

# Appendix C

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## Archaeological Due Diligence Assessment



**Geolink**

# **Sportmans Creek New Bridge Preliminary Options Report**

**LGA: Clarence Valley**

Archaeological Due Diligence Assessment

**10 March 2014**




McCARDLE CULTURAL HERITAGE



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**Report No: J13039**

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## EXECUTIVE SUMMARY

McCardle Cultural Heritage Pty Ltd (MCH) has been commissioned by Geolink to prepare an Archaeological Due Diligence Assessment investigating the constraints and opportunities for the Sportsmans Creek new bridge at Lawrence, NSW. The findings of this investigation will facilitate an analysis of concept options and assist in the selection of a preferred option. The Sportsmans Creek Bridge is located on the southern approach to the village of Lawrence within the Clarence Valley Council (CVC) local government area. Lawrence is located 25 kilometres north of Grafton on the Lawrence Road (MR152) which is managed and maintained by CVC. The purpose of the Archaeological Due Diligence Assessment is to identify any archaeological constraints to the proposed Sportsmans Creek new bridge development and construction to ensure any cultural materials present are protected.

The investigation area is situated within the Clarence Alluvial Plains along Sportsmans Creek, which is dominated by alluvial processes and is characterised by alluvial plains, levees, abandoned channels and back swamps. This location is considered to be very well resourced and would have provided valuable and reliable resources that would allow sustained occupation of the local area. Due to waterlogging swamps were not favoured for actual camping (hunting and gathering occurs in the swamps), it was the elevated land above and overlooking swamps that were preferred by past Aboriginal societies, and this is typically where evidence of camping may be located. The specific investigation area has been cleared and primarily used for pastoral purposes (grazing), involving the wholesale clearance of native vegetation, the introduction of pasture grass, the construction of dams, housing, fencing, tracks, roads, developments and associated infrastructure (water, electricity, telephone) as well as flooding on account of the low lying alluvial flats along Sportsmans Creek.

A search of the OEH AHIMS register has shown that 6 known Aboriginal sites are currently recorded within five kilometres of the investigation area and include three TRE, two AFT and one Burial. Austral Archaeology (2002) undertook a Heritage Assessment and Statement of Heritage Impact (SoHI) for the preferred option of the replacement of Sportsmans Creek Bridge as part of a previous investigation by Clarence Valley Council. The survey did not identify any Aboriginal archaeological or cultural sites. However, two (2) Potential Archaeological Deposits (PADs), one on each side of the creek, were identified. PAD1 and PAD2 were both subject to past land use practices such as vegetation clearing and landscaping activities. It was argued that although this sort of activity is likely to have caused some disturbance to any sub surface archaeological remains, such remains, even though possibly disturbed, can still contribute information to the past Aboriginal occupation of the investigation area.

This assessment identified that the investigation area has been subject to significant impacts including clearing, excavation works for tracks, roads, the current bridge, a boat ramp, housing and infrastructure, and picnic areas. Although the alluvial plains may have provided resources for hunting and/or gathering, such landforms were not suitable for

occupation. Rather elevated landforms overlooking reliable water were favoured for past occupation. Given the investigation area is situated within the Sportsman's Creek alluvial plains and is highly disturbed, no sites or PADs were identified within the investigation area. No further archaeological works are required for the proposed development.

MCH recommends that;

- 1) The persons responsible for the management of on-site works will ensure that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974.



## GLOSSARY

**Aeolian deposits:** sediments transported by wind (sand dunes, loess).

**Alluvial:** sediment mass that is deposited from transport by channelled stream flow or over-bank flow.

**Aboriginal Cultural Heritage Values:** traditional values of Aboriginal people, handed down in spiritual beliefs, stories and community practices. May include local plant and animal species, places that are important and ways of showing respect for other people.

**Aboriginal Place:** locations that have been recognised by the Minister for Climate Change and the Environment (and gazetted under the *National Parks and Wildlife Act 1974*) as having special cultural significance to the Aboriginal community. An Aboriginal Place may or may not include archaeological materials.

**Aboriginal Site:** an Aboriginal site is the location of one or more Aboriginal archaeological objects, including flaked stone artefacts, midden shell, grinding grooves, archaeological deposits, scarred trees etc.

**Artefact:** any object that is physically modified by humans.

**Artefact scatter:** a collection of artefacts scattered across the surface of the ground. Also referred to as open camp sites.

**Assemblage:** a collection of artefacts associated by a particular place or time, assumed to be generated by a single group of people, and can comprise different artefact types.

**Axe:** a stone-headed axe usually having two ground surfaces that meet at a bevel.

**Backed artefact:** a stone tool where the margin of a flake is retouched at a steep angle and that margin is opposite a sharp edge.

**Background scatter:** a term used to describe low density scatter of isolated finds that are distributed across the landscape without any obvious focal point.

**B.C:** abbreviation for the term Before Christ. In academic, historical and archaeological professions, this term is now generally replaced by Before Common Era (B.C.E).

**Biface:** a stone artefact flaked on both faces.

**Bipolar flake:** stone artefacts produced by striking into an anvil with a hammer stone. These flakes usually display crushing at either end.

**Blade:** a flake that is at least twice as long as it is wide.

**Bondi point:** a small asymmetrical backed artefact with a point at one end and backing retouch.

**B.P:** Before Present, used in age determination instead of B.C or B.C.E. Present is academically defined as the year 1950 (the year the term was invented).

**Bulb of percussion:** a small, rounded protrusion on a flake resulting from the blow that separated the flake from its core or other flake.

**Bulbar depression:** a depression left on the core (where a flake's bulb of percussion was attached) when a blade or flake was struck off.

**Calcined bone:** burned bone reduced to white or blue mineral constituents.

**Ceremonial Sites:** Included in the OEH AHIMS database are sites which were associated with the spiritual beliefs and activities of Aboriginal people. They may be natural places in the landscape or places where structures were made as part of particular ceremonies. Structures include bora rings, stone arrangements etc.

**Conjoin:** a physical link between artefacts broken.

**Contact site:** a site that displays interaction between early colonists and Aboriginal Australians.

**Core:** a chunk of stone from which flakes are removed and will have one or more negative flake scars but no positive flake scars. The core itself can be shaped into a tool or used as a source of flakes to be formed into tools.

**Cortex:** the rough outer weathered surface of a rock, usually chemically altered and removed during knapping.

**Cultural deposit:** sediments and materials laid down by, or heavily modified by human activity.

**Cultural Heritage Sensitivity:** This term is used to denote not just the value of a place in the landscape to Aboriginal people, but also the vulnerability of the value. For instance, places with important spiritual values may be very sensitive because the rocks, pools or trees are easily damaged by the activities of others, or only a very few examples remain.

**Debitage:** small pieces of stone debris that break off during the manufacturing of stone tools. These are usually considered waste and are the by product of production (also referred to as flake piece).

**Distal:** the terminating end of a flake opposite the bulb.

**Edge damage:** the removal of small flakes, or crushing, from the edge of an artefact.

**Elders:** Older Aboriginal people in the local community for whom there is great respect because of their knowledge, dignity or communication skills. These people are not necessarily the descendants of traditional Aboriginal people from the area.

**Elouera:** a type of backed blade, triangular sectioned and resembling an orange segment in shape.

**Exposure:** an area of land surface where the ground surface is visible, usually as a result of thinner vegetation cover, erosion or human caused disturbances. In archaeological surveys, the percentage of ground surface exposed is recorded and the used to calculate effective survey coverage.

**Flake:** any piece of stone struck off a core and has a number of characteristics including ring cracks showing where the hammer hit the core and a bulb of percussion. May be used as a tool with no further working, may be retouched or serve as a platform for further reduction.

**Flaked piece/waste flake:** an unmodified and unused flake, usually the by product of tool manufacture or core preparation (also referred to as debitage).

**Fluvial deposit:** sediments laid down by running water.

**Formation processes:** human caused (land uses etc) or natural processes (geological, animal, plant growth etc) by which an archaeological site is modified during or after occupation and abandonment. These processes have a large effect on the provenience of artefacts or features.

**Grinding Grooves:** Aboriginal people made a range of edge ground implements such as 'axes' and 'hatchets'. The sharp edge of these tools was maintained by grinding it on sandstone outcrops, most often in stream beds where pools of water were available to wet the grindstone. Spear shafts were also sometimes shaped by grinding. The grinding sites can be identified by elongated grooves in the sandstone surface in sets of 2 to more than 100. Some portable grindstones are also reported from Aboriginal sites.

**Grinding stone:** an abrasive stone used to abrade another artefact or to process food.

**Ground edge hatchet:** a stone axe that is oval or rounded in shape, has edges formed by grinding and sharpening, and were hafted to wooden handles using resin, wax or a combination of materials.

**Hafting:** the process of attaching a stone artefact onto a handle or spear.

**Hammer stone:** a stone that has been used to strike a core to remove a flake, often causing pitting or other wear on the stone's surface.

**Harm:** is defined as an act that may destroy, deface or damage an Aboriginal object or place. In relation to an object, this means the movement or removal of an object from the land in which it has been situated

**Holocene:** the post-glacial period, beginning about 10,000 B.P.

**In situ:** archaeological items are said to be "in situ" when they are found in the location where they were last deposited.

**Isolated find:** a single artefact not located with any other.

**Knapping:** the process of striking rocks causing them to fracture.

**Midden:** a type of archaeological site that is dominated by shell deposits that may have been sourced by Aboriginal people from fresh water, estuarine or open coastline habitats. The long-term disposal of refuse can result in stratified deposits, which are useful for relative dating.

**Pleistocene:** the latest major geological epoch, colloquially known as the "Ice Age" due to the multiple expansion and retreat of glaciers. Ca. 3,000, 000-10,000 years B.P.

**Post-depositional:** after deposition.

**Retouched flake:** a flake that has been flaked again in a manner that modified the edge for the purpose of resharpening that edge.

**Scarred tree:** a tree that bears a scar or scars which are wounds formed from the deliberate removal of bark or wood by Aboriginal people and are usually an indicator of an activity area.

**Scraper:** stone tool made on a flake or core with steep retouch along one or more edges.

**Site:** an area where archaeological evidence is observed.

**Stone arrangement:** an arrangement of stones into a shape or pattern and often used for ceremonial purposes or place markers.

**Spiritual Significance:** the importance of a place in the landscape that is valued by Aboriginal people because it is part of their spiritual culture. Examples include places associated with totem species or places that are the subject of traditional cultural stories.

**Stratified Archaeological Deposits:** Aboriginal archaeological objects may be observed in soil deposits and within rock shelters or caves. Where layers can be detected within the soil or sediments, which are attributable to separate depositional events in the past, the deposit is said to be stratified. The integrity of sediments and soils are usually affected by

200 years of European settlement and activities such as land clearing, cultivation and construction of industrial, commercial and residential developments.

**Surface scatter:** archaeological materials found distributed over the ground surface.

**Taphonomy:** the study of processes which have affected organic materials such as bone after death; it also involves the microscopic analysis of tooth-marks or cut marks to assess the effects of butchery or scavenging activities.

**Test excavation:** excavation of small sections (a sample) of an area to determine the archaeological remains and significance.

**Traditional Aboriginal Owners:** Aboriginal people who are listed in the Register of Aboriginal owners pursuant to Division 3 of the *Aboriginal Land Register Act (1983)*. The Registrar must give priority to registering Aboriginal people for lands listed in Schedule 14 of the *National Parks and Wildlife Act 1974* or land subject to a claim under 36A of the *Aboriginal Land Rights Act 1983*.

**Traditional Knowledge:** Information about the roles, responsibilities and practices set out in the cultural beliefs of the Aboriginal community. Only certain individuals have traditional knowledge and different aspects of traditional knowledge may be known by different people, e.g. information about men's initiation sites and practices, women's sites, special pathways, proper responsibilities of people fishing or gathering food for the community, ways of sharing and looking after others, etc.

**Typology:** the systematic organization of artefacts into types on the basis of shared attributes.

**Use wear:** the wear displayed on an artefact as a result of use.

**Weathering:** the natural chemical or physical alteration of an object or deposit through time.

## ACRONYMS

|              |  |
|--------------|--|
| <b>ACHMP</b> | Aboriginal Cultural Heritage Management Plan   |
| <b>AHIMS</b> | Aboriginal Heritage Information Management System. Data base of recorded sites across NSW managed by OEH |
| <b>OEH</b>   | Office of Environment and Heritage   |

## OEH AHIMS SITE ACRONYMS

|            |   |
|------------|---|
| <b>ACD</b> | Aboriginal ceremonial and dreaming  |
| <b>AFT</b> | Artefact (stone, bone, shell, glass, ceramic and metal)   |
| <b>ARG</b> | Aboriginal resource and gathering   |
| <b>ART</b> | Art (pigment or engraving)  |
| <b>BOM</b> | Non-human bone and organic material   |
| <b>BUR</b> | Burial  |
| <b>CFT</b> | Conflict site   |
| <b>CMR</b> | ceremonial ring (stone or earth)  |
| <b>ETM</b> | Earth mound   |
| <b>FSH</b> | Fish trap   |
| <b>GDG</b> | Grinding groove   |
| <b>HAB</b> | Habitation structure  |
| <b>HTH</b> | Hearth  |
| <b>OCQ</b> | Ochre quarry  |
| <b>PAD</b> | Potential archaeological Deposit. Used to define an area of the landscape that is believed to contain subsurface archaeological deposits. |
| <b>SHL</b> | Shell   |
| <b>STA</b> | Stone arrangement   |
| <b>STQ</b> | stone quarry  |
| <b>TRE</b> | Modified tree (carved or scarred)   |
| <b>WTR</b> | Water hole  |

## 1 INTRODUCTION

### 1.1 INTRODUCTION

Roads and Maritime Services (RMS) is responsible for managing road related transport infrastructure and providing safe and efficient access to the road network for the people of NSW to a consistent standard. Bridges and connecting roadways are key links in the transport network that allow safe, effective and reliable access for the movement of people and goods over streams, roads, railways and other obstacles, benefiting communities and allowing the growth of the National and State economies. The Roads and Maritime is proposing to demolish an existing single lane timber truss bridge and construct a new two lane concrete bridge over Sportsmans Creek at Lawrence, approximately 30 kilometres east of Grafton, NSW. The project is identified in the RTA's Timber Bridge Management Strategy.

McCardle Cultural Heritage Pty Ltd (MCH) has been commissioned by Geolink to prepare an Archaeological Due Diligence Assessment for the new Sportsmans Creek Bridge at Lawrence, NSW. The assessment has been undertaken to meet the NSW Office of Environment and Heritage (OEH) Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales, the Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHI) and the Brief.

### 1.2 PROPONENT DETAILS

Roads and Maritime Services

### 1.3 THE INVESTIGATION AREA AND HOW IT IS DEFINED

The Sportsmans Creek Bridge is located on the southern approach to the village of Lawrence within the Clarence Valley Council (CVC) local government area. Lawrence is located 25 kilometres north of Grafton on the Lawrence Road (MR152) which is managed and maintained by CVC. The location and extent of the investigation area is indicated in *Figures 1.1 to 1.3* that include the area in which the Project Services are to be performed.

### 1.4 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The existing bridge over Sportsmans Creek was constructed in 1910 and opened in 1911. It is 91.7 metres in length and consists of three (3) timber beam approach spans and two (2) timber Dare Truss spans. The bridge is a wide single lane structure with a carriageway of 5.5 metres. Whilst not being listed on the State Heritage Register, Sportsmans Creek Bridge has a moderate state significance rating and is listed on the s170 Heritage and Conservation Register. As outlined in the Roads and Maritime Timber Truss Bridge Conservation Strategy (July 2012), there are six other Dare Truss bridges that are considered to be of higher levels of Significance and are to be retained in perpetuity by Roads and Maritime, including the nearby Briner Bridge in Tucabia.

The existing bridge has poor sight distance, poor alignment, no pedestrian access, and does not provide for future increases in traffic volume. The bridge is situated on a



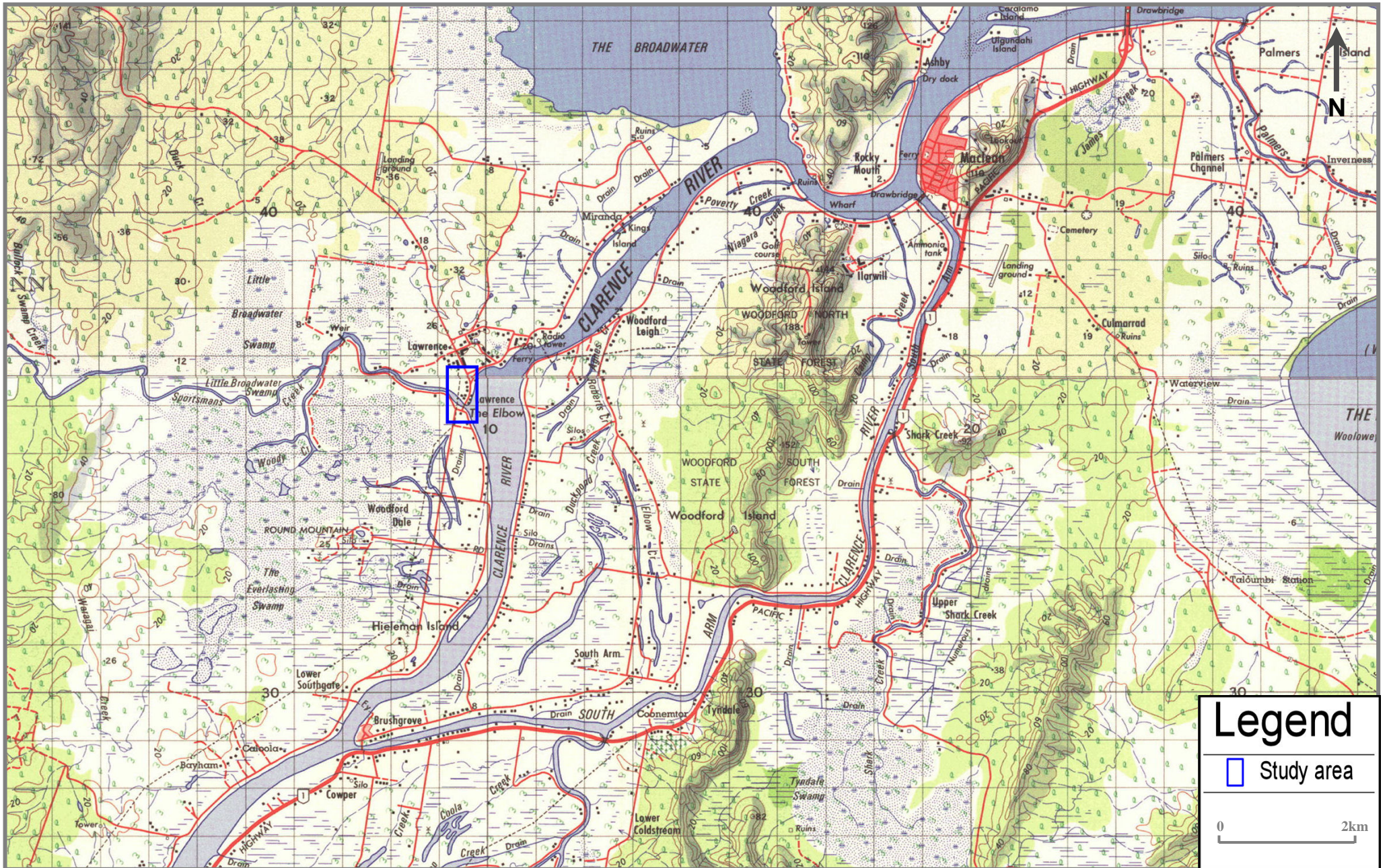


Figure 1.1 Regional location of the study area

Source: 1:100 000 Topo Series: Bare Point & Woodburn



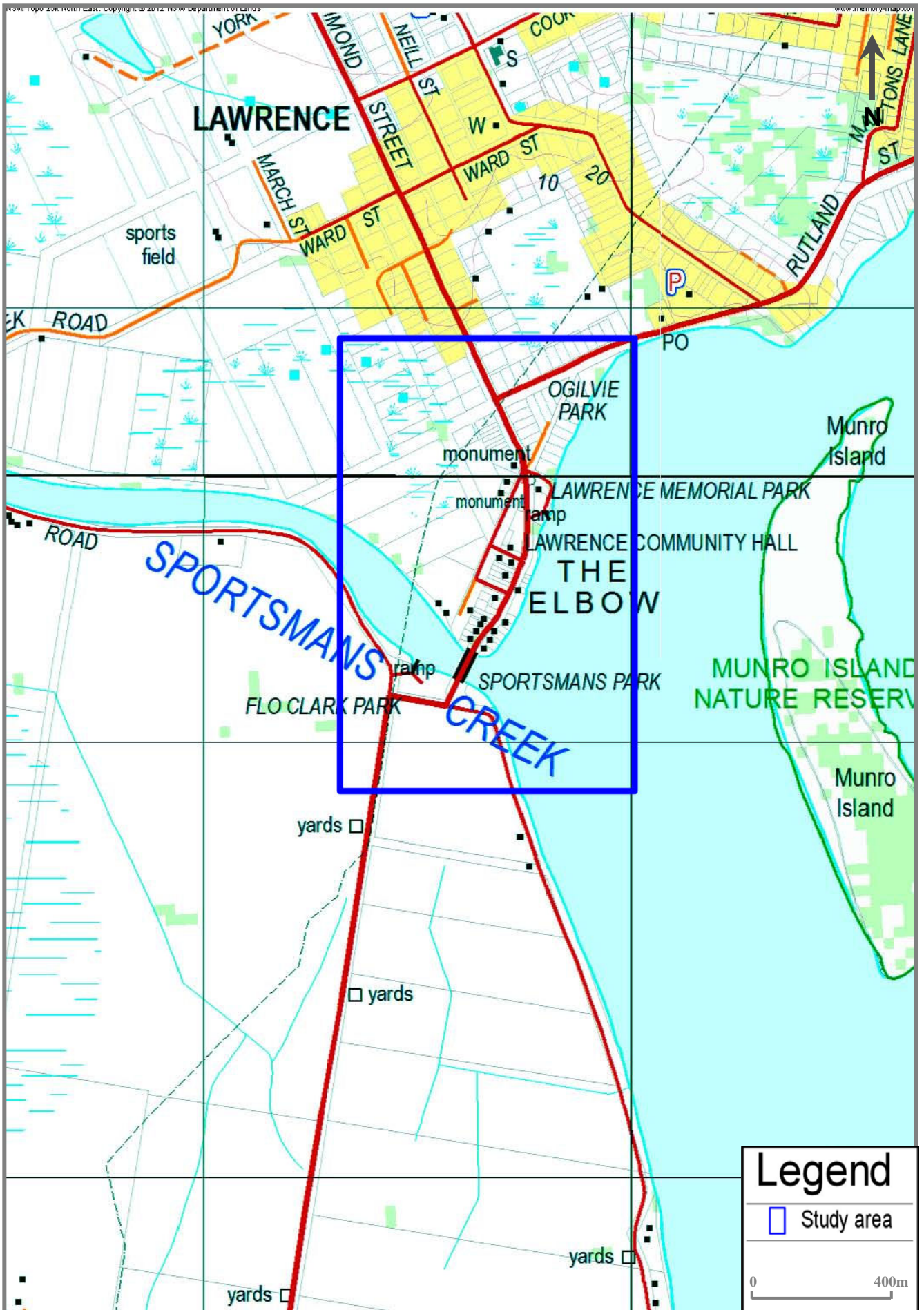


Figure 1.2 Local location of the study area

Source: 1:25 000 Topo Series: Memory Map



MCH:



Figure 1.3 Aerial location of the study area

Regional road and is an important link for the transport industry, particularly the cane and cattle farming industries that exist in the immediate area. Significant seasonal cane haulage activities rely on this bridge for access. The existing bridge presents significant transport limitations both at present and in the future due to its geometry, design limitations and the ability to overcome these deficiencies whilst maintaining its heritage integrity. The bridge was identified for restoration or replacement under the NSW Government's Country Timber Bridge Program. In 2000 the former Minister for Local Government and member for Clarence, the Hon Harry Woods MLA, announced its replacement with a new structure nearby following feasibility studies. In 2003 the former Minister for Roads, the Hon Carl Scully MP, reversed the previous announcement. This decision was based on the results of more detailed investigations and heritage considerations. The announcement advised that Roads and Maritime would develop a project to widen and rehabilitate the existing timber bridge in light of its heritage significance. The latter announcement attracted ongoing community and Council representations.

Roads and Maritime has undertaken a state-wide approach to consider a strategy for the management of its remaining timber truss bridge stock. As part of this study, the Sportsman's Creek Bridge is proposed to be demolished and replaced with a modern concrete structure. The RMS Timber Truss Heritage Conservation Strategy has now been endorsed by NSW Heritage Office. This project will replace the existing crossing, including demolition of the existing timber bridge. As part of this project the new bridge structure must be handed over to CVC for their ongoing ownership, control, maintenance and inspection. The project will follow two main works including the construction of the new bridge and the demolition of the existing bridge.

Any future planning will have regard to the requirements and provision of the National Parks and Wildlife Act 1974.

## 1.5 PURPOSE OF THE ASSESSMENT

The purpose of the assessment is to assess any archaeological constraints to support the proposed new bridge construction and removal of the old bridge, and to provide opportunities and options to ensure any cultural materials present are protected.

## 1.6 OBJECTIVE OF THE ASSESSMENT

The objective of the assessment is to identify areas of indigenous cultural heritage value, to determine possible impacts on any indigenous cultural heritage identified (including potential subsurface evidence) and to develop management recommendations where appropriate. The assessment employs a regional approach, taking into consideration both the landscape of the study area (landforms, water resources, soils, geology etc) and the regional archaeological patterning identified by past studies.

## 1.7 PROJECT BRIEF/SCOPE OF WORK

The following tasks were carried out:



- a review of relevant statutory registers and inventories for indigenous cultural heritage including the NSW Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS) for known archaeological sites, the State Heritage Register, the Australian Heritage Database (includes data from the World Heritage List UNESCO, National Heritage List, Commonwealth Heritage List, Register of the National Estate) and the Clarence Valley Environmental Plan;
- a review of local environmental information (topographic, geological, soil, geomorphological and vegetation descriptions) to determine the likelihood of archaeological sites and specific site types, prior and existing land uses and site disturbance that may affect site integrity;
- a review of previous cultural heritage investigations to determine the extent of archaeological investigations in the area and any archaeological patterns;
- the development of a predictive archaeological statement based on the data searches and literature review;
- identification of human and natural impacts in relation to the known and any new archaeological sites of the study area;
- undertake a site inspection; and
- the development of mitigation and conservation measures.

## 1.8 PROJECT LEGISLATIVE FRAMEWORK

The EP&A Act establishes the statutory framework for planning and environmental assessment in New South Wales. The implementation of the EP&A Act is the responsibility of the Minister for Planning, statutory authorities and local councils. The EP&A Act contains three parts which impose requirements for planning approval:

- Part 3 of the EP&A Act relates to the preparation and making of Environmental Planning Instruments (EPIs), State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs).
- Part 3A of the EP&A Act (now repealed) made provisions for 'major infrastructure and other projects' that required approval from the Minister for Planning and Infrastructure. Transitional provisions for existing Part 3A projects are still being assessed. Part 3A as it was immediately before it was repealed will continue to apply to projects approved under Part 3A.
- Part 4 of the EP&A Act establishes the framework for assessing development under an EPI. The consent authority for Part 4 development is generally the local council, however the consent authority may also be the Minister, the Planning Assessment Commission or a joint regional planning panel depending upon the nature of the development.
- Part 4, Division 4.1 of the EP&A Act establishes the assessment pathway for State Significant Development (SSD) declared by the State Environmental Planning Policy (State and Regional Development) 2011 (NSW). Once a development is declared as SSD, the Director-General will issue Director-General Requirements (DGRs) outlining what issues must be considered in the EIS.
- Part 5 of the EP&A Act provides for the control of 'activities' that do not require development consent and are undertaken or approved by a determining authority.

Development under Part 5 that is likely to significantly affect the environment is required to have an EIS prepared for the proposed activity.

- Part 5.1 of the EP&A Act establishes the assessment pathways for State significant infrastructure (SSI). Development applications made for SSI can only be approved by the Minister. Once a development is declared as SSI, the Director-General will issue DGRs outlining what issues must be addressed in the EIS.

The applicable approval process is determined by reference to the relevant environmental planning instruments and other controls, LEPs and State Environmental Planning Policies (SEPPs). Pursuant to section 36 of the EP&A Act there is a general presumption that a SEPP prevails over a LEP in the event of an inconsistency.

This project falls under Part 5.

## 1.9 STATUTORY CONTROLS

Land managers are required to consider the effects of their activities or proposed development on the environment under several pieces of legislation. Indigenous cultural heritage in NSW is protected and managed under both Commonwealth and State legislation. The appropriate legislation is summarised below.

- *New South Wales National Parks and Wildlife Act 1974, Amendment 2010*

The National Parks and Wildlife Act (1974), Amended 2010, administered by the OEH is the primary legislation for the protection of Aboriginal cultural heritage in New South Wales. Part 6 of the Act provides protection for Aboriginal objects and declared Aboriginal places through the establishment of offences of 'harm' to these objects and places. Under the Act, it is an offence to knowingly harm or desecrate an Aboriginal object or Aboriginal place. If harm to an object or place is anticipated, an Aboriginal Heritage Impact Permit (AHIP) must be applied for and OEH may issue an AHIP under the s90 of the Act.

- *Environmental Planning and Assessment Act 1979, (EP&A Act, NSW)*

Consideration of potential impacts of a development on Aboriginal heritage is a key component of the environmental impact assessment process under the EP&A Act. The standards of the OEH Due Diligence Code may be used or adapted by proponents to inform the initial assessment of the environmental impacts of an activity on Aboriginal heritage. An environmental assessment that meets all the requirements of the Due Diligence Code will satisfy the Due Diligence test.

- *The Heritage Act 1977 (NSW)*

The Heritage Act 1977 protects the natural and cultural history of NSW with emphasis on non-indigenous cultural heritage through protection provisions, and the establishment of a Heritage Council. While Aboriginal heritage sites and objects are protected primarily by the NPW Act 1974, if an Aboriginal site, object or place is of great significance, it can be protected by a heritage order issued by the Minister on the advice of the Heritage Council.

- *The Aboriginal and Torres Strait Islander Heritage Protection Act 1984, Amendment 1987 (Commonwealth)*

The Aboriginal and Torres Strait Islander Heritage Protection Act 1984 protects areas and/or objects which are of significance to Aboriginal people and which are under threat of destruction. A significant area or object is defined as one that is of particular importance to Aboriginal people according to Aboriginal tradition. The Act can, in certain circumstances override state and territory provisions, or it can be implemented in circumstances where state or territory provisions are lacking or are not enforced. The Act must be invoked by or on behalf of an Aboriginal or Torres Strait Islander or organisation.

- *The Australian Heritage Commission Act 1975* (Commonwealth)

The Australian Heritage Commission Act 1975 established the Australian Heritage Commission. The Australian Heritage commission assesses places to be included in the National Estate, and maintains a register of these places which are significant in terms of their association with particular community or social groups for social, cultural or spiritual reasons. The Act does not include specific protective clauses.

## 1.10 QUALIFICATIONS OF THE INVESTIGATOR

Penny McCardle is the Principal Archaeologist & Forensic Anthropologist at MCH. Penny has 10 years' experience in Indigenous archaeological assessments, excavation, research, reporting, analysis and consultation, as well as six years in skeletal identification, biological profiling and skeletal trauma identification. Qualifications include:

- BA (Archaeology and Palaeoanthropology, University of New England 1999
- Hons (Archaeology and Palaeoanthropology): Physical Anthropology), University of New England 2001
- Forensic Anthropology Course, University of New England 2003
- Armed Forces Institute of Pathology Forensic Anthropology Course, Ashburn, VA 2008
- Analysis of Bone trauma and Pseudo-Trauma in Suspected Violent Death Course, Erie College, Pennsylvania, 2009
- Currently undertaking a PhD, University of Newcastle, 2014

## 1.11 REPORT STRUCTURE

The report includes Chapter 1 which outlines the project, Chapter 2 presents the environmental context, Chapter 3 presents ethno historic context, Chapter 4 provides the archaeological background, Chapter 5 provides the results of the fieldwork, analysis and discussion; Chapter 6 presents the development impact assessment, Chapter 7 presents the mitigation strategies and Chapter 8 presents the management recommendations.

## 2 LANDSCAPE AND ENVIRONMENTAL CONTEXT

### 2.1 INTRODUCTION

The nature and distribution of Aboriginal cultural materials in a landscape are strongly influenced by environmental factors such as topography, geology, landforms, climate, geomorphology, hydrology and the associated soils and vegetation (Hughes and Sullivan 1984). These factors influence the availability of plants, animals, water, raw materials, the location of suitable camping places, ceremonial grounds, burials, and suitable surfaces for the application of rock art. For this reason, the environmental factors listed above are used in constructing predictive models of Aboriginal site locations.

Environmental factors also affect the degree to which cultural materials survive in the face of both natural and human influences, as well as the likelihood of sites being detected during ground surface survey. Site detection is dependent on a number of environmental factors including surface visibility (which is determined by the nature and extent of ground cover including grass and leaf litter etc) and the survival of the original land surface and associated cultural materials (by flood alluvium and slope wash materials). It is also dependant on the exposure of the original landscape and associated cultural materials (by water, sheet and gully erosion, ploughing, vehicle tracks etc), (Hughes and Sullivan 1984). Combined, these processes and activities are used in determining the likelihood of both surface and subsurface cultural materials surviving and being detected.

It is therefore necessary to have an understanding of the environmental factors, processes and activities which affect site location, preservation, detection during surface survey, and the likelihood of in situ subsurface cultural materials being present. The environmental factors, processes and disturbances of the surrounding environment and specific investigation area are discussed below.

### 2.2 GEOMORPHOLOGY

At 22,700 square kilometres (DLWC 1998) the Clarence River is both the largest coastal river catchment in NSW, as well as the largest river in terms of flow (Soros-Longworth and McKenzie 1980, DLWC 1998). A rise in sea level from approximately 100 meters below current levels stabilised approximately 6,500 years ago. This process initiated a period of coastal estuary infilling with estuarine muds, sands and silts, resulting in the broad floodplain of approximately 2,620 square kilometres (DLWC 1998) which now occurs downstream from Grafton.

In general the floodplain ground surface slopes away from high natural levees of up to 7 metres AHD near Grafton, through to often swampy back plains at or near sea level. Large areas of low elevation back swamp occur at Glenugie Creek, Coldstream River, Shark Creek, Everlasting Swamp and the Broadwater.

At Grafton the river turns generally to the north-east, and is joined by smaller coastal streams from the south-eastern side of the river (Glenugie Creek, Coldstream River and

Shark Creek), and from the north-western side of the river (Sportsmans, Broadwater and Mangrove Creeks). The broadest section of the floodplain above Maclean is located around Ulmarra.

The Clarence River and its floodplain can be divided into sections above and below Maclean - the bedrock constriction near Maclean confines overbank flows, and as a result, upstream flood levels and average floodplain surface elevations tend to be higher than below the constriction.

Downstream of Maclean the river maintains a main channel, but bifurcates between a number of low elevation deltaic islands, including Harwood, Chatsworth, Goodwood, Palmers and Micalo Islands. The estuarine reaches contain complex patterns of sedimentation, with fluvial deltaic deposition over estuarine muds of coastal lagoons. With progressive infilling by alluvial sediments, the estuarine lagoons become freshwater swamps and then alluvial back plains. For example, sedimentation at Wooloweyah Lagoon and the Broadwater will continue until a freshwater back swamp is formed, similar to swamps on the Coldstream River, and Tyndale Swamp on Shark Creek.

Milford (in prep) and Morand (in prep) have discussed the Quaternary fluvial sediments and barrier sands of the Lower Clarence. The most recent maps which accurately depict the extent of Quaternary sedimentation on the NSW coast are the 1:25 000 ASS Risk Maps (Naylor et al. 1995). Relevant maps for the Lower Clarence catchment and associated areas are Grafton (Milford 1997a), Copmanhurst (Milford 1997b), Tucabia (Milford 1997c), Tyndale (Milford 1997d), Yamba (Morand 1997a), and Maclean (Morand 1997b). Further sources of geomorphic information are listed in MHL (1995b).

The name 'Everlasting Swamp' may be attributed to the larger geomorphic basin, which includes a number of intermittent wetlands including Grasshopper Swamp, the Horseshoe, Imesons Swamp, and Little Broadwater, as well as the semi-permanent wetland of Teal Lagoon. Sportsmans Creek drains through the swamp, and Woody and Reedy Creeks form smaller distributary systems from Sportsmans Creek. Originally the swamp extended over 20 km<sup>2</sup> of tidal and intermittent wetlands (CRCC 1998), although following drainage, the only semi-permanent wetland is now Teal Lagoon. The lowest-lying areas of the swamp are <0.3 m AHD, with some small areas below mean sea level (Soros-Longworth and McKenzie 1980).

The swamp is bordered by bedrock hills to the north, west and south, and river levees up to 7.5 metres AHD (but typically 3 - 5 m) to the east. A number of prior channels are incised into the levees. The base of these channels is commonly near 1 metre AHD. A number of studies have drawn attention to the conservation values of the swamp, although many of those values are now at least temporarily compromised. Goodrick (1970) recommended the preservation of 2,880 ha of seasonal freshwater swamps in the Everlasting Swamp- Sportsmans Creek-Little Broadwater Swamp area, primarily on the basis of bird habitat. Soros- Longworth and McKenzie (1980) also recommended that these areas be considered for wetland preservation, and the NPWS has also proposed the preservation of the swamp (Soros-Longworth and McKenzie 1980). Sportsmans Creek is



recognised as a fish and crustacean nursery (Soros-Longworth and McKenzie 1980). Everlasting Swamp is one of the three largest freshwater wetland areas on the lower Clarence (Pressey 1989), and has been listed in the Directory of Important Wetlands in Australia (ANCA 1996). The vegetation of the swamp was assessed by Puplijovski (1998). Everlasting Swamp itself, and the two wetlands to the north of the creek have been included on the Register of the National Estate.

The dominant plant species in the central swamp is *Eleocharis equisetina*, with *Casuarina glauca* the dominant fringing tree species, with occurrences of *Melaleuca linariifolia*. Other species present include *Paspalum distichum*, *Phragmites Australia*, *Pseudoraphis spinescens* and *Cyperus polystachos*. Everlasting Swamp is the largest breeding area for black swan on the Clarence floodplain and there are frequent records of broilgas. Species and numbers of avifauna are provided in Environment Australia (1999). The nearby Broadwater contains the largest single area of the seagrass *Ruppia* sp. in the state (Environment Australia 1999).

Everlasting Swamp has been mapped as Everlasting soil landscape by Morand (in prep). Detailed information on the landscape and topography, vegetation, geology and regolith, climate and hydrology, soils, land use/land degradation and limitations is provided in that document. Detailed information is also available in Smith (1998b) and Beveridge (1998). The Everlasting Swamp ASS Priority Area totals approximately 2 857 ha.

## 2.3 TOPOGRAPHY

The topographical context is important to identify potential factors relating to past Aboriginal land use patterns. The specific investigation area is situated on alluvial plains along Sportsman's Creek which is dominated by alluvial processes. Such locations provide an abundance of resources for past hunting and/or gathering, however, they were not suitable for occupation due to flooding.

## 2.4 GEOLOGY

The nature of the surrounding and local geology, along with the availability and distribution of stone materials has a number of archaeological and Aboriginal land use implications. The implications for past Aboriginal land use mainly relate to the location of stone resources or raw materials and their procurement for manufacturing and modification for stone tools. Evidence of stone extraction and manufacture can be predicted to be concentrated in the areas of stone availability. However, stone can be transported for manufacture and/or trading across the region. The investigation area is situated on Quandary alluvium, gravel, sand, silt and clay. Areas also include riverine deposits (Macleay Geological Map 1970). Materials most dominant in stone tool manufacture throughout the region are quartz, quartzite, jasper, silcrete and chert.

## 2.5 SOILS

The nature of the surrounding soil landscape also has implications for Aboriginal land use and site preservation, mainly relating to supporting vegetation and the preservation of

organic materials and burials. The deposit of alluvial and aeolian sediments and colluvium movement of fine sediments (including artefacts) results in the movement and burying of archaeological materials. The increased movement of soils by this erosion is likely to impact upon cultural materials through the post-depositional movement of materials, specifically small portable materials such as stone tools, contained within the soil profiles.

The investigation area is situated within the Clarence Alluvial Plains which is dominated by alluvial processes and includes alluvial plains, levees, abandoned channels and back swamps. Soil landscape mapping and descriptions are only available for the northern side of Sportsmans Creek. The soil landforms for the southern side of Sportsmans Creek are unknown.

The northern portion of the investigation area is situated on the Cowper Soil Landscape. Within this landscape are the *disturbed* and *undisturbed* forms. The north-western half of the investigation area is situated within the *Undisturbed* Cowper soil landscape that is alluvial in nature and includes major levees lining the main channels of the Clarence River and associated tributaries. Slopes are 0-6%, relief 1-5 metres and elevation is 2-6 metres. Soils are deep (>200 cm) and include brown fine sandy clay loam (A horizon) with a diffuse boundary to brown light fine sandy clay loam (B horizon) on flat/crests. On flats the soils include dark brown light clay with a sharp boundary to dark brown light-medium clay, a diffuse boundary to dark brown medium clay, and a gradual boundary to brown light-medium clay. This overlays the D horizons (Morand 2001: 114-116). Given the low levels of recorded disturbed soils in the north-western half of the investigation area, cultural materials may be present.

The north eastern half of the investigation area is situated in the *disturbed* Cowper Soil Landscape. This landscape includes ranges from level plains to undulating terrain that has been disturbed by human activity to a depth of at least 100 centimetres, with the original soil being removed, greatly disturbed, or buried. Landfill includes soil, rock, and building and waste material. The original vegetation in this area has been completely removed (Morand 2001: 195-196). Given the highly disturbed nature of the soils in the north-eastern half of the investigation area, cultural materials that may have been present would have been disturbed or destroyed by such land uses.

## 2.6 CLIMATE

Climatic conditions would also have played a part in the occupation of an area, as well as impacting upon the soils, vegetation and associated cultural materials. The region has a warm temperate climate with a pronounced summer 'wet' season and dryer winters and springs. Rainfall is high and variable with the mean annual rainfall being 1461mm, and February and March being the wettest period. August to September are the driest months. Temperatures are generally consistent with mean annual maximums of about 25°C, and mean annual minimums of about 14°C (Morand 2001: 6).

## 2.7 WATERWAYS

One of the major environmental factors influencing human behaviour is water as it is essential for survival and as such people will not travel far from reliable water sources. In those situations where people did travel far from reliable water, this indicates a different behaviour such as travelling to obtain rare or prized resources, and/or trade. Proximity to water not only influences the number of sites likely to be found but also artefact densities. The highest number of sites and the highest density are usually found in close proximity to water and usually on an elevated landform. This assertion is undisputedly supported by the regional archaeological investigations carried out in the region where by such patterns are typically within 50 metres of a reliable water source.

The Hydrology is dominated by the Clarence River catchment to the south and the Richmond River catchment to the north. The Clarence River is the largest coastal river in NSW in terms of annual flows. The Clarence catchment does not have any major dams or regulating infrastructure, except for weirs, floodgates and off-river storages. The Richmond River is also predominantly unregulated with only a small regulated section below the 11,000 ML capacity Toonumbar Dam situated upstream of Casino. Both river systems have extensive floodplains which cover over 260,000 ha (>50%) of the Clarence Lowlands. Periods of heavy rainfall often result in the many wetland depressions on the Clarence and Richmond floodplain becoming inundated, particularly during summer months. However the impact of drainage has reduced the extent and duration of inundation. Major flood events that inundate significant areas of the floodplain are less regular.

The main types of water sources include permanent (rivers and soaks), semi-permanent (large streams, swamps and billabongs), ephemeral (small stream and creeks) and underground (artesian). Stream order assessment is one way of determining the reliability of streams as a water source. Stream order is determined by applying the Strahler method to 1:25 000 topographic maps. Based on the climatic analysis, the investigation area will typically experience comparatively reliable rainfalls under normal conditions and thus it is assumed that any streams above a third order classification will constitute a relatively permanent water source.

The Strahler method dictates that upper tributaries do not exhibit flow permanence and are defined as first order streams. When two first order streams meet they form a second order stream. Where two-second order streams converge, a third order stream is formed and so on. When a stream of lower order joins a stream of higher order, the downstream section of the stream will retain the order of the higher order upstream section (Anon 2003; Wheeling Jesuit University 2002).

The investigation area is situated along Sportsman's Creek (4<sup>th</sup> order) and its junction with the Clarence River (6<sup>th</sup> order) and swamp lands in the northern portion of the investigation area. This location is considered to be very well resourced and would have provided valuable and reliable resources that would allow sustained occupation of the local area. Due to water logging, alluvial plains (such as the specific study area) and swamps were not favoured for actual camping (hunting and gathering occurs in those

areas), it was the elevated land above and overlooking alluvial plains and swamps that were preferred by past Aboriginal societies and this is typically where evidence of camping may be located.

When assessing the relationship between sites and water sources it must be noted that the Australian continent has undergone significant environmental changes during the past 60,000 years that people have lived here, and that Pleistocene sites (older than 10,000 years) would have been located in relation to Pleistocene water sources that may not exist today. Stone tool type will assist with the age of sites (Pleistocene or Holocene).

## 2.8 FLORA AND FAUNA

The availability of flora and associated water sources affect fauna resources, all of which are primary factors influencing patterns of past Aboriginal land use and occupation. The assessment of flora has two factors that assist in an assessment. The first is a guide to the range of plant resources used for food, medicine, and the manufacturing of objects including nets, string bags, shields and canoes. The second is what it may imply about current and past land uses, as well as its influence on survey conditions such as visibility, access and disturbances.

European settlers extensively cleared the original native vegetation in the 1800's. The present vegetation within the investigation area is primarily covered in grasses with a sparse scattering of trees. The drainage throughout the investigation area would have supported a wide range of faunal populations including kangaroo, wallaby, goanna, snakes and a variety of birds. Typically, due to vegetation cover, most artefacts identified through surface inspection are identified when they are visible on exposures created by erosion or ground surface disturbances (Dean-Jones and Mitchell 1993; Kuskie and Kamminga 2000). The grass ground cover throughout the investigation area is expected to result in limited visibility, hence reducing the detection of surface cultural materials.

## 2.9 LAND USES AND DISTURBANCES

Based upon archaeological evidence, the occupation of Australia extends back some 40,000 years (Mulvaney and Kamminga 1999). Although the impact of past Aboriginal occupation on the natural landscape is thought to have been relatively minimal, it cannot simply be assumed that 20,000 years of land use have passed without affecting various environmental variables. The practice of 'firestick farming' whereby the cautious setting of fires served to drive game from cover, provide protection, and alter vegetation communities significantly influenced seed germination, thus increasing diversity within the floral community.

Following European settlement of the area in the 1820s, the landscape has been subjected to a range of different modifactory activities including extensive logging and clearing, agricultural cultivation (ploughing), pastoral grazing, residential developments and mining (Turner 1985). The associated high degree of landscape disturbance has resulted in the alteration of large tracts of land and the cultural materials contained within these areas. The specific investigation area has been cleared and primarily used for pastoral

purposes (grazing), involving the wholesale clearance of native vegetation, the introduction of pasture grass, the construction of dams, housing, fencing, tracks, roads, developments and associated infrastructure (water, electricity, telephone).

Although pastoralism is a comparatively low impact activity, it does result in disturbances due to vegetation clearance and the trampling and compaction of grazed areas. These factors accelerate the natural processes of sheet and gully erosion, which in turn can cause the horizontal and lateral displacement of artefacts. Furthermore, grazing by hoofed animals can affect the archaeological record due to the displacement and breakage of artefacts resulting from trampling (Yorston *et al* 1990). Pastoral land uses are also closely linked to alterations in the landscape due to the construction of dams, fence lines and associated structures. As a sub-set of agricultural land use, ploughing typically disturbs the top 10-12 centimetres of topsoil (Koettig 1986) depending on the method and machinery used during the process. Ploughing increases the occurrence of erosion and can also result in the direct horizontal and vertical movement of artefacts, thus causing artificial changes in artefact densities and distributions. In fact, studies undertaken on artefact movement due to ploughing (e.g. Roper 1976; Odell and Cowan 1987) have shown that artefacts move between one centimetre and 18 metres laterally, depending on the equipment used and horizontal movement. Ploughing may also interfere with other features and disrupt soil stratigraphy (Lewarch and O'Brien 1981). Ploughing activities are typically evidenced through 'ridges and furrows' however a lengthy cessation in ploughing activities dictates that these features may no longer be apparent on the surface.

Whilst the impacts of vehicular movements on sites have not been well documented, based on general observations it is expected that the creation of dirt tracks for vehicle access would result in the loss of vegetation and therefore will enhance erosion and the associated relocation of cultural materials. Dumping of rubbish would have impacted on the site through vehicular access (tracks) and the movement of surface artefacts through the actual 'dumping' of rubbish. Excavation works required for dam and housing construction and the laying of infrastructure (water, telephone) would require the removal of soils thus displacing and destroying any cultural materials that may have been present. As fence construction and the erection of telegraph poles require the removal of soils for the holes, this would also have resulted in the disturbance and possible destruction of any cultural materials.

## 2.10 NATURAL DISTURBANCES

It must be recognised that the disturbance of cultural materials can also be a result of natural processes. The patterns of deposition and erosion within a locality can influence the formation and/or destruction of archaeological sites. Within an environment where the rate of sediment accumulation is generally very high, artefacts deposited in such an environment will be buried shortly after being abandoned. Frequent and lengthy depositional events will also increase the likelihood of the presence of well-stratified cultural deposits (Waters 2000:538,540).

In a stable landscape with few episodes of deposition and minimal to moderate erosion, soils will form and cultural materials will remain on the surface until they are buried. Repeated and extended periods of stability will result in the compression of the archaeological record with multiple occupational episodes being located on one surface prior to burial (Waters 2000:538-539). Within duplex soils artefacts typically stay within the A horizon, on the interface between the A and B horizons. If erosion occurs after cultural material is deposited, it will disturb or destroy sections of archaeological sites even if they were initially in a good state of preservation. The more frequent and severe the episodes of erosional events, the more likely it is that the archaeological record in that area will be disturbed or destroyed (Waters 2000:539; Waters and Kuehn 1996:484). Regional erosional events may entirely remove older sediments, soils and cultural deposits so that archaeological material or deposits of a certain time interval no longer exist within a region (Waters and Kuehn 1996:484-485).

The role of bioturbation is another significant factor in the formation of the archaeological record. Post-depositional processes can disturb and destroy artefacts and sites as well as preserve cultural materials. Redistribution and mixing of cultural deposits occurs as a result of burrowing and mounding by earthworms, ants and other species of burrowing animals. Artefacts can move downwards through root holes as well as through sorting and settling due to gravity. Translocation can also occur as a result of tree falls (Balek 2002:41-42; Peacock and Fant 2002:92). Depth of artefact burial and movement as a result of bioturbation corresponds to the limit of major biologic activity (Balek 2002:43). Artefacts may also be moved as a result of an oscillating water table causing alternate drying and wetting of sediments, and by percolating rainwater (Villa 1982:279).

Experiments to assess the degree that bioturbation can affect material have been undertaken. In abandoned cultivated fields in South Carolina, Michie (summarised in Balek 2002:42-43) found that over a 100 year period 35% of shell fragments that had been previously used to fertilise the fields were found between 15 and 60 centimetres below the surface, inferred to be as a result of bioturbation and gravity. Earthworms have been known to completely destroy stratification within 450 years (Balek 2002:48). At sites in Africa, conjoined artefacts have been found over a metre apart within the soil profile. The vertical distribution of artefacts from reconstructed cores did not follow the order in which they were struck off (Cahen and Moeyersons 1977:813). These kinds of variations in the depths of conjoined artefacts can occur without any other visible trace of disturbance (Villa 1982:287). However, bioturbation does not always destroy the stratigraphy of cultural deposits. In upland sites in America, temporally-distinct cultural horizons were found to move downwards through the soil as a layer within minimal mixing of artefacts (Balek 2002:48).

## 2.11 DISCUSSION

The regional environment provided resources, including raw materials, fauna, flora and water, that would have allowed for sustainable occupation of the local area. Within the investigation area, the landforms of an alluvial flood plain overlooking a 4<sup>th</sup> order stream may not have been suitable for occupation during the wet season and/or during times of



heavy rain. However, such areas may have been used in the dry seasons as Sportsmans Creek would have provided the necessary resources for occupation, hunting and/or gathering.

In relation to modern alterations to the landscape, the use of the majority of the investigation area for agricultural purposes can be expected to have had low to moderate impacts upon the archaeological record, while impacts from dam and housing construction works would have had high impacts on the archaeological record. This may have resulted in the displacement of cultural materials, however in less disturbed areas such as the north-western half and the southern portion of the investigation area, it is possible that archaeological deposits may remain relatively intact.

Vegetation cover across the investigation area consists of grasses with scattered areas of trees. This will affect visibility and thereby reduce the potential for identifying archaeological evidence. Typically, due to vegetation cover, most artefacts identified through surface inspection are identified when they are visible on exposures created by erosion or ground surface disturbances (Kuskie and Kamminga 2000).

Because of the natural and cultural processes discussed above, site integrity cannot be assumed for the investigation area. However, the existence of in situ cultural materials cannot be ruled out.

### 3 ETHNO-HISTORIC BACKGROUND

Unfortunately, due to European settlement and the associated destruction of past Aboriginal communities, culture, social structure, activities and beliefs, little information with regards to the early traditional way of life of past Aboriginal societies remains.

#### 3.1 USING ETHNO-HISTORIC DATA

Anthropologists and ethnographers have attempted to piece together a picture of past Aboriginal societies throughout the region. Although providing a glimpse into the past, one must be aware that information obtained on cultural and social practices were commonly biased and generally obtained from informants including white settlers, bureaucrats, officials and explorers. Problems encountered with such sources are well documented (e.g. Barwick 1984; L'Oste-Brown et al 1998). There is little information about who collected information or their skills. There were language barrier and interpretation issues, and the degree of interest and attitudes towards Aboriginal people varied in light of the violent settlement history. Access to view certain ceremonies was limited. Cultural practices (such as initiation ceremonies and burial practices) were commonly only viewed once by an informant who would then interpret what he saw based on his own understanding and then generalise about those practices.

#### 3.2 LAWRENCE ETHNO-HISTORIC ACCOUNTS

The Clarence Valley area is dominated by lower valleys and rich coastal plains fed by the Clarence River and the Nymboida River. The Clarence River flows into the sea between Iluka and Yamba and was originally called Breimba or Berrinbah by the Aboriginal people indigenous to the area, who were traditionally part of the Gumbainggir language group. The full extent of Gumbainggir country stretched from Nambucca Heads in the south, to Yamba in the north and out to Glenn Innes in the west. The Clarence River was located along the northern border of the Gumbainggir territory, with the traditional country of the Bundjalong language group located to the north of this. To the south of Gumbainggir country was the Dainggatti language group, and to the west were the Nganyaywana (Horton 1994).

The richness of resources within the traditional country of the Gumbainggir people was such that they were known for sharing with other nations. Known tools and artefacts made and used by the Gumbainggir included shields, clubs, spears, bags, nets and small implements. Raw materials utilised included bark of the wild hibiscus bushes and soft tea-tree bark. Bangalow palm leaves were used to carry honey and water. Woven nets were used in catching fish and collecting. Middens of turban shells, mud whelks and river oysters attest to the types that were regularly eaten. Tree climbing was important in order to capture opossums, flying foxes and koalas, whose flesh was eaten and their skins used for rugs. Tools for scraping, cutting and sewing included implements made from bone, stone and shell. Known burial customs included wrapping a body in bark and burying it



in a sitting position with limbs tied together. Known dancing customs include the broлга dance, a ceremonial performance to be performed with song and story (Thomas 1013).

Early contact with European settlers and the Gumbainggir people occurred initially through coastal explorations, logging expeditions and stock movement. The first recorded contact was in March 1841 when naturalist and surveyor Clement Hodgkinson made contact with the local Aboriginal community during exploration of the extent of the Nambucca and Bellinger Rivers. He made reference to the local Aborigines undertaking fishing, hunting and dancing (Wright 2002). Due to their geographic location, river and coastal resources were an integral part of their diet. The Bongil Bongil area is one place where bush tucker and seafood were eaten. The Aboriginal name for the place translates roughly to mean “a place where one stays a long time because of the abundance of food”, thus attesting to the rich resources in that area (OEH 2012). Regarding resources, Hodgkinson also made note of trees suitable for logging, commenting that the Aboriginal people were likely to put up fierce defence against loggers encroaching on their traditional area (Wright 2002).

The Clarence Valley had suitable grazing land and as more settlers moved their stock to the cleared areas around the Clarence River, attempts were made to present privileges and gifts to Aboriginal people deemed useful or friendly by the settlers. Between the years 1870 and 1873 the ethnographic photographer John Lindt used the wet-plate process to photograph Aboriginal people of the Clarence River district. The staged tableaux in which he photographed his subjects however is more telling of the popular anthropological and ethnographic ideas of the day than of the subjects themselves. Lindt took his images against artificially painted backdrops of bush settings, placing Aboriginal artefacts and weapons around his subjects for the composition of the picture (Teaching for Change 2013).

Another language identified as spoken in the Clarence Valley area was Yaygirr, belonging to the Pama-Nyungan family of Australian languages and closely related to the Gumbainggir language (Crowley 1973). The Yaygirr language group was spoken around the mouth of the Clarence River. It was reported by the linguist Gerhardt Laves in 1929, who noted there were only two remaining speakers of the language at that time. Ongoing conflict with settlers, disease, dislocation from traditional resources and at least one massacre event along the Clarence River had killed the majority of the Aboriginal population. The Yaygirr language still survives however, with Elders having produced a book called ‘Yaygirr Dictionary and Grammar’ in 2012 as part of program of language revitalisation (Muurrbay Aboriginal Language and Culture Co-operative 2013).

## 4 ARCHAEOLOGICAL CONTEXT

Archaeological evidence is a finite non-renewable physical and material resource. Archaeology is the study of past human societies through their material remains and artefactual assemblages. The study of archaeological evidence increases our understanding and knowledge of the structure and culture of past and ancient societies that are not recorded by any other means. Each site possesses a unique and invaluable record of that individual site, as well as providing evidence for its context within a wider archaeological and cultural landscape. Collectively, archaeological sites contribute to charting cultural evolution and change over time, providing an insight into the communications, trade and growth of past human societies.

A review of the archaeological literature of the region, and more specifically the Clarence Valley area and the results of an OEH AHIMS search provides essential contextual information for the current assessment. Thus, it is possible to obtain a broader picture of the wider cultural landscape, highlighting the range of site types, site contents, extent and locations of sites throughout the region, site frequency and distribution patterns, and the presence of any sites within the investigation area. It is then possible to use the archaeological context in combination with the review of environmental conditions to establish an archaeological predictive model for the investigation area.

### 4.1 OEH ABORIGINAL HERITAGE INFORMATION MANAGEMENT SYSTEM

It must be noted that there are many limitations with an AHIMS search. Firstly site coordinates are not always correct due to errors and changing of computer systems at OEH over the years that failed to correctly translate old coordinate systems to new systems. Secondly, OEH will only provide up to 100 sites per search, thus limiting the search area surrounding the investigation area and enabling a more comprehensive analysis. And finally, few sites have been updated on the OEH AHIMS register to notify if they have been subject to a s87 or s90. As such, it is unknown what sites remain in the local area and what sites have been destroyed.

In addition to this, other limitations include the number of studies in the local area. Fewer studies suggest that sites have not been recorded, ground surface visibility also hinders site identification and the geomorphology of the majority of NSW soils, coupled with high levels of erosion have proven to disturb sites and site contents. However the extent of these disturbances is unknown (i.e. we do not know if a site identified at the base of an eroded slope derived from the upper crest was washed along the bottom, thus altering our predictive modelling in an unknown way). Thus, the OEH AHIMS search is limited and provides a basis that only aids in predictive modelling. The new terminology for site names including (amongst many) an 'artefact' site, encompasses stone, bone, shell, glass, ceramic and/or metal and combines both open camps and isolated finds into the one site name. Unfortunately this greatly hinders the predictive modelling as different site types grouped under one name provides inaccurate data.

A search of the OEH AHIMS register has shown that 6 known Aboriginal sites are currently recorded within five kilometres of the investigation area and include three TRE, two AFT and one Burial. The AHIMS results are provided in Annex B and the site locations are shown in *Figure 4.1*.

## 4.2 LOCAL ARCHAEOLOGICAL CONTEXT

All archaeological surveys throughout the local area have been undertaken in relation to environmental assessments for developments. The most relevant investigations indicate differing results and observations based on surface visibility and exposure, alterations to the landscape (including mining, industrial and residential development), proximity to water sources and geomorphology. The reports available from OEH are discussed below and their location illustrated in *Figure 4.2*.

Collins (2009) was commissioned to undertake an archaeological assessment of a proposed 66kV sub transmission line to run from Koolkhan (Grafton) to substations at Maclean on the North Coast of NSW. The proposed transmission line was to run for a length of 40.5 kilometres with a 50 metre wide easement. The topography of the investigation area consisted of low hills, valleys and floodplain. Water sources in proximity to the investigation area included Shark Creek and the Clarence River. Vegetation removal had occurred across the investigation area to create grazing pasture but it was noted that occasional mature trees remained. A search of the AHIMS register of sites did not identify any previously recorded sites within the bounds of the investigation area. Based on sites in the surrounding area it was predicted that isolated artefacts, artefact scatters, middens, scarred trees and burials could occur.

The survey identified three (3) new sites which are described below and summarised in *Table 4.1*. Sites Koolmac-1 and Koolmac-2 are an artefact scatter located within exposures. Koolmac-1 was located on a level-low gradient crest of a slope that falls away to the Clarence River floodplain and included thirteen (13) artefacts manufactured from quartz, quartzite, chert and jasper, with artefact types including flakes, broken flakes and cores. Although it was thought the surface scatter may extend beyond visibility, due to the degrading topographic context it was argued that subsurface integrity was lost and no subsurface cultural materials would be present. Koolmac-2 was located on a level end of a spur into former floodplain swamps on the terminal end of undulating hills and included three (3) artefacts manufactured from silcrete and chert, with artefact types including a flake, a broken flake and a core. Although it was thought the surface scatter may extend beyond visibility, due to the degrading and eroding topographic context it was argued that subsurface integrity was lost and no subsurface cultural materials would be present. Koolmac-3 was a mature living swamp box with an estimated height of fourteen (14) metres and girth of 2.7 metres. The scarred tree was located within a pocket of remnant vegetation on the Koolmac-2 spur and has two (2) partially healed scars (no axe marks).



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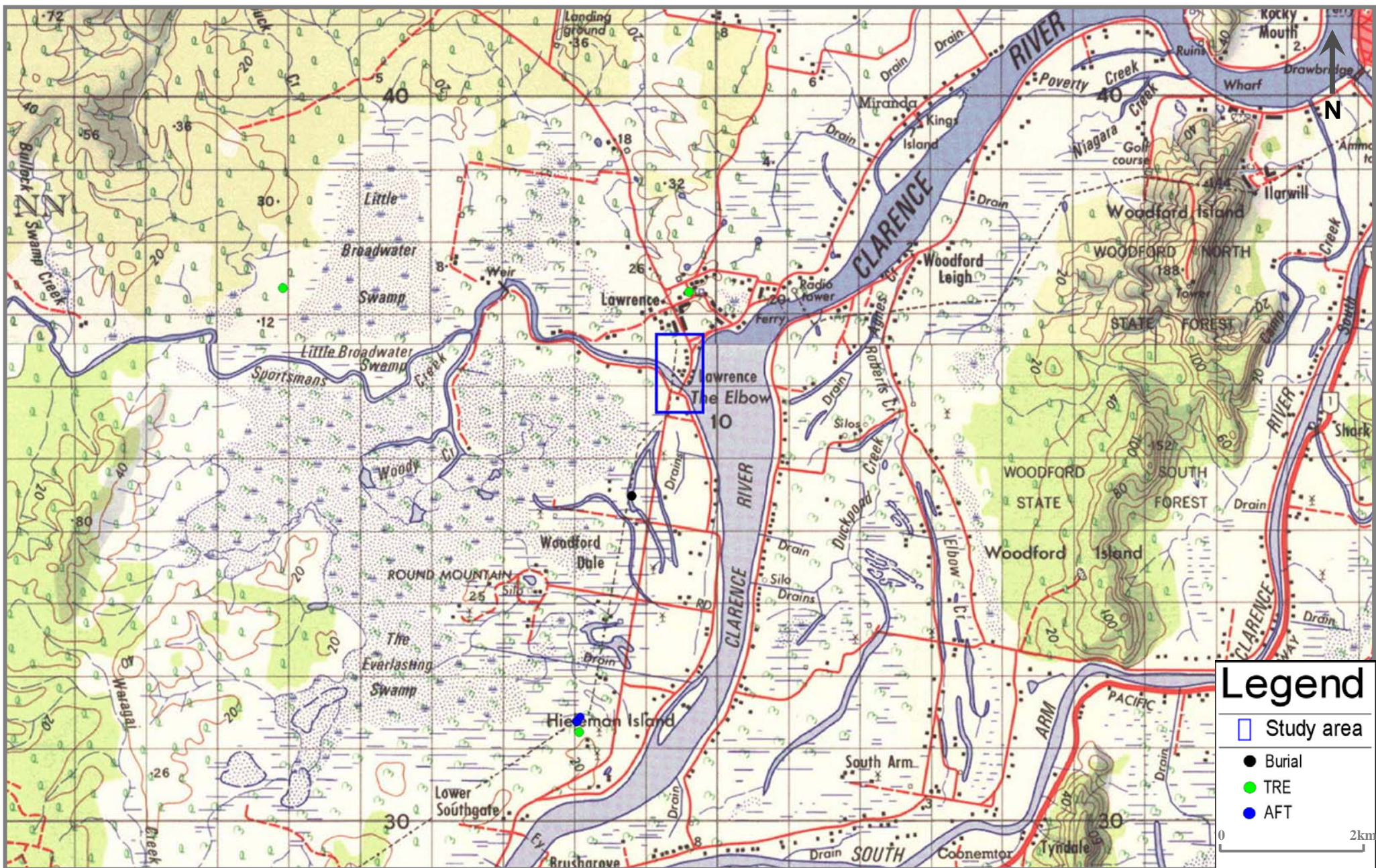


Figure 4.1 Known sites

Source: 1:100 000 Topo Series: Bare Point & Woodburn



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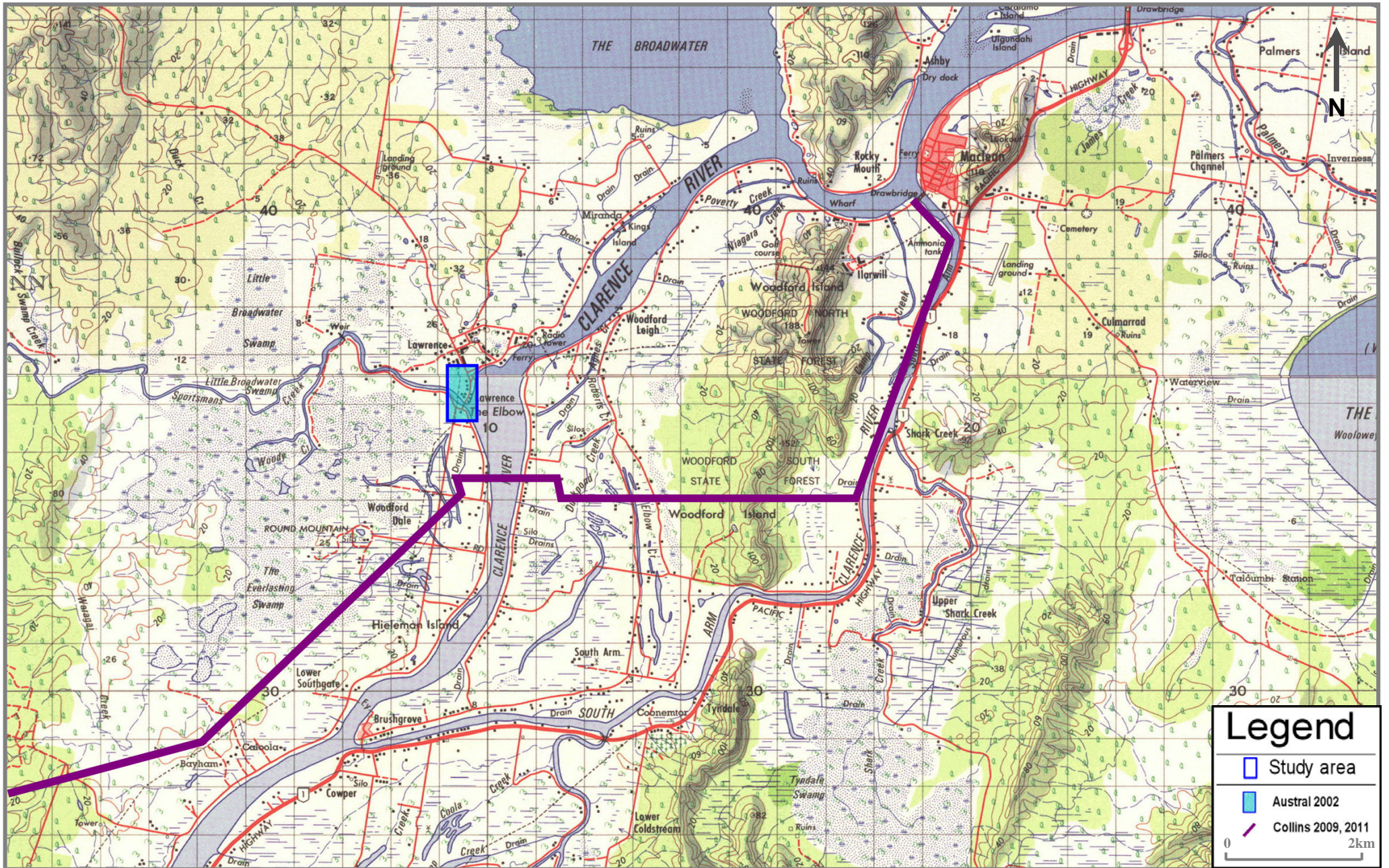


Figure 4.2 Previous studies

Source: 1:100 000 Topo Series: Bare Point & Woodburn



#### 4.1 Summary of sites (Collins 2009)

| Site      | Site type        | Landform   | Distance to water | Stream order   | Artefacts /features | Disturbance         | Subsurface potential |
|-----------|------------------|------------|-------------------|----------------|---------------------|---------------------|----------------------|
| Koolmac-1 | artefact scatter | floodplain | not provided      | Clarence River | 11                  | clearance & grazing | yes                  |
| Koolmac-2 | artefact scatter | low spur   | not provided      | swamp          | 3                   | clearance & grazing | yes                  |
| Koolmac-3 | scarred tree     | spur       | not provided      | not provided   | 2 scars             | not provided        | not provided         |

Collins recommended that a permit be sought for surface collection at site Koolmac-1, with the other two sites to be fenced for their protection during works with monitoring to be undertaken during vegetation clearance and excavation works. It was also recommended that the Koolmac-1 artefacts be redeposited following the completion of the proposed works.

Collins (2011) was commissioned to undertake an Aboriginal cultural heritage salvage and damage report for the previously recorded sites Koolmac-1 (13-4-0167) and Koolmac 2 (13-4-0168). These sites were being salvaged under AHIP permit number 1106702. A detailed inspection of the Koolmac-1 and Koolmac-2 AHIP areas was undertaken for the purposes of collecting surface artefacts ahead of the planned project disturbance. A total of 16 stone artefacts were collected/salvaged under the auspices of the AHIP. Of these, 11 were recovered from site Koolmac-1, and five from pole emplacement locations adjacent to the recorded site Koolmac-2. Based on the apparent low artefact density, restricted range of activities, artefact types and distribution, it was concluded by Collins that sites Koolmac-1 and Koolmac-2 represented short-term stopping places only. On the completion of project disturbance works, the PVC cylinders were then buried in nearby locations selected by the Aboriginal stakeholder representatives in consultation with the Koolmac Construction Coordinator. Map grid references of the re-deposition locations were taken for registration on the AHIMS database as well as inclusion on the Essential Energy mapping system. It was recommended that the artefact re-deposition locations, as well as areas with the potential to contain additional stone artefacts associated with sites Koolmac-1 and Koolmac-2, should be plotted and cross-referenced on the Essential Energy GIS mapping system and any relevant construction/maintenance drawings. It was further recommended that if any identified/suspected stone artefacts or other Aboriginal cultural heritage materials were later detected at any time, Essential Energy should stop work and temporarily fence off the find location (with a 50 metre surrounding buffer) until such time as written approval to proceed had been given by OEH.

#### 4.3 PREVIOUS ASSESSMENT OF THE INVESTIGATION AREA

Austral Archaeology (2002) was commissioned to prepare a Heritage Assessment and Statement of Heritage Impact (SoHI) for the preferred option of the replacement of Sportsmans Creek Bridge as part of a previous investigation by CVC. The investigation area comprised the Sportsmans Creek Bridge, Lawrence, and the immediate environs. The survey of the area to be impacted upon by the proposed construction of a new concrete bridge on the Grafton Street alignment was undertaken by Austral Archaeology and

Yaegl Local Aboriginal Land Council. The archaeological survey did not identify any Aboriginal archaeological or cultural sites. However, two (2) areas of archaeological sensitivity (PADs) were identified. The two areas of sensitivity, PAD1 and PAD2 were both subject to past land use practices such as vegetation clearing and landscaping activities. It was argued that although this sort of activity is likely to have caused some disturbance to any sub surface archaeological remains, such remains, even though possibly disturbed, can still contribute information to the past Aboriginal occupation of the investigation area.

The SoHI determined that the social and technical value of the bridge along with its associated cultural landscape, did not appear to be fully appreciated by the local community. As a result, the status of the bridge was of little interest to them, however it was recognised that this may change, and the public regard to their own heritage, and cultural inheritance may also change. Therefore, the SoHI considered it essential that the management of the Bridge and cultural landscape be carried out in a manner that will not be viewed disastrous in a few years time, when perceptions of value have changed. It was stated that actions that take place today in terms of the management of cultural heritage, need to be mindful of changes that are likely to occur in the future, and regarded in terms of 'custodianship' of a society's cultural resources. The recommendations in relation to protection of indigenous heritage included:

- any future earthworks associated with removal of the existing bridge and/or construction of the proposed new bridge be monitored by a qualified archaeologist and a representative of the Yaegal Local Aboriginal Land Council;
- the Yaegal Local Aboriginal Land Council be involved in the consultation process, submission of a preliminary research permit and the ceasing of all works if historic artefacts are uncovered, in accordance with NPWS Aboriginal Heritage legislation, and
- education/awareness of the statutory legislation protecting sites by relevant staff.

#### 4.4 LOCAL & REGIONAL CHARACTER OF ABORIGINAL LAND USE & ITS MATERIAL TRACES

The following is a summary and discussion of the two previous investigations detailed above. It must be remembered, however, that there are various factors which will have skewed the results. These include but are not limited to:

- the landform on which a site area is observed is not necessarily its origin, for example, artefacts which would have originated on a crest may be located eroding down the slope;
- biases due to levels of exposure on different landforms, differential sampling of landforms based on decisions made by archaeologists and/or as a result of restrictions due to the locations of proposed development areas, as well as the variable levels of reporting by different archaeologists will affect the count of sites on each landform type. For example, the large percentage of sites found along creek lines may be, at least partially, representative of how many cultural heritage surveys focused on these landforms, and
- artefact counts can be skewed due to factors such as differing levels of fragmentation of material and levels of ground surface visibility. A very large number of sites/ artefacts

were located on exposures with either no or very few artefacts visible away from the exposures.

Therefore the summary provides an indication of what may be expected in terms of site location and distribution. Based on previous work it is also clear that assessments are limited in number and that the majority of sites contain stone artefacts. This is to be expected due to stone's high preservation qualities.

The highest numbers of sites appear to be located within 50 metres of a water source on elevated landforms indicating the need for water and associated resources. The surrounding area includes sites such as artefact scatters, isolated finds, scarred trees and a burial. Variations between archaeologists' classifications of raw material types (for example tuff and indurated mudstone) will have an effect on the results of this count. Raw material type appears to include quartz, quartzite, chert, jasper and silcrete. However it must be remembered that raw materials may have been incorrectly classified, and not all site descriptions provided in reports and on site cards contained detailed information.

Due to differences in recording techniques it is difficult to determine how many of each artefact type is represented across the region, though types include flakes, broken flakes, retouched flakes, multi-platform cores, single platform cores, bipolar cores, flaked pieces, 'waste' pieces, 'chips', debitage, 'geometric microliths', 'backed blades', 'bondi points', 'scrapers', 'eloueras', 'burrins', 'blades', 'hatchets', 'unifacial choppers', 'bifacial choppers', 'pebble tools', a 'slice', edge-ground axes, anvils, hammer stones and heat. Due to variations in both the amount of data that is included in reports, and the terms different archaeologists used to describe artefact types, it is not practicable to provide a count of the different artefact types. However, it is evident that flakes, broken flakes and flaked pieces are the most common artefact types recorded. The artefactual material in the region was observed on exposures with good to excellent ground surface visibility. The likelihood of finding artefacts surrounding these exposures is reduced due to poor visibility. The site area is often given as the area of exposure. Hence, it is inappropriate to attempt to draw any conclusions regarding site extent based on current information. Based on information gained from previous studies within a five kilometre radius of the investigation area, it can be expected that:

- the likelihood of locating sites increases with proximity to water;
- the likelihood of finding large sites increases markedly with proximity to water;
- sites are likely to be located on elevated land;
- a variety of raw materials will be represented though the majority of sites;
- a variety of artefact types will be located though the majority will be flakes, flaked pieces and debitage;
- the likelihood of finding scarred trees is dependent on the level of clearing in an area, and
- the majority of sites will be subject to disturbances including human and natural.

These findings are consistent with models developed for the area.

#### 4.5 PREDICTIVE MODEL FOR THE INVESTIGATION AREA

Due to issues surrounding ground surface visibility and the fact that the distribution of surface archaeological material does not necessarily reflect that of sub-surface deposits, it is essential to establish a predictive model.

Previous archaeological studies undertaken throughout the Clarence Valley area are limited and provide limited information regarding site types, context, extents, locations and proximity to water. Sites registered on the NSW OEH AHIMS Register as well as landforms and past land use activities, provide an indication of site types and site patterning in the area. Research has shown that scarred trees and artefact sites are the most predominant site types likely in the area. The most common site locations are along watercourses and on elevated landforms, with artefact density being greatest in close proximity to water sources.

Within the specific investigation area, a low potential for evidence of past occupation is predicted due to the landform being an alluvial plain along Sportsmans Creek, which is also subject to regular flooding. Sites are expected to be located on elevated land, which the investigation area is lacking.

#### 4.6 ARCHAEOLOGICAL POTENTIAL IN THE INVESTIGATION AREA

Based on archaeological sites registered in the region, the results of past archaeological studies, and the location of the investigation area within low lying flood plains, no sites are likely to occur throughout the investigation area.

#### 4.7 HERITAGE REGISTER LISTINGS

The State Heritage Register, the Australian Heritage Database (which includes data from the World Heritage List UNESCO, National Heritage List, Commonwealth Heritage List, Register of the National Estate) and the Clarence Valley Local Environmental Plan refer to items of indigenous heritage significance. However, not all indigenous places are listed, and the Heritage Commission is consulting with Traditional Owners to gradually include indigenous information. There are no indigenous heritage items listed on the Clarence Valley Environment Plan.

#### 4.8 MODELS OF PAST ABORIGINAL LAND USE

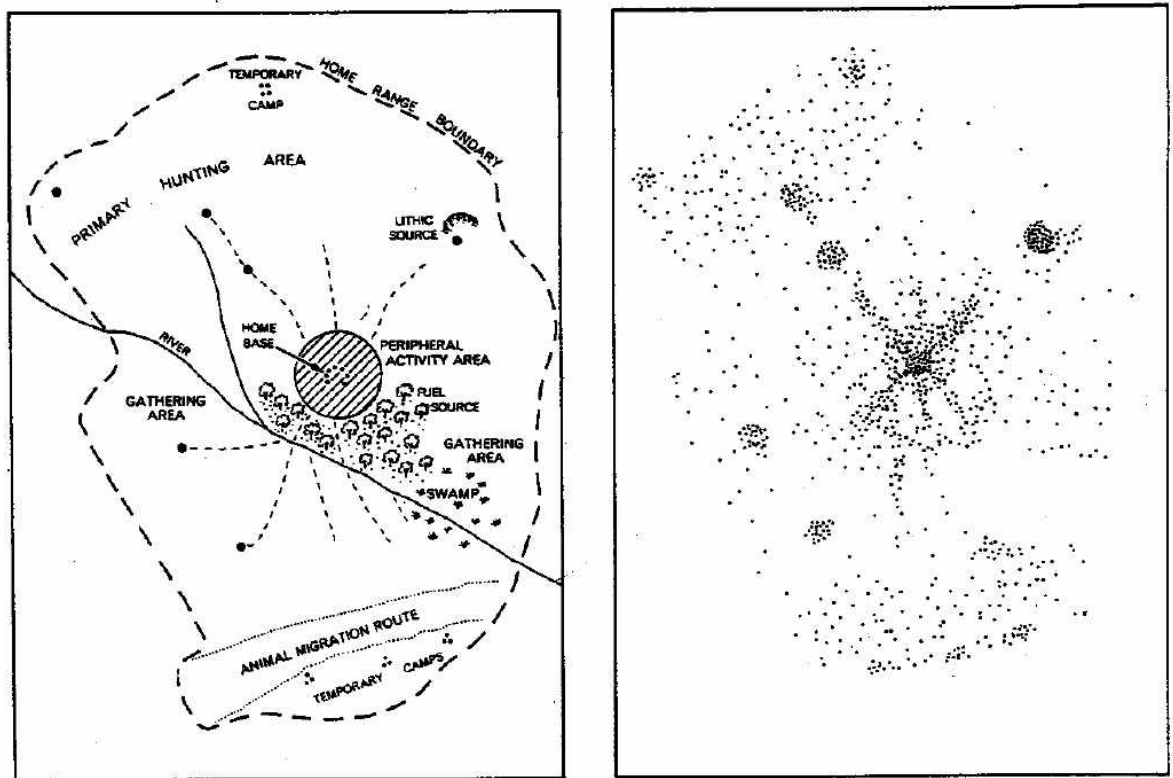
The main aim of this project is to attempt to define both the nature and extent of occupation across the area. As a result, the nature of the analysis will focus on both the landform units and sites. The purpose of this strategy is to highlight any variations between sites and associated assemblages, landforms, and resources across the area (treating assemblages as a continuous scatter of cultural material across the landscape).

In doing this, it is possible to identify variation across the landscape, landforms, and assemblages that correspond with variation in the general patterns of landscape use and



occupation. Thus the nature of activities and occupation can be identified through the analysis of stone artefact distributions across a landscape. A general model of forager settlement patterning in the archaeological record has been established by Foley (1981). This model distinguishes the residential 'home base' site with peripheral 'activity locations'. Basically, the home base is the focus of attention and many various activities, while activity locations are situated away from the home base and are the focus of specific activities (such as tool manufacturing). This pattern is illustrated in *Figure 4.2*. Home base sites generally occur in areas with good access to a wide range of resources (reliable water, raw materials etc). The degree of environmental reliability, such as reliable water and subsistence resources, may influence the rate of return to sites and hence the complexity of evidence. Home base sites generally show a greater diversity of artefacts and raw material types (which represent a greater array of activities performed at the site and immediate area).

*Figure 4.2 Foley's model (left) and its manifestation in the archaeological record (right), (Foley 1981).*



Activity locations occur within the foraging radius of a home base camp (approximately 10 km); (Renfrew and Bahn 1991). Based on the premise that these sites served as a focus of a specific activity, they will show a low diversity in artefacts and are not likely to contain features reflecting a base camp (such as hearths). However, it is also possible that the location of certain activities cannot be predicted or identified, adding to the increased dispersal of cultural material across the landscape. If people were opting to carry stone tools during hunting and gathering journeys throughout the area rather than manufacturing tools at task locations, an increased number of used tools should be recovered from low density and dispersed assemblages.

## 5 RESULTS

### 5.1 METHODOLOGY

The survey areas were surveyed on foot by the archaeologist and included transects at approximately 4 metres apart. Transects focused on areas of high ground surface visibility and exposures such as erosional features, creek bank, tracks, and cleared areas.

### 5.2 LANDFORMS

McDonald et al (1998) describes the categories of landform divisions. This is a two layered division involving treating the landscape as a series of 'mosaics'. The mosaics are described as two distinct sizes: the larger categories are referred to as landform patterns and the smaller referred to as landform elements within these patterns. Landform patterns are large-scale landscape units, and landform elements are the individual features contained within these broader landscape patterns. There are forty landform pattern units and over seventy landform elements. However, of all the landform element units, ten are morphological types. For archaeological investigations, the landscape is divided into standardised elements that can be used for comparative purposes and predictive modelling. As outlined in *Chapter 2*, the study area includes one landform: alluvial plains.

### 5.3 SURVEY UNITS

For ease of management, the study area was divided into 4 Survey Units (SUs) that were based on the proposed development impact areas (Refer to *Figure 5.1*).

#### **Survey Unit 1 (New Bridge south)**

This unit includes the southern side of the proposed new bridge location and is situated in alluvial plains along Sportsmans Creek. This unit has been previously impacted by past land use including clearing, excavation and fill works for the adjacent roads, the boat ramp, and picnic area. Vegetation is predominantly pasture grass with trees in some areas which contribute to reduced ground surface visibility. Exposures in this unit were low, and no raw materials usually transported into the area for stone tool manufacture were visible. There is low to no potential for in situ archaeological materials in the unit.

*Figure 5.1 Survey Unit 1 facing north*





MCH:



Figure 5.1 Survey units



### **Survey Unit 2 (New bridge north)**

This unit includes the northern side of the proposed new bridge location and is situated in alluvial plains along Sportsmans Creek. This unit has been previously impacted by past land use including clearing, excavation, and fill works for the adjacent roads, a house, and associated infrastructure. Vegetation is predominantly pasture grass with trees in some areas which contribute to reduced ground surface visibility. Exposures were moderate and no raw materials usually transported into the area and utilised for stone tool manufacture were present or visible. There is low to no potential for in situ archaeological materials in the unit.

*Figure 5.2 Survey unit 2 facing north west*



### **Survey Unit 3 (Old bridge compounds south)**

This unit includes the southern side of the existing bridge and two compound areas situated to the east and west of the bridge. Located on alluvial plains along Sportsmans Creek, this area has been previously impacted by past land use including clearing, excavation, and fill works for the current road and existing bridge and picnic areas. Vegetation is predominantly pasture grass with trees in some areas which contribute to reduced ground surface visibility. Exposures were low to moderate and no raw materials usually transported into the area and utilised for stone tool manufacture were present or visible. There is low to no potential for in situ archaeological materials in the unit.

*Figure 5.3 Survey unit 3 facing east*





### Survey Unit 4 (Old bridge compound north)

This unit includes the northern side of the existing bridge and east of the proposed new bridge. Located on alluvial plains along Sportsman's Creek, this area has been previously impacted by past land use including clearing and agricultural practices. Vegetation is predominantly pasture grass with trees in some areas which contributed to reduced ground surface visibility. Exposures were low to moderate and no raw materials usually transported into the area and utilised for stone tool manufacture were present or visible. There is low to no potential for in situ archaeological materials in the unit.

*Figure 5.4 Survey unit 4 facing west*



## 5.4 EFFECTIVE COVERAGE

Effective coverage is an estimate of the amount of ground observed taking into account local constraints on site discovery such as vegetation and soil cover. There are two components to determining the effective coverage: visibility and exposure.

Visibility is the amount of bare ground on the exposures which may reveal artefacts or other cultural materials. Visibility refers to 'what conceals'. Visibility is hampered by vegetation, plant or leaf litter, loose sand, stony ground or introduced materials (such as rubbish). On its own, visibility is not a reliable factor in determining the detectability of subsurface cultural materials (DECCW 2010/783:39).

The second component in establishing effective coverage is exposure. Exposure refers to 'what reveals'. It estimates the area with a likelihood of revealing subsurface cultural materials rather than just an observation of the amount of bare ground. Exposure is the percentage of land for which erosion and exposure is sufficient to reveal cultural materials on the surface (DECCW 2010/783:37). The effective coverage for the study area was determined for both visibility and exposure ratings and *Table 5.1* details the visibility rating system used.

**Table 5.1 Ground surface visibility rating**

| Description   | GSV rating % |
|---|--------------|
| <b>Very Poor</b> – heavy vegetation, scrub foliage or debris cover, dense tree or scrub cover. Soil surface of the ground is very difficult to see.   | 0-9%         |
| <b>Poor</b> – moderate level of vegetation, scrub, and / or tree cover. Some small patches of soil surface visible in the form of animal tracks, erosion, scalds, blowouts etc, in isolated patches. Soil surface visible in random patches.  | 10-29%       |
| <b>Fair</b> – moderate levels of vegetation, scrub and / or tree cover. Moderate sized patches of soil surface visible, possibly associated with animal, stock tracks, unsealed walking tracks, erosion, blow outs etc, soil surface visible as moderate to small patches, across a larger section of the study area. | 30-49%       |
| <b>Good</b> – moderate to low level of vegetation, tree or scrub cover. Greater amount of areas of soil surface visible in the form of erosion, scalds, blowouts, recent ploughing, grading or clearing.  | 50-59%       |
| <b>Very Good</b> – low levels of vegetation / scrub cover. Higher incidence of soil surface visible due to recent or past land-use practices such as ploughing, mining etc.   | 60-79%       |
| <b>Excellent</b> – very low to non-existent levels of vegetation/scrub cover. High incidence of soil surface visible due to past or recent land use practices, such as ploughing, grading, mining etc.  | 80-100%      |
| Note: this process is purely subjective and can vary between field specialists, however, consistency is achieved by the same field specialist providing the assessment for the one study area/subject site.   |              |

As indicated in *Table 5.2*, the overall effective coverage of the investigation area is 15.64%, with grass being identified as the limiting factor, and erosion across the study area identified as minimal. The disturbances included clearing, fences, grazing, and previous excavation, all of which have impacted upon the landscape and associated cultural materials. As described in detail in *Chapter 2*, these disturbances result in the lateral and horizontal movement of materials.

**Table 5.2 Effective coverage for the investigation area**

| SU                          | Landform       | Area (m2)    | Vis. % | Exp. % | Exposure type           | Previous disturbances                           | Present disturbances | Limiting visibility factors | Effective coverage (m2) |
|-----------------------------|----------------|--------------|--------|--------|-------------------------|---|----------------------|-----------------------------|-------------------------|
| 1                           | alluvial plain | 300          | 15%    | 95%    | erosion, tracks, quarry | clearing, excavation, road, boat ramp, power    | traffic, erosion     | grass, leaf litter          | 43                      |
| 2                           | alluvial plain | 300          | 15%    | 50%    | erosion                 | clearing, excavation, road, boat ramp, power    | traffic, erosion     | grass, leaf litter          | 23                      |
| 3                           | alluvial plain | 800          | 20%    | 100%   | erosion, tracks         | clearing, excavation, road, bridge, picnic area | traffic, erosion     | grass, leaf litter          | 160                     |
| 4                           | alluvial plain | 1,000        | 30%    | 50%    | erosion, tracks         | clearing, agricultural                          | cattle, erosion      | grass, leaf litter          | 150                     |
| <b>Totals</b>               |                | <b>2,400</b> |        |        |                         |   |                      |                             | <b>375</b>              |
| <b>Effective coverage %</b> |                |              |        |        |                         |   |                      |                             | <b>15.64%</b>           |

The level and nature of the effective survey coverage is considered satisfactory to provide an effective assessment of the Aboriginal sites identified, as well as those potentially present within the investigation area. The coverage was comprehensive for obtrusive site types (e.g. grinding grooves and scarred trees) but somewhat limited for the less obtrusive surface stone artefact sites due to surface visibility constraints that included vegetation cover and minimal exposures.

In view of the predictive modelling and the results obtained from the effective coverage, it is concluded that the survey provides a valid basis for determining the probable impacts of the proposal, and for formulating recommendations for the management of both identified and potential Aboriginal sites.

Landforms include the Sportsmans Creek alluvial plains, which although would have provided suitable hunting and/or gathering grounds, is not considered suitable for occupation due to the lack of elevated landforms.

## 5.5 ARCHAEOLOGICAL SITES

Sites were labelled according to the project title, e.g. SC/1 where SC represents Sportsmans Creek, and 1 indicates the site number allocated consecutively.

### 5.5.1 DEFINITION OF A SITE

A 'site' can be defined by various factors. For this study a 'site' was defined on the combination of the following inter-related factors:

- landform;
- exposure and visibility;
- visible boundaries of artefacts; and
- a feature identified by the Aboriginal community on the basis of their own cultural knowledge and significance.

The 'site area' was defined as the area in which artefacts were observed on a landform, though it must be remembered that this may not represent an accurate picture of site size. Visibility of artefacts is affected by differences in vegetation cover and hence ground surface visibility, as well as the degree of natural and human-induced disturbance.

### 5.5.2 DEFINITION OF SITE COMPLEX

Site complex refers to sites that occur in groups. For example, complexes may consist of burial grounds and carved trees, artefact scatters that represent different stages of procurement and manufacture or artefact scatters and shell middens. Complexes may also consist of artefact scatters that are connected across a landscape with the scatters being either specific activity centres (such as tool manufacturing sites) or larger base camp areas (with more artefacts and a variety of artefacts).

### 5.5.3 MAPPING IDENTIFIED SITES

MCH use topographic maps with MGA system 1994 (unless they are new maps produced after 1999 that have used the MGA94 system) and our hand held Global Positioning System (GPS) units use MGA. It is important to note that the Global Positioning System is operated by the United States and is subject to changes that may affect the accuracy and performance of all GPS equipment. At present, the hand held unit operated by MCH has an estimated error of approximately 5-10 metres, though this is also dependant on the number of satellites available/detected as well as other factors such as tree coverage/interference.

### 5.5.4 SITES IDENTIFIED

No sites were identified and this is likely due to two main factors including;

- the investigation area is situated on Sportsmans Creek alluvial plains and is subject to regular flooding; and
- the high level of land uses and impacts as well as natural factors (such as erosion and flooding) would have destroyed any evidence of past occupation.

## 5.6 POTENTIAL ARCHAEOLOGICAL DEPOSIT (PAD)

The terms 'Potential Archaeological Deposit (PAD)' and 'area(s) of archaeological sensitivity' are used to describe areas that are likely to contain sub-surface cultural deposits. These sensitive landforms or areas are identified based upon the results of fieldwork, the knowledge gained from previous studies in or around the subject area, and the resultant predictive models. Any or all of these attributes may be used in combination to define a PAD.

The likelihood of a landscape having been used by past Aboriginal societies and hence containing archaeologically sensitive areas is primarily based on the availability of local natural resources for subsistence, artefact manufacture, and ceremonial purposes. The likelihood of surface and subsurface cultural materials surviving in the landscape is primarily based on past land uses and preservation factors.

No PADs were identified and this is due to two main factors including;

- the investigation area is situated on Sportsmans Creek alluvial plains and is subject to regular flooding; and
- the high level of land uses and impacts as well as natural factors (such as erosion and flooding) would have destroyed any evidence of past occupation.

## 5.7 DISCUSSION

As no sites have been identified, the results of the investigation are discussed below in terms of overall site integrity, local and regional contexts, and predictive modelling.



### 5.7.1 INTEGRITY

The integrity of the investigation area can be assessed only for surface integrity through the assessment of past and present land uses and their impacts. Subsurface integrity can only be assessed through controlled excavation that allows for the examination of both the horizontal and vertical distribution of cultural materials (caused by natural and/or human impacts) and by conjoining artefacts. Land uses and their impacts (clearing, agricultural practices, excavation, building, road and bridge construction and associated infrastructure) as well as natural impacts (bioturbation, erosion, flooding) within the investigation area are considered to be high across the entire investigation area. Due to such disturbances, the integrity of the investigation area is lost and any sites that may have been present would have been destroyed.

### 5.7.2 INTERPRETATION & OCCUPATION MODEL

Given the high level of disturbance throughout the investigation area and the fact that no sites or PADs were identified, it is not possible to discuss site interpretation or occupation models.

### 5.7.3 REGIONAL & LOCAL CONTEXT

Given the high level of disturbance throughout the investigation area and the fact that no sites or PADs were identified, it is not possible to identify any differences or similarities with other assessments throughout the region (such as site patterning, site types, land form preference etc).

### 5.7.4 REASSESSMENT OF THE PREDICTIVE MODEL

In view of the survey results, the predictive model of site location can be reassessed for the investigation area. The potential for artefacts to occur within the investigation remains assessed as very low or negligible. No sites or PADs were identified within the investigation area. There remains a low to no potential for evidence to occur in the areas currently obscured by vegetation. Environmental contexts in which sites and potentially deposits of research significance may occur, in association with more focused and/or repeated Aboriginal occupation, are absent from the investigation area.

## 5.8 CONCLUSION

Sites provide valuable information about past occupation, use of the environment and its specific resources including diet, raw material transportation, stone tool manufacture, and movement of groups throughout the landscape. Therefore these results provide merely an indication of what may be expected in terms of site location and distribution. Proximity to water on an elevated landform was an important factor in past occupation of the area, with most sites located within 50 metres of the tributaries. The surrounding area contains no raw materials that are typically used in the manufacture of stone tools, no exposed sandstone is evident, and no elevated landform is present within close proximity. The specific investigation area is highly disturbed and is considered not to have been suitable for past occupation.

## 6 ASSESSMENT OF IMPACTS

The archaeological record is a non-renewable resource that is affected by many processes and activities. As outlined in *Chapter 2*, various natural processes and human activities would have impacted on archaeological deposits through both site formation and taphonomic processes. *Chapter 6* describes the impacts within the investigation area, showing how these processes and activities have disturbed the landscape and associated cultural materials in varying degrees.

### 6.1 POTENTIAL IMPACTS

Detailed descriptions of the possible impacts are provided in *Section 1.4*, and the OEH Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (2010:21) describes impacts to be rated as follows:

- Type of harm: is either direct, indirect or none
- Degree of harm is defined as either total, partial or none
- Consequence of harm is defined as either total loss, partial loss, or no loss of value

As no sites or PADs were identified, there are no impacts on the archaeological record within the study area.

### 6.2 CUMULATIVE IMPACTS

The cumulative impact to Aboriginal heritage in terms of scientific inquiry in this location is unknown given that:

- The net development footprint (i.e. the area of direct impact) is small and does not affect a high proportion of any particular landform present within the region;
- No sites were identified within the study area;
- No PADs were identified within the study area; and
- The placement of the development within this area, in particular on the alluvial plain and within the disturbed context, ensures the cumulative impacts are focused in the areas of lower potential and therefore are kept to a minimum.

Mitigation measures to minimise these impacts are outlined in the following chapter.

## 7 MITIGATION AND MANAGEMENT STRATEGIES

Specific strategies as outlined through the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW, and the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (DECCW 10011a,b), are considered below for the management of identified sites and potential archaeological deposits within the study area.

One of the most important considerations in selecting the most suitable and appropriate strategy is the recognition that Aboriginal cultural heritage is very important to the local Aboriginal community. Decisions about the management of sites and potential archaeological deposits should be made in consultation with the appropriate local Aboriginal community.

### 7.1 CONSERVATION/PROTECTION

The OEH is responsible for the conservation/protection of Indigenous sites and they therefore require good reason for any impact on an indigenous site. Conservation is the first avenue and is suitable for all sites, especially those considered to be of high archaeological significance and/or cultural significance. Conservation includes the processes of looking after an indigenous site or place so as to retain its cultural significance, and are managed in a way that is consistent with the nature of peoples' attachment to them.

No sites or PADs were identified and the investigation area is highly disturbed with low to no potential for in situ archaeological evidence of past occupation. Therefore, conservation is not warranted.

### 7.2 FURTHER INVESTIGATION

An Aboriginal Heritage Impact Permit (AHIP) is no longer required to undertake test excavations (providing the excavations are in accordance with the Code of Practice for Archaeological Investigations in NSW). Subsurface testing is appropriate when a Potential Archaeological Deposit (PAD) has been identified, and it can be demonstrated that subsurface Aboriginal objects with potential conservation value have a high probability of being present, and that the area cannot be substantially avoided by the proposed activity. However, testing may only be undertaken as per the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2011) and following discussions/consultation with the local Aboriginal community.

No sites or PADs were identified and the investigation area is highly disturbed with low to no potential for in situ archaeological evidence of past occupation. Therefore, further investigation is not justified.

### 7.3 AHIP

If harm will occur to an Aboriginal object or Place, an AHIP is required from the OEH. An AHIP is required when a site is identified but its extent, the nature of its contents, level of

integrity and/or its significance cannot be adequately assessed through a surface survey. In this case, if a systematic excavation of the known site could provide benefits and information for the Aboriginal community and/or archaeological study of past Aboriginal occupation, a salvage program may be an appropriate strategy to further assess the site to determine its extent, nature, content, integrity and significance. The AHIP may also include surface collection of artefacts.

No sites or PADs were identified and as such an AHIP is not required.

#### 7.4 MONITORING

An alternative strategy for areas where archaeological deposits are predicted to occur is to monitor development works for cultural materials, predominantly during the initial earth moving and soil removal works. This was the main strategy for managing the possible occurrence of Aboriginal skeletal remains.

However, with the legislative changes, due diligence process and AHIP restructuring, monitoring is not an option as if there is even a slight possibility of cultural materials being present, this must be addressed through the due diligence process (Archaeological Due Diligence Assessment) and Code of Practice.



## 8 RECOMMENDATIONS

### 8.1 GENERAL

- 1) The persons responsible for the management of on site works will ensure that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974.

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# ANNEX A

## AHIMS Search Results

Cheryl Brown  
PO Box 1967  
Hurstville New South Wales 2220  
Attention: Cheryl Brown

Date: 02 July 2013

Email: cheryl.brown@environment.nsw.gov.au

Dear Sir or Madam:

**AHIMS Web Service search for the following area at Datum :AGD, Zone : 56, Eastings : 504000 - 514000, Northings : 6731000 - 6741000 with a Buffer of 50 meters, conducted by Cheryl Brown on 02 July 2013.**

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

|          |  |
|----------|--|
| <b>6</b> | <b>Aboriginal sites are recorded in or near the above location.</b>          |
| <b>0</b> | <b>Aboriginal places have been declared in or near the above location. *</b> |

### **If your search shows Aboriginal sites or places what should you do?**

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(http://www.nsw.gov.au/gazette\)](http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

### **Important information about your AHIMS search**

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

## AHIMS Web Services (AWS)

Note: This Excel report shows the sites found in AHIMS on the 02/07/2013. If this date is not the same as the or letter.

| <u>Site ID</u> | <u>Site name</u>      | <u>Datum</u> | <u>Zone</u> | <u>Easting</u> | <u>Northing</u> | <u>Context</u> |
|----------------|-----------------------|--------------|-------------|----------------|-----------------|----------------|
| 13-1-0037      | Everlasting Swamp, Wo | AGD          | 56          | 508900         | 6734700         | Open site      |
| 13-1-0170      | Lawrence Downs Scarr  | AGD          | 56          | 504002         | 6737567         | Open site      |
| 13-4-0168      | Koolmac 2             | GDA          | 56          | 508127         | 6731592         | Open site      |
| 13-1-0182      | Lawrence Scar Tree    | AGD          | 56          | 509701         | 6737515         | Open site      |
| 13-4-0169      | Koolmac-3             | GDA          | 56          | 508160         | 6731448         | Open site      |
| 13-4-0176      | Koolmac-2 Redeposit   | GDA          | 56          | 508130         | 6731596         | Open site      |



original date of the Search Results letter obtained during the Basic Search, then the search results might be different. T

**Site status**

Valid  
Valid  
Partially Destroyed  
Valid  
Valid  
Valid

**Primary contact**

Searle

**Site features**

Burial : -  
Modified Tree (Carved or Scarred) : 1  
Artefact : 3  
Modified Tree (Carved or Scarred) : -  
Modified Tree (Carved or Scarred) : 1  
Artefact : 5

**Site types**

Burial/s

**Recorders**

Ray Kelly,Mr.T Donnelly  
Mr.John Willoughby  
ADISE Pty Ltd,Ms.Jacqu  
Mrs.Lisa Southgate  
Ms.Jacqueline Collins  
ADISE Pty Ltd,Ms.Jacqu

Your Ref Number :

Client Service ID : 105000

The PDF version of this report will always coincide with the Basic Search Results

| <u>Reports</u> | <u>Permits</u> | <u>Longitude GDA94</u> | <u>Latitude GDA94</u> |
|----------------|----------------|------------------------|-----------------------|
| 1501           |                | 153.09                 | -29.52                |
|                |                | 153.04                 | -29.49                |
| 101357,102468  |                | 153.08                 | -29.55                |
|                |                | 153.10                 | -29.49                |
|                |                | 153.08                 | -29.55                |
| Jelene Collins |                | 153.08                 | -29.55                |