankment Road area. Any such evidence would be of high significance to the Aboriginal community, particularly the Garby Elders. Although *in situ* archaeological deposits are unlikely to have survived the destructive effects of past logging and road construction/maintenance, Aboriginal Participants advised that the potential cultural/social significance of this PAD should be refined by way of subsurface archaeological testing prior to construction.

Further investigation would similarly determine the archaeological status and scientific/archaeological significance of the Embankment Road spur.

Impact of the Proposal

S2W-10: PAD 6 lies within an area of proposed carriageway construction and would be destroyed.

S2W-11: PAD 7

S2W-11: PAD 7 was identified by the Garby Elders and comprises the banks of Arrawarra Creek on the northern extremity of the Proposal. Because a ceremonial/sacred site is located further upstream (cf Section 9.2), the Garby Elders consider it possible that subsurface evidence associated with ceremonial activities may occur within the area targeted for the Arrawarra Creek bridge construction. The banks of Arrawarra Creek within the proposed bridge construction impact zone have been disturbed by the installation of an overhead transmission line (a slashed easement), an underground

telecommunications cable and vehicle track, and are mostly degraded and channeled by water erosion. Field observations suggest that any cultural materials present on PAD 7 are highly unlikely to be in a primary depositional context.

Significance Assessment

Like PAD 6, PAD 7 may contain material evidence of ceremonial and/or historic camping activities in the Arrawarra Creek/Embankment Road area. Any such evidence would be of high significance to the Aboriginal community, particularly the Garby Elders. Although PAD 7 is disturbed, eroded, and unlikely to contain *in situ* deposits, Aboriginal Participants advised that the potential cultural/social significance of this PAD should be refined by way of subsurface archaeological testing prior to construction.

Further investigation would determine the archaeological status and scientific/archaeological significance of the Arrawarra Creek banks.

Impact of the Proposal

S2W-11: PAD 7 would be destroyed by construction of the Arrawarra Creek bridge.

S2W-12: Artefact scatter (#22-1-220)

S2W-12 comprises a low, cleared, east-trending ridge south of Fiddaman Road at Emerald Beach that was not available for survey access. Since completion of the S2W survey, this ridge has been inspected (Davies 2006b) and subject to subsurface archaeological salvage investigation (Davies 2007) in response to a residential development proposal. The salvage investigation was conducted under Section 90 Heritage Impact Permit with Licence to Salvage #2587, issued by the DECC in 2006.

As reported by Davies (2007), the salvage investigation involved the excavation of one square metre mechanical test pits on a 15 metre grid system, yielding a salvaged sample of less than 0.5 percent of the total site area. As outlined in Section 5.1, the salvage revealed a distribution of artefacts churned within the highly disturbed topsoil. Although extending to the ridge slopes, artefacts occurred with the highest density on the level crest, where up to 123 per square metre were recovered. Of the 1,277 salvaged artefacts almost half had been made on beach cobbles, mainly of volcanic origin. The findings indicated that S2W-12 was used intermittently, primarily for the initial stages of stone reduction. In the absence of bone and shellfish remains, it was concluded that S2W-12 was probably a task-specific site peripheral to the main campsites, which may have been located further towards the coast (Davies 2007:23).

Based on the identified artefact distribution, there is no doubt that S2W-12 subsurface artefacts will continue into the 50 metre long and 75 metre wide section of the ridge crest (bordering the eastern margin of the existing Pacific Highway reserve) to the immediate west. This part of the ridge, which was not within Davies' (2006b, 2007) investigation area, is occupied by a house and sheds. Any artefacts that may be present within this unsalvaged area are expected to be at least, if not more, disturbed than those recovered during Davies' salvage.

Significance Assessment

S2W-12 has been subject to archaeological salvage, but the methodology adopted for, and the spatial extent of this salvage is such that additional artefacts will be present within topsoil off the test pit locations, as well as across the adjoining section of ridge.

The S2W-12 locality is not known to be of Aboriginal ceremonial, spiritual or historical significance. The site nevertheless contains widespread evidence of traditional Aboriginal occupation and for this reason alone is regarded to have a low-moderate level of cultural/social value. Loss of this value has been mitigated to some extent through the conduct of the salvage investigation and the educational information provided by the results and the artefact collection, which will be jointly curated by the CHLALC and Yarrawarra AC. Impacts on cultural/social values are to be further compensated within the residential development context via the dedication of an appropriately re-vegetated and signposted reserve on the eastern boundary (Davies 2007:11).

As revealed by the salvage investigation (Davies 2007), S2W-12 has been severely disturbed and has little to no potential for *in situ* archaeological deposits. This finding can reasonably be extrapolated to the section of ridge crest that has not been investigated. Given that a representative sample of artefacts has already been salvaged from the site, it is considered to have little further research potential and is assessed to have a low level of scientific/archaeological significance. Although representative of a repeated-use campsite on the coastal ramp ridges, the representative value of S2W-12 has been substantially reduced by its lack of structure and spatial integrity.

Impact of the Proposal

The western third of S2W-12 (including the anticipated site extension) lies within an area of proposed interchange construction. This portion of the site would therefore be destroyed.

S2W-13: PAD 8

As outlined in Section 4.2, Holder (1984:21) maintains that an Aboriginal man known as 'Tommy Twohead' died as a result of injuries sustained during a tribal fight north of the present Coffs Harbour Clay Target Club in 1885-6. 'Tommy Twohead' is reported to have been buried by the

Skinner family, on the coastal alluvial plains somewhere in the south-east corner of Portion 41, Parish of Moonee. In the absence of any further documentary information or contemporary Aboriginal knowledge, the exact whereabouts of this burial has not been pinpointed.

Because the S2W-13: PAD 8 potential burial area was not identified as lying within or close to the Proposal at the time the survey was conducted, it was not subject to field inspection. However, it is highly unlikely that the burial location could be detected on the basis of surface evidence. Even if skeletal remains have survived the poor preservation conditions provided by the highly acid soils (cf Milford 1999), the burial is similarly unlikely to be detected using remote sensing or archaeological test pitting methods.

Significance Assessment

S2W-13: PAD 8 has the potential to contain evidence of an Aboriginal burial dating to the late 19th century. All ancestral and contemporary Aboriginal burials in Gumbaingirr country are attributed a high level of cultural/social significance, including the reported grave of 'Tommy Twohead'. Even though the burial was presumably not undertaken according to traditional custom and its exact whereabouts and preservation context are unknown, its cultural/social values are enhanced by the historical information provided by Holder (1984), and the reported association of the deceased with events carried out in the vicinity of the Coffs Harbour Clay Target Club.

Given its relatively recent date and probable European mode of interment, the burial is unlikely to be of research value and is provisionally assessed to have a low level of scientific/archaeological significance.

Impact of the Proposal

It was initially proposed to construct a property access road inside the eastern boundary of Portion 41, Parish of Moonee, within the reported burial area. It was anticipated that this construction could result in the disturbance or destruction of the burial.

Revised impact of the Proposal

As recommended by Aboriginal Participants, the property access road was re-aligned to pass through the adjacent property to the east, thereby avoiding Portion 41 and the reported burial location. It is expected that with appropriate management the S2W-13 burial site could remain intact.

Table 2. Summary of recorded archaeological sites and PADs

Site ID	Site type	GDA Reference	Landform element	Contents	Cultural significance	Scientific significance
S2W-1	PAD	514135 E 6654900 N	Spur crest	Potential disturbed subsurface artefacts	Potential significance- level of significance to be refined by subsurface work prior to construction	
S2W-2	Artefact scatter	514083 E 6655959 N	Upper spur slope, probably extends to crest in north	4 surface artefacts- highly disturbed	Low	Low
S2W-3	Isolated find	514400 E 6660375 N	Eroded bank of tributary gully	1 surface artefact- highly disturbed	Low	Low
S2W-4	Artefact scatter/ historic camp	516600 E 6662050 N	Crest and slopes on end of low spur	Potential extensive surface scatter and subsurface deposit	High- Impact mitigation implemented	High (regional)- Impact mitigation implemented
S2W-5	Isolated find and PAD	516495 E 6668874 N	Ridgeline bench	1 surface artefact- Potential disturbed subsurface artefacts	Potential significance- level of significance to be refined by subsurface work prior to construction	
S2W-6	Isolated find and PAD	516454 E 6668970 N	Ridgeline knoll crest and upper slope	1 surface artefact- Potential undisturbed subsurface artefacts	Potential significance- level of significance to be refined by subsurface work prior to construction	
S2W-7	Artefact scatter	516340 E 6669241 N	Ridgeline knoll crest	>200 disturbed surface artefacts	Low-moderate	Low
S2W-8	PAD	516456 E 6671035 N	Ridge crest	Potential disturbed subsurface artefacts	Potential significance- level of significance to be refined by subsurface work prior to construction	
S2W-9	PAD	516524 E 6671579 N	Elevated peninsula at creek confluence	Potential for minimally disturbed subsurface artefacts	Potential significance- level of significance to be refined by subsurface work prior to construction	
S2W-10	PAD	517550 E 6673400 N	Crest of low spur	Potential disturbed subsurface artefacts	Potential significance- level of significance to be refined by subsurface work prior to construction	
S2W-11	PAD	517620 E 6673944 N	Creek banks	Potential disturbed subsurface artefacts	Potential significance- level of significance to be refined by subsurface work prior to construction	
S2W-12	Artefact scatter	517250 E 6662675 N	Ridge slopes, probably extends to crest between	Low to moderate density of disturbed subsurface artefacts	Low-moderate	Low
S2W-13	PAD	517000 E 6662750 N	Valley flat	Potential historic Aboriginal burial	High- Impact mitigation implemented	Low- Impact mitigation implemented

9.2 Sites/places beyond the Proposal boundaries

A number of Aboriginal sites/places have been identified close to, but outside, the boundaries of the Proposal. These should be taken into account and avoided during the selection of areas to be affected by water quality basins, machinery compounds and other necessary construction facilities/ infrastructure.

Site #22-1-143: Artefact scatter

(GDA Reference: 514025/6657350 Moonee Beach 9537-4-S, Edition 2, 1:25,000)

Three stone artefacts have been recorded beside a small semi-permanent tributary of Sugar Mill Creek at Moonee. On the south side, one artefact lay on the disturbed and compact clay surface of a track following a water main easement, five metres west of the existing Pacific Highway reserve. The two other artefacts were found directly opposite, on the northern bank of the creek (Macdonald and Collins 1999:129). The present survey revealed the adjacent Pacific Highway reserve to have been downcut and highly disturbed.

Significance Assessment

The Site #22-1-143 artefact scatter is small, occurs in a disturbed context and is assessed by Aboriginal Participants to have a low level of cultural/social significance. Although some undetected artefacts may be present, archaeological materials are unlikely to survive within the highway reserve itself (the Proposal impact area). Site #22-1-143 is considered to have minimal further research potential and is assessed to have low scientific/archaeological significance.

Corroboree area north of Site S2W-4

During the mid-1880s a tribal fight and a corroboree were reportedly held on the coastal alluvial plain inland of Look-At-Me-Now Headland, north of the spur now occupied by the Coffs Harbour Clay Target Club (Holder 1984:20-21). The corroboree site is believed to lie less than 200 metres east of the Proposal. While the site is unlikely to contain archaeological evidence, it is regarded as an integral and important part of the Aboriginal cultural landscape.

Significance Assessment

Aboriginal Participants have assessed the historic Clay Target Club corroboree area to have a high level of cultural/social significance. The reported corroboree area has not been surveyed for archaeological evidence and its scientific/archaeological significance has thus not been assessed.

Embankment Road historic camp

This historic camp location lies in Wedding Bells State Forest, on the northern side of Embankment Road approximately 800 metres west of the Proposal (cf Figure 3c). Documented by Perkins (1997:33) and Goulding (2001), the camp was used by direct descendants of the Garby Elders and is believed to be linked to Aboriginal people prospecting for gold in the locality.

Significance Assessment

The Embankment Road historic camping place was used by known individuals and is of considerable attachment and cultural/social importance to the Garby Elders. The site was not detected in the field and it remains unknown whether material evidence survives. Further investigation would be required before any assessment of this site's scientific/archaeological significance could be made.

Arrawarra Creek ceremonial/sacred site

This site was identified to the project archaeologist during the route selection process, and is highly significant and of prime concern to local Gumbaingirr Elders. With respect to the site's secret/sacred nature, and at the request of Participants, no specific details of its use or location are given in this report. As outlined in Section 2.3, however, the site lies several hundred metres west of the Proposal. It is imperative that all construction-related facilities be located well away from this particular area.

Significance Assessment

The Arrawarra Creek ceremonial/sacred site has been assessed to have a high level of cultural/social significance. It is believed to contain material evidence of ceremonial activity (cf Collins 2002, 2003), and if this is the case, may also be of considerable scientific significance.

9.3 Other Aboriginal cultural heritage concerns

Wedding Bells State Forest

Forested lands, including Wedding Bells State Forest, are of enduring value to the Gumbaingirr people, who have detailed knowledge of the wide variety of bush foods, medicines and other raw material products they contain. Even though wild resources are no longer relied on for subsistence, collection of these resources is important for the maintenance of cultural traditions, such that the Corindi Beach Aboriginal community (represented by the Garby Elders and Yarrawarra Aboriginal Corporation) is actively seeking to negotiate access to State Forest for the purposes of plant resource collection (English undated). As discussed by English (undated), the collection of wild plant resources plays an integral role in the transmission of cultural knowledge

and in binding Aboriginal families together. As part of the revival and transmission of traditional practices, the Garby Elders and members of the Jalumbo Cultural Heritage Research Unit, Yarrawarra Aboriginal Corporation, still regularly collect forest products for the manufacture of material culture items. The ongoing accessibility of these products is crucial to these endeavors.

Aside from concerns for individual sites, places and resources, the natural appearance of forested lands provides a tangible link with the traditional landscape, and remains a visually significant part of Gumbaingirr identity and culture.

Impact of the Proposal

The Proposal would result in the destruction of approximately 52 hectares of Wedding Bells State Forest, which represents less than one percent of the total forest area.

Given the necessary clearance and visual impact of this clearance, the Proposal will obviously have some impact on Aboriginal forest values. This impact has already been mitigated to a large extent through the RTA's decision to not pursue the more westerly Option A, which was vigorously opposed by the Aboriginal community due to its biodiversity and other significant cultural attachments. Although destruction of a small proportion of the plant resources available in Wedding Bells State Forest would be inevitable if the Proposal proceeds, the development would have no appreciable detrimental effect on existing Aboriginal plant collection practices, given that plant resources are not currently sourced from Wedding Bells State Forest.

Waterways

As related by Mudjay Elders representatives Steven Hart and Terry Carberry (Section 2.3), the welfare of waterways is of fundamental importance to the contemporary Gumbaingirr community, whose ancestors have always utilised aquatic and marine resources. Fishing and the collection of crustaceans and molluscs from the Moonee Creek, Hearn's Lake and Woolgoolga Lake estuaries is still undertaken, and these estuaries are regarded as an integral part of the cultural landscape. Like those from the forest, aquatic and marine resources are no longer relied upon for subsistence, but allow Aboriginal people on limited incomes to supplement their diet with traditional foods. As such, the exploitation of waterway resources is seen to be an on-going cultural tradition.

Impact of the Proposal

The Proposal would require bridge construction across Cunninghams and Skinners Creeks (small estuarine tributaries of Moonee Creek), Moonee Creek, Double Crossing Creek (Hearn's Lake), Woolgoolga Creek and Arrawarra Creek, as well as a number of minor gullies and tributaries that drain into these waterways.

While the unmitigated impact of bridge and other construction works could be expected to be detrimental to water quality and the survival of downstream flora and fauna of identified Aboriginal cultural heritage value, the RTA is committed to implementing best practice to manage these pollution effects. Construction impacts in all areas would be minimised as far as possible. Drainage to contain groundwater drawdown, flow and discharge would be installed in all necessary locations, and soil disturbance and water quality assessments undertaken throughout and following the construction process. Appropriate monitoring, contingency, and remedial procedures would be implemented to ensure that Aboriginal cultural and natural values are not compromised as a result of the Proposal.

9.4 Summary of the Aboriginal cultural landscape and potential impacts

Information revealed by Aboriginal Participants in tandem with the archaeological data reviewed and recorded during the course of the route selection study and environmental assessment provides an overview of an Aboriginal cultural landscape that extends from the traditional, through the initial European contact period to contemporary times. This landscape contains an inter-related network of mythological and ceremonial places, story places, resource-use places, travel routes, camping places and places of work, superimposed upon the archaeological record. The archaeological record thus represents only one component in a cultural landscape that is valued for many different and equally legitimate reasons.

Although minimised as far as possible throughout the route selection and environmental assessment process (particularly with the decision not to select Option A for further investigation), a transect of the Aboriginal cultural landscape would nevertheless be impacted by development of the Proposal. As assessed in this report, this impact would or may include the archaeological sites and PADs described in Section 9.1, as well as the resource-use and natural values attributed to forests and waterways.

Apart from PADs identified at S2W-9 (potential traditional campsite), S2W-11 (potential traditional ceremonial and/or historic activity area) and S2W-13 (potential historic burial), the recorded archaeological sites and PADs occur on coastal ramp ridges/spurs. Of these, S2W-4 is believed to represent a seasonal base camp used into the European contact period. This site is of high cultural/social significance. The concept design has been revised to preserve this significance. On the basis of past subsurface investigation results, the remaining coastal ramp sites/PADs are probably associated with temporary camping and/or task-specific activities by small groups ranging from S2W-4 and other coastal base camps. These sites either have low, low-moderate or

other potential cultural/social significance. These levels of significance would be further refined by subsurface investigations prior to construction.

As outlined in Section 9.3, Wedding Bells State Forest and waterways traversed by the Proposal are regarded as important components in the contemporary Gumbaingirr landscape. Because clearing of the construction corridor will be necessary, some impact on forest values would be inevitable, but adverse effects on waterways could be avoided by implementation of appropriate sediment containment and monitoring measures.

The ceremonial/sacred area and historic campsite described in Section 9.2 should be avoided by ancillary facilities so as not to compromise the cultural/social values of these sites/places.

If implemented, it is anticipated that the program of archaeological subsurface investigation, artefact salvage and/or Aboriginal construction monitoring recommended and supported by the Aboriginal community in relation to the identified archaeological sites and PADs (Section 11) would provide information of sufficient educational and scientific value to compensate the loss of these sites/PADs during the course of necessary construction, and result in the permanent preservation of some sites/PADs within undeveloped sections of the new highway reserve.

10 CONCLUSIONS AND IMPACT MITIGATION STRATEGIES

The Proposal would directly impact all or parts of four identified Aboriginal sites and six potential archaeological deposits (PADs), and may indirectly affect four further sites/PADs. These sites/PADs have been identified in 12 separate locations (Section 9.1). The remaining PAD (the reported S2W-13 historic burial) seems unlikely to be either directly or indirectly affected due to a re-alignment of a proposed property access road. The Proposal also has the potential to adversely affect the natural and resource use values of Wedding Bells State Forest and waterways (Section 9.3).

S2W-1 has moderate potential for disturbed subsurface artefacts but is unlikely to contain materials or deposits of sufficient significance to warrant a subsurface archaeological investigation. Aboriginal use of dissected ridgelines like that housing PAD 1 is likely to have been sporadic, and associated with transit to more productive locations adjacent to coastal swamps and the ocean further east. The expectation of a low density of artefacts in tandem with the apparent high level of disturbance suggests that were subsurface archaeological testing to

proceed, it would be unlikely to generate information of any greater overall value than could be gained through construction monitoring.

The **S2W-2** (#22-1-212) and **S2W-7** (#22-1-211) artefact scatters occur in disturbed eroded contexts with low to negligible potential for subsurface deposits. Collection and recording of the surface artefacts is recommended prior to the commencement of construction activities. This impact mitigation strategy is endorsed by the local Aboriginal community, who would require the artefacts to be relocated to a nearby protected place agreed with the RTA.

The **S2W-3** (#22-1-137) isolated artefact could not be detected and has probably washed into the adjacent gully since its 1999 recording. No further artefacts are apparent in the area and no impact mitigation is considered necessary.

It is anticipated that the **S2W-4** (#22-1-138) artefact scatter and historic campsite will contain a large number of undetected artefacts. Due to its historical associations and contemporary attachments, this site is of high Aboriginal cultural significance and of potentially high local and regional scientific significance.

As originally proposed, the northern periphery of this site was to be directly impacted by construction of a property access road and the western portion incorporated into an eastern extension of the highway reserve. However, in response to Aboriginal community recommendations, the proposed new access road to the Coffs Harbour Clay Target Club premises has been moved north onto the adjacent lowland to avoid the foot of the spur where artefacts were identified during the field survey, and the highway reserve would remain on its existing boundary rather than being extended to the east. To further mitigate potential impacts on significant occupation materials, the Garby Elders requested that a subsurface investigation (and any necessary subsequent salvage) be conducted along the new property access road alignment prior to the commencement of construction works, and that construction-related topsoil disturbance be subsequently monitored.

Two isolated stone artefacts with associated PADs (**S2W-5** [#22-1-210] and **S2W-6** [#22-1-208]) and one PAD (**S2W-8**) were recorded in ridgeline contexts on the Woolgoolga bypass section of the Proposal. These PADs have moderate potential to contain reasonably intact archaeological evidence, and their further investigation could contribute valuable information regarding the past use of subcoastal ridge systems. Limited subsurface investigation of the PADs is supported by Aboriginal Participants and is recommended in an effort to avoid the unmitigated destruction of potentially significant sites.

S2W-9 has moderate to high potential for undisturbed archaeological evidence beneath aggrading alluvial sediments, and has the capacity to provide data on the use of subcoastal creeklines, an aspect of past local Aboriginal occupation that has not been explored in any detail. This PAD would be destroyed by the Proposal. As with PADs S2W-5, 6 and 8, the most appropriate impact mitigation strategy is subsurface investigation, coupled with any subsequent salvage that may be warranted.

The **S2W-10** and **S2W-11** PADs have little potential for undisturbed deposits but may contain materials reflecting ceremonial and/or more recent historical use of the Embankment Road/Arrawarra Creek locality. Any such materials would be of high Aboriginal cultural significance. Because the archaeological context of traditional ceremonial and historic campsites in the subcoastal hinterland have not been researched, these materials may also be of scientific significance. The Garby Elders have requested subsurface investigation of the PADs to relieve their concerns that significant materials may be destroyed and/or damaged as a result of construction or ancillary works. This request should be honoured, irrespective of the level of past disturbance.

S2W-12 extends along the crest and slopes of a ridge for some 210 metres, the western third of which would be destroyed by the Proposal. Although this site will undoubtedly contain many further artefacts, archaeological investigations (Davies 2007) have revealed no potential for undisturbed deposits. Given that a representative sample of artefacts has already been salvaged and analysed, any additional archaeological investigation would be unlikely to provide information of any greater value than that detailed in the Davies (2007) report. Impacts on Aboriginal cultural/social values are to be compensated by the dedication of an appropriately re-vegetated and signposted reserve on the eastern boundary of the adjacent development area (Davies 2007:11). Aboriginal community representatives have advised that impacts could be further mitigated by artefact collection conducted after the existing buildings have been removed, followed-up by initial construction monitoring within that section of the site to be affected by the Proposal.

S2W-13 represents a reported historic Aboriginal burial (Holder 1984:21). Although reported to be in the south-eastern corner of Portion 41, Parish of Moonee, the exact location of the burial is not known. Further investigation would be necessary to confirm the location of this site. The investigation would include consultation with the Holder family descendants and a field inspection with Aboriginal Participants.

In line with Aboriginal community recommendations, the property access road has been re-aligned to pass through the adjacent property to the east to avoid Portion 41 and the reported location of the burial site.

As detailed in Table 1, approximately 46 percent of the Proposal was covered in the field, and many of the areas proposed for construction impact along the margins of the existing highway reserve have been inspected during the course of past archaeological surveys (cf Section 5.1). Apart from a few properties where survey access was denied (and which have nevertheless been taken into account, eg S2W-6, S2W-12), the unsurveyed balance of the Proposal is not considered to have any substantial archaeological potential, being very poorly drained, of high gradient, and/or disturbed as a result of past highway construction, residential development or intensive cultivation practices.

The Aboriginal consultation undertaken in conjunction with the route selection study (Collins 2002, 2003) and this environmental assessment report has revealed no permanent constraints to the Proposal providing the Section 11 management recommendations are implemented.

11 MANAGEMENT RECOMMENDATIONS

The management recommendations presented in this section are based on-

- Advice received from Aboriginal Participants.
- The results of heritage register searches and background research into the ethno-history and archaeology of the Sapphire-Woolgoolga locality.
- The results of the route selection and environmental assessment field surveys.
- The assessed significance of the recorded sites/PADs and the wider cultural landscape.
- A consideration of the potential impacts of the Proposal on Aboriginal heritage sites and values.

11.1 The Proposal

1. All initial ground surface disturbance/topsoil stripping on the **S2W-1** location should be monitored by an archaeologist and representatives of the Coffs Harbour and District Local Aboriginal Land Council and Gumbula Julipi Elders Aboriginal Corporation. In the event that Aboriginal objects are detected, all work on the PAD should cease pending the completion of a subsurface archaeological salvage investigation.
2. Prior to the commencement of disturbance works, surface artefacts at **S2W-2** and **S2W-7** should be salvaged/collected and fully recorded. In line with Aboriginal community wishes, the salvaged artefacts should be re-located to an adjacent defined (and protected) place in the undeveloped section of highway reserve once construction is complete.
3. Given that the **S2W-3** isolated artefact is no longer detectable it is recommended that bridge construction works proceed as planned in its vicinity.
4. To preserve the Aboriginal cultural and scientific values of the **S2W-4** artefact scatter and historic campsite, it is recommended that subsurface archaeological testing and subsequent artefact salvage (if necessary) be conducted along the revised alignment of the Coffs Harbour Clay Target Club property access road. In line with Aboriginal community wishes, all recovered artefacts should be re-located to an adjacent defined (and protected) place in the undeveloped section of highway reserve once construction is complete.

In a further effort to preserve the Aboriginal cultural and scientific values of **S2W-4**, it is recommended that, with the exception of works necessary for construction of the Coffs Harbour Clay Target Club property access road, all construction-related earthworks, ancillary works and vegetation clearance east of the highway between Chainages 16750 and 17130 be confined to the existing Pacific Highway reserve. The existing reserve boundary fence, or an alternative temporary fence (on the same alignment) should be maintained for the duration of construction to define the 'no-go' zone. As a further precaution against accidental site disturbance, temporary protective fencing should also be erected along the margins of the Clay Target Club access road construction corridor.

Both the Coffs Harbour and District Local Aboriginal Land Council and Garby Elders have requested construction monitoring of all initial ground disturbance works/topsoil stripping

necessary for construction of the Clay Target Club access road. It is recommended that this monitoring be implemented regardless of the results of the subsurface testing.

5. The **S2W-5** artefact and potential archaeological deposit lie outside the proposed construction impact zone and should be preserved *in situ* if possible. Protective fencing for the duration of construction would be necessary to prevent inadvertent disturbance.
6. The **S2W-6** artefact lies outside the proposed construction impact zone and should be preserved *in situ* if possible. Protective fencing for the duration of construction would be necessary to prevent its inadvertent disturbance.
7. Prior to construction, a program of subsurface archaeological testing and assessment, and where necessary subsequent artefact salvage, should be conducted on those sections of the **S2W-5**, **S2W-6**, **S2W-8**, **S2W-9**, **S2W-10** and **S2W-11** potential archaeological deposits that would be subject to construction-related impacts. A Draft Aboriginal Heritage Subsurface Investigation Work Plan is provided in Appendix D.

The Garby Elders have requested construction monitoring of initial ground disturbance works/topsoil stripping on the **S2W-10** and **S2W-11** PADs. It is recommended that this monitoring be implemented regardless of the results of the subsurface testing.

8. An archaeological salvage investigation has already been conducted on some parts of the **S2W-12** artefact scatter to be affected by the Proposal. Given its high level of disturbance, no further controlled subsurface investigation/salvage is warranted. However, it is recommended that Coffs Harbour and District Local Aboriginal Land Council and Yarrawarra Aboriginal Corporation/Garby Elders representatives be engaged to inspect the **S2W-12** area following removal of the existing buildings, and to monitor initial ground disturbance works/topsoil stripping with a view to salvaging a larger sample of artefacts.
9. Although the Proposal has been modified to avoid the reported site area, it is recommended that consultation with the Holder family descendants and a field inspection with Aboriginal Participants be undertaken in an endeavor to confirm the exact location of **S2W-13**. All construction-related and ancillary activities should avoid the south-eastern corner of Portion 41, Parish of Moonee, and temporary protective fencing should be erected and maintained for the duration of construction to prevent inadvertent disturbance of this area.

As a further precaution, it is recommended that Aboriginal monitoring of initial ground disturbance works/topsoil stripping necessary for construction of the property access road in the vicinity of **S2W-13** be implemented to the satisfaction of the local Aboriginal community. In the event that any evidence of a burial is detected, work should cease pending advice from the DECC.

11.2 Sites/places beyond the Proposal boundaries

10. To avoid accidental damage to culturally-significant sites on Arrawarra Creek and Embankment Road further west, it is recommended that temporary protective fencing be erected and maintained for the duration of construction to define a 'no-go' zone west of the proposed construction impact zone in these areas. The exact locations and length of the required fencing should be determined in consultation with the Garby Elders.
11. To minimise impacts on Aboriginal cultural heritage resources, the locations of the sites described in Section 9.2 of this report should be noted and avoided during the course of all construction-related and ancillary activities.

11.3 Other Aboriginal cultural heritage concerns

12. To mitigate the adverse effects of forest clearance on Aboriginal cultural landscape values, clearance within Wedding Bells State Forest should be minimised as far as possible.

To offset losses, it is recommended that highway cuttings through Wedding Bells State Forest be re-vegetated with locally-indigenous plant species. Aboriginal community representatives, and the Jalumbo Cultural Heritage Research Unit, Yarrawarra Aboriginal Corporation, in particular, have the capacity to provide expert advice with respect to the selection of appropriate species.

To further promote an appreciation of and maintain cultural attachments to the Proposal area, and satisfy RTA wishes to involve the Aboriginal community throughout the full process of the Pacific Highway Sapphire to Woolgoolga Upgrade, it is further recommended that opportunities be offered to Aboriginal community representatives to be employed to undertake tasks associated with the re-vegetation program, both within Wedding Bells State Forest, and elsewhere as feasible.

13. To preserve the Aboriginal cultural values of waterways traversed by the Proposal, the RTA should ensure that best practice methods of containing sediment run-off are implemented and maintained during and following the construction process.

11.4 General recommendations

14. All identified Aboriginal sites and potential archaeological deposits within and near the Proposal should be clearly marked and annotated on construction plans/drawings, and their management requirements detailed in the Environmental Management Plan for Construction (Indigenous Heritage Management Sub Plan). RTA project and construction management staff and construction contractors (especially the project contractor's environmental manager, who would be responsible for preparation and implementation of all aspects of the Indigenous Heritage Management Sub Plan), should be informed of the site locations, conservation management requirements, and legal obligations with respect to Aboriginal sites.
15. Additional field survey and/or assessment will be required where any machinery compound, stockpile, concrete batching plant, water retention pond or other construction-related infrastructure/facility is to be established beyond the boundaries of the Proposal area assessed in this report.
16. In the event that any Aboriginal objects not identified in this report (as defined by the *National Parks and Wildlife Act 1974*) are discovered or exposed during any stage of construction, work must immediately cease in the vicinity of the find. The DECC Northern Aboriginal Heritage Unit (Coffs Harbour), the Coffs Harbour and District Local Aboriginal Land Council (CHLALC) and relevant Aboriginal Elders group/s (as advised by the CHLALC) should then be contacted for management advice and clearance given by these organisations before work resumes in the subject locality.
17. It is recommended that the RTA continue to liaise closely with the identified Aboriginal stakeholders in relation to Aboriginal heritage issues, and that these stakeholders be kept informed of the timetable for any works associated with planning and construction of the Pacific Highway Sapphire to Woolgoolga Upgrade.

Table 3. Summary of Proposal impacts and management recommendations

Site ID	Impact of the Proposal	Recommended management strategy
S2W-1	Direct impact from carriageway construction.	Monitor topsoil disturbance. Stop work and conduct subsurface salvage investigation if artefacts detected.
S2W-2	Direct impact from interchange construction.	Salvage artefacts prior to construction and re-deposit in an agreed place.
S2W-3	Adjacent to bridge. Likely impact from construction works.	No management necessary. Proceed with works.
S2W-4	Possible indirect impact from construction of property access road.	Impact mitigation implemented- eastern Proposal boundary moved to existing reserve boundary. Property access road moved to lowland north. Conduct subsurface testing and artefact salvage (if necessary) along new access road alignment prior to construction. Temporary fencing as necessary to prevent accidental construction damage. Aboriginal monitoring of topsoil disturbance.
S2W-5	Eastern margin of highway reserve. Potential for avoidance.	Avoid artefact and PAD if possible. Temporary fencing as necessary to prevent accidental construction damage. Otherwise, conduct subsurface testing and artefact salvage (if necessary) prior to construction.
S2W-6	Artefact on eastern margin of highway reserve. Direct impact on PAD from carriageway construction.	Avoid artefact if possible. Temporary fencing as necessary to prevent accidental construction damage. Conduct subsurface testing on PAD and artefact salvage (if necessary) prior to construction.
S2W-7	Direct impact from carriageway construction.	Salvage artefacts prior to construction and re-deposit in an agreed place.
S2W-8	Direct impact on western half of PAD from carriageway construction.	Conduct subsurface testing and artefact salvage (if necessary) prior to construction.
S2W-9	Direct impact from carriageway construction.	Conduct subsurface testing and artefact salvage (if necessary) prior to construction.
S2W-10	Direct impact from carriageway construction.	Conduct subsurface testing and artefact salvage (if necessary) prior to construction. Temporary fencing as necessary to prevent accidental construction damage. Aboriginal monitoring of topsoil disturbance.
S2W-11	Direct impact from bridge construction.	Conduct subsurface testing and artefact salvage (if necessary) prior to construction. Temporary fencing as necessary to prevent accidental construction damage. Aboriginal monitoring of topsoil disturbance.
S2W-12	Direct impact from interchange construction on western third of site.	Surface inspection and artefact collection following building removal. Aboriginal monitoring of topsoil disturbance with artefact collection.
S2W-13	Possible direct impact from construction of property access road.	Impact mitigation implemented- access road moved to avoid Portion 41. Undertake consultation with Holder family descendants and field inspection with Aboriginal Participants in an endeavour to confirm the burial location. Construction-related activities to avoid south-east corner of Portion 41. Temporary fencing as necessary to prevent accidental construction damage. Aboriginal monitoring of topsoil disturbance. Stop work and seek DECC advice if any evidence of a burial is detected.
Forest	Clearance of Proposal corridor	Minimise clearance to preserve Aboriginal cultural values.
Waterways	Possible impacts on water quality and downstream flora and fauna.	Minimise construction impacts and implement best practice to manage pollution effects and preserve Aboriginal cultural values.

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GLOSSARY

ALLUVIAL PLAIN

A level landscape unit with extremely low relief. There may be frequently active erosion and aggradation by channelled and overbank stream flow, or the landforms may be relict to these processes (Speight 1990:48).

ALLUVIUM

General term for detrital deposits made by rivers or streams (Lapidus 1987:18).

ARCHAEOLOGICAL SITE

A place containing cultural materials of sufficient quality and quantity to allow inferences about human behaviour at that location (Plog *et al* 1978:383).

ARGILLITE

A rock derived from mudstone or shale that has been altered and indurated by pressure and cementation. Argillites are mid-way in metamorphism between shale and slate (Lapidus 1987:36).

ARTEFACT

Any object having attributes as a consequence of human activity (Dunnell 1971).

ASSEMBLAGE

A set of artefacts found in association with each other and therefore assumed to belong to the one phase or one group of people (Champion 1980:11).

BENCH

A short, gently or very gently inclined minimal mid-slope landform element eroded or aggraded by any agent (Speight 1990:25).

BROAD PLATFORM

A platform which, when viewed from above, obscures the body of the flake. Usually produced by detaching the flake by striking well behind the platform margin (Witter 1992:110).

CARBONIFEROUS

The time interval between 360 and 290 million years ago (Lapidus 1987:90).

CHERT

A dense, extremely hard, microcrystalline or cryptocrystalline siliceous sedimentary rock, consisting mainly of inter-locking quartz crystals, sub-microscopic and sometimes containing opal (amorphous silica). Chert occurs mainly as nodular or concretionary aggregations in limestone and dolomite, and less frequently as layered deposits (banded chert). It may be an organic deposit (radiolarian chert), an inorganic precipitate (the primary deposit of colloidal silica), or as a siliceous replacement of pre-existing rocks. Flint is a variety of chert occurring as nodules in chalk and having a conchoidal fracture (Lapidus 1987:102).

CORE

A piece of stone which has been used as a source for flake production. Cores are thus generally characterised by negative flake scars (Morwood and L'Oste-Brown 1995:162).

CORTEX

The natural weathered surface of rock, not the result of human activity (McCarthy 1976:101).

CREST

Landform element standing above all or most points in the adjacent terrain. Usually smoothly convex (Speight 1990:13).

DEVONIAN

A time interval of the Palaeozoic Era, during which rocks of the Devonian System were formed (410 to 360 million years ago) (Lapidus 1987:158-159).

DISTAL

The opposite end of an artefact to the platform end. The blade of an edge-ground axe or the working edge of other implements form the distal end (McCarthy 1976:101).

DORSAL

The face of a flake that was exposed on the core before removal of the flake (Phagan 1976:39).

DORSAL RIDGE

A ridge occurring on the dorsal face of a flake at the junction between two flake scars (Hiscock 1984).

FACETED PLATFORM

A platform carrying a series of small scars and/or crushing on its surface (Hiscock 1988:86).

FEATHER TERMINATION

Is identified on the distal end of a flake which terminates in a sharp edge with a minimal margin. Feather terminations are an indicator of good knapping control (Crabtree 1972:64).

FLAKE

A piece of stone detached from a larger mass by the application of force and having a feather, hinge or step termination and a bulb of percussion. A platform may be present if the proximal end is unbroken (Crabtree 1972:64).

FLAKED PIECE

A chipped artefact with negative flake scars which cannot be classified as a flake, core or retouched flake (Hiscock 1988:64).

FLOODPLAIN

An alluvial plain characterised by frequently active erosion and aggradation by channelled or overbank stream flow (Speight 1990:51).

FOCAL PLATFORM

A platform having a small area such that when viewed from above, most of the remaining body of the flake can be seen. Focalised platforms are produced by striking close to the platform edge (Witter 1992:110).

GREYWACKE

Sedimentary rock. A very hard, dark grey or greenish-grey, coarse-grained sandstone characterised by angular particles and rock fragments embedded in a clayey matrix (Lapidus 1987:265).

HAMMERSTONE

Any stone showing signs of scarring, pounding, cratering or crushing but still retaining most of its cortex. Hammerstones were used for delivering percussive blows to artefacts, breaking and pounding nuts, seeds and bones, striking off and opening shellfish, and for shredding bark (McCarthy 1976:55).

HILL

Part of a landsystem of high relief with gently-inclined to precipitous slopes. Fixed, shallow erosional stream channels, close to very widely spaced, form a non-directional or convergent integrated tributary network (Speight 1990:51).

HILLSLOPE

A gently inclined to precipitous slope, commonly simple and maximal, eroded by sheet wash, creep, or water-aided mass movement (Speight 1990:31).

HINGE TERMINATION

Is identified on the distal end of a flake which terminates in a blunted or rounded right angled break. Hinge terminations occur when inadequate percussive force is applied and are thus an indicator of poor knapping control (Hiscock 1986b:49).

JASPER

A compact, microcrystalline variety of quartz. Its colours are variable, including white, grey, red, brown and black (Lapidus 1987:308).

LANDFORM ELEMENT

A topographic feature of 40 metres or more in maximum dimension which forms part of a larger unit, the landform pattern (Speight 1990:9).

LATERAL MARGINS

The sides of an artefact- between the proximal and distal ends (McCarthy 1976:101).

LENGTH

Maximum dimension of a core or flaked piece in any direction; maximum distance along the percussion axis of a flake from the platform to the distal margin (Witter 1986:2).

LITHOSOL

A shallow stony soil of low fertility, lacking in profile differentiation (Charman 1978).

METASEDIMENT

A metamorphosed sedimentary rock in which the original texture is still recognizable (Lapidus 1987:345).

MID-SLOPE

A slope landform element not adjacent below a crest or flat and not adjacent above a flat or depression (Speight 1990:11-34).

MULTI-PLATFORM CORE

A core with at least one negative scar running in a different direction to the remainder. Multi-directional scars indicate that the core has been rotated to get the most economical use of the raw material (Hiscock 1986a:49).

NEGATIVE FLAKE SCAR

Concave surface resulting from the removal of a flake (Phagan 1976:39).

OVERPASS TERMINATION

Is identified on the distal end of a flake whose fracture plane (ventral surface) curves markedly away from the core face (dorsal surface) and continues directly into the core, removing the base of the core and giving the flake a J shape in longitudinal cross section (Hiscock 1988:86).

PEBBLE

Stone worn and rounded by water and other natural forces (McCarthy 1976:101).

PLAIN

A large very gently-inclined or level element, of unspecified geomorphological agent or mode of activity (Speight 1990:32).

PLATFORM

The plane or surface against which force is applied in order to detach a flake from a core. The platform may be the natural surface of the stone, or cortex, it may be a surface produced by the prior removal of one or more flakes, or a surface produced by grinding or abrading (Phagan 1976:11).

PLATFORM PREPARATION

Accomplished when the knapper strikes or brushes the edge of the core platform and removes small flakes from the edge. This prevents the platform from shattering (Hiscock 1988:86).

PODZOLIC SOIL

A zonal soil with a surface of organic matter. Beneath this is an ashen-grey layer, then a zone in which iron and aluminium minerals have accumulated (Lapidus 1987:412).

QUARTZ

Crystalline silica having no cleavage but a conchoidal fracture (Lapidus 1987:429).

QUARTZITE

A metamorphic rock consisting mainly of quartz grains. Formed through the recrystallization of sandstone by thermal or regional metamorphism (Lapidus 1987:430).

QUATERNARY

The most recent period of geological time; a division of Cenozoic (Lapidus 1987:430).

REJUVENATION FLAKE

A flake removed to refurbish the working edge of an artefact by exposing a fresh edge (Morwood and L'Oste-Brown 1995:170).

RETOUCH

The alteration to the primary termination of a flake caused by deliberate secondary flaking in order to resharpen or modify the edge (Crabtree 1972:89).

RIDGE

A compound landform element comprising a narrow spine crest and its immediately adjoining slope with the spine length being greater than the width (Speight 1990:19).

SILTSTONE

A fine-grained sedimentary rock principally composed of silt-grade material. Intermediate between sandstone and shale, siltstone contains less clay than shale and lacks its fissility and fine laminations (Lapidus 1987:474).

SLOPEWASH

Earth material moved down a slope principally by the action of gravity, aided by non-channelled running water (Lapidus 1987:477).

SPUR

Landform element comprising a lower, subsidiary ridge leading down from a locally dominant ridge or crest (Packard 1992:100).

STONE ARTEFACT

Fragment of stone which generally possesses one or more of the following characteristics:

- Positive or negative ring crack
- Distinct positive or negative bulb of force
- Definite erillure scar in position beneath a platform
- Definite remnants of flake scars (ie dorsal scars and ridges)

These traits indicate the application of an external force to a core, and are characteristic of the spalls removed by humans using direct percussion. Stone artefacts that have none of the above may be identified as such if they possess ground facet/s characteristic of human industry (Hiscock 1984:128).

THICKNESS

The greatest dimension perpendicular to both the length and width of an artefact (Witter 1986:2).

UPPER SLOPE

A slope landform element adjacent below a crest or flat but not adjacent above a flat or depression (Speight 1990:11-34).

VALLEY FLAT

A small, gently inclined to level flat, aggraded or sometimes eroded by channelled or over-bank stream flow, typically enclosed by hillslopes (Speight 1990:34).

VOLCANIC ROCK

Very fine-grained or glassy igneous rock produced by volcanic action at or near the earth's surface, either extruded as lava or expelled explosively (Lapidus 1987:535).

WIDTH

The maximum distance between the lateral margins of an artefact, measured at right angles to the length (Witter 1986:2).

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