UPGRADING THE PACIFIC HIGHWAY

Woolgoolga to Ballina Planning Alliance

UPGRADING THE PACIFIC HIGHWAY

Woolgoolga to Ballina Upgrade

Working Paper

Aboriginal Cultural Heritage Assessment

Woolgoolga to Wells Crossing Section

November 2012

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NSW GOVERNMENT Transport Roads & Maritime Services

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Preface

The purpose and scope of this working paper is to describe and assess Aboriginal cultural heritage impacts that would occur as a result of the upgrade of the Pacific Highway between Woolgoolga and Ballina (the project).

This working paper comprises four parts based on geography (from south to north):

- Woolgoolga to Wells Crossing
- Wells Crossing to Iluka Road
- Iluka Road to Woodburn
- Woodburn to Ballina.

The four parts reflect the previous development projects that now make up the project (Figure 1). These divisions have been retained for this Aboriginal heritage assessment primarily to maintain continuity in the Aboriginal community consultation and participation process from the previous development projects.

Each of the four parts is made up of two volumes:

- Volume 1 – Aboriginal cultural heritage assessment report (CHAR)
- Volume 2 – Appendices.
  - Appendix A: Archaeological assessment for the relevant section.
  - Appendix B: Glossary of terms used in the Cultural Heritage Assessment Reports.
  - Appendix C: The Director-General's environmental assessment requirements.
  - Appendix D and E: Records of past and previous consultation.
  - Appendix F: The matrix of the ancillary works area assessment.
  - Appendix G: Predictive model maps produced by the Office of Environment and Heritage.
  - Appendix H: Maps showing the location of survey coverage and areas highlighted for survey priority in the Office of Environment and Heritage's predictive modelling.
  - Appendix I: Details the coverage of survey undertaken.
  - Appendix J: Tabulated sub-surface test-excavation results.
  - Appendix K: Summary of all sub-surface testing undertaken.
  - Appendix L: Stratigraphic drawings of soil profiles encountered during sub-surface testing.
  - Appendix M: Photos of the sites investigated.
  - Appendix N: Analysis of artefact / material discovered during investigations.
  - Appendix O: Results of radiocarbon dating (Woodburn to Ballina only).
  - Appendix P: Results of the ground-penetrating radar investigation (Woodburn to Ballina only).

Together the volumes for these four parts make up the working paper on Aboriginal cultural heritage for the entire project.

Each cultural heritage assessment report (Volume 1) has the following structure:

- Introduction (Chapter 1) - provides a broad overview of the project and a general description of the study area. It also identifies the purpose and structure of this report.
- Legislative context (Chapter 2) - outlines the statutory requirements and context of the project with regard to the Aboriginal heritage investigations.
- Consultation (Chapter 3) - describes the consultation process undertaken and summarises the outcomes.
- Existing environment (Chapter 4) – outlines the desktop assessment undertaken to determine the existing heritage conditions prior to undertaking investigations within the Alliance, including geology, geomorphology, vegetation, natural resources and recorded Aboriginal archaeological sites.
- Aboriginal cultural assessment (Chapter 5) – provides the Aboriginal cultural assessment undertaken to identify Aboriginal cultural values within the region of the project, with a particular focus on the intangible and historic Aboriginal cultural places that are not necessarily identified during the archaeological assessment, which focuses on material and pre-contact archaeological sites.
- Summary of archaeological assessment (Chapter 6) – provides a summary of the archaeological field investigations undertaken for the project, including field survey and sample sub-surface test-excavation, and the archaeological sites identified through this process. The full archaeological assessment is presented in Volume 2, Appendix A.
- Significance assessment (Chapter 7) – describes the process and results of assessing the significance of all identified Aboriginal cultural heritage values identified within or adjacent to the project.
- Impact assessment (Chapter 8) – describes the process and results of assessing how the project will avoid or impact on Aboriginal heritage values.
- Management recommendations (Chapter 9) – describes the general and specific management recommendations proposed for the project to protect, minimise and mitigate impact to Aboriginal heritage values. Management recommendations are appropriate to the assessed significance of the sites and places and the proposed impact from the project, and were developed with input from registered Aboriginal stakeholders.
- References (Chapter 10) – all references for each cultural heritage assessment report and archaeological assessment are presented in this chapter.

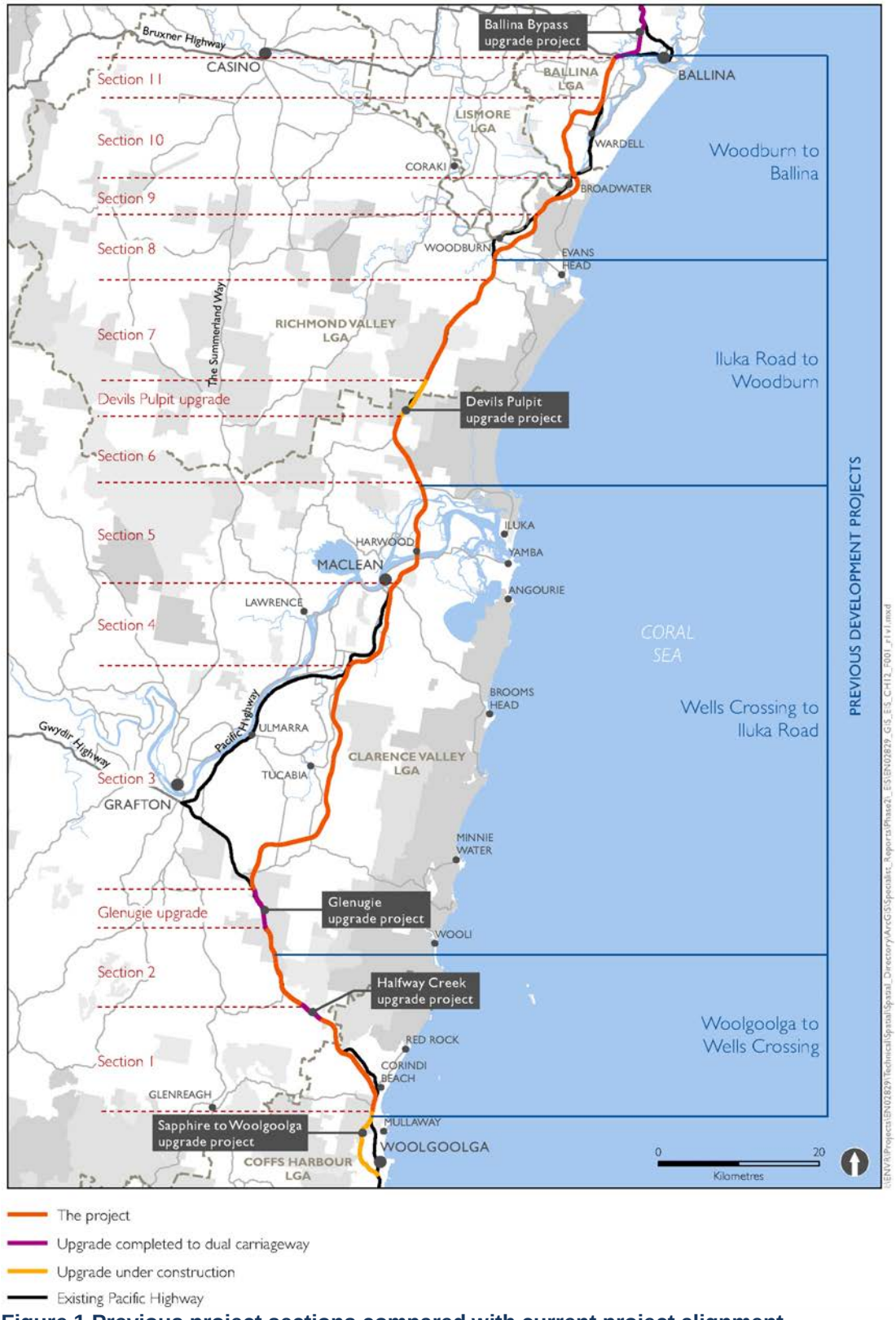

Figure 1 Previous project sections compared with current project alignment

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Executive summary

This report is the Aboriginal cultural heritage assessment report (CHAR) for the Woolgoolga to Ballina Pacific Highway Upgrade (the project), from Woolgoolga to Wells Crossing. The purpose of this CHAR is to describe and assess potential Aboriginal cultural heritage impacts created by the proposed upgrade of the Pacific Highway between Woolgoolga and Wells Crossing. This report has been prepared to inform the Environmental Impact Statement (EIS) and is generally consistent with the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (Department of Environment and Conservation [DEC] 2005).

This CHAR considers work undertaken during both the route option phase and the detailed assessment phase, and includes discussions on all aspects relating to consultation, environmental background, the archaeology and cultural heritage values present, significance and impact assessments, and management recommendations. The archaeological assessment component of this report is included as Appendix A in Volume 2, while a summary of this assessment is included in this report.

The Woolgoolga to Ballina upgrade of the Pacific Highway is described in 11 sections. This CHAR reports on sections 1 and 2 between Woolgoolga and Wells Crossing.

Consultation

Aboriginal stakeholders have been involved throughout the project between Woolgoolga and Wells Crossing to date and consultation has been undertaken in accordance with the Roads and Maritimes Services' (RMS) Procedure for Aboriginal Cultural Heritage Consultation and Investigation 2011 (PACHCI), and the Office of Environment and Heritage's (OEH) Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (ACHCRP), (as well as the now redundant Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation [DEC 2005], and Interim Community Consultation Requirements for Applicants [Department of Environment and Climate Change 2005]). This included Aboriginal community involvement at Aboriginal focus group meetings during the route development and concept design phases; reviewing and commenting on draft reports, and undertaking fieldwork activities.

Assessment findings

The full archaeological assessment for Woolgoolga to Wells Crossing can be found in Volume 2, which accompanies this document. The structure of the archaeological assessment was a process of building on previous assessment through ongoing consultation and revision.

A total of 2,856,252 square metres (99 per cent) of the Woolgoolga to Wells Crossing sections was subject to field survey; initially between 2005 and 2007, then for the current stage of investigations between 2010 and 2012. The remaining area was assessed as not requiring survey.

From the survey, a total of three stand-alone potential archaeological deposits (PADs), six stand-alone sites and eight sites with PAD components were identified to be near or within the boundary of the project between Woolgoolga and Wells Crossing. One previously recorded site (Pacific Highway Scarred Tree 1) was inspected and determined to not be a site. Following further inspection, one PAD and one site were determined to not be located within the boundary of the project. Consequently, two stand-alone PADs, and 13 sites (eight of which have PAD components) occur within the boundary of the project, leading to a total of 10 areas (made up of two stand-alone

PADs and eight PADs within sites) identified to have the potential for low-moderate or higher amounts of sub-surface material.

During sub-surface testing of PADs (either stand-alone PADs or PADs associated with sites), a total of nine PADs were excavated (one low risk PAD was inaccessible during the assessment); five contained sub-surface archaeological deposits. As a result of the sub-surface testing, the extent and significance of five sites was explored, and as the one standalone PAD test-excavated yielded no archaeological material, it was no longer considered to have archaeological potential.

Five Aboriginal cultural places were identified within the boundary of the project, but only one will be impacted by the project. A total of one PAD and nine out of 14 archaeological sites near or within the boundary of the project will be impacted by the project.

Management recommendations

A number of management recommendations were developed for Aboriginal cultural places and archaeological sites within the boundary of the project between Woolgoolga and Wells Crossing. A summary of the recommendations for archaeological sites is included below, while Section 9 includes full recommendations for both archaeological sites and Aboriginal cultural places.

Table 1-1 Summary of recommendations for archaeological sites

Management recommendations	Number of sites	Name of site
Collection and comprehensive salvage excavations (mechanical). Detailed analysis and reporting of cultural material. Dating of cultural material where applicable. Inspection following clearing for road works.	2	WWC39 WWC46
Inspection following clearing for road works. Collection of artefacts. Detailed analysis and reporting of cultural material.	7	WWC18 Sherwood North WWC37 WWC53 WWC78 WWC135 WWC138
Further investigation of PAD.	1	WWC Dirty Creek 1
An exclusion zone put in place to ensure incidental damage does not occur to site.	2	WWC26 WWC139
None – not impacted by the project.	5	WWC5 WWC7 WWC92 IA2 WWC115

Abbreviations

ACHCRP 2010	Aboriginal Cultural Heritage Consultation Requirements for Proponents
AFG/s	Aboriginal focus group/s
AHIMS	Aboriginal heritage information management system
AHIP	Aboriginal heritage impact permit
ASIRF	Aboriginal site impact recording form
CHAR	Cultural heritage assessment report
DEC	NSW Department of Environment and Conservation (now the Office of Environment and Heritage)
DECC	NSW Department of Environment and Climate Change (now the Office of Environment and Heritage)
DECCW	NSW Department of Environment, Climate Change and Water (Now the Office of Environment and Heritage)
DP&I	NSW Department of Planning & Infrastructure
E	Easting
EIS	Environmental impact statement
EPA	Environmental protection agency
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
g	Gram/s
GIS	Geographic information system
GPS	Global positioning system
H	High
ha	Hectare/s
ICOMOS	International Council on Monuments and Sites
km	Kilometre/s
L	Low
LALC	Local Aboriginal land council

LEP	Local environmental plan
LGA	Local government area
m	Metre/s
M	Moderate
mm	Millimetre/s
MPC	Multiplatform core
N	Northing
n	Number
N/A	Not applicable
NPW Act	National Parks and Wildlife Act 1974
NPWS	NSW National Parks and Wildlife Service (part of the OEH)
NSW	New South Wales
OEH	Office of Environment and Heritage
PACHCI	Procedure for Aboriginal cultural heritage consultation and investigation
PAD	Potential archaeological deposit
RTA	Roads and Traffic Authority of NSW
RMS	NSW Roads and Maritime Services
SKM	Sinclair Knight Merz Pty Ltd
SPC	Single platform core
STP	Shovel test pits
TBA	To be announced
TBC	To be confirmed
UNESCO	United Nations educational, scientific and cultural organisation

1. Introduction

1.1. Overview

The RMS is seeking approval under Part 5.1 of the *Environmental Planning and Assessment Act 1979* to upgrade around 155 kilometres of the Pacific Highway from Woolgoolga to Ballina.

The purpose of this CHAR is to describe and assess Aboriginal cultural heritage impacts that would occur as a result of the proposed upgrade of the Pacific Highway between the Woolgoolga and Wells Crossing sections of the project. This CHAR has been prepared to inform the EIS, which accompanies the project approval application.

This CHAR covers the project from Woolgoolga to Wells Crossing; three other reports have been prepared that cover the sections from Wells Crossing to Iluka Road, Iluka Road to Woodburn, and Woodburn to Ballina.

1.2. Study objectives and scope

1.2.1. Objectives

The purpose of this study is to undertake a detailed assessment of Aboriginal heritage within the boundary of the project between Woolgoolga and Wells Crossing to determine the level of impacts from the project.

The objectives of this Aboriginal cultural heritage assessment report are to:

- Undertake an Aboriginal cultural heritage assessment, including an archaeological assessment, in accordance with relevant guidelines.
- Prepare a technical paper which addresses the Department of Planning and Infrastructure (DP&I) Director-General requirements.
- Summarise and present the cultural heritage assessment to ensure that potential impacts have been assessed and issues finalised, to allow an informed decision to be made by all stakeholders.

The Aboriginal heritage assessment is presented in two volumes:

- Volume 1: Cultural heritage assessment report.
- Volume 2: Archaeological assessment (Appendix A), and supporting documentation (Appendices B – N).

1.2.2. Scope of assessment

Broadly, the scope of the Aboriginal cultural heritage assessment was as follows:

- Meet the DP&I Director-General's environmental assessment requirements.
- Identify gaps in previous Aboriginal heritage assessment (Kuskie 2008) and address these through further desktop assessment.
- Undertake comprehensive Aboriginal stakeholder consultation (both through meetings and field investigations).
- Undertake field investigations (survey and test excavation) with registered Aboriginal party site officers to investigate known sites and identify and test PADs to better define the Aboriginal cultural heritage values within the boundary of the project.
- Undertake a significance assessment of the sites and places identified. This includes both scientific (archaeological) and cultural (determined by Aboriginal stakeholders).
- Provide an assessment of the potential impact/harm to Aboriginal cultural heritage sites and places.
- Develop management recommendations in consultation with registered Aboriginal parties in order to ensure that prior to, during and after construction Aboriginal cultural heritage sites and places are effectively managed. The level of management required would be based on the identified impacts and the significance of the site or place.
- Provide a completed CHAR for the project.

1.2.3. Study requirements

The investigations and assessments were undertaken with regard to the OEH's Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales 2010, Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales (NSW) (OEH 2011), the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 and the now obsolete Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005).

This assessment has been undertaken in compliance with RMS' PACHCI.

Additionally, this assessment was based upon the DP&I Director-General's environmental assessment requirements issued on the 23 November 2011 for the project relating to Aboriginal heritage. Table 1-1 details the Director-General's environmental assessment requirements relating to Aboriginal heritage and where these are addressed within this report. These requirements require assessment of the impacts to sites and places 'within or near' the boundary of the project. However, it should be noted that areas near but outside the boundary of the project have not been able to be comprehensively investigated or surveyed, and no sub-surface investigation was undertaken, as this is beyond the scope and authority of this assessment.

Table 1-1 Director-General's environmental assessment requirements for key issue Aboriginal heritage

Requirements	Where addressed in report?
Including but not limited to: Investigation of impacts to Aboriginal heritage (including cultural and archaeological significance), in particular impacts to Aboriginal heritage sites identified within or near the project should be assessed.	Chapter 5, 6, 7 and 8
Where impacts are identified, the assessment shall: ▪ Outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of these measures), generally consistent with the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (Department of Environment and Conservation 2005).[1]	Chapter 3 and 9
▪ The assessment shall be undertaken by a suitably qualified heritage consultant.	Chapter 6 Chapter 2
▪ The assessment shall demonstrate effective consultation with Aboriginal communities in determining and assessing impacts and developing and selecting options and mitigation measures (including the final proposed measures).	Chapters 3 and 9 Volume 2
▪ The assessment shall develop an appropriate archaeological assessment methodology, including research design, to guide physical archaeological test excavations of the areas of PAD identified in a manner that establishes the full spatial extent and significance of any archaeological evidence across each area of PAD, and include the results of these excavations.	Chapter 6 Volume 2

This Aboriginal cultural heritage assessment report was undertaken by fully qualified and experienced archaeologists and heritage consultants, primarily Joseph Brooke (Bachelor of Archaeology (Honours), 6 years experience), Robyn Jenkins (Bachelor of Arts, Bachelor of Social Science (Honours), and 5 years experience), and Vanessa Edmonds (Bachelor of Arts, Master of Letters, 25 years experience).

[1] These guidelines have been superseded by Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (OEH). Both the 2010 requirements and the 2005 guidelines are followed in this CHAR.

1.2.4. Definitions

In this report, the term 'site' and 'place' are used to refer to Aboriginal archaeological sites (the same as *objects* in the *National Parks and Wildlife Act 1974*), and intangible or non-archaeological Aboriginal cultural places (not necessarily declared *Aboriginal places* as per *National Parks and Wildlife Act 1974*), respectively.

The term 'project' is used to refer to, and includes, the construction and operational footprints of the Woolgoolga to Ballina upgrade of the Pacific Highway, that is, approximately 155 kilometres of proposed upgraded highway.

The capitalised term 'Section' has been used to refer to a section in this report (eg Section 2.1.2), whereas the non-capitalised term 'section' or 'sections' has been used to generally describe the particular section or sections of the project from Woolgoolga to Wells Crossing (eg section 1 or 2 – refer to Table 1-2 below).

1.2.5. Study area

The area subject to this assessment includes the section of the project between Woolgoolga and Wells Crossing. The project within the context of the region is shown in Figure 1-1. The alignment and scope of the project is shown in Figure 1-2.

The boundary of the project is generally 100 metres wide with interchanges and areas of large cutting and earth embankments typically being wider. The operational footprint of the project includes ancillary elements, such as local access roads and permanent water quality basins, all of which are located within the project design boundary – referred to as the boundary of the project. The study area encompasses the boundary of the project and any peripheral land areas where indirect impacts may occur. Finally, the study region is discussed in terms of the general landscape in which the project is located, which in the broader context is the NSW North Coast region.

The future delivery of the project would be staged in sections based on upgrade need and availability of funding. For the purposes of planning this future staging, the project has been divided into 11 indicative sections as shown in Figure 1-2 and listed in Table 1-2.

For the purposes of this report, only the project between Woolgoolga and Wells Crossing is examined, specifically project section 1 and section 2 (Table 1-2).

Table 1-2 Summary of project sections in relation to the CHAR assessments (bold type indicates Woolgoolga to Wells Crossing project section assessed in this report)

Project section	Location	Relevant section and Aboriginal focus group
1	**Woolgoolga to Halfway Creek**	**Woolgoolga to Wells Crossing**
2	**Halfway Creek to Glenugie upgrade**	**Woolgoolga to Wells Crossing**
3	Glenugie upgrade to Tyndale	Wells Crossing to Iluka Road
4	Tyndale to Maclean	Wells Crossing to Iluka Road
5	Maclean to Iluka Road, Mororo	Wells Crossing to Iluka Road

Project section	Location	Relevant section and Aboriginal focus group
6	Iluka Road to Devil's Pulpit upgrade	Iluka Road to Woodburn
7	Devil's Pulpit upgrade to Trustums Hill	Iluka Road to Woodburn
8	Trustums Hill to Broadwater National Park	Iluka Road to Woodburn and Woodburn to Ballina
9	Broadwater National Park to Richmond River	Woodburn to Ballina
10	Richmond River to Coolgardie Road	Woodburn to Ballina
11	Coolgardie Road to Ballina bypass	Woodburn to Ballina

1.3. The project

1.3.1. Project description

The project between Woolgoolga and Wells Crossing would achieve four lanes of divided highway from about five kilometres north of Woolgoolga to about six kilometres south of Ballina. The general location of the project is shown in Figure 1-1 and an overview of the project is shown in Figure 1-2.

Key features of the project would include:

- A class M (motorway standard) highway, comprising a four-lane dual carriageway (two lanes in each direction) that can be upgraded to a six-lane dual carriageway in the future, if required.
- Grade-separated interchanges to provide access to and from the upgraded highway.
- Bridges for waterway crossings.
- Overbridges and underpasses to maintain access along local roads crossed by the upgraded highway.
- Viaduct structures in places where the upgraded highway would traverse low-lying or flood-prone areas.
- Service roads and access roads to maintain connections to existing local roads and properties.
- Rest areas located at 50 kilometre intervals for both northbound and southbound traffic.
- Structures to facilitate fauna passage over and under the upgraded highway.

In addition to the construction footprint, ancillary areas are required adjacent to the boundary of the project for construction. The impact of these ancillary areas would vary due to the different levels of ground disturbances required for each of the works. Ancillary areas would include:

- Main and satellite compound areas.
- Stockpile areas.
- Plant and workshops.
- Vehicle parking.
- Bridge construction areas.
- RMS site office.
- Materials processing areas.

The approval sought is for a class M upgrade standard, however, staging of the project would result in some sections being initially constructed to a class A (arterial) upgrade standard (Table 1-3).

1.3.2. Project route development

Planning for the project commenced in 2004 and has involved ongoing community consultation and environmental investigations. Route selection and concept design development was completed in four sections, which are referred to throughout this document as the 'previous development projects'. The four previous development projects were:

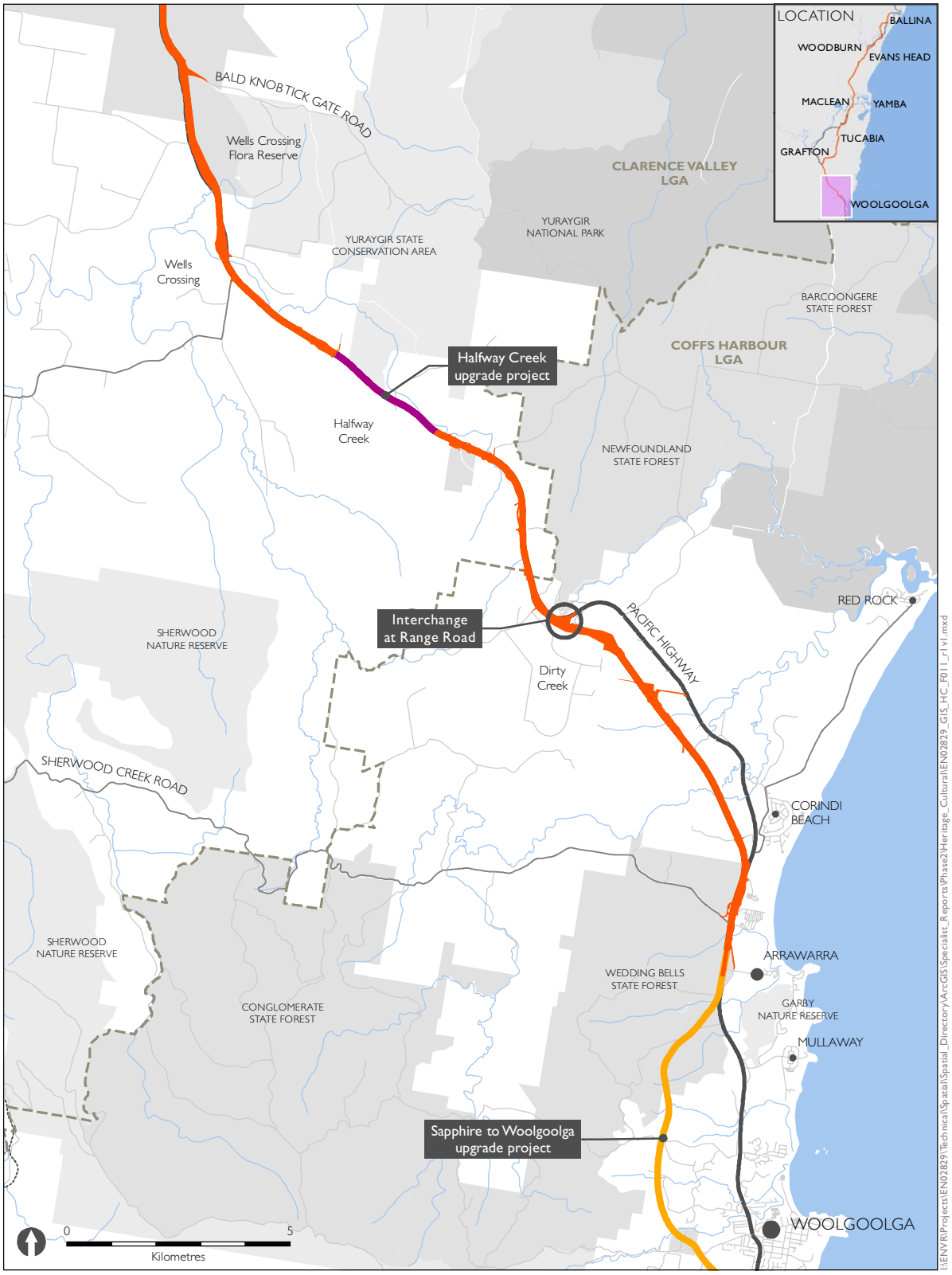
- **Woolgoolga to Wells Crossing (this CHAR).**
- Wells Crossing to Iluka Road.
- Iluka Road to Woodburn.
- Woodburn to Ballina.

The route development process for the previous development project between Woolgoolga and Wells Crossing typically involved the following steps:

- Assessing preliminary information on engineering, environmental, social and economic constraints.
- Identifying and developing potential route options.
- Short-listing and refining feasible route options for further investigation.
- Comparing short-listed options in terms of functional, environmental, social and economic criteria, with input from the community and stakeholders.
- Selecting the preferred route and developing the concept design for the preferred route.

Additional documentation supporting the development of the preferred route and concept design for the project, including methodology, working papers and outcomes of community and stakeholder involvement, is available on the RMS website www.pacifichighwayupgrade.com.au (click on Woolgoolga to Ballina).

Figure 1-1 The project alignment - Woolgoolga to Wells Crossing



1.3.3. Previous Aboriginal heritage assessment

Aboriginal heritage assessment has previously been undertaken for this project between Woolgoolga to Wells Crossing earlier in the concept design phase of the project (Kuskie 2008). Kuskie's (2008) assessment commenced in 2005 and considered a 200 metre wide corridor along the same alignment as the current boundary of the project, with a few omissions due to more recent design changes. Kuskie (2008) aimed to identify Aboriginal heritage constraints for his assessment corridor, so that these could be considered in the concept design. Kuskie (2008) undertook:

- Consultation with relevant (at the time) Aboriginal stakeholders via an Aboriginal focus group (AFG) for the boundary of the project between Woolgoolga and Wells Crossing to identify known Aboriginal cultural places within the assessment corridor. Kuskie's (2008) consultation was in accordance with the Interim Community Consultation Requirements for Applicants (DEC 2005) and the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005).
- Field survey across the assessment corridor in April 2007 with representatives from the AFG, all within the current boundary of the project.

1.3.4. Project sections

The Woolgoolga to Ballina project is described in 11 sections as identified in Table 1-3 and depicted in Figure 1-2. Each of these sections has a start and end point which ties in to the existing highway, therefore assisting identification of project stages. Project stages may comprise one (or more than one) of those sections identified in Table 1-3. The sections relevant for this CHAR are sections 1 and 2, as highlighted in the table.

Table 1-3 Project sections (bold type indicates Woolgoolga to Wells Crossing project section assessed in this report)

Section	Location	Approximate chainage (m)		Length (km)	Initial upgrade standard
		Start	Finish		
1	**Woolgoolga to Halfway Creek** ***1a: Woolgoolga to Range Road*** ***1b: Range Road to Halfway Creek***	**0** **9650**	**9650** **17,000**	**9.6** **7.4**	**Class M** **Class A**
2	**Halfway Creek to Glenugie upgrade**	**17,000**	**28,700**	**11.7**	**Class A**
3	Glenugie upgrade to Tyndale	33,800	68,800	35.0	Class M
4	Tyndale to Maclean	68,800	82,000	13.2	Class M
5	Maclean to Iluka Road, Mororo *5a: Maclean to Watts Lane* 5b: *Watts Lane to Illuka Road*	82,000	96,400	14.4	 Class M Class A
6	Iluka Road to Devil's Pulpit upgrade	96,400	105,600	9.2	Class A

Section	Location	Approximate chainage (m)		Length (km)	Initial upgrade standard
7	Devil's Pulpit upgrade to Trustrums Hill	111,100	126,400	15.3	Class A
8	Trustrums Hill to Broadwater National Park	126,400	137,600	11.2	Class M
9	Broadwater National Park to Richmond River	137,600	145,100	7.5	Class M
10	Richmond River to Coolgardie Road	145,100	158,600	13.5	Class M
11	Coolgardie Road to Ballina bypass	158,600	164,000	5.4	Class M

Figure 1-2 Section 1 - Woolgoolga to Halfway Creek

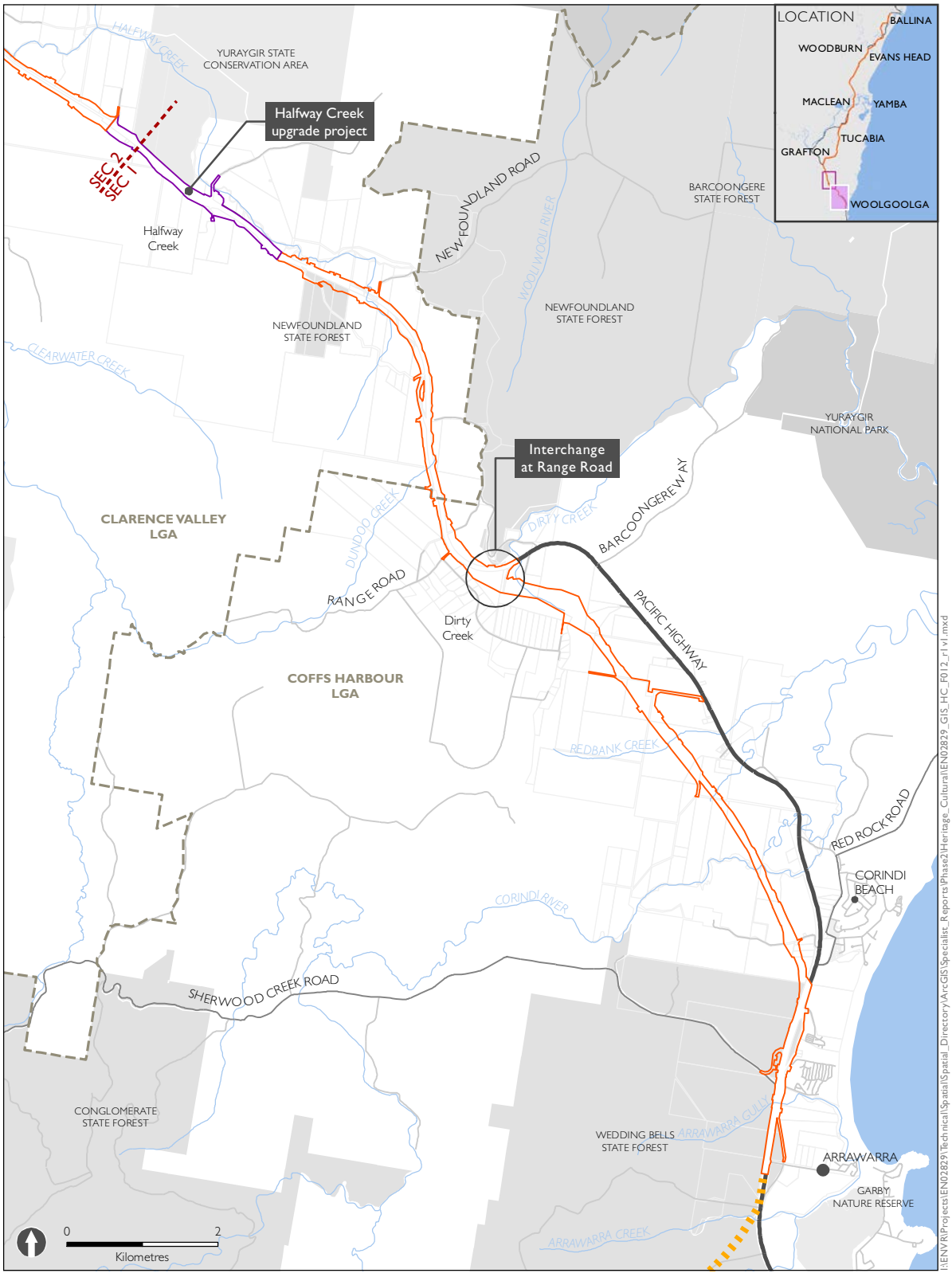
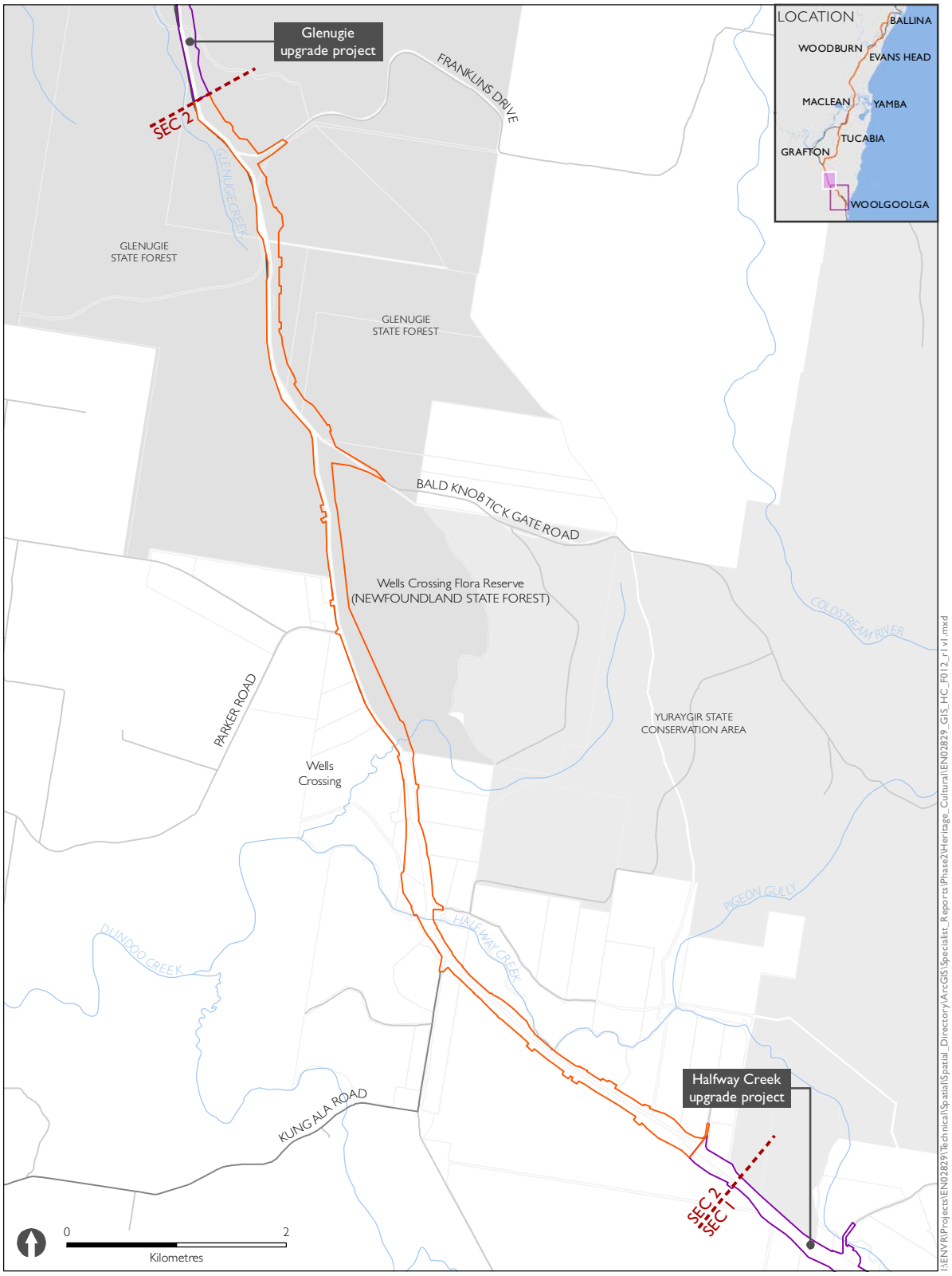


Figure 1-3 Section 2 - Halfway Creek to Glenugie upgrade



2. Legislative context

The following legislation is relevant to this investigation:

New South Wales

- *Environmental Planning and Assessment Act 1979.*
- *National Parks and Wildlife Act 1974.*
- *National Parks and Wildlife Amendment Act 2010.*
- *Native Title Act (NSW) 1994.*
- *Aboriginal Land Rights Act (NSW) 1983.*

Commonwealth

- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984.*
- *Environment Protection and Biodiversity Conservation Act 1999.*
- *Native Title Act 1993.*

Additionally, the United Nations' *Declaration on the Rights of Indigenous Peoples*, to which Australia is a signatory, also provides further legislative context.

These Acts and how their relevant sections and associated regulatory documents (eg codes of practice, guidelines, etc) govern the project are described in Table 2-1. It is important to note from Table 2-1 that this project has been assessed as 'state significant infrastructure' under Part 5.1 of the *Environmental Planning and Assessment Act 1979*. As such, an Aboriginal heritage impact permit (AHIP) under s.90 of the *National Parks and Wildlife Act 1974* would not be required to investigate Aboriginal objects within the project, provided that the investigation would address the DP&I Director-General's requirements (see Table 1-1).

Table 2-1 Legislative framework

Reference	Requirements
Environmental Planning and Assessment Act 1979	▪ Framework for environmental planning and assessment in NSW. Including the requirement for environmental impacts to be considered prior to development approval. ▪ Includes requirements for Aboriginal cultural heritage items and places. ▪ Local government areas (LGAs) prepare local environmental plans (LEPs) and development control plans in accordance with the Act to provide guidance on the level of environmental assessment required. ▪ Part 5.1 of the Act applies to state significant infrastructure. ▪ Under Part 5.1 section 115ZG, a range of approvals are not required, including Section 90 AHIP. Once environmental assessment requirements are issued by the Director-General of Planning and Infrastructure for a Part 5.1 project, any investigative or other activities complying with the requirements are also taken to be part of the project approval.

Reference	Requirements
National Parks and Wildlife Act 1974	■ Administered by the OEH. ■ Serves to protect Aboriginal objects and Aboriginal places in NSW. ■ Under the terms of the *National Parks and Wildlife Act 1974*, any person who harms an Aboriginal object is guilty of an offence. ■ An Aboriginal object (s5) is defined as: 'any deposit, object or material evidence (not being a handicraft for sale) relating to Aboriginal and non-European habitation of the area that comprises New South Wales, being habitation both prior to and concurrent with the occupation of that area by persons of European extraction, and includes Aboriginal remains.' ■ An Aboriginal place is an area that has been declared by the Minister as a place of special significance for Aboriginal culture. It may or may not contain physical Aboriginal objects. ■ Aboriginal heritage information system (AHIMS) – Register for identified Aboriginal objects or places. ■ An AHIP is needed to undertake a number of activities, relevant to development are those issued under section 90 of the Act (though the project is exempt from applying for AHIPs under Part 5.1 section 115ZG of the *Environmental Planning and Assessment Act 1979)*. ■ AHIP applications must be submitted and approved by the OEH. ■ New procedures that accompany the *National Parks and Wildlife Amendment Act 2010* include, the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales 2010, the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010, and the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW 2010.
Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales 2010	■ The *National Parks and Wildlife Act 1974* provides that a person who exercises due diligence in determining that their actions will not harm Aboriginal objects has a defence against prosecution for the strict liability offence if they later unknowingly harm an object without an AHIP. A due diligence code of practice has been developed to guide proponents on how to take due diligence and whether or not they should apply for an AHIP ■ Provisions relating to the due diligence system are effective from 1 October 2010.
Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (ACHCRP)	■ Establishes the requirements for consultation (under part 6 of the *National Parks and Wildlife Act 1974*) with Aboriginal stakeholders as part of the heritage assessment process to determine potential impacts of proposed activities on Aboriginal objects and places and to inform decision making for any application for an AHIP. ■ The ACHCRP comprises 4 stages with associated timeframes which must be adhered to: - **Stage 1** – Notification of project proposal and registration of interest (14 days from date letter sent to register as a registered Aboriginal party). - **Stage 2** – Presentation of information about the proposed project (set up Aboriginal focus group [AFG] meetings, prepare info, etc). - **Stage 3** – Gathering information about cultural significance (28 days for registered Aboriginal parties to provide a review and feedback to consultants' methodology). - **Stage 4** – Review of draft cultural heritage assessment report (registered Aboriginal parties have 28 days from sending of the report to make a submissions).

Reference	Requirements
Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales 2010	■ The Code sets out the detailed requirements for archaeological investigations of Aboriginal objects in NSW for activities that require assessment under Part 4 or Part 5 of the *Environmental Planning and Assessment Act 1979.* An AHIP to undertake test excavation is not required if complying with this Code, as test excavations complying with this Code are excluded from the definition of harm to an Aboriginal object. ■ The Code sets out in detail: - Minimum qualifications for anyone undertaking archaeological investigation under the Code in NSW. - Assessment steps required to be undertaken for all archaeological investigation. - Assessment steps that may be required to be undertaken to adequately characterise the Aboriginal objects being investigated. The Code must be used for investigation that is likely to result in an AHIP application. However, once the DP&I Director-General's environmental assessment requirements are issued, the project is exempt from the requirement to obtain an AHIP and hence also this code.
Aboriginal Land Rights Act (NSW) 1983	The *Aboriginal Land Rights Act* recognises the rights of Aboriginal people in New South Wales and provides a vehicle for the expression of self-determination and self-governance. The purposes of the Act are: ■ To provide land rights for Aboriginal persons in New South Wales, ■ To provide for representative LALCs in New South Wales, ■ To vest land in those LALCs, ■ To provide for the acquisition of land, and the management of land and other assets and investments, by or for those LALCs and the allocation of funds to and by those LALCs, ■ To provide for the provision of community benefit schemes by or on behalf of those LALCs.
Native Title Act (NSW) 1994	■ The *NSW Native Title Act 1994* was introduced to ensure that the laws of NSW are consistent with the Commonwealth *Native Title Act 1994*. It validates past and intermediate acts which may have been invalidated because of the existence of native title.
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	■ Protects Aboriginal cultural property in a wider sense and includes any places, objects and folklore that "are of particular significance to Aboriginals in accordance with Aboriginal tradition". ■ The Act may apply to contemporary Aboriginal cultural property as well as ancient sites. ■ The responsible Minister may make a declaration under Section 10 of the Act in situations where state or territory laws do not provide adequate protection of heritage places.
Environment Protection and Biodiversity Conservation (EPBC) Act 1999	■ The EPBC Act includes provisions to protect matters of national environmental significance and Commonwealth land. Lists and registers made under the Act include: - A National Heritage List of places of national heritage significance. - A Commonwealth Heritage List of heritage places owned or managed by the Commonwealth. - Management of the Register of the National Estate. An independent expert body, the Australian Heritage Council, advises the Minister on the listing and protection of heritage places.

Reference	Requirements
Native Title Act 1993	■ Recognises and protects native title, and provides that native title cannot be extinguished contrary to the Act. ■ National Native Title Tribunal is a Commonwealth Government agency set up under this Act and mediates native title claims under the direction of the Federal Court of Australia. ■ The National Native Title Tribunal maintains the following registers: - National Native Title Register. - Register of Native Title Claim. - Unregistered claimant applications. - Register of Aboriginal land use agreements.
Declaration on the Rights of Indigenous Peoples	The Declaration makes statements regarding the rights of Indigenous peoples, and expectations of States' roles in this. This includes, in Article 11, that Indigenous peoples have the right to 'maintain, protect and develop past present and future manifestations of their cultures', including archaeological sites. The Declaration is a non-binding instrument, but there is some discussion that it may be a reflection of customary international law, which would bind States to the provisions.

3. Consultation

3.1. Consultation and assessment process

Aboriginal stakeholder engagement and involvement has been important for the identification of Aboriginal cultural values of the project. This chapter details the consultation process used for the project between Woolgoolga and Wells Crossing. This includes the identification of registered Aboriginal parties and the nature of Aboriginal stakeholder consultation and involvement in the assessment process.

3.1.1. Overview of consultation

The consultation undertaken to date has followed relevant government and RMS consultation guidelines. However, consultation for this project has been undertaken over a long period and consequently has occurred under several consultation frameworks.

The relevant frameworks are:

- Initial consultation with stakeholders began in 2006, as part of the concept design investigations for Woolgoolga to Wells Crossing (Kuskie 2008), and followed the Interim Community Consultation Requirements for Applicants (NSW Department of Environment and Climate Change [DECC] 2005).
- In 2010, when the environmental impact assessment for the project commenced, consultation was continued under the existing framework in accordance with transitional arrangements to the Aboriginal Cultural Heritage Consultation Requirements for Proponents (NSW Department of Environment, Climate Change and Water [DECCW] 2010).
- In 2011, after the transitional arrangements had been repealed, the Roads and Traffic Authority (now RMS) proceeded to bring the consultation process up to date with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010), including re-advertising and notifying potential interested parties. These changes were addressed by a revision of the PACHCI in 2011.

The Director-General of the DP&I has issued environmental assessment requirements for the project (Table 1-1), which include assessment of impacts to Aboriginal heritage, and mitigation and management measures to be generally consistent with the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005). These guidelines have now been superseded by the Aboriginal Cultural Heritage Consultation Requirements for Proponents (ACHCRP) (DECCW 2010), which are followed in this assessment. As the 2010 and 2005 consultation requirements are broadly similar (with the 2010 requirements being generally more rigorous), this assessment remains consistent with the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005), and consequently the Director-General requirements. The Director-General requirements also require consultation with local Aboriginal land councils and Aboriginal stakeholders relevant to the project; the project also complies with this requirement.

It should be noted that there are no Native Title holders within the project, as Native Title holders have specific rights in relation to cultural heritage. Several claimants exist for the project; see below for more discussion on this.

Relevant guidelines and the previous and current consultation are detailed below.

3.2. Consultation and assessment requirements

3.2.1. Roads and Maritime Services consultation procedure

Consultation with registered Aboriginal parties followed the process described in the PACHCI (RMS 2011). This aimed to ensure that registered Aboriginal parties had the opportunity to contribute to the assessment through:

- The development and design of the cultural heritage assessment methodologies.
- The identification of Aboriginal heritage constraints to be considered within the design.
- The development of recommendations for the management of archaeological sites within the boundary of the project.

Consultation for the project between Woolgoolga and Wells Crossing was completed up to and included Stage 3 of the 2011 PACHCI procedure for projects assessed under Part 5.1 of the *Environmental Planning and Assessment Act 1979*. The stages of PACHCI are:

- Stage 1 – Internal RMS assessment to identify key environmental issues.
- Stage 2 – Further assessment and site survey, with an archaeologist and specific Aboriginal stakeholders to assess the project's potential cultural heritage impacts.
- Stage 3 – Where Stages 1 and 2 lead to the preliminary view that harm to Aboriginal objects or places is likely to occur, then formal consultation must be undertaken and a cultural heritage assessment report prepared. This may also include sub-surface testing where required.
- Stage 4 – Implement project mitigation measures (eg salvage) in accordance with project approval.

3.2.2. Consultation requirements for proponents

The ACHCRP replace the Interim Community Consultation Requirements for Applicants (DEC 2005) and Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation. These requirements apply to all AHIP applications submitted after 12 April 2010. This project does not require any AHIPs, as it is being assessed under Part 5.1 of the *Environmental Planning and Assessment Act 1979*; consequently, these requirements do not strictly need to be applied. The consultation and assessment process for this project was commenced prior to ACHCRP (DECCW 2010). Therefore, a number of updates were undertaken to ensure all relevant Aboriginal stakeholders were included in the consultation process and also to transition the consultation process from the obsolete requirements to the new and current requirements.

The ACHCRP includes a process for the notification and registration of interested stakeholders, preparation for the Aboriginal cultural heritage assessment and the drafting, review and finalisation of an Aboriginal cultural heritage assessment report.

3.3. Previous Aboriginal community consultation

3.3.1. Aboriginal focus groups 2005-2007

The boundary of the project between Woolgoolga and Wells Crossing of the Pacific Highway Woolgoolga to Ballina upgrade project has been subject to several investigations at various stages, such as during route selection and previous development projects. During these stages, Aboriginal stakeholders were consulted at AFGs with regard to potential Aboriginal cultural heritage issues.

The studies for the Woolgoolga to Wells Crossing development projects were undertaken between 2005 and 2007 (Kuskie 2008). Two AFG meetings were held in 2006 and 2007 (Table 3-1), as well as field survey (covering approximately 90 per cent of the current boundary of the project) with Aboriginal site officers. Also a number of site visits were undertaken with knowledge holders to better define culturally sensitive areas (eg Halfway Creek Ceremonial site). The stakeholders were provided the proposed fieldwork methodology in February 2007 and an AFG meeting was held to discuss the methodology. All stakeholders agreed that the methodology was suitable and complete.

Table 3-1 AFG meetings held for Woolgoolga to Wells Crossing 2005-2007

Aboriginal focus group meetings	Dates
AFG 1	27 February 2006
AFG 2	7 February 2007

Site officers nominated to represent the AFG were invited to attend fieldwork activities and accompanied archaeologists during the survey period. AFG stakeholders were provided with a draft of the cultural heritage assessment for review and comment.

Details of the consultation record are provided in Volume 2. The following Aboriginal stakeholder organisations were invited to attend the Woolgoolga to Wells Crossing AFGs for investigations prior to 2010:

- Yarrawarra Aboriginal Corporation (incorporating the Garby Elders and Jalumbo Cultural Heritage Research Unit).
- Coffs Harbour and District Local Aboriginal Land Council (LALC).
- Grafton-Ngerrie LALC.
- NSW Aboriginal Land Council.

Although consultation for Woolgoolga to Wells Crossing followed the Interim Community Consultation Requirements for Applicants (DECC 2005), subsequent consultation conformed with the ACHCRP (DECCW 2010).

3.4. Current consultation activities

3.4.1. Methodology

The consultation strategy adopted in 2010 was to ensure continuity from previous consultation. The primary aims of the current consultation strategy were to:

- Re-engage stakeholders who had not been involved since the AFG in 2007.
- Transition to the ACHCRP process.
- Inform registered Aboriginal parties that RMS has now selected a route and that assessment is now in concept design phase, rather than route options assessment.

Where possible, the RMS Aboriginal Cultural Heritage Advisor with knowledge of the consultation from Woolgoolga to Wells Crossing attended AFGs. The current phase of consultation involved:

- Notification (including advertisement) for stakeholder registration for the AFG.
- Registration of registered Aboriginal parties for the AFG.
- Holding AFG meetings.
- Undertaking archaeological survey and sub-surface test excavations with the Aboriginal site officers nominated in AFG meetings.
- Providing assessment methodologies and statements of findings to the AFG and requesting comments.
- Providing stakeholders with a draft CHAR for comment. (*Pending*)
- Incorporating any comments received on the CHAR into the final report.*(Pending)*

In addition to the AFG meetings, consultation with nominated Aboriginal site officers was incorporated as part of the archaeological survey. Typical items discussed were:

- Options for mitigation of impact to Aboriginal sites and PADs.
- Potential significance of Aboriginal sites.
- Information pertaining to any Aboriginal cultural sites.
- Previous survey coverage and findings.

3.4.2. Aboriginal focus groups 2010 - 2012

Over the course of undertaking this Aboriginal cultural heritage assessment, a series of AFG meetings were held to ensure stakeholders were meaningfully engaged and had an opportunity to provide input and comment on the process.

Table 3-2 provides dates for AFG meetings held under this round of consultation. The minutes of these AFG meetings are provided in Volume 3.

Table 3-2 AFG meetings held for Woolgoolga to Wells Crossing 2010 - 2012

Aboriginal focus group meetings	Dates
AFG 1	19 August 2010
AFG 2	15 September 2010
AFG 3	5 October 2011
AFG 4	13 December 2011
AFG 5	26 June 2012

For AFGs 1 - 2, a background to the project between Woolgoolga and Wells Crossing was presented to the group. Discussions were held over large-scale plans showing the project design boundaries, previously surveyed areas and registered Aboriginal sites and PADs. A separate plan for each AFG relevant only to their area was provided at the meetings. The primary aims of the first round of AFG meetings were to:

- Explain the concept design phase of project.
- Inform the Registered Aboriginal parties that further targeted archaeological survey was proposed along the boundary of the project (following identification of gaps in survey coverage) and present the methodology for this survey.
- Request Aboriginal site officer assistance with that survey (following the RMS procedures for engagement).
- Discuss any issues arising from the presentation and discussion.

One AFG meeting was held after completion of the field survey. The primary aims of this were to:

- Present the results of the archaeological survey.
- Discuss the significance of any new Aboriginal cultural heritage sites recorded within the boundary of the project.
- Discuss potential mitigation strategies for sites recorded in the boundary of the project.
- Present the archaeological and cultural methodologies for assessment of PADs in the boundary of the project.

After the majority of the sub-surface testing program had been completed AFG 4 was held. The primary aims of this AFG meeting were to:

- Present the results of the sub-surface testing program.
- Discuss the significance of the Aboriginal cultural heritage sites recorded within the boundary of the project.
- Discuss management recommendations, including the development of salvage and protection requirements.

3.4.3. Notification, identification and registration of stakeholders

Letters were distributed to a number of agencies on 28 July 2011 with a closing date of 29 August 2010, seeking names of Aboriginal people who may have an interest in the project and who hold knowledge relevant to determining the cultural significance Aboriginal objects and/or places. These agencies were:

- The Office of the Registrar of the *Aboriginal Land Rights Act 1983*.
- OEH.
- Relevant LALCs.
- Relevant local councils.
- The National Native Title Tribunal.
- Native Title Services Corporation Limited.
- Northern Rivers Catchment Management Authority.

The OEH nominated 10 potential stakeholders. Letters were sent on the 26 August 2011 to those nominated stakeholders seeking registration of interest. The closing date for registration was 7 October 2011.

Advertisements appeared in August and September 2011 in the following publications:

- *Grafton Daily Examiner* (25 August).
- *Coffs Coast Advocate* (25 August).
- *Yamba Clarence Valley Review* (31 August).
- *National Indigenous Times* (15 September).
- *The Koori Mail* (7 September).

During the first round of AFG meetings, it was noted that additional Native Title claimants may exist for the project. A Native Title search was conducted on 2 September 2010; no new Native Title claimants were identified as stakeholders for this area.

3.4.3.1. Summary of issues raised at Aboriginal focus group meetings

Only one issue was raised at AFG 1 and 2, which related to the restrictions placed on pay rates by the RMS PACHCI document.

At the third AFG meeting, the only issue raised was the impact a refinement of the corridor near Eggins Drive could have on an artefact.

While the fifth AFG meeting was held on the 26 June 2012, no Aboriginal representatives were in attendance. Project issues were then discussed at the Wells Crossing to Iluka Road AFG.

3.4.4. Participation in fieldwork

During fieldwork, nominated Aboriginal site officers were engaged to assist with the identification and investigation of sites and PADs during survey and sub-surface test excavations, as well as to identify any cultural places. Site officers in attendance during those surveys are detailed in Table 3-3.

Notable comments from site officers during that fieldwork included (from Coffs Harbour LALC and Yarrawarra (Garby Elders) site officers):

- Details of the importance and sensitivity of landforms in the respective areas.
- Discussion of the type, scope and methodology for potential further investigation (eg survey, sub-surface testing, etc).

Table 3-3 Site officers participating in field assessments

Organisation	Name	Role	Dates of participation
Yarrawarra Cultural Centre (Garby Elders)	Milton Duroux	Senior Aboriginal Site Officer	25 August 2010 7 October 2011 14 November 2011 – 18 December 2011 8 March 2012 12 March 2012
Yarrawarra Cultural Centre (Garby Elders)	Anthony Dootson	Trainee Aboriginal Site Officer	25 August 2010 7 October 2011 14–20 November 2011
Yarrawarra Cultural Centre (Garby Elders)	Tim Cowan	Senior Aboriginal Site Officer (volunteer)	25 August 2010
Yarrawarra Cultural Centre (Garby Elders)	Rick Cain	Site Officer	21 November 2011 – 11 December 2011
Yarrawarra Cultural Centre (Garby Elders)	Noeline Kennedy	Trainee Site Officer	12–18 December 2011
Yarrawarra Cultural Centre (Garby Elders)	Noeline Dootson	Trainee Site Officer	8 March 2012 12 March 2012
Garlambirla Guuyu-girrwaa Corporation	Mark Ferguson	Senior Aboriginal Site Officer	25 August 2010 7 October 2011 21 November 2011 – 4 December 2011 12–18 December 2011 12 March 2012
Grafton-Ngerrie LALC	Rod Duroux	Senior Aboriginal Site Officer	14–20 November 2011 8 March 2012 12 March 2012

Organisation	Name	Role	Dates of participation
Grafton-Ngerrie LALC	Brett Duroux	Site Officer	14–20 November 2011 8 March 2012
Coffs Harbour LALC	Ian Brown	Senior Aboriginal Site Officer	25 August 2010
Coffs Harbour LALC	Mark Flanders	Senior Site Officer	7 October 2011 21 November 2011 – 18 December 2011 12 March 2012
Coffs Harbour LALC	Jake Kennedy	Trainee Site Officer	21 November 2011 – 18 December 2011

3.4.5. Aboriginal stakeholder comment on cultural heritage assessment report

The final draft of this CHAR and associated archaeological assessment and appendices were provided to stakeholders for comment on 26 June 2012. Comments and recommendations made within eight weeks of this date by Aboriginal stakeholders are summarised in Table 3-5, and included in full in Appendix E. Changes requested and based on comments were considered and were incorporated into this CHAR where possible.

Table 3-4 Comments received from Aboriginal stakeholders on the draft CHAR between Woolgoolga and Wells Crossing

Registered stakeholder group	Received comments?	Comments
Yarrawarra Aboriginal Corporation (incorporating the Garby Elders Group)	Yes	They have looked over some parts of the CHAR; they said the reports were good, and they are happy with the recommendations.
Grafton-Ngerrie LALC	Yes	Received a 5 page list of comments stating general unhappiness with the process of consultation and the recommendations. Also requested that some legislation needed to be added to the relevant sections.
Garlambirla Guuyu-girrwaa Corporation	Yes	Received comments that grinding grooves and ceremonial sites are not always visible from the surface. GGG need to be informed if the road alignment shifts at all. Cultural heritage awareness training needs to be provided to all people who are working on country delivered by the local group. All recommendations made by the site officers should be taken into account by the archaeologists. Site officers should be able to oversee all works.

Registered stakeholder group	Received comments?	Comments
Coffs Harbour and District LALC	Yes	Received comments that grinding grooves and ceremonial sites are not always visible from the surface. GGG need to be informed if the road alignment shifts at all. Cultural heritage awareness training needs to be provided to all people who are working on country delivered by the local group. All recommendations made by the site officers should be taken into account by the archaeologists. Site officers should be able to oversee all works.

3.5. Consultation with government agencies

Consultation was undertaken with government agencies throughout the project, including with the Department of Planning and Infrastructure (DP&I) to gain Director-General's requirements.

Regular consultation was undertaken with OEH/EPA to ensure alignment of values, approach and methodologies. Regular meetings were held to discuss the approach proposed, and requesting comments, particularly in regards to transitioning from previous requirements to current requirements (eg ACHCRP, and the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales [OEH 2010]). The methodologies and research design for proposed investigations were discussed with OEH during these meetings, prior to their implementation. Meetings also discussed impacts to sites and places and appropriate ways to manage these.

4. Existing environment

This chapter provides an overview of the land use, cultural, geological conditions that characterise the sections of the boundary of the project between Woolgoolga and Wells Crossing.

The information provided relates specifically to those factors which affect archaeological site distribution and preservation. Interpretation relating to landforms, geology, soils, and vegetation are made from an archaeological perspective and may not necessarily accord to scientific reports on these subjects. For example, descriptions may be different than that standard to geology and geography.

Land systems are mutually exclusive complexes that contain similar environmental components such as climate, geology, landform, soil and indigenous vegetation (Rowan 1990). Land systems form useful discrete units for describing and analysing the landscape.

4.1. Regional context

This review of the existing environment is arranged into land systems in order to build a context for the archaeological assessment. Several land systems occur within the boundary of the project and are summarised in Table 4-1.

Table 4-1 Summary of land systems within the boundary of the project

Project section	Land system	Location within/near the boundary of the project	Specific landscape characteristics
1	Coastal plain	Arrawarra and south of Corindi Wells Crossing, Halfway Creek, ending around Dirty Creek	Relatively flat plain behind dune barrier on coast, with depressions comprising brackish lagoons, swamps and marshes.
1,2	Coastal range (includes Coast Range and Dirty Creek Range)	Woolgoolga and Wells Crossing Corindi River, Dirty Creek	Ridgelines dissected by ephemeral and permanent waterways and small river valleys. Overlooking Coastal Plain and swamps. Foot slopes and spurs of range adjacent valley flats. Gradients are generally gentle and elevation less than 40 metres above sea level. Broad alluvial valley flats.

4.1.1. Geology and geomorphology

South of the Richmond River the surface sediments consist of the Pleistocene coastal plain, a Quaternary sand, silt and clay unit in barrier dune formations trending east–west. The Pleistocene coastal plain with its sand, silt and clay sediments underlies the Broadwater National Park, south of the Clarence River.

The Beenleigh Block bedrock is the basement unit in the region. This consists of grey-green coarse grained sandstone and slate, which has been slightly metamorphosed. Local quartz veins have also been altered by pressure and temperature. The bedrock can exhibit turbidite facies, a layering of sediments consistent with deep marine deposition in the Carboniferous period, approx 350 million years ago. Basement rocks of the Beenleigh Block outcrop in several small areas south of the Richmond River.

The stone most frequently quarried in NSW by Aboriginal people was silcrete, with chert, quartz and quartzite extraction also being relatively common (Department of Primary Industries 2007). In the Woolgoolga to Wells Crossing region, it is likely that the most frequently occurring raw material types will be chert and silcrete. Chert is a fine-grained silica-rich microcrystalline sedimentary rock. Chert usually forms as a nodule in a sedimentary rock such as a limestone, which has been subject to pressure or temperature change after its initial deposition. Silcrete is formed from clay or sand that silicified under granite; it can be very coarse grained to cryptocrystalline in nature.

Stone was mined from boulders, exposed veins or blocks, conglomerates and from deposits of pebbles or cobbles and gravel. Mining was by extraction from surface deposits and by excavation below the surface (Department of Primary Industries 2007).

4.1.2. Land systems

The coastal plains in the south of the boundary of the project (section 1) consist of extensive low-lying alluvial, aeolian, and estuarine swamp deposits occurring between the dune landscapes of the beach and low-lying hills. Inland from these coastal plains (though outside the boundary of the project) are the Coramba Beds, which form a lowland range of spurs, ridges and hills. The sedimentary and metamorphic rocks present in this area include greywacke, quartzite, chert and slate – these potential Aboriginal raw material sources may have been quarried directly, or collected in cobbles from streams originating there. The coastal range (sections, 1, and 2) consists of a series of geological units dating to the Jurassic and Cretaceous periods, and comprise sandstone, shale and quartz pebble conglomerate (Kuskie 2008). These units tend to have very shallow top soil associated with them, especially in cleared land and land subject to forestry due to erosion.

4.1.3. Vegetation

Before European colonisation, the native vegetation of the boundary of the project largely comprised dense gallery rainforest stands, which covered the Clarence River floodplains and coastal range. Much of this vegetation has been cleared for cattle grazing and agriculture, particularly for the sugar cane plantations. Some areas have been more heavily cleared than others; the rainforest of the Clarence River Valley floodplain, for example, has been heavily disturbed due to these activities more than other areas. The timber milling industry also led to the clearing of natural vegetation. Despite the extensive clearing, stands of the original vegetation survive.

At present, tall, open hardwood forests occur mainly within the State Forests and National Parks and Nature Reserves along the coast, such as the Glenugie and Wedding Bells State Forests and Yuraygir National Park. These forests are dominated by species such as grey gum, spotted gum and red mahogany, with acacia shrubs forming a dense understory. These forests also occur on areas of Crown land and private land that have not been subject to clearing, such as on the slopes of the Coast Range near Woolgoolga in section 1 (Kuskie 2008). Drainage depressions and alluvial plains also support tall swamp vegetation with broad-leaved paperbark (Collins 2008: 5).

4.2. Ethnographic record

4.2.1. Aboriginal tribal boundaries

Two Aboriginal language groups are represented along the boundary of the project:

- Yaegl (Yaygir).
- Kumbainggiri (Gumbaynggir).

The lower Clarence River was occupied by Yaegl (Yaygir) Aboriginal people, who were the northern neighbours of the Kumbainggiri (Gumbaynggir). On Friday 12 August 1799, Mathew Flinders recorded an Aboriginal settlement at the mouth of the Clarence River (Piper 1982). Flinders described large dome shaped bark huts, baskets, nets and other evidence that suggested that the occupants of the Iluka area pursued a hunting/fishing economy supplemented with vegetable foods.

According to Tindale (1940), the Kumbainggiri (Gumbaynggir) occupied the headwaters of the Nymboida River across the range to Urunga, Coffs Harbour, Bellingen, Glenreagh and Grafton, north and west of the Yaegl language group. The Kumbainggiri spoke a language belonging to the Kumbainggeric Group. According to Crowley (1979), Yaegl and Gumbaynggir originated from the same proto-language to become distinct sub-groups on their own. As this tribal group covered such a large, environmentally diverse area it is probable that the language contained three or four dialects and supported a population of between 1200 and 1500 people (Hoddinott 1978).

4.2.2. Social organisation

Peterson (1976) described Aboriginal society as being comprised of a hierarchy of organisational levels and groups with fluid boundaries between them. The smallest group in the hierarchy is the family comprised of a man with one or more wives, their children and some of their parents. The second level of the hierarchy consisted of bands, small groups consisting of members of several nuclear families who conduct hunting and gathering tasks together for most of the year. The third level of the hierarchy consists of regional networks which comprise a number of bands. Members of these regional networks usually have beliefs in a common language dialect and assemble for specific ceremonies. The ‘tribe’ is the next highest unit which is recognised as a linguistic unit with flexible territorial boundaries. The highest level of the hierarchy is the ‘cultural area’, which consists of groups who share certain cultural characteristics, such as initiation ceremonies and closely related languages.

4.2.3. Settlement patterns

Although Aboriginal groups remained within their own territories, long distance travel was often undertaken to attend social and ceremonial events and to exchange goods between the north coast river systems (Collins 2005). Further inland, shifting camp seems to have been frequent, occurring as often as monthly. Camps were usually constructed in dense sheltered scrub and consisted of bark shelters sufficient to accommodate a few occupants from the rigours of the weather. According to Coleman (1982), Aboriginal occupation along the coastal zone was largely sedentary, with people limiting their movements to small territories that could support their subsistence needs.

At the time of European settlement, Yaegl peoples comprised a number of separate, but interrelated groupings – often called clans – each associated with a specific geographic area (Collins 2008). These groups shared economic resources and ceremonial occasions, traded with one another, intermarried, and spoke a mutually intelligible language. According to Belshaw (1966), the Aboriginal population density ranged from one person per square kilometre on the coastline, to one person per approximately 50 square kilometres in the escarpment ranges. Early European accounts indicate that no land system was completely abandoned by Aboriginal people at any time of the year.

4.2.4. Material culture

The majority of the region's material culture (shields, spears, boomerangs, clubs, digging sticks, canoes, containers and woven nets and bags) were made from wood or other vegetative material that is rarely recognisable in the archaeological record. A limited assemblage of artefacts more conducive to presentation has been recorded, including hafted stone hatchets used to cut possums and bees nests from trees, stone knives used in scarification and to cut women's hair, slivers of sharpened shell for sundry cutting tasks, bone tools to soften and engrave designs on skin rugs and bone needles used when sewing skins together (Bundock 1898; Dawson 1935; Flick 1934).

4.2.5. Resources

Ainsworth (1922, cited in Collins 2005) partially reconstructed the traditional Aboriginal resource base and environmental context from which the principal resources originated. Although shellfish and rainforest resources such as yams and flying foxes were regularly consumed, Ainsworth's (1922) description primarily concerns fishing methods. Nets were reportedly used in the narrow and shallow waters of the estuary. In addition, fern and rush roots, birds, marsupials, reptiles, wattle seed, blue flax lily fruit, roots and fibre, grubs, eels, tortoises, and pine rafting resin would also have been utilised (Maiden 1889; Bundock 1898; Bray 1901; Petrie 1904; Flick 1934; Simpson 1956; McBryde 1982; Byrne 1986).

Goods and resources would have been exchanged between Aboriginal groups in the Clarence and Richmond River Valleys. Axes manufactured from greywacke pebbles collected from the mid Clarence River gravels have been recovered at both Woombah and Woodburn, east and north of the study area respectively (Binns and McBryde 1972). Resource exploitation appears to have been undertaken by family groups and often several families would co-operate to form a highly flexible 'band' that would gather and then separate as conditions demanded (Godwin 1990).

A wide variety of mammals, birds, fish and vegetable foods contributed to the Aboriginal diet and all the available habitat types were exploited (Collins 2008). Resources mentioned in early ethnohistoric sources include koalas, possums, kangaroos, wallabies, echidna, bandicoots, goannas, snakes and various birds, all available in the sub-coastal forests of the ranges. Faunal remains recovered at Woombah reveal that Aboriginal people were largely reliant on estuarine foods, such as oysters (McBryde 1982). Although no vegetable products were represented archaeologically, McBryde (1982) suggested that these would have been regularly exploited.

The environment differed greatly before the arrival of non-Aboriginal people to the region. Broad rivers flowed through thickly forested plains with occasional grasslands and densely treed mountain ranges (Hoff 2010). The rainforests "...teemed with animal and bird species..." while networks of paddymelon and wallaby tracks were evident in the undergrowth, and pigeons and other edible birds swarmed the trees (McKenzie-Kelly family cited in Hoff 2010).

4.2.6. Spiritual locations and culture

Initiation ceremonies of the north coast reportedly involved the gradual revelation of sacred information and a corresponding growth in social and economic status (Collins 2005). The major initiation ceremonies were undertaken at Bora grounds. Women also had their own initiation grounds and associated rites (Winterbotham 1983).

Radcliffe-Brown (1929) reported that sacred spots known as 'Djurebil' (also more generically called 'increase sites') were often marked by a natural feature such as a water-hole or a significant rock or group of trees. Initiated people performed rites at each djurebil within their territory to ensure the maintenance and well-being of the associated species or resource. According to Oakes (1979), Djurebils were 'rogation spots' where the sacred being was ceremonially asked to make a certain natural resource more plentiful.

4.2.7. European and Aboriginal interaction

Rich (1989) identified several stages and themes in the history of contact between Aboriginal people and non-Aboriginal settlers. Initially interaction was reportedly amicable, though degenerated into violent clashes. Aboriginal people were employed as cedar spotters and labourers; however, when cedar supplies diminished, widespread land clearance was conducted along river valleys and further upstream within mountainous localities. Cedar getters travelled by boat up the Clarence River in 1837 and met with friendly Aboriginal locals, whose only previous and amicable interaction had been with convicts and ships crews (Hoff 2010). Initially, Aboriginal people shared the location of large trees with the cedar getters, possibly oblivious to actual intent of the foresters. Interaction between the cedar getters and Aboriginal people reportedly became tense, *The Monitor* claiming that "...these 'drunken sawyers' travelled the river well armed, [and] provoked the Aborigines to reprisals and shot them when the situation became out of hand" (Hoff 2010).

Following the *Robertson Land Act* in 1861, contact between Aboriginal and non-Aboriginal people intensified, which resulted in the systematic dispossession of Aboriginal people from their land. Following the spread of disease and violent resistance, Aboriginal people became reliant on European settlers and were often employed as stockmen, shepherds and servants on grazing properties (Rich 1989). This marked the beginning of the fringe-dwelling period which continued well into the 20th century.

In the latter part of the 19th century, there was a growing concern for Aboriginal people in NSW which resulted in the forming of the Aborigines Protection Association in 1881 (Kuskie 2008). In 1883, the Government established a Board of Protection of Aborigines to achieve a "more systematic and enlightened treatment of Aborigines". Rural stations were created so that Aboriginal people could remain on tribal territory. In north-eastern NSW, 126 reserves were established between 1883 and 1971 including at Coffs Harbour and Grafton (Burke 1997). Amendments to the *Aborigines Protection Act 1869*, however, allowed the board to forcibly move Aboriginal people onto reserves well away from tribal areas and control all aspects of their lives. Further amendments enabled the board to forcibly remove Aboriginal children from their parents, a practice which was conducted throughout the first half of the 20th century.

4.3. Historical land use and current site condition

The north coast of NSW was first explored by Oxley in 1820, with settlement by non-Aboriginal (European) people continuing during the following decades (Byrne 1981). Past and present land

use activities within the study area include timber milling, cattle grazing, agriculture, and the construction of roads and dwellings. The introduction of timber felling, cattle grazing and general agricultural practices led to the extensive clearing of much of the original rainforest and eucalypt forests in the boundary of the project. The major exceptions are the areas of state forest and reserves.

Cattle have been grazed over much of the boundary of the project in both historical and modern times. The opening up of land for free selection in the 1860s and the passing of Land Acts by the NSW Government in the 19th century resulted in the expansion of farming lands. Many of the first farmers were actually timber cutters, who were required to improve their land by constructing buildings and cultivating their land after first clearing it (Ballina Shire Council 2004). Land clearances and general agricultural practices, such as ploughing, have resulted in the modification of large tracts of land throughout the study area.

Dairy farming was preceded in many areas by timber cutters, with cedar being a particularly desirable wood. The introduction of free selection removed many of the restrictions imposed on timber cutters, and allowed selectors to cut timber on their own land. Timber milling became an important industry in the Woolgoolga region following the rise in importance of the industry further south at Coffs Harbour. Sawmill construction began here after the building of a jetty in Coffs Harbour in 1892, which facilitated the transport by ship of the logged timber. Companies such as British Australian Timber and Great Northern Timber were based in Woolgoolga in the early 1900s, and both built tramlines to replace the slower bullock teams which had previously moved the cut logs to the port. Historical records show that one of these tramlines travelled north of Woolgoolga along part of what later became the Pacific Highway.

The arrival of the cedar cutters and dairy farmers led to the expansion of settlements and other services required to supply the growing populations. Roads were often initially cut by early settlers, such as the timber cutters, and were then expanded by dairy farmers and other settlers who needed to transport goods to and from their homes. Road construction and maintenance later became the responsibility of local councils, with funding for major roads supplied by the New South Wales Government (Ballina Shire Council 2004). The subsequent construction of roads and other forms of transport, as well as residential dwellings and commercial buildings, have disturbed the landscape throughout the study area.

The major land use activities associated with the project presently are farming and agriculture including beef, wool, blueberry, macadamia, soybean and tea production. Other land uses include timber logging, conservation areas such as the state parks and forests, and urban land encompassing the larger townships and settlements and their associated commercial activities, such as service stations and caravan and holiday parks.

Figure 4-1 shows a modelled estimate of the accumulated impact on the landscape from post colonisation land-use. This mapping is derived from a DECCW online regional predictive model mapping tool (the Aboriginal Site Decision Support Tool).[2] Areas with high accumulated impact

[2] Accessible at http://mapdata1.environment.nsw.gov.au/asdst/default.aspx; how the Aboriginal Site Decision Support Tool modelling was developed is described at http://www.environment.nsw.gov.au/licences/AboriginalSitesDecisionSupportTool.htm

(shown in red/orange), such as the existing Pacific Highway, are less likely to retain archaeological remains. Areas of much lower accumulated impact such as outside but surrounding the current Pacific Highway (shown green to blue), include State Forests. As can be seen in Figure 4-1, much of the boundary of the project traverses areas that have been subject to a moderate or high degree of accumulated impact. This suggests that less robust site types, such as human remains, shell deposits and scarred trees, are not likely to occur in the boundary of the project. It also suggests that more robust site types, such as artefact scatters, are more likely to have lower integrity in the areas subject to higher levels of accumulated impact.

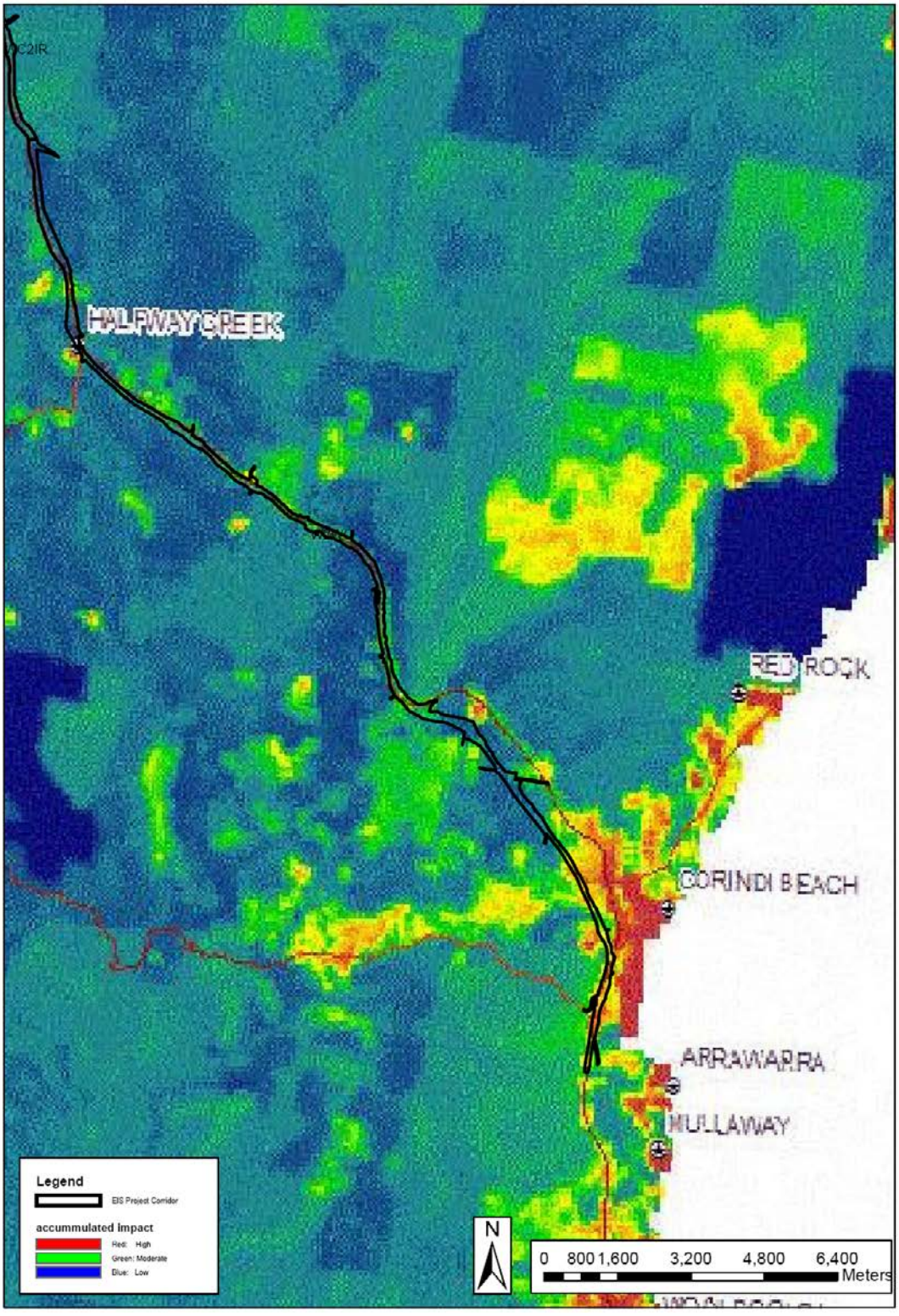


Figure 4-1 Accumulated impact between Woolgoolga and Wells Crossing from post-colonial land-use

4.4. AHIMS register search

The AHIMS was searched in 2010 and updated in February 2012 for records relevant to the project and surrounds. Fourteen sites were identified (Figure 4-2 and Table 4-2) as relevant to the project between Woolgoolga and Wells Crossing.

It should be noted that these results are not an indication of all cultural heritage resources relevant to the project, as very few investigations have previously been undertaken within the boundary of the project. The AHIMS results list recorded sites only, and are more an indication of previous survey effort than anything else.

Figure 4-2 Woolgoolga to Wells Crossing - Aboriginal heritage sites (registered on AHIMS)

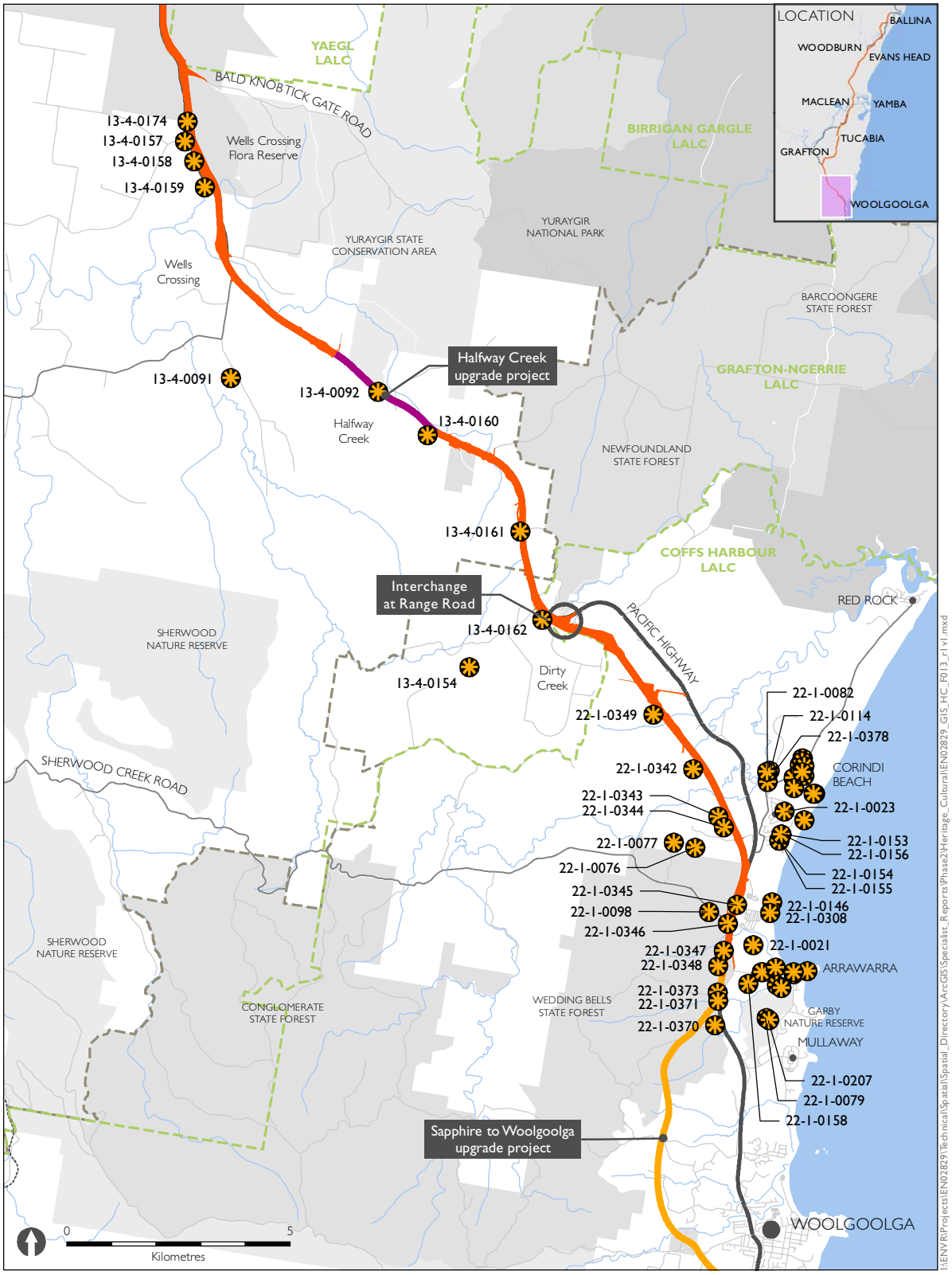


Table 4-2 Listings on AHIMS located within 200 metres of the boundary of the project

Project section	AHIMS ID	Site name	Easting/ northing GDA 94 Zone 55	Site type	Landform	Distance from boundary of the project (metres)
1	22-1-0348	WWC 5	517620E 6674720N	Artefact scatter	Spur crest	Within boundary of the project
1	22-1-0347	WWC 7	517640E 6674880N	Artefact scatter	Flat	20 m
1	22-1-0346	WWC 18	517730E 6675480N	Artefact scatter	Spur crest	Within boundary of the project
1	22-1-0345	WWC 26	518040E 6676060N	Isolated artefact	Simple slope	Within boundary of the project
1	22-1-0344	WWC 37	517740E 6677830N	Artefact scatter	Simple slope	Within boundary of the project
1	22-1-0343	WWC 39	517620E 6678070N	Artefact scatter	Ridge crest	Within boundary of the project
1	22-1-0342	WWC 46	517060E 6679130N	Isolated artefact	Valley flat	Within boundary of the project
1	13-4-0162	WWC 78	513680E 6682480N	Isolated artefact	Spur crest	Within boundary of the project
1	13-4-0092	IA2	509950E 6687400N	Isolated artefact	Undulating plain	Within boundary of the project
1	13-4-0161	WWC 92	513190E 6684450N	Artefact scatter	Drainage depression	5 m
1	13-4-0160	WWC 115	511110E 6686610N	Artefact scatter	Drainage depression	Within boundary of the project
1	13-4-0159	WWC 135	506120E 6692160N	Artefact scatter	Spur crest	Within boundary of the project
2	13-4-0158	WWC138	505880E 6692750N	Artefact scatter	Simple slope	Within boundary of the project
2	13-4-0157	WWC 139	505670E 6693190N	Isolated artefact	Ridge crest	Within boundary of the project

5. Aboriginal cultural assessment

5.1. Introduction

The cultural assessment in this report includes cultural information collected during consultation, survey and sub-surface testing. The Aboriginal cultural assessment was undertaken by Robyn Jenkins, Vanessa Edmonds, and Joseph Brooke.

5.2. Methodology

The assessment involved consultation in a number of forms with knowledge holders as identified by the registered Aboriginal parties for the project (see Chapter 3 for further details of consultation). The cultural assessment was based on:

- Reviewing archaeological fieldwork and consultation conducted for the previous development project, by Kuskie (2008).
- Reviewing literature relevant to the boundary of the project and surrounding landscape.
- Consultation with elders and knowledge holders for the region during AFG meetings.
- Consultation with elders and knowledge holders for the region outside of AFG meetings (eg oral history recording, site visits with Elders).
- Consulting with Aboriginal site officers during field work regarding Aboriginal objects and cultural values.

The information provided has contributed to an understanding of the cultural value of the broader landscape within which the project is located. Knowledge holders have provided information about the traditional presence of Aboriginal people in the landscape, ceremonial sites and the impact of European land management practices on their traditional land, and subsequently their culture. The cultural assessment identified locations of Aboriginal cultural value within the boundary of the project.

5.3. Cultural landscape

The understanding and perception of the landscape expressed by the knowledge holders and the community is an area traversed by an interconnecting network of physical, social and spiritual places. The World Heritage Convention of United Nations Educational, Scientific and Cultural Organization (UNESCO) define an associative cultural landscape as one which has ‘powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant of even absent’ (UNESCO 1991). The relationship between Aboriginal Australians and the land can often be conceived in spiritual terms rather than primarily in material terms (Andrews *et al* 2006).

Aboriginal cultural knowledge has been defined as:

> *Accumulated knowledge which encompasses spiritual relationships, relationships with the natural environment and the sustainable use of natural resources, and, relationships between people, which are reflected in language, narratives social organisation, values, beliefs and cultural laws and customs* (Andrews *et al* 2006).

Aboriginal cultural knowledge was traditionally bequeathed through oral traditions from generation to generation. Within all Aboriginal communities there was a time of dislocation and upheaval associated with the arrival of European settlers. This widespread disruption resulted in the loss of varying degrees of detailed knowledge and understanding of many of the elements of the cultural landscape from Aboriginal communities. A recognition and concern regarding this loss of knowledge of the cultural landscape and the meanings embedded in the landscape was expressed by several of the stakeholders during consultation for the project (eg Mark Flanders pers comm October 2010; Anthony Dootson pers comm November 2010; Rod Duroux pers comm November 2011).

It should be noted that Indigenous communities across Australia are extremely diverse, and generally defy generalisation. The above descriptions are common conceptions of Aboriginal cultural landscapes and values, however, a large range of beliefs and practices are evident across Australia and uniformity should not be assumed.

5.4. Identified Aboriginal cultural heritage values

The previous and current consultation process with stakeholders and on-site discussions with Aboriginal site officers identified the following cultural heritage values within the landscape (Table 5-1).

Table 5-1 Cultural heritage values identified by registered Aboriginal parties

Cultural heritage value	Description
Resource gathering locations and techniques	Stakeholders identified that they still fish and collect wild food throughout the region (Milton Duroux and Mark Flanders pers comm August 2010). The techniques and primary resource gathering locations are known and passed on through generations.
Scarred trees	Stakeholders identified scarred trees as being of sacred and ceremonial significance (Rod Duroux pers comm, August 2011). This was due in part to these being some of the only 'markers' remaining in the landscape as a result of European agricultural practices.
Pathways through the landscape	Across the entire project, registered Aboriginal parties identified numerous pathways that lead from the ranges to the coast (eg Milton Duroux and Mark Flanders pers comm August 2010; Rod Duroux pers comm. November 2011). These pathways also link spiritual and ceremonial sites. During the current field survey, Aboriginal Sites Officers identified the importance of spurs and ridgelines as a route for travel through the landscape. These pathways were generally a link between the coastline and the mountain ranges. These pathways link spiritual and ceremonial sites, artefact scatters often occur along these pathways, as well as scarred trees (Mark Flanders pers comm August 2011).
Water courses, water holes or springs	Permanent water bodies are culturally significant as central locations for gathering of people, resource collection and camping. Watercourses are often associated with spiritual beings (Mark Flanders pers comm August 2011).

Cultural heritage value	Description
Aboriginal plants and animals	Aboriginal plants and animals are significant to traditional owners. During the consultation process animals and plants were often mentioned in context of resource collection and spiritual importance (eg Milton Duroux pers comm. November 2011; Rick Cain pers comm. November 2011; Mark Flanders pers comm August 2011).
Burial sites	Burial sites are of great importance and generally are of high concern to Traditional Owners as the location of burials is rarely documented. Anecdotal evidence of burials needs proper consideration.
Areas of spiritual significance	The strong attachment that traditional owners have to the project and surrounding landscape is evident through their Dreaming stories and social connections (eg Anthony Dootson pers comm August 2010; Rod Duroux pers comm August 2011; Milton Duroux pers comm August 2010). Stories relating to creation beings *Birrugan* and *Mindi* link a number of places across the district including Arrawarra, Yamba, Woodburn, Tyndale, and the Clarence and Richmond Rivers.
Post-contact sites	Post-contact sites are those which have gained significance to Aboriginal people after the arrival of European settlers.
Massacre sites	These are of great importance to the Traditional Owners, and are often difficult to discuss (various, pers comm 2010, 2011, 2012).

5.5. Aboriginal cultural places within or adjacent to boundary of the project

The cultural assessment has identified four Aboriginal cultural places within or adjacent to the boundary of the project.[3] Details of each of these cultural places and their locations are listed in Table 5-2 and maps showing their approximate locations are provided in Volume 2 (Figures 3-1 and 3-2).

[3] The four Aboriginal places are not gazetted Aboriginal Places under S86(4) of the NPW Act, but places of local significance identified during the community consultation process.

Table 5-2 Aboriginal cultural places within 200 metres of the boundary of the project

Project section	Place name	Information	Within or adjacent to the boundary of the project
1	Corindi Massacres	In the Corindi area, at least two massacres of Aboriginal people occurred in the 1800s, one of which may have been led by a Major Oakes, in revenge for an alleged attempted robbery (Cane 1988; Bawden 1997). Rick Cain and Dee Murphy (Yarrawarra Aboriginal Corporation) discussed a massacre site located at Corindi, extending to Red Rock (Kuskie 2006: 3). This site is of high cultural sensitivity, in part because the events occurred in the late 19th century. Another massacre site is reported to stretch from Arrawarra Creek to Red Rock (Milton Duroux pers comm November 2011; Cane 1988; Burke 2007; Smith *et al* 2000 in Kuskie 2006: 3)	Adjacent
1	Burials (historic)	The Yarrawarra Aboriginal Corporation (1995) sought to identify oral historical information pertaining to some burials and determined that a burial site probably lay west of the Pacific Highway and north of Kangaroo Trail Road (also Milton Duroux and Anthony Dootson pers comm November and December 2011). Kuskie (2008) determined that the Woolgoolga to Wells Crossing project would not impact any known burials.	Adjacent
1	Corindi Beach corridors of movement	Corridors of movement and significant cultural areas are located around Mullaway to Arrawarra and Corindi to Corindi Beach (Yarrawarra 1995). Kuskie (2008) mentioned that one of these may pass near a service station within the boundary of the project.	Within
1	Halfway Creek ceremonial site	A bora/ceremonial site occurs near, but outside the boundary of the project at Halfway Creek (Rod Duroux pers comm August 2010; Kuskie 2008; Murphy 1996). Discussions documented with the Garby Elders and Grafton-Ngerrie LALC (Appendix E) indicated that the area was considered to be culturally significant. The boundary of the project is within close proximity of this bora/ceremonial site. Consultation and numerous site inspections undertaken during the previous development project investigations allowed the boundary of the project alignment to be adjusted to avoid this site.	Adjacent

5.6. Aboriginal cultural places near the boundary of the project

Other Aboriginal cultural places that were identified during consultation and from the cultural heritage reports, but are not within the immediate vicinity of the boundary of the project include those listed in Table 5-3. For further details of these places, see Kuskie 2008.

Table 5-3 Aboriginal cultural places near the boundary of the project

Site name	General location	Information
Historical camps (sandstone caves)	Dirty Creek Range and Milleara	Sandstone caves around Dirty Creek Range and Milleara may have been associated with historically known camp sites. The boundary of the project is within close proximity to these caves (Kuskie 2008).
Travel routes	Pillar Mountain and Bull Paddock	Traditional travel routes leading from Pillar Mountain to the Bull Paddock traverse the study area at Wells Crossing and another near to the north (Kuskie 2008; Milton Duroux and Rod Duroux pers comm August 2011).
Birrugan and Mindi spiritual sites	Glenugie peak, Tyndale, Clarence River, Yamba	The creation of Glenugie Peak involved two ancestors; Birrugan and Mindi (his elder). The two fought over food and Birrugan became so angry that he piled all of the yams he was collecting into a mound, which became the Glenugie Peak (Gumbaynggir Language and Cultural Group 1992 cited in Navin Officer 2009: 23.

6. Summary of archaeological assessment

This section summarises the archaeological assessment undertaken as part of this report. The full archaeological assessment for Woolgoolga to Wells Crossing can be found in Volume 2 (Appendix A), which accompanies this document.

The archaeological assessment was undertaken by fully qualified and experienced archaeologists and heritage consultants, primarily Joseph Brooke (Bachelor of Archaeology (Honours), 6 years experience), Robyn Jenkins (Bachelor of Arts, Bachelor of Social Science (Honours), and 5 years experience), and Vanessa Edmonds (Bachelor of Arts, Master of Letters, 25 years experience).

Also presented here is a methodology for assessing the risk of impacting sites by a number of ancillary works proposed for the boundary of the project. As the proposed areas for the ancillary works were identified later in the assessment stage, they were not able to be subject to field investigation. As such, the areas would be subject to a separate Aboriginal archaeological report, and if required, an addendum to this CHAR.

6.1. Assessment methodology

The methodology of the archaeological assessment built on each of the stages listed below, through ongoing consultation and revision. The stages were broadly structured as follows:

1. Desktop assessment to develop a predictive model.
2. Survey program.
3. Sub-surface testing program.

All stages of the archaeological assessment included consultation and involvement with the registered Aboriginal parties Section 3.4.

Key to the archaeological assessment was the following steps:

- Reviewing existing data (including any previous investigations specific to the boundary of the project, AHIMS searches, etc) to identify any gaps in the assessments and to develop a predictive model to aid in identifying areas within the boundary of the project more sensitive to the discovery of archaeological sites. This specifically informed the survey program with previously identified PADs generally not subject to further survey.
- Developing a cultural heritage assessment methodology and consultation strategy. The methodology was presented to the registered Aboriginal parties for discussion and development prior to any fieldwork commencing.
- Undertaking field investigations (survey and sub-surface testing) with Aboriginal site officers. Discussions regarding the methodology, PAD/site condition and initial management recommendations were also undertaken in the field.

- Recording and analysis of cultural material in the field, as material could not be removed off site.

6.2. Ancillary works assessment

In addition to the boundary of the project, ancillary areas are required adjacent to the boundary of the project for construction.

These areas were identified following the field investigations, and were consequently not able to be assessed during field investigations for this CHAR. As part of the cultural heritage investigation, these ancillary areas have been assessed at a desktop level to determine the potential risk of impact to Aboriginal heritage and identify whether any require further investigation to determine potential risk of impact, or recommending that the site's use as an ancillary area is modified. The areas were assessed against the following criteria:

- Approximate area outside of boundary of the project – all areas inside the boundary of the project were assessed as requiring no further investigation, as these have already been covered by the project assessment, any areas outside the boundary of the project were recommended for survey.
- Presence of site or cultural place within the ancillary site.
- Presence of site or cultural place within 25 metres of the ancillary site.
- Land system – to place the ancillary site within the predictive model developed in the archaeological assessment (Appendix A).
- Landform – to better contextualise the ancillary site within the predictive model.
- Potential archaeological sensitivity was used to inform whether and to what level investigation was recommended.

Potential archaeological sensitivity was assessed based on the predictive model (see Appendix A) using a combination of factors including landform, and proximity to a known site or PAD. Modelling by OEH was also used to inform potential archaeological sensitivity. This matrix then fed into an assessment of the risk of each ancillary works area impacting upon Aboriginal cultural heritage. Recommendations were then made for consultation and field assessment where the risk of impact to Aboriginal cultural values was not sufficiently known (ie where outside the boundary of the project), and/or where there was a known risk to impact Aboriginal cultural heritage values.

Broadly, the recommendations fell into four categories:

- Survey and consultation.
- Survey, sub-surface testing and consultation.
- Follow management recommendations proposed in Section 9.2.
- No further investigation.

At a minimum, for all ancillary areas that fell outside the boundary of the project, survey and consultation with registered Aboriginal parties was recommended, as the risk to Aboriginal cultural heritage was not sufficiently known. Additionally, sub-surface testing was recommended for those

ancillary areas outside the boundary of the project with higher potential archaeological sensitivity and/or those where there was a known Aboriginal cultural heritage site/PAD within or immediately adjacent to the ancillary area. Where an Aboriginal cultural place is identified partially or wholly within an ancillary area, further consultation with registered Aboriginal parties, and their approval would be sought regarding the appropriateness of the ancillary area and proposed works there. This process was discussed and accepted by registered Aboriginal parties during an AFG meeting.

For ancillary areas that fell within the boundary of the project where the main cultural heritage assessment in this report identified no specific Aboriginal cultural heritage values, the risk of impact to Aboriginal cultural heritage values was assessed as low and no further investigation was recommended. For ancillary areas that fell within the boundary of the project, and the main cultural heritage assessment in this report identified some Aboriginal cultural heritage value, then following the actions outlined in Section 9.2 was recommended.

The ancillary area assessment matrix table can be found in Appendix F. The specific recommendations to manage the investigations are found in Figure 6-1.

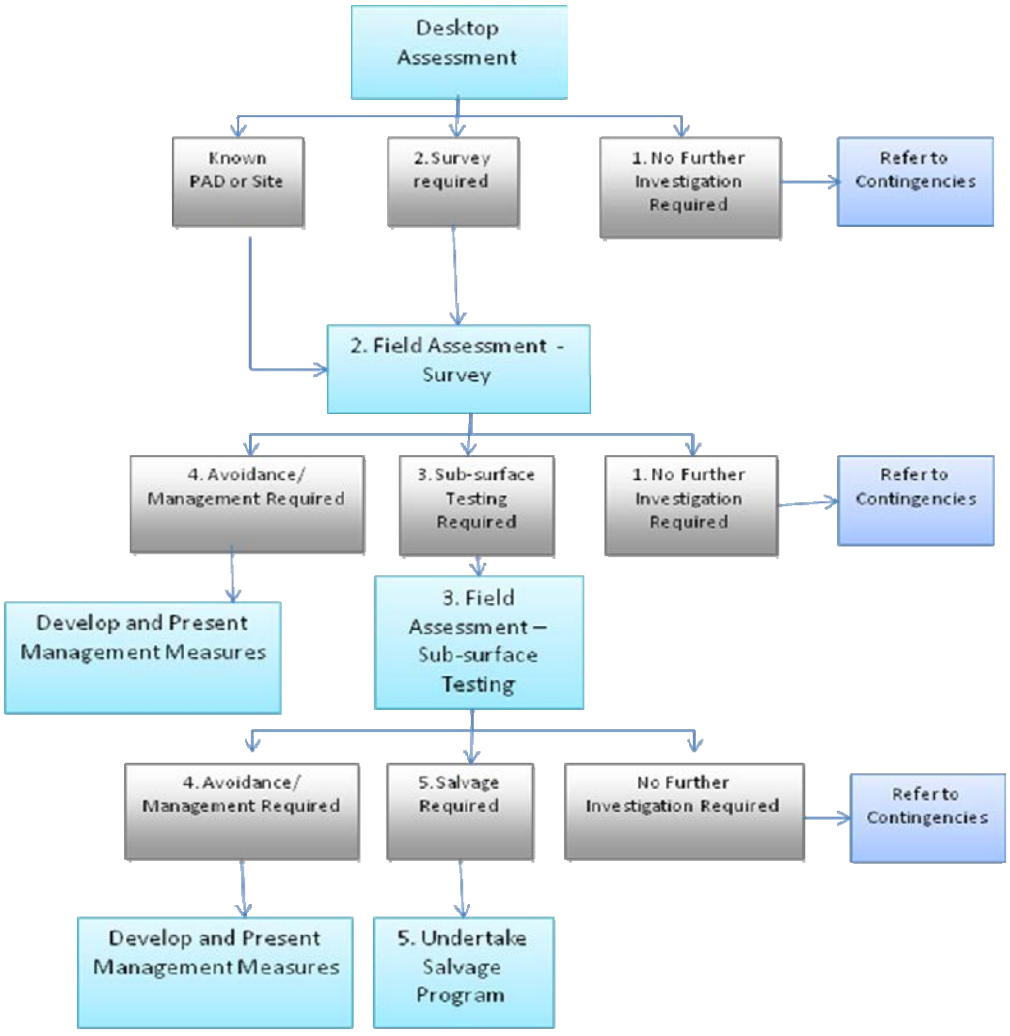


Figure 6-1 Management process to apply to construction ancillary sites

The steps outlined in Figure 6-1 are dependent on what is found to be present/absent from the ancillary sites or any change in the proposed locations. All investigations would be in accordance with the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (OEH 2010), and have regard to the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (OEH 2010). Field investigations are occurring concurrently with the display of this EIS, with the results to be identified in the project submissions report.

1. No survey required

- Determined through the desktop assessment to being part of an area that has already been assessed or once survey and sub-surface testing it has been determined to not be a site.
- Refer to contingencies (Section 9.4) for measures to be undertaken in the case of the unexpected discovery of cultural material or human remains.

2. Survey required

- Survey would be undertaken at all ancillary works and design change areas identified during the desktop as requiring investigation. The triggers for this would be if there is a known PAD or site, or the area has not been subject to any previous field investigation.
- Survey would involve the nominated Aboriginal site officers identified for the area.
- Survey would be undertaken by two methods:
  - Visual inspection – which would not require the entire area to be walked over due to past ground disturbance (eg road cutting) or environmental constraint (eg swamp). This would only be considered adequate if the nominated Aboriginal site officers are in agreement with the approach.
  - Foot survey – this would be undertaken with evenly spaced transects.
- The survey would identify if there is a PAD, if there is an area that may require avoidance or management (such as a scarred tree) or if there is no further investigation required.
- The PAD would be registered in AHIMS and further investigation would be undertaken.

3. Sub-surface testing required

- Sub-surface testing would be undertaken at all ancillary works and design change areas identified during the survey as being a PAD and requiring excavation.
- The methodology would follow that utilised during the original investigations. Broadly it is as follows:
  - Excavation only within the ancillary works or design change area boundary.
  - Spacing of test pits 10 metres – 20 metres apart in transects or parallel transects to create a grid.
  - Excavation of a series of 0.5 metre x 0.5 metre test pits by hand tools (eg trowel and shovel).

- Excavation was undertaken in a controlled manner, with the first test pit for each area in 50 millimetre spits (depth units), and subsequent test pits in that area in 50 millimetre to 100 millimetre spits (depending on soil layers identified).
- Sieving of excavated sediment using approximately 5 millimetre aperture wire-mesh sieves.
- Excavation below archaeological deposits into sterile soils.
- Drawing of stratigraphic profiles, and taking of scaled photos of every test pit;
- Finishing excavation in an area when enough information has been recovered to adequately characterise the objects present with regard to their nature and significance.
- Backfill of all completed test pits.
- Completion of Aboriginal site impact recording forms (ASIRFs) for all excavation areas and lodging of these with AHIMS (underway at present).

- Excavation may also include larger size test pits such a 1 metre x 1 metre or trenches using the same hand methods.
- Sub-surface testing would identify if there is a need for further investigation (salvage) or if there is no further investigation required.

4. Avoidance or management

- There may potentially be a need to avoid an area or incorporate a management strategy. For example, if a scarred tree is located.
- If a need is identified for avoidance or management of an area, the specific requirements would be discussed in consultation with an archaeologist, the registered Aboriginal parties and RMS.

5. Salvage

- Salvage recommendations would be developed for each site discovered prior to any field salvage investigations being undertaken.
- The specific requirements would be discussed in consultation with an archaeologist, the registered Aboriginal parties and RMS.
- Recommendations would involve both hand excavation and/or mechanical excavation with a mechanical sieve. The salvage recommendations provided for specific sites in this report (Table 9-2) would be used as a guide to develop the salvage framework.

6.3. Results of the archaeological assessment

A total of 2,856,252 square metres (295 hectares) was subject to survey within the boundary of the project between Woolgoolga and Wells Crossing, totalling over 99 per cent of the boundary of the project. The remainder of the boundary of the project is not considered a risk for impact to cultural

heritage sites or places, due to previous significant impacts (primarily the current Pacific Highway), and so does not require survey. It should be noted however, that Aboriginal stakeholders consulted felt that despite previous impacts, these areas still retained cultural significance and potentially unidentified spiritual significance. The entire survey (including that undertaken by Kuskie and the Alliance) yielded a relatively high effective coverage (accounting for visibility and proportion of the sub-surface exposed) of seven per cent, and a total of three new PADs and 14 new sites were identified near or within the boundary of the project. One previously recorded site (Pacific Highway Scarred Tree 1) was inspected by representatives of all relevant stakeholders and determined to not be a site (see Appendix A for further details). The 14 sites identified were artefact sites – either artefact scatters or isolated artefacts.

Through some changes to the boundary of the project not all PADs/sites identified during the survey required further assessment as they were avoided. WWC5 and Sherwood Creek Road to Kangaroo Trail PAD were re-inspected and determined not to be sites/PADs within the corridor (though they remain sites/PADs further to the west outside the boundary of the project) due to significant disturbance, and were therefore not test excavated. A total of eight sites with PAD components and two stand-alone PADs were required to be excavated within the boundary of the project between Woolgoolga and Wells Crossing (Table 6-1). However, one of these (WWC Dirty Creek 1) could not be accessed and is therefore addressed in management recommendations, so only nine PADs underwent excavation (Section 9). Of the remaining areas (sites and PADs) to be excavated, five contained sub-surface Aboriginal deposits, all of which were associated with existing sites, so the excavation gave further information on the extent and significance of the sites. The one standalone PAD tested yielded no archaeological material, so was no longer considered to have archaeological potential.

Aboriginal archaeological stone artefacts were discovered during excavation of a total of 346 shovel test pits (0.5 metre x 0.5 metre). The details of these findings can be found within Volume 2 (Appendix A); a summary is provided in Table 6-1. The locations of all sites identified are shown in Figure 6-2 and Figure 6-3.

Table 6-1 Current status of areas or sites following survey and sub-surface testing within or near the boundary of the project between Woolgoolga and Wells Crossing

Project section	Name (AHIMS ID)	Previous type(s)	Description	Material identified in test-excavation	Updated name	Updated site type(s)
1	WWC5 (22-1-0348)	Site – Artefact scatter and PAD	Located on spur crest at Farm Trail on west side of existing highway.	N/A	WWC5	Site – Artefact scatter (Outside the boundary of the project)
1	WWC7 (22-1-0347)	Site – Isolated artefact	Located on flat north of Farm Trail on west side of existing highway.	N/A – outside the boundary of the project	WWC7	Site – Isolated artefact (outside the boundary of the project)
1	WWC18 (22-1-0346)	Site – Artefact scatter and PAD	Broad area on spur crest at Sherwood Creek Road, west of existing highway. Partially within, partially adjacent to boundary of the project.	1 stone artefact	WWC18	Site – Artefact scatter
1	WWC26 (22-1-0345)	Site – Isolated artefact	Located on east side of existing highway and west of Eggins Drive.	N/A	WWC26	Site – Isolated artefact
1	Sherwood North (22-1-0402)	Site – Artefact scatter and PAD	The site is located on a spur in closed woodland, with a cleared section for single-carriage gravel track.	None	Sherwood North	Site – Artefact scatter
1	Sherwood Creek Road to Kangaroo Trail (22-1-0401)	PAD	Broad low–lying portion of coastal plain from north of Sherwood Creek Road to near Kangaroo Trail Road. Known Aboriginal burials in similar context nearby.	N/A	Sherwood Creek Rd to Kangaroo Trail	PAD (outside the boundary of the project)
1	WWC37 (22-1-0344)	Site – Artefact scatter and PAD	South of Corindi River; shallow skeletal soil.	1 stone artefact	WWC37	Site – Artefact scatter

Project section	Name (AHIMS ID)	Previous type(s)	Description	Material identified in test-excavation	Updated name	Updated site type(s)
1	WWC39 (22-1-0343)	Site – Artefact scatter and PAD	Prominent very gentle ridge crest south of the Corindi River and adjacent gentle simple slope leading north to creek and creek flats. Several less common artefact types. Deposits potentially relatively deep and intact in places, although levels of disturbance also possibly high in portions of this area. High potential for sub-surface deposit.	98 stone artefacts	WWC39	Site – Artefact scatter
1	WWC 46 (22-1-0342)	Site – Isolated artefact and PAD	Located on vehicle track in forest on flat north of Corindi Creek. Deep alluvial soils inferred. Known Aboriginal burials in similar contexts nearby.	3 stone artefacts	WWC46	Site – Artefact scatter
1	WWC 53/A (22-1-0349)	Site – Isolated artefact	Located on margin of vehicle track north of Redbank Creek.	N/A	WWC53	Site – Isolated artefact
1	WWC Dirty Creek 1 (22-1-0403)	PAD	Located on upper slopes and crests of spurs north of Redbank Creek	N/A	WWC Dirty Creek 1c	PAD - Occurrences 1a, 1b and 1d all showed no signs of material, so are no longer considered to have potential – WWC Dirty Creek 1c is thickly vegetated and on a sensitive landform, and is still considered to have potential

Project section	Name (AHIMS ID)	Previous type(s)	Description	Material identified in test-excavation	Updated name	Updated site type(s)
1	Dirty Creek PAD (13-4-0178)	PAD	Slopes and top of rise nearby Dirty Creek.	None	-	No material found from sub-surface testing – **no longer considered to be a PAD or site**
1	WWC 78/A (13-4-0162)	Site – Isolated artefact	Located east of existing highway and Range Road.	N/A	WWC 78	Site – Isolated artefact
1	WWC92 (13-4-0161)	Site – Isolated artefact	Located east of existing highway and Falconers Road.	N/A	WWC92	Site – Isolated artefact No material found from sub-surface testing within the boundary of the project, so site is only outside the boundary of the project
1	WWC115 (13-4-0160)	Site – Artefact scatter and PAD	East of existing highway at Halfway Creek duplication near "Milleara". Moderate potential for sub-surface deposit. Area has since been disturbed through road construction and no evidence of a site was found.	None	WWC115	Site – Artefact scatter No material found from sub-surface testing within the boundary of the project, so site is only outside the boundary of the project
1	IA2 (13-4-0092)	Site – Isolated artefact	Already impacted by Halfway Creek duplication.	N/A	-	Site has previously been destroyed - No longer a site
2	WWC 135/A (13-4-0159)	Site – Artefact scatter and PAD	East of existing highway immediately north of Wells Crossing. Moderate to high potential for sub-surface deposit.	5 stone artefacts	WWC135	Site – Artefact scatter

Project section	Name (AHIMS ID)	Previous type(s)	Description	Material identified in test-excavation	Updated name	Updated site type(s)
2	WWC 138/A (13-4-0158)	Site – Isolated artefact	Artefact on vehicle track north of Wells Crossing and east of existing highway and Parker Road. Shallow skeletal soil restricts potential for sub-surface deposit.	N/A	WWC138	Site – Isolated artefact
2	WWC139/A (13-4-0157)	Site – Isolated artefact and PAD	On vehicle track north of Wells Crossing and east of existing highway and Parker Road. Moderate potential for sub-surface deposit.	None	WWC139/A	Site – Isolated artefact
2	Pacific Highway Scar Tree 1 (13-4-0174)	Site – Scarred tree	Eucalypt tree.	N/A	Pacific Highway Scar Tree 1	Inspection of the site with traditional knowledge holders confirmed that this is **not a site**

Figure 6-2 Section 1 - Sites and Places near or within the project corridor

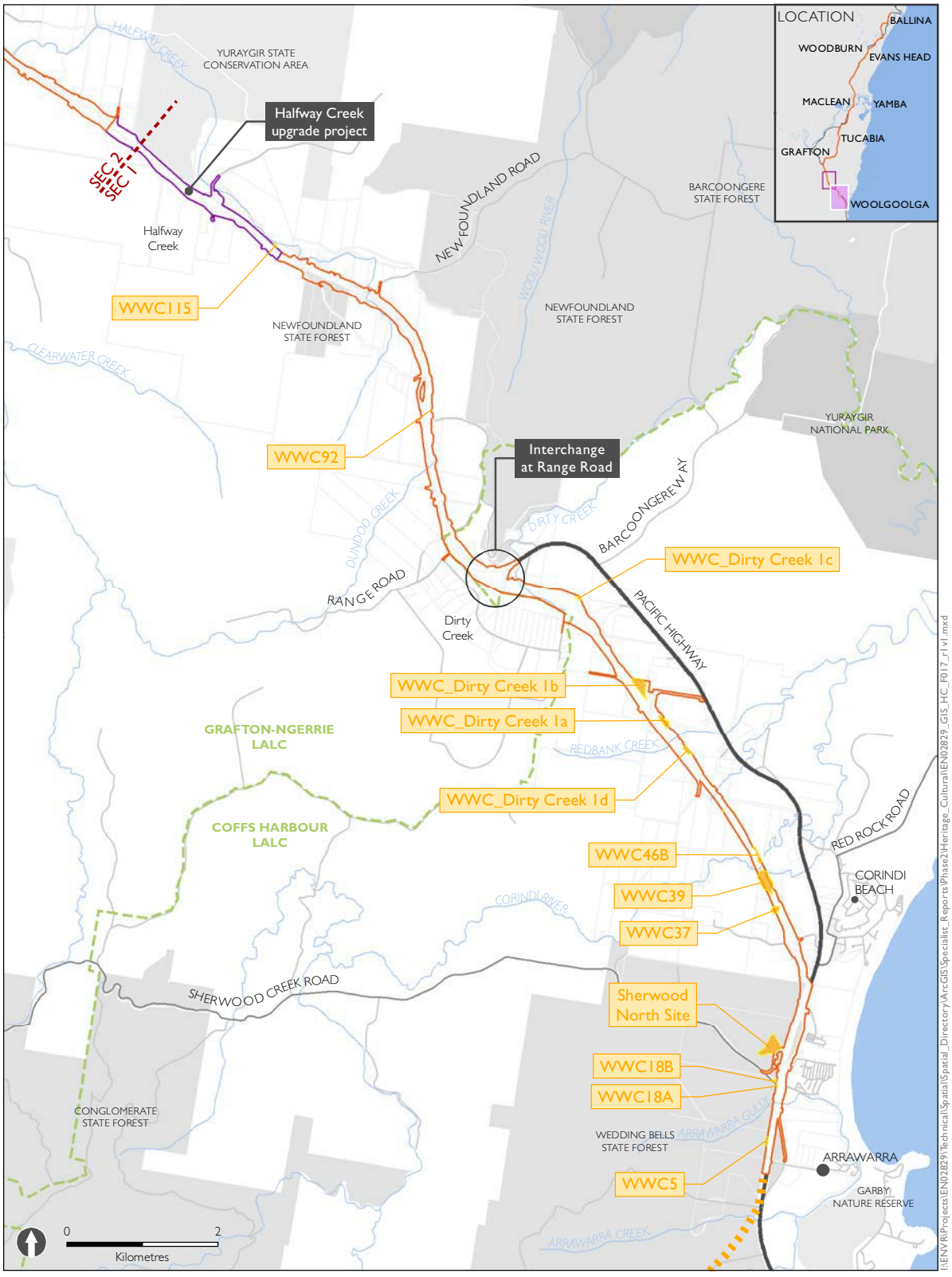
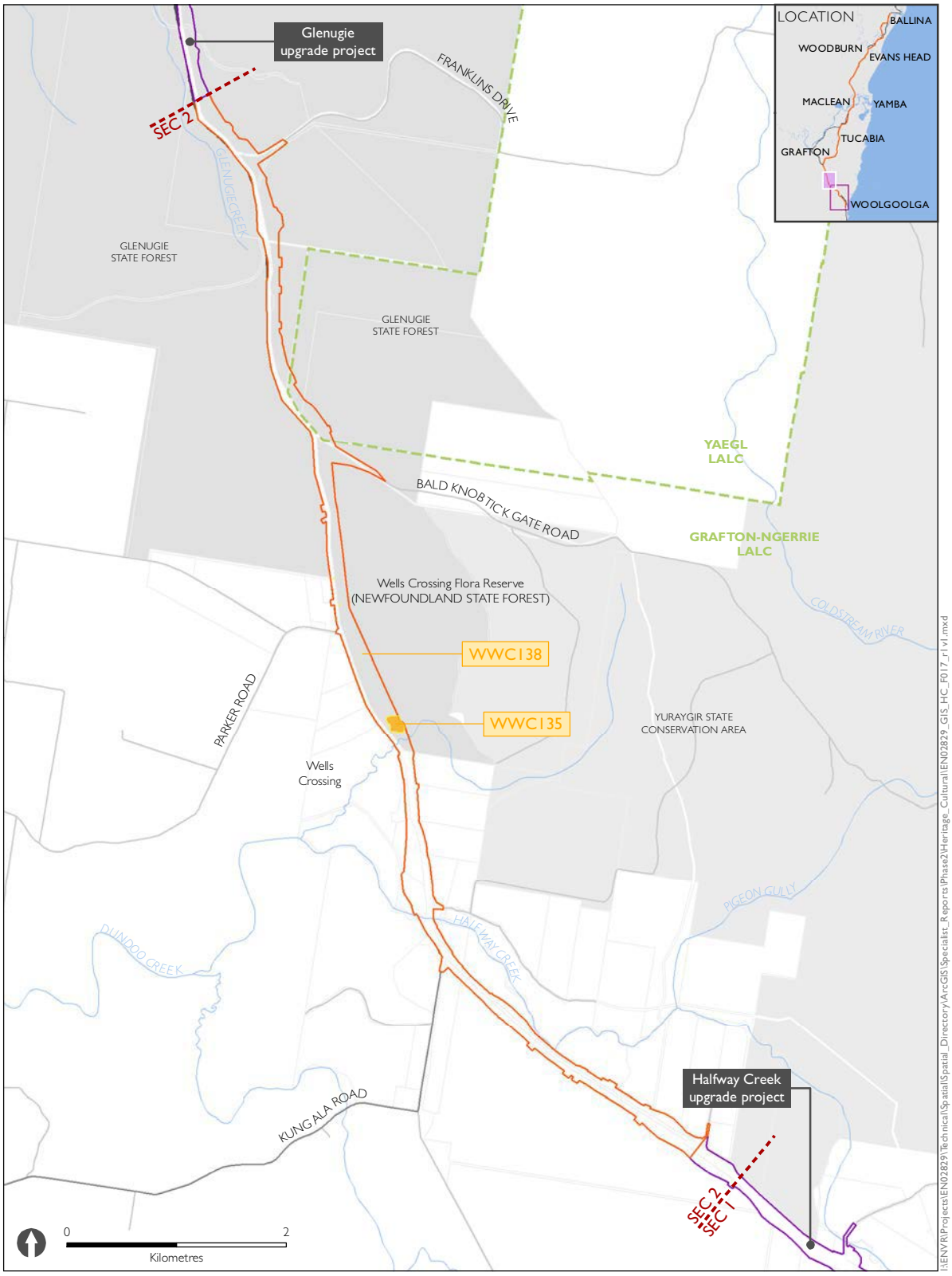


Figure 6-3 Section 2 - Sites and Places near or within the project corridor



7. Significance assessment

7.1.1. Basis for assessment

A significance assessment is made up of several significance criteria that attempt to define why a site is important. Evidently, this can be challenging as sites are important for different reasons to different people, and even at different times. The assessment of Aboriginal cultural heritage in this assessment is based upon the four values of the *Australia ICOMOS Burra Charter* (Australian ICOMOS 1999).

- Social values.
- Historical values.
- Scientific values.
- Aesthetic values.

Each of these values is assessed below, and an overall significance is then given based on an average across the values. This is inherently a reductive process, and oversimplifies what is important to a range of different stakeholders, but is a necessary process in being able to create comparative values between sites. The significance of each site ultimately feeds the management of sites and places (see Section 9).

7.1.2. Social significance

The significance of a site does not relate only to its scientific or research value. Aboriginal people's views on the significance of archaeological sites are usually related to traditional, cultural and educational values, although some Aboriginal people also value any scientific information a site may be able to provide.

Aboriginal cultural significance was assessed from consultation with the nominated Aboriginal site officers and other members of the stakeholders, including Elders, both during and following field assessments. It should be noted that Aboriginal significance assessed in this manner may not reflect the views of all members of the community.

7.1.3. Scientific significance

Aboriginal site significance assessments need to consider both the scientific and social or cultural values of a site. Research potential or scientific significance of an Aboriginal archaeological site can be assessed by utilising the criteria set out below. Social or cultural values of a site can only be established through Aboriginal consultation.

Criteria used for assessing scientific significance for Aboriginal archaeological sites are described below. Ratings are low, moderate or high.

- **Site integrity –** The integrity of a site refers to its state of preservation, or condition. A site can be disturbed through a number of factors among which are: natural erosion processes, destructive land use practices or repeated use of a site in the past by both humans and animals.

- **Site structure –** Structure refers to a site's physical dimensions, that is, size and stratification, or sub-surface deposits. A large site or a site with stratified deposits has more research potential than small sites and/or surface scatters. Sometimes however, specific research questions may be aimed at smaller sites in which case they would be rated at a higher significance than normal. Site structure cannot be assessed for scarred trees or isolated artefacts.
- **Site contents –** This category refers to the range and type of occupation debris found in a site. Generally, complex art sites, extensive quarries with associated debris and surface sites that contain a large and varied amount of organic and non organic materials are considered to have greater research potential than those sites with small, uniform artefacts, single motif art sites and small quarries with little or no debris. With scarred trees contents may refer to the size and type of scar or how many there are on the one tree.
- **Representativeness and rarity –** Representativeness refers to how much variability exists between the subject site and others inside or outside the subject area. It also considers the types of sites already conserved in the area and how much connectivity between sites exists. Rarity considers how often a particular site type occurs in an area. Assessment of representativeness and rarity requires some knowledge of the background archaeology of the area or region in which a study is being undertaken. Rarity also relates to whether the subject site or area is important in demonstrating a distinctive way of life, custom, process, land use, function or design which is no longer practiced (OEH 2011:10).

The scientific significance assessment is shown in Appendix A.

7.1.4. Aesthetic significance

This refers to the 'sensory' value of a place, and can include aspects such as form, texture, and colour, and can also include the smell and sound elements associated with use or experience of a site (Australian ICOMOS 1999). Aesthetic significance can be closely linked to the social value of a site.

7.1.5. Historic significance

The historic value of a site is determined through its association with historically important people, events or activities.

7.1.6. Scale of significance

Significance of sites and places is assigned to different geographic scales, such as local, regional, State and National, appropriate to the scale of importance. For example, Uluru is significant at a National (and World) scale, whereas a local historic building may only be significant on a local scale. This is reflected in the variety of heritage lists held by local councils, up to State and Federal government. In scale of significance, the criteria presented above as well as educational or research potential, representativeness and rarity (Australian ICOMOS 1999) have been considered in determinations of significance.

Each site has been assessed and its scale of significance has been identified as being of importance at the State, regional or local level. Each site has also been given a grading of its

significance overall based on the grading of each of the individual values. The gradings of low, moderate and high have been assigned comparatively across the sites investigated in the region.

7.2. Statements of significance

7.2.1. Corindi Massacres site

Social significance

- The Corindi Massacre Sites are of high social significance to the traditional owners as they are the location of massacres of Aboriginal people in the 19th century. They are culturally sensitive sites.

Historical significance

- The sites have moderate-high historical significance as the sites are reflective of the interactions between local Aboriginal people and European people on their arrival in the region in the 19th century. The site is important in demonstrating the prevalence of Aboriginal massacre sites across the Australian landscape.

Scientific significance

- The place does not meet this criterion.

Aesthetic significance

- The place does not meet this criterion.

Summary statement of significance

- Overall the Corindi Massacre Sites have a high level of significance at the regional scale. The Sites have high social significance to the traditional owners as the site of massacres of Aboriginal people in the 19th century. Being the site of such massacres the sites are culturally sensitive. The site also has moderate-high historical significance as it reflects the pattern of interactions between local Aboriginal people and European people in the region from the 19th century.

7.2.2. Burials (historical)

Social significance

- The historical burials and the surrounding areas are of high social significance to the traditional owners.

Historical significance

- The historical burials have moderate historical significance as they relate to ancestors of the current traditional owners from the historical period.

Scientific significance

- The place does not meet this criterion.

Aesthetic significance

- The place does not meet this criterion.

Summary statement of significance

- The historical burials and the surrounding areas are of high social significance to the traditional owners. The historical burials have moderate historical significance as they relate to ancestors of the current traditional owners from the historical period.

7.2.3. Corindi Beach Corridors of Movement

Social significance

- The place has moderate social significance for its importance as pathways and broad corridors of movement through the landscape and includes significance cultural areas, including from Mullaway to Arrawarra, and Corindi to Corindi Beach.

Historical significance

- The place has moderate historical significance as the location of corridors of movement known to present-day community members and have been used in the historical period.

Scientific significance

- The place does not meet this criterion.

Aesthetic significance

- The place does not meet this criterion.

Summary statement of significance

- Overall the Corindi Beach Corridors of Movement have a moderate level of significance at the regional scale. It has moderate social significance as pathways and corridors between significant areas in the region. It has moderate historical significance through the continued knowledge of the areas by the present-day community members and their use in the historical period.

7.2.4. Halfway Creek Ceremonial Site

Social significance

- The area where a bora/ceremonial site is situated at Halfway Creek is of high social significance to the traditional owners.

Historical significance

- The site has moderate historical significance as an important for ceremonies into the historical period.

Scientific significance

- The scientific significance of the site was unable to be comprehensively assessed as the exact location of the site is not known.

Aesthetic significance

- The aesthetic significance of the site was unable to be comprehensively assessed as the exact location of the site is not known.

Summary statement of significance

- Based on the limited assessment of significance to date, Halfway Creek Ceremonial Site has a moderate-high level of significance at the regional level. It is highly socially significant as an important location for ceremonies from prehistoric times through to the historical period. It is also of moderate historical importance for this reason. The scientific and aesthetic significance of the site was unable to be assessed.

7.2.5. Birrugan and Mindi Spiritual Sites

Social significance

- The Birrugan and Mindi Spiritual Sites are highly social significant for their association with stories about two ancestors, *Birrugan* and *Mindi* (his elder) which relate to geographic features in the landscape including Glenugie Peak, a swamp at South Grafton, and a rock in the South Arm of the Clarence River.

Historical significance

- The place does not meet this criterion.

Scientific significance

- The place does not meet this criterion.

Aesthetic significance

- The Sites have high aesthetic significance as they are key geographic features in the stories are visually representative of and intimately linked to the stories.

Summary statement of significance

- Overall the Birrugan and Mindi Spiritual Sites are of high significance at the local level. The association of the landscape features with key stories about ancestors are of high significance both socially and aesthetically.

7.2.6. WWC5 (AHIMS ID 22-1-0348)

Social significance

- The artefact scatter at WWC5 has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the raw materials are common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC5 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

7.2.7. WWC7 (AHIMS ID 22-1-0347)

Social significance

- Site WWC7 comprises an isolated artefact and has low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a single artefact and the raw material is common to the area. The site has a low representativeness ranking as similar stone artefacts are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC7 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

7.2.8. WWC18 (AHIMS ID 22-1-0346)

Social significance

- The artefact scatter at WWC18 has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the raw materials are common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC18 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

7.2.9. WWC26 (AHIMS ID 22-1-0345)

Social significance

- Site WWC26 comprises an isolated artefact and has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a single artefact and the raw material is common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC26 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

7.2.10. Sherwood North (AHIMS ID 22-1-0403)

Social significance

- The artefact scatter at Sherwood North has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the raw materials are common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

Overall Sherwood North is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

7.2.11. WWC37 (AHIMS ID 22-1-0344)

Social significance

- The artefact scatter of Site WWC37 has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents

ranking as the site comprises of a low density artefact scatter and the raw material is common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential. It has some limited local educational potential particularly on how Aboriginal populations used different parts of the landscape during different seasons.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC37 is of low-moderate significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to is low density, common raw material and overall common presence in the region. The site has limited research potential and some educational potential about how Aboriginal populations used different parts of the landscape during different seasons.

7.2.12. WWC 39 (AHIMS ID 22-1-0343)

Social significance

- The WWC39 site is of moderate social significance through its likely association with other important cultural sites in the region including the Corindi Massacre Sites, historical burial sites and the Corindi Corridors of Movement.

Historical significance

- The site has low historical significance through its likely association with other historical period cultural sites in the region and therefore its use by Aboriginal people at this time.

Scientific significance

- The site has moderate scientific significance as it is ranked as having low integrity, low structure moderate contents and moderate-high representativeness/rarity. The physical integrity and structure of the site is low due to some disturbance by post-contact land use practices. The contents of the site are ranked as moderate due to the wide range of both common and less readily available raw materials, and the presence of artefacts in later stages of production. This evidence indicates heavier working of those materials, and can present when raw materials were rationed, which is a sign that the materials were either difficult to obtain, rare or were considered valuable for other reasons. This supports a moderate-high ranking of representativeness/rarity as does the presence of less common artefact types. It has some potential for research as there are potentially relatively deep and intact deposits in places. The site has potential for local educational purposes, as it could be used to educate the way Aboriginal populations interacted with waterways while examining the artefacts on site, as the site is located on the banks of Corindi Creek.

Aesthetic significance

- The site has moderate aesthetic significance due to its geographic location on a prominent very gentle ridge crest south of the Corindi River and adjacent to a gentle simple slope leading north to the creek and creek flats.

Summary statement of significance

- Overall WWC39 is of moderate significance at the local level. It is of moderate social significance through its association to other cultural sites in the region, and is of low historical significance due to its possible use into the historical period. It has moderate scientific significance through the presence of less common raw materials and artefact types, and the potential for the presence of further deep and intact archaeological deposits. It also has educational potential for teaching about the way Aboriginal populations interacted with waterways. The site's geographic location on a prominent ridge crest is of moderate aesthetic significance.

7.2.13. WWC46 (AHIMS ID 22-1-0342)

Social significance

- The artefact scatter of Site WWC46 has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way.

Historical significance

The site has low historical significance through the presence of known Aboriginal burials in similar contexts nearby.

Scientific significance

- The site has low-moderate scientific significance as it is ranked as having low-moderate integrity, moderate structure, low contents and low representativeness/rarity. The integrity of the site is low-moderate and the structure is moderate as it has been subject to disturbance by some post-contact land-use practices and other alluvial post-depositional processes. The site has a low contents ranking as the site comprises of a low density artefact scatter and the raw materials are common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. It has some potential for local educational purposes, as it could be used to educate the way Aboriginal populations interacted with waterways while examining artefacts on site, as the site is located on the banks of Corindi Creek, and also how Aboriginal populations used and moved between different parts of the landscape during different seasons.

Aesthetic significance

- The site has low-moderate aesthetic significance due to its geographic location adjacent to Corindi Creek.

Summary statement of significance

- Overall WWC46 has low-moderate significance at the local level. It has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way and low historical significance through the presence of known Aboriginal burials in similar contexts nearby. The site is of low-moderate scientific significance due to its moderate level of disturbance, the presence of common raw materials and its overall commonness in the region. It has some educational potential about the way Aboriginal populations interacted with waterways, and moved between different parts of the landscape during different seasons. The site's location adjacent to Corindi Creek is of low-moderate aesthetic significance.

7.2.14. WWC53 (AHIMS ID 22-1-0349)

Social significance

- Site WWC53 comprises an isolated artefact and has low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a single artefact and the raw material is common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC53 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

7.2.15. WWC Dirty Creek 1 (AHIMS ID 22-1-0403)

The significance of WWC Dirty Creek 1 was unable to be assessed due to restricted property access and was not subject to any sub-surface investigation during this project.

7.2.16. WWC78 (AHIMS ID 13-4-0162)

Social significance

- Site WWC78 comprises an isolated artefact and has low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a single artefact and the raw material is common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC78 is of low significance at the local level. It is of low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

7.2.17. WWC92 (AHIMS ID 13-4-0161)

Social significance

- Site WWC92 comprises an isolated artefact and has low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents

ranking as the site comprises of a single artefact and the raw material is common to the area. The site has a low representativeness ranking as similar stone artefacts are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC92 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

7.2.18. IA2 (AHIMS 13-04-0092)

The significance of this site has not been assessed as it has been destroyed by the Halfway Creek duplication.

7.2.19. WWC115 (AHIMS ID 13-4-0160)

Social significance

- Site WWC115 comprises an artefact scatter and has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a low density artefact scatter and sub-surface investigations failed to reveal any additional artefactual material. The site has a low representativeness ranking as artefact scatters are common within the region. The site has no research or educational potential.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC115 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density and overall common presence in the region. The site has no research or educational potential.

7.2.20. WWC135 (AHIMS ID 13-4-0159)

Social significance

- Site WWC115 comprises an artefact scatter and has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way.

Historical significance

- The site has low historical significance as the presence of a flaked glass artefact indicates use of the site into the historical period.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises a low number of artefacts with raw material is relatively common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has no clear research or educational potential.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC135 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low historical significance given the evidence of use of European materials in the production of artefacts. It has low scientific significance due to its low density and overall common presence in the region. The site has no research or educational potential.

7.2.21. WWC138 (AHIMS ID 13-4-0158)

Social significance

- Site WWC138 comprises an isolated artefact and has low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a single artefact and the raw material is common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has no research or educational potential.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC138 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to is low density, common raw material and overall common presence in the region. The site has no research or educational potential.

7.2.22. WWC139 (AHIMS ID 13-4-0157)

Social significance

- Site WWC139 comprises an artefact scatter and has low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low content ranking as the site comprises of a low density artefact scatter and sub-surface investigations failed to reveal any additional artefactual material. The site has a low representativeness ranking as artefact scatters are common within the region. The site has no research or educational potential.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC139 is of low significance at the local level. It is of low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way. It has low scientific significance due to its low density and overall common presence in the region. The site has no research or educational potential.

7.3. Summary

The significance assessment of Aboriginal cultural places is shown in Table 7-1, while the significance of archaeological sites is shown in Table 7-2. The scientific significance assessment is shown in Appendix A.

Table 7-1 Summary of significance assessment of Aboriginal cultural places near or within the boundary of the project between Woolgoolga and Wells Crossing

Project section	Place name	Social significance	Historic significance	Scientific significance	Aesthetic significance	Overall significance
1	Corindi Massacres Site	High	Moderate-High	n/a	n/a	High
1	Burials (historic)	High	Moderate	n/a	n/a	High
1	Corindi Beach Corridors of Movement	Moderate	Moderate	n/a	n/a	Moderate
1	Halfway Creek Ceremonial Site	High	Moderate	Was not able to be assessed	Was not able to be assessed	High
1	Birrugan and Mindi Spiritual Sites	High	n/a	n/a	High	High

Table 7-2 Summary of significance assessment of archaeological sites near or within the boundary of the project between Woolgoolga and Wells Crossing

AHIMS ID	Name	Scientific significance	Social significance	Aesthetic significance	Historical significance	Overall significance
22-1-0348	WWC5	Low	Low-Moderate	n/a	n/a	Low
22-1-0347	WWC7	Low	Low	n/a	n/a	Low
22-1-0346	WWC18	Low	Low-Moderate	n/a	n/a	Low
22-1-0345	WWC26	Low	Low-Moderate	n/a	n/a	Low-Moderate

AHIMS ID	Name	Scientific significance	Social significance	Aesthetic significance	Historical significance	Overall significance
22-1-0403	Sherwood North	Low	Low-Moderate	n/a	n/a	Low-Moderate
22-1-0344	WWC37	Low	Low-Moderate	n/a	n/a	Low
22-1-0343	WWC39	Moderate	Moderate	Moderate	Moderate	Moderate
22-1-0342	WWC46	Low-Moderate	Low-Moderate	Low-Moderate	Low	Low-Moderate
22-1-0349	WWC53	Low	Low	n/a	n/a	Low
22-1-0403	WWC Dirty Creek 1	Unable to be assessed				
13-4-0162	WWC78	Low	Low	n/a	n/a	Low
13-4-0161	WWC92	Low	Low	n/a	n/a	Low
13-4-0092	IA2	Unable to be assessed – no longer a site				
13-4-0160	WWC115	Low	Low-Moderate	n/a	n/a	Low
13-4-0159	WWC135	Low	Low-Moderate	n/a	Low	Low
13-4-0158	WWC138	Low	Low	n/a	n/a	Low
13-4-0157	WWC139	Low	Low	n/a	n/a	Low

8. Impact assessment

The potential impact to Aboriginal cultural places and archaeological sites recorded within or near the boundary of the project has been considered. This section looks specifically at those areas where:

- Avoidance of a site or place will occur due to changes to the boundary of the project, and site may fall partially or wholly outside the boundary of the project, or some portion may remain within the boundary of the project but be avoided by construction.
- A site or place may not be directly impacted by construction of the project, but may be at risk of indirect impacts, such as a culturally sensitive place becoming more visible/accessible due to the construction of the project.
- Partial impact to a site or place would occur, with avoidance to part of the site within and/or outside of the boundary of the project.
- Impact is unavoidable and the site will be totally destroyed.

8.1. Impact avoidance

All recorded Aboriginal cultural places and archaeological sites recorded within or near to the boundary of the project between Woolgoolga and Wells Crossing have been considered in relation to the proposed road construction, operation and associated activities, and wherever possible, RMS has sought to avoid and reduce impacts to cultural heritage values.

During the development of the preferred route and development of the concept design, the alignment was modified where possible to avoid or reduce the impact to identified Aboriginal cultural values, particularly those of high significance. Examples of project refinements made to avoid Aboriginal cultural sites and archaeological sites include:

- The boundary of the project was re-aligned to avoid burials near Arrawarra and Corindi.
- The boundary of the project alignment was refined and moved to the west of a previously identified bora/ceremonial site located to the east of the existing highway in the vicinity of Halfway Creek, so that this site was avoided to the western side.

Despite the refinements described above, some impacts would still occur at a number of identified sites and places. The majority of impacts to Aboriginal cultural and archaeological sites along the boundary of the project between Woolgoolga and Wells Crossing would be likely to occur during the construction phase of the project. The types of impact which would occur include:

- Direct impacts from road construction that would destroy or partially impact sites.
- Construction of temporary sites ancillary to the main road formation (eg construction compounds, batching plants or bulk materials storage) that would have direct and indirect impacts to part or all of sites.
- Indirect impacts during operation (such as water run-off, visibility, etc).

These impacts to Aboriginal heritage from the project (either permanent or temporary) are attributed to cultural places, archaeological sites and can be site specific or apply on a regional scale.

8.2. Impacts

8.2.1. Impacts to cultural places

Five Aboriginal cultural places are near or within the boundary of the project (Table 8-1), but four of these were avoided through appropriate route option choice and project refinements made during previous development project phases. Only one may be impacted, the Corindi Beach corridors of movement. This place comprises a whole landscape and therefore cannot be entirely avoided by the project.

Table 8-1 Impact to Aboriginal cultural places near or within the boundary of the project

Project section	Place name	Aboriginal significance	Impact	Description of impact
1	Corindi Massacres	High	None	N/A
1	Burials (historic)	High	None	N/A
1	Corindi Beach corridors of movement	Moderate	Direct	Unavoidable as traverses region
1	Halfway Creek Ceremonial Site	High	None	N/A
1	Birrugan and Mindi spiritual sites	High	None	N/A

8.2.2. Impacts to archaeological sites

A total of 10 archaeological items – nine archaeological sites and one stand-alone PAD – out of 15 will be impacted by the project between Woolgoolga and Wells Crossing, with four sites being avoided by the boundary of the project and one site already impacted by previous highway works. Of the nine sites to be impacted, two will only be minimally impacted, with the majority of the sites remaining intact. No indirect impacts to known sites are likely from the project between Woolgoolga and Wells Crossing.

It should be noted, that the low (eight sites), low-moderate (two sites) and moderate (one site) significance of each of the sites within the boundary of the project between Woolgoolga and Wells Crossing do not justify avoidance.

Table 8-2 Impacts to archaeological sites near or within the boundary of the project

AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
22-1-0348	WWC 5	Low	Artefact scatter	None	The site is located outside, immediately adjacent to the boundary of the project, and to the south of the construction footprint. No direct or indirect impact is likely from the project.
22-1-0347	WWC 7	Low	Isolated artefact	None	This site is located outside the boundary of the project, approximately 20 m to the west of the project. No direct or indirect impact is likely from the project.
22-1-0346	WWC18	Low	Artefact scatter	Direct	WWC18 will be subject to excavation to provide a road cutting for approximately 25 m in length. The result would be the removal of approximately 5 per cent of the site and only minimal irreversible impact to its heritage values. Part of the site is within the boundary of the project and will be avoided by the construction footprint, and part of the site will be avoided and is outside the boundary of the project to the west.
22-1-0345	WWC26	Low	Isolated artefact	None	Within the boundary of the project, but direct impact would be avoided by the construction footprint. Fencing would be required to ensure impact from associated activities is avoided.
22-1-0403	Sherwood North	Low	Artefact scatter	Direct	Sherwood North will be subject to excavation to provide an embanked road for approximately 60 m in length. The result would be the removal of approximately 5 per cent of the site and only minimal irreversible impact to its heritage values. The majority of the site will be avoided and is outside the boundary of the project to the north-west.
22-1-0344	WWC37	Low-moderate	Artefact scatter	Direct	WWC37 will be subject to excavation to provide a cut and embanked road for approximately 85 m in length. The result would be the removal of approximately 50 per cent of the site and irreversible impact to its heritage values. Part of the site is within the boundary of the project but will be avoided by the construction footprint, and part of the site will be avoided and is outside the boundary of the project to the west.

AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
22-1-0343	WWC39	Moderate	Artefact scatter	Direct	WWC39 will be subject to excavation through the middle of the site to provide an embanked road for approximately 360 m in length. The result would be the removal of approximately 60 per cent of the site and irreversible impact to its heritage values. Part of the site is within the boundary of the project but will be avoided by the construction footprint, and part of the site will be avoided and is outside the boundary of the project to the east and west.
22-1-0342	WWC46	Low-moderate	Artefact scatter	Direct	WWC46 will be subject to excavation to provide embanked road for two sections, one approximately 75 m in length, the other approximately 30 m in length. The result would be the removal of approximately 30 per cent of both parts (locus A and B) of the site and irreversible impact to part of its heritage values. Part of the site is within the boundary of the project but will be avoided by the construction footprint, and part of the site will be avoided and is outside the boundary of the project to the east.
22-1-0349	WWC53	Low	Isolated artefact	Direct	WWC53 will be subject to excavation to provide road cutting for approximately 5 m in length. The result would be the removal of 100 per cent of the site and irreversible impact to its heritage values. This site is located close to, but outside the construction footprint, as such it may be able to be avoided during the detailed design of the project.
22-1-0403	WWC Dirty Creek 1	To be confirmed	PAD	Direct	TBC
13-4-0162	WWC 78	Low	Isolated artefact	Direct	WWC78 will be subject to excavation to provide a road cutting for approximately 20 m in length. The result would be the removal of 100 per cent of the site and irreversible impact to its heritage values.
13-4-0161	WWC92	Low	Isolated artefact	None	WWC92 is outside, immediately adjacent to the east of the boundary of the project - no direct or indirect impact is likely from the project. Fencing may be required to ensure impact from the project is avoided.

AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
13-4-0092	IA2	Low	Isolated artefact	Previously destroyed	N/A
13-4-0160	WWC115	Low	Artefact scatter	None	WWC115 is outside, immediately adjacent to the east of the boundary of the project - no direct or indirect impact is likely from the project. Fencing may be required to ensure impact from the project is avoided.
13-4-0159	WWC135	Low-moderate	Isolated artefact	Direct	WWC135 will be subject to excavation through the middle of the site to provide an embanked road for approximately 180 m in length. The result would be the removal of approximately 70 per cent of the site and irreversible impact to its heritage values. Part of the site is within the boundary of the project but will be avoided by the construction footprint, and a small portion of the site will be avoided and is outside the boundary of the project to the east and west. Fencing would be required within the boundary of the project to ensure impact from associated activities is avoided.
13-4-0158	WWC138	Low	Artefact scatter	Direct	WWC138 will be subject to excavation to provide a road embankment for approximately 5 m in length. The result would be the removal of 100 per cent of the site and irreversible impact to its heritage values.
13-4-0157	WWC139	Low	Artefact scatter	None	Within the boundary of the project, but direct impact would be avoided by the construction footprint. Fencing would be required to ensure impact from associated activities is avoided.

8.3. Cumulative impact

8.3.1. Introduction

Cumulative impacts can be defined as the combined effects of environmental or social impacts that occur because of multiple activities and developments with similar impacts within a particular local area and region. Cumulative impacts can be measured generally overtime, or within discrete periods, such as the cumulative impacts of a project, or the cumulative impacts of European land-use activities.

A process for the assessment of cumulative impact has not been defined or endorsed by the NSW Government. Therefore, a range of approaches have been used in the past and the scope and complexity of these assessments have generally related to the scale of the proposal, the predicted interactions and the nature of the available comparative and baseline data.

The assessment of cumulative impacts on cultural heritage values must take into account the fact that many cultural values are a non-renewable resource, associated with a finite and limited number of surviving places and objects. Except for those cultural traditions which revive or reinterpret past belief within new material forms, cultural heritage is mainly invested in the material evidence of the past. As such there is little ability to revive or re-establish the material past. It follows that each incremental loss of the material record of the past is irreversible, and itself a factor in changing perceptions of rarity and value.

Ideally an assessment of cumulative impacts should be measured against a baseline of data which characterises the existing cultural resources to be impacted, and the cumulative loss already realised. In the case of the local and regional contexts of the proposed project, effective data sets of such cultural heritage information do not exist. The OEH AHIMS database provides a register of known Aboriginal places in NSW, but is limited in its application due to the multiple and selective factors which affect the registration of recordings. Only a very small proportion of NSW has been the subject of comprehensive archaeological survey, and consequently, most patterns or trends evident within AHIMS site distributions reflect variables in data collection rather than the actual surviving resource. For example, following cultural heritage investigation for this project, the AHIMS register would show a relatively large concentration of sites in and around the boundary of the project compared to the surrounding region. This merely reflects the large scale of investigation undertaken for the project, rather than the actual distribution of sites. The gaps in archaeological survey across the project region mean that the AHIMS register does not provide a complete baseline for a comprehensive cumulative impact assessment. However as the only baseline data available it does help inform qualitative observations and discussion on the cumulative impact.

8.3.2. Assessment

In considering the regional scale cumulative impact of the project, archaeological values across a range of site types and landforms must be assessed. Sites (type, density, integrity) do not exist in isolation. They are associated with particular landforms and natural features. Considering the combinations of these sites and features in an area assists in drawing conclusions about cumulative impacts. For example, a single site assessment identifying a number of artefact scatters associated with a scarred tree may find this site type common and typical. However, this site type may not exist with a similar association anywhere else in the region. As a result, this site and its context have significance at a regional level. Further it would pose a cumulative impact if it were to be impacted.

Approximately 15 per cent of the entire boundary of the project has been extensively impacted by previous earthmoving works and construction (predominantly the current and previous alignments of the Pacific Highway), such that there is no potential for Aboriginal heritage evidence to survive in those portions of the project. It should be noted however, that Aboriginal stakeholders consulted felt that despite previous impacts, these areas still retained cultural significance and potentially unidentified spiritual significance. Outside these areas, activities such as logging over long periods, have disturbed much of the project so that many non-robust archaeological site types, such as scarred trees, bora rings, shell deposit and burials have been destroyed, and more robust site types (such as artefact sites) have lost much of their integrity. Modelling on the OEH website (http://www.environment.nsw.gov.au/licences/AboriginalSitesDecisionSupportTool.htm) supports this theory with significant reductions in predicted distributions of scarred trees, shell deposit and burials between 1750 and the current model. This phenomenon has the effect of making these site

types more significant due to their increased rarity and they thus need consideration of conservation and protection. Conversely, because of this disturbance, the potential impact of the project to Aboriginal heritage is smaller, as most of the project has already been at least moderately disturbed.

Based on the boundary of the project, a total of 11 archaeological sites and one PAD are within the boundary of the project between Woolgoolga and Wells Crossing (Table 6-1). Of these sites, direct impact would occur to nine sites and one PAD from the project (Table 8-2). The overall significance of the archaeological sites fall within a range between low and moderate, with all but one being of low or low-moderate significance. It is important to consider the archaeological sites in a regional context; regionally they provide a reasonable distribution of sites across a number of landforms. The regional Aboriginal cultural heritage values across the project would be reduced marginally by the cumulative impacts from the project. Throughout the process, efforts were made by the RMS throughout the project stages to date to avoid impact to more significant Aboriginal cultural places and archaeological sites, such as burials, carved trees and ceremonial sites, thus leading to reduced cumulative impact to the Aboriginal cultural values of the region.

In summary, an accurate cumulative impact assessment of the project is hindered due to the lack of a comparative dataset. However, given the relatively low number of sites and places directly impacted by the conduct of the activity, and the knowledge gained through consultation and investigation, it may be observed that the regional archaeological resource would not be impacted to a significant level because of this project. On a regional scale, loss of cultural heritage resources due to the project is considered to be low.

As further sites are recorded in the conduct of future heritage investigations, a more complete picture of the area is created. It is noted that artefact scatters are mainly associated with elevated areas overlooking water bodies. If a broader area is considered, similar landforms in an undisturbed context exist extensively in the north coast region, thus these site types will be avoided with more integrity outside the boundary of the project.

8.3.3. Assay of the Pacific Highway upgrade program

Within an assessment of cumulative impact, project specific cumulative impacts must be considered. In this case, consideration of the cumulative impact of the project in the context of the entire Pacific Highway upgrade project is appropriate. The planned and partly realised upgrade of the Pacific Highway aims to construct a continuous four lane divided dual carriageway, between Hexham and the NSW-Queensland border, a distance of approximately 680 kilometres.

An exhaustive cumulative assessment of the cultural heritage impacts of all portions of the Pacific Highway upgrade is beyond the scope of the present investigation and would be very difficult due to the incomplete datasets outside the Pacific Highway Upgrade corridor. However, it can be noted that the majority of the archaeological sites are common (eg small flaked-stone artefact scatters) within the region the Pacific Highway passes through, with few exceptional raw materials or artefact types. Many of these site types and associated landforms still exist un-impacted (and likely unrecorded) within the region. This notion is also supported by the large number of landform based PADs located within the Pacific Highway corridor that also extend outside the Pacific Highway corridor.

Additionally, it should be noted that the Pacific Highway upgrade project investigations often form the largest investigations in the regions that they traverse, and so add greatly to the understanding of archaeology and Aboriginal occupation in the regions, and in this way contribute a positive legacy for these regions. However, the permanency of the Pacific Highway Upgrade projects is

contrasted with the less stable nature of heritage and will unfortunately and inevitably lead to some loss of the cultural heritage values of the region.

9. Management recommendations

To manage impacts to Aboriginal archaeological and cultural heritage the broad objectives for the project are:

- Avoid or minimise impacts on significant cultural heritage.
- Preserve as much cultural heritage in its original environment as possible.
- Maintain cultural heritage through preservation, salvage and increased knowledge.

The first principle of cultural heritage management is impact avoidance and minimisation before mitigation. If it is not possible to completely avoid sites, then mitigation is required for parts of sites that are not going to be impacted. Where complete avoidance is not possible, management recommendations must be implemented for impacted areas of each of the archaeological sites.

These recommendations have been developed to aim to avoid significant impacts and where impacts are unavoidable, to effectively mitigate impacts. Management recommendations have been drafted in accordance with the amount of impact to the site and the significance of the site. All management recommendations have been presented to relevant registered Aboriginal parties, and their comments have been considered and where possible incorporated into the recommendations.

A summary of the management recommendations for archaeological sites and cultural places are displayed in

Table 9-1. Detailed management recommendations for archaeological sites are included in Table 9-2 and for Aboriginal cultural places in Table 9-3.

Where there is unexpected discovery of Aboriginal objects within the boundary of the project, refer to Section 9.4 for contingency actions that would be followed.

It must be noted that many of the registered Aboriginal parties have recommended that monitoring of, or inspections following vegetation clearance or groundbreaking works be undertaken by their site officers in an effort to identify and collect any artefacts uncovered during works. However, this mitigation strategy is only endorsed by the RMS PACHCI guidelines and OEH policies where there is a significant risk that Aboriginal objects are likely to be uncovered by activities. There is not a significant risk that Aboriginal objects are likely to be uncovered by the project, and so monitoring cannot be recommended in this CHAR. As mentioned above, unexpected finds contingencies must be followed should any Aboriginal heritage material be discovered (Section 9.4). Additionally, cultural heritage awareness training must be undertaken for all personnel involved in the construction of the project to aid in the identification of Aboriginal cultural heritage material (see Section 9.1 below). In acknowledgement of the traditional owners' significance of the sites recorded, and the low surface visibility and exposure encountered during investigations, inspection of the ground within the proximity of the sites following vegetation clearance is recommended (see Table 9-2).

Table 9-1 Summary of management recommendations of archaeological sites near or within the boundary of the project

Management recommendations	Number of sites	Name of site
Collection and comprehensive salvage excavations (mechanical). Detailed analysis and reporting of cultural material. Dating of cultural material where applicable. Inspection following clearing for road works.	2	WWC39 WWC46
Inspection following clearing for road works. Collection of artefacts. Detailed analysis and reporting of cultural material.	7	WWC18 Sherwood North WWC37 WWC53 WWC78 WWC135 WWC138
Further investigation of PAD.	1	WWC Dirty Creek 1
An exclusion zone put in place to ensure incidental damage does not occur to site.	2	WWC26 WWC139
None – not impacted by the project.	5	WWC5 WWC7 WWC92 IA2 WWC115

9.1. General project management requirements

The following requirements would apply throughout construction to the management of all Aboriginal heritage sites and places within the boundary of the project:

- Try to further minimise impacts on sites during detailed project design.
- All salvage excavations would be restricted to the site extent within the boundary of the project, and should be undertaken with regard to the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (OEH 2010).
- All field-based mitigation (eg collection, salvage) must be undertaken with relevant Aboriginal site officers.
- Project updates would be distributed to registered Aboriginal stakeholders at least every 3 months, and AFG meetings should be held with registered Aboriginal stakeholders minimally every 6 months prior to and during construction until management actions have been completed.

- All areas would be fenced to protect sites and would include signage on all sides of the fencing. The signs would all include the following information – 'Cultural Heritage No Go Zone' – and include contact details of management.
- The results of the salvage excavations and the archaeological material analysis would be included within a detailed salvage report.
- Additionally, a summary report (to be made public) will accompany the technical report.
- In acknowledgement of local Aboriginal people's connection to and millennia of continued use of the land and its natural resources, registered Aboriginal stakeholders should be provided with the reasonable opportunity to have access to some of the natural resources within the boundary of the project to maintain and develop their cultural traditions. This could include a selection of trees, or other plants. These trees or other resources should be identified in pre-construction prior to vegetation clearance.
- Cultural heritage awareness training must be undertaken for all personnel prior to involvement in the construction of the project. Where possible, this should be undertaken externally, and the possibility of a local Aboriginal organisation providing this service should be explored.
- Compliance auditing of the project for cultural heritage purposes should occur every 3 months during pre-construction and construction – any non-complying impact to Aboriginal heritage sites should be reported to the registered Aboriginal stakeholders, and resolved jointly between RMS and the registered Aboriginal stakeholders.
- An Aboriginal heritage interpretation strategy would be prepared as part of the Aboriginal heritage management plan. This will identify how archaeological and cultural information can be sustainably communicated to different audiences, including the local Aboriginal community, the local general public and the broader group of people interested in Aboriginal heritage as part of the North Coast's history. Measures would include opportunities for promoting salvage and investigation, the recovery of information, permanent installations and ways of marking the presence of Aboriginal people in the landscape, including, signage, enduring interpretation products such as books and through place naming.

9.2. Effectiveness of mitigation

The implementation of the management recommendations described below will be effective in avoiding impact and where avoidance is not possible, these recommendations will be effective in mitigating the impact to sites and places.

To ensure the effectiveness of the mitigation proposed and to be adaptable to any finds during the salvage that are significantly different to those in this CHAR, the salvage excavation methodology and quotas proposed in Table 9-2 must be reviewed while the salvage is underway, by at least the time 50 per cent of the quota has been reached. This should involve a discussion with the contracted archaeologist, and relevant registered Aboriginal parties. Any increase or decrease to the quota, or change of methodology proposed must be approved by the RMS Senior Environmental Environment Specialist Heritage, or the OEH. If no change to the quota is proposed, then the salvage may be completed. At any time (including after the review mentioned

above), if significantly different findings are made, the quotas/methodology should be reviewed as mentioned above.

The management recommendations below have been based on the significance assessment and the current expected impact to sites and places (as described in Chapter 8 and further quantified in Table 9-2). Should impacts to sites within the boundary of the project change by more than 10 per cent, these management recommendations should be reviewed, as they may need to be adjusted according to the nature of the increase or reduction of impact. For example, an increase or decrease in impact to a site may warrant a more or less of the site to be salvaged, or may warrant the nature of the mitigation to be altered more significantly. The appropriateness of changes to salvage quotas or management recommendations would be done on a site-by-site basis, take account of the specific changes to the impact, and would be done in consultation with registered Aboriginal parties.

Any impact proposed beyond the boundary of the project as assessed in this report must be subject to assessment and consultation with registered Aboriginal parties, consistent with the process in this report.

9.3. Specific management requirements

9.3.1. Archaeological sites

Each site to be impacted by the construction works within the boundary of the project has specific management requirements (see Table 9-2), and specific management requirements have been included for site protection and avoidance. Broadly these fit into three categories:

- Collection of cultural material located during the survey and sub-surface testing program – only excavation required to recover already discovered sub-surface material would be undertaken. Additionally, inspection of the site for Aboriginal heritage material and the area within 50 m of the site following vegetation clearance.
- Salvage excavation – mechanical and/or hand excavation to salvage the archaeology associated with these sites – this would be located in parts of the site not previously subject to sub-surface testing, but should generally be located in the vicinity of locations where features and/or higher concentrations have been recorded and outside areas of high disturbance. Additionally, inspection of the site for Aboriginal heritage material and the area within 50 m of the site following vegetation clearance.
- Fencing – 'No Go' zones due to the location of a cultural heritage site/place.

For all salvaged material, suitable storage must be agreed upon with the registered Aboriginal parties prior to commencing salvage in those areas. If it is determined that the objects will be removed from the project area to be transferred to a separate safe storage location (temporarily or permanently), the curator of these objects will be required to ensure they comply with Section 85A of the NPW Act. This will involve the submission to OEH of a Care Agreement application which must also include an accurate catalogue of any objects collected/transferred

Where artefact concentrations per square metre (over all depths) encountered are 50 per cent greater than previously encountered, additional hand-tool salvage excavation must be undertaken. If these artefact concentrations are encountered during machine excavation, then machine

excavation must stop within 20 metres, and hand-tool excavation must proceed to define the extent of the concentration within the boundary of the project. Other features that must trigger such additional salvage excavation include, encountering:

- *In situ* lithic flaking floors.
- Remains of a hearth in relatively *in situ* condition.
- *In situ* non-human bone relating to Aboriginal occupation.
- Midden deposit.

Up to but no more than an additional six square metres must be excavated in this situation at that site, unless rare features are encountered, in which case discussions with the registered Aboriginal parties and OEH should be undertaken to agree on a suitable approach.

Table 9-2 Management requirements for archaeological sites within the boundary of the project between Woolgoolga and Wells Crossing

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
1	WWC5 (22-1-0348)	Artefact scatter	Low-Moderate	0%	• Located adjacent to the boundary of the project – exclusion zones may need to be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing).
1	WWC18 (22-1-0346)	Artefact scatter	Low-Moderate	5%	▪ All previously recorded artefacts within impacted area must be recovered and removed off-site. ▪ For areas avoided by the concept plan, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing) ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.
1	WWC26 (22-1-0345)	Isolated artefact	Low	0%	▪ Located within the boundary of the project, but outside the construction footprint - exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing)
1	Sherwood North (22-1-0402)	Artefact scatter	Low-Moderate	5%	▪ All previously recorded artefacts within impacted area must be recovered and removed off-site. ▪ For areas avoided by the boundary of the project, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing). ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.
1	WWC37 (22-1-0344)	Artefact scatter	Low-Moderate	50%	▪ All previously recorded artefacts must be recovered and removed off-site. ▪ For areas avoided by the concept plan and/or the boundary of the project, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing). ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
1	WWC39 (22-1-0343)	Artefact scatter	Moderate	60%	▪ All previously recorded artefacts must be recovered and removed off-site. ▪ Salvage excavation must be undertaken of this site within the portion of the site extent to be impacted. ▪ A total of 80 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (approximately 900 mm bucket). ▪ Each excavation must be undertaken in 50 mm spits to sterile base deposits. ▪ The location of excavations should be decided upon in the field by the archaeologist and registered Aboriginal Stakeholders. ▪ All artefacts which have previously been recorded and reburied during sub-surface testing must be recovered. ▪ All cultural material recovered during salvage would be removed off-site for detailed analysis to be undertaken. Once analysed the material would be returned to the registered Aboriginal Stakeholders for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. ▪ All recovered cultural material would be subject to detailed analysis and inclusion in a technical report. ▪ For areas avoided by the concept plan and/or the boundary of the project, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing). ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
1	WWC 46 (22-1-0342)	Artefact scatter	Low to Moderate	30%	▪ Salvage excavation must be undertaken of this site within the portion of the site to be impacted closest to Corrindi Creek. ▪ A total of 40 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (approximately 900 mm bucket). ▪ Each excavation must be undertaken in 50 mm spits to sterile base deposits. ▪ The location of excavations should be decided upon in the field by the archaeologist and registered Aboriginal Stakeholders. ▪ All artefacts which have previously been recorded and reburied during sub-surface testing must be recovered. ▪ All cultural material recovered during salvage would be removed off-site for detailed analysis to be undertaken. Once analysed the material would be returned to the registered Aboriginal Stakeholders for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. ▪ All cultural material recovered would be subject to detailed analysis and inclusion in a technical report. ▪ For areas avoided by the concept plan and/or the boundary of the project, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing). ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.
1	WWC53 (22-1-0349)	Isolated artefact	Low	100%	▪ All previously recorded artefacts must be recovered and removed off-site. ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
1	WWC Dirty Creek 1 (22-1-0403)	PAD	TBA	20%	Due to restricted property access, WWC Dirty Creek 1 has only been subject to field survey. Therefore the following approach is necessary: **Sub-surface testing** - The methodology outlined in the archaeological assessment in Volume 2 must be applied to sub-surface testing if identified as being required. **Salvage** – must be undertaken if the requirement is identified during sub-surface testing. The triggers for sub-surface testing are as follows: ▪ More than 10 but less than 50 artefacts – a minimum of 10 m² to be excavated by machine ▪ More than 50 but less than 100 artefacts – a minimum of 30 m² to be excavated by machine ▪ More than 100 but less than 300 artefacts – a minimum of 60 m² to be excavated by machine and hand excavation ▪ Please note: If multiple site components are identified or a higher number of artefacts (300+) are identified within the area, these salvage measures may require revision. ▪ All salvage quotas and revisions to salvage quotas must be approved by the RMS Senior Environmental Officer (Heritage), or the Office of Environment and Heritage (as for Section 9.2). ▪ Salvage excavation must be undertaken of this site within the site extent and within the boundary of the project. ▪ All machine excavation would be undertaken with a mechanical sieve and an excavator (900 mm bucket). ▪ Each excavation must be undertaken in 50 mm spits to sterile base deposits. ▪ The location of excavations should be decided upon in the field by the archaeologist and registered Aboriginal Stakeholders. ▪ All artefacts which have previously been recorded and reburied during sub-surface testing must be recovered. ▪ All cultural material recovered during salvage would be removed off-site for detailed analysis to be undertaken. Once analysed the material would be returned to the registered Aboriginal Stakeholders for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. All cultural material recovered would be subject to detailed analysis and inclusion in a technical report. ▪ Where necessary, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing). ▪ If a site is recorded here, for areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
1	WWC78 (13-4-0162)	Isolated artefact	Low	100%	▪ All previously recorded artefacts must be recovered and removed off-site. ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.
1	WWC92 (13-4-0161)	Isolated artefact	Low	0%	▪ Located adjacent to the boundary of the project – exclusion zones may need to be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing).
1	WWC115 (13-4-0160)	Artefact scatter	Low	0%	▪ Located adjacent to the boundary of the project – exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing).
2	WWC135 (13-4-0159)	Artefact scatter	Low-Moderate	70%	▪ All previously recorded artefacts must be recovered and removed off-site. ▪ For areas avoided by the concept plan and/or the boundary of the project, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing). ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.
2	WWC138 (13-4-0158)	Isolated artefact	Low	100%	▪ All previously recorded artefacts must be recovered and removed off-site. ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.
2	WWC139 (13-4-0157)	Artefact scatter	Low to Moderate	0%	▪ Located within the boundary of the project, but outside the construction footprint – exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing).

9.3.2. Aboriginal cultural places

Each Aboriginal cultural place identified within the boundary of the project requires management or mitigation. The management requirements for cultural places are listed in Table 9-3. For the Corindi Beach corridors of movement, this place covers a broad area of land so specific management measures may not be possible. In this case, other types of management are appropriate, such as:

- Enabling access to the areas for the Traditional Owners.
- Cultural heritage awareness workshops prior to construction.
- Educational and cultural signage at rest areas.

Table 9-3 Management requirements for Aboriginal cultural places near or within the boundary of the project between Woolgoolga and Wells Crossing

Project section	Place name	Aboriginal significance	Impact	Mitigation strategy/recommendations
1	Corindi Massacres	High	None	None required
1	Burials (historic)	High	None	None required
1	Corindi Beach corridors of movement	Moderate	Partial impact - unavoidable as traverses region and has already been impacted similarly by existing highway	Enable access to the areas for the Traditional Owners. Aboriginal culture and heritage awareness induction workshops should be undertaken for all construction staff for Woolgoolga to Wells Crossing prior to construction. Educational and cultural signage should be placed at rest areas describing some of the general Aboriginal occupation of the area. Any signage should be subject to approval by the registered Aboriginal parties.
1	Halfway Creek Ceremonial Site	High	None	None required
1	Birrugan and Mindi spiritual sites	High	None	None required

9.4. Management Procedures

9.4.1. Unexpected discovery of archaeological finds

The below procedure is consistent with RMS' Unexpected Archaeological Finds Procedure (2011), but summarises several details – the full document should be consulted in the instance of an

unexpected find; this can be found at http://www.rta.nsw.gov.au/environment/downloads/unexpected_archaeological_finds_procedure.pdf, or by contacting an RMS regional environment staff. If Aboriginal cultural heritage is found during construction activities, the following steps would be followed:

- Stop work in the immediate area (within approximately 25 metres) of the find and notify the project manager.
- The project manager should arrange for a number of photographs that capture the general context and specific details of the find to be taken, and where practical delineate and protect the find with appropriate high-visibility fencing – no further interference must occur with the find or within the protected area. Only construction that is required to comply with occupational and environmental health and safety standards and/or to protect the cultural heritage would occur. Inform all site personnel of this protected area.
- The project manager should inform the relevant RMS regional environment staff, Senior Environmental Specialist (Heritage), and the Aboriginal Cultural Heritage Advisor (Northern Region).
- If the find is reasonably suspected to be human remains, proceed directly to notifying local police.
- A suitably qualified and experienced archaeologist should be engaged to inspect the find, conduct a preliminary assessment and prepare an archaeological management plan.
- The Aboriginal Cultural Heritage Advisor (Northern Region), or the archaeologist will also make contact with the registered Aboriginal parties to notify them of the find and invite them to take part in the site inspection and assessment of the finds, as well as taking part in preparing any management strategies and plans for any objects discovered.
- Subject to the archaeologist's assessment, work can recommence at a set distance from the find, determined by the archaeologist. This is to protect any other archaeological material that may exist in the vicinity, which has not yet been uncovered – existing protective fencing may need to be adjusted to reflect the newly assessed protected area. No works are to take place within this area until further written notice from the archaeologist/project manager.
- The archaeologist must prepare and archaeological management plan in accordance with the RMS's Unexpected Archaeological Finds Procedure (RMS 2011c) shortly after the site inspection.
    - In preparing the management plan, the archaeologist with the assistance of RMS regional environment staff must review the Construction Environmental Management Plan, any heritage sub-plans, any conditions of project approval and heritage assessment documentation (eg this report). Discussions should occur with design engineers to consider if re-design options exist and are appropriate.
    - The management plan must be submitted to the project manager as a letter, brief report, or email within two working days.

  - In accordance with the RMS' Unexpected Archaeological Finds Procedure (RMS 2011c), notify OEH to inform them of any find (eg submit an AHIMS site card), including the archaeological management plan.
- Reviews of the archaeological management plan and notification must occur in accordance with RMS' Unexpected Archaeological Finds Procedure (RMS 2011c).
- Assess whether heritage impact is consistent with the project approval or if project approval modification is required from the Department of Planning and Infrastructure.
- Implement the archaeological management plan.
- Ensure all archaeological work has been completed prior to RMS project work resuming – written clearance to resume work from the archaeologist, RMS regional environment staff, and if necessary OEH.

9.4.2. Notification and reporting of incidents that breach this management plan

- Incident reporting requirements in accordance with Project Approval would include Aboriginal heritage.
- Where the RMS reasonably suspects that an incident has occurred that contravenes the management plan presented here, the project incident management system will be followed.

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Appendix A Aboriginal Archaeological Assessment Report

1. Introduction

This archaeological assessment forms the second volume to the Aboriginal cultural heritage assessment report (CHAR) for the boundary of the project between Woolgoolga and Wells Crossing section of the Woolgoolga to Ballina Pacific Highway upgrade project (the 'project').

The purpose of this report is to present the process, results and discussion of the archaeological assessment undertaken as part of the CHAR between Woolgoolga and Wells Crossing. The assessment has been undertaken with regard for the NSW Department of Environment, Climate Change and Water (DECCW) Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (NSW) 2010.

Project information, significance assessment, impact assessment and management recommendations are all contained within Volume 1 of this report. Additionally, a summary of information and results contained in this archaeological assessment are also included in Volume 1. As such, this report, Appendix A, serves as a supplement to Volume 1 and the two documents should be read concurrently.

This archaeological assessment is structured as follows:

- Chapter 1: Introduction.
- Chapter 2: Desktop assessment – develops the background information further from that presented in Volume 1, including specific information on previous archaeological investigations and development of a predictive model that aims to identify landforms with sensitivity for Aboriginal cultural heritage sites.
- Chapter 3: Field survey – describes the methods and outcomes of the field survey conducted to identify Aboriginal cultural heritage sites and potential archaeological deposits (PADs).
- Chapter 4: Sub-surface testing – explains the approach taken, process and results of the sub-surface test excavation program undertaken to explore the presence, nature and extent of sub-surface archaeological deposits.
- Chapter 5: Archaeological sites – presents analysis and discussion on the sites within the boundary of the project between Woolgoolga and Wells Crossing. This includes detailed artefact analysis, presentation of several radiocarbon dating results and an analysis of shell midden deposits.
- Chapter 6: Significance assessment.
- Chapter 7: Impact assessment.
- Chapter 8: Management recommendations.

It should be noted that the consultation undertaken for this archaeological assessment (with regard for the Office of Environment and Heritage [OEH] Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 [ACHCRP]) is described in Volume 1 (the CHAR).

2. Review of background information

2.1. Introduction

The region around the project is generally poorly studied in regards to the archaeology of Aboriginal occupation. Previous archaeological investigation has generally been for small isolated projects, and the occasional locality-wide study for road or forestry projects.

The archaeological assessment methodology used the available information to develop a predictive model. This Chapter specifically draws information from previous investigations that have been undertaken within the region of the project. The predictive model developed in section 2.1.1 draws on the information from previous investigations as well as the following sections from Volume 1:

- Historical context (Volume 1, Chapter 3).
- Existing environment (Volume 1, Chapter 4).
- Aboriginal cultural assessment (Volume 1, Chapter 5)
- Previously recorded cultural heritage sites (Volume 1, Chapter 6).

2.1.1. Previous investigations within the boundary of the project between Woolgoolga and Wells Crossing

Kuskie (2008) conducted an Aboriginal heritage impact assessment of the project between Woolgoolga and Wells Crossing of the proposed Pacific Highway upgrade for the former Roads and Traffic Authority (now Roads and Maritime Services [RMS]). A search of the Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS) database identified 15 Aboriginal heritage sites within his study area, with only one (AHIMS ID 13-4-0092), located on the preferred route (Kuskie 2008). The recorded location of this site indicates that it would have been impacted by the construction of the Halfway Creek Duplication, a previous development project of the Pacific Highway Woolgoolga to Ballina upgrade project.

Collins (2007) undertook cultural heritage survey partially overlapping the current boundary of the project near Arrawarra as part of the Sapphire to Woolgoolga section of the Pacific Highway Upgrade. Collins identified seven artefact sites and eight PADs within her project area. Additional survey was undertaken by Collins (2010) for a proposed rest area for the highway, immediately south of the current boundary of the project at Arrawarra. Collins (2010) identified an additional artefact scatter in this area that had been substantially disturbed by recent logging activities.

Appleton and Beck (1995) identified two artefact scatters, both outside of, but in close proximity to, Kuskie's (2008) study area. Of the 28 recorded stone artefacts, one was manufactured of quartz and the remainder of mudstone, which the authors suggested would have been available from local creek beds. Brown *et al* (2000) identified 55 stone artefacts while conducting site monitoring of

scarred tree and burial site (AHIMS) ID 22-1-0082) at Corindi Park Drive. The assemblage was dominated by argillite (32 flakes, five cores and a single hammerstone), with lower frequencies of other raw materials (one opal, eight mudstone, one greywacke, and two quartz).

Collins (2009) conducted an Aboriginal cultural heritage assessment of a proposed 66 kilovolt transmission line between the townships of Grafton and Maclean for Clarence Consultants Pty Ltd. Collins (2009) study area is either within or in close proximity to the boundary of the project. A total of two artefact scatters and a scarred tree were identified during the survey however these were located outside the Woolgoolga to Wells Crossing boundary of the project.

2.1.2. Previous Aboriginal archaeological investigations near the boundary of the project between Woolgoolga and Wells Crossing

Piper (1980) conducted a cultural heritage assessment of five parcels of land at the corner of the Pacific Highway and Arrawarra Beach Road, Arrawarra. A total of two Aboriginal sites were identified during the survey, specifically a shell midden identified on the ground surface and a shell midden distributed across the surface of a creek bank.

Byrne (1981) conducted a cultural heritage assessment of the proposed 330 kilovolt electricity line between Grafton and Lismore, for the Electricity Commission of NSW. Isolated stone artefacts were identified in two locations. The first artefact consisted of an orange-brown quartzite flake embedded in a low bank at the edge of a recently cultivated paddock. The second artefact consisted of a coarse grained silcrete core tool identified on sloping ground. A total of three stone artefact scatters were also identified during the survey and consisted of chert, quartzite, quartz, silcrete artefacts identified on spurs, slopes and ridges.

Byrne (1985) produced a background report for the management of Aboriginal archaeological resources in the Ulmarra Shire Council area. Byrne (1985) assessed the archaeological potential of the four landforms (floodplain, riverine, uplands and coast and coastal wetlands) and predicted the Aboriginal site types that would exist within these areas:

- Floodplain: Open sites consisting of stone artefact scatters would be the most common Aboriginal site type and would be located on high ground in and around the periphery of the floodplain. A previously recorded bora ground and burial site indicated that there is a likelihood that other such sites could be located in the region. Due to the depositional environment of the floodplain, most sites are likely to be covered to some extent by alluvium.
- Riverine: There is a clear association between Kangaroo Creek Sandstone and rockshelter occupation / art sites along the Orara River. Open campsites may also be identified along the length of the Orara especially on the flat tops of spurs running down to bends in the river. Stone arrangements and bora grounds may also exist along the rivers length. Site density would be lower along watercourses draining into or through the floodplain due to poor drainage conditions.
- The Uplands: Open camp sites may be identified on flat positions such as saddles and along the tops of ridges. Rockshelters may also be identified in the Kangaroo Creek Sandstone which occurs within the coastal ranges. Bora grounds and stone arrangements may also be found in the upland zone.

- Coast and Coastal Wetlands: Middens would be the most common site type and may be located between beaches and swamps in order to draw on the resources of both environments. Middens may also be identified west of backdunes on the margins of floodplain swamps, albeit on relatively high and well-drained surfaces. Stone artefact scatters may be identified in similar environments as shell middens as well as the ridges and spurs of dry schlerophyll country along the coast. Finally, small fish traps and burials may also occur within the region.

Navin Officer (1990) conducted a cultural heritage assessment of a proposed 330 kilovolt transmission line between Coffs Harbour and Koolkhan (north of Grafton) for the Electricity Commission of NSW. A total of 50 Aboriginal sites were identified as well as five PADs and six isolated finds. The Aboriginal sites consisted of 27 artefact scatters, three quarry sites, and three scarred trees. Aboriginal sites were identified in all landforms within their study area although predominantly in hilly, ridgeline country. Aboriginal sites were also identified in close proximity to creeks and alluvial flats, where creek valleys offered better travel routes than surrounding hillslopes (Navin Officer 1990).

Appleton (1998) conducted an Aboriginal cultural heritage assessment of six parcels of land at Corindi. A total of seven Aboriginal sites were identified during the survey and consisted of five open scatters, a scarred and tree and a burial. The location of the burial was identified through oral evidence only, therefore its exact location is unknown. The artefacts were identified on creek banks, drainage channels, floodplain and lower slopes. The artefacts were manufactured from quartz and quartzite, and included flakes and cores. The scarred tree, a large mature blackwood, was associated with the burial.

Davies (1998) conducted an Aboriginal cultural heritage assessment of a proposed Telstra Optic Fibre Cable route in the vicinity of Corindi / Red Rock. No Aboriginal archaeological sites were identified during the survey.

Collins (2003) conducted an Aboriginal cultural heritage assessment of a parcel of land at Corindi Beach for Northern Blue Pty Ltd. No Aboriginal archaeological sites were identified during the survey which the author attributes to vegetation cover and modern land modification. Collins (2003) argued that stone artefact scatters are likely to exist within the area albeit to a small extent.

Appleton (2003) conducted an Aboriginal cultural heritage assessment of the proposed Arrawarra Recreation Area, Arrawarra Beach Reserve for Coffs Harbour City Council. No Aboriginal archaeological sites were identified within Appleton's (2003) study area, which has been subject to ground disturbance in the past.

Collins (2007) conducted an Aboriginal cultural heritage assessment of a parcel of land at Woolgoolga for BBK Development Corporation Pty Ltd. No additional Aboriginal archaeological material was identified during the survey which Collins (2007) attributed to poor surface visibility.

A summary of other relevant reports is listed in Table 2-2.

Table 2-1 Previous archaeological investigations in proximity to the boundary of the project

Reference	Aboriginal sites	Results / conclusions
McBryde 1974	Numerous	A range of Aboriginal sites were investigated, including middens, quarry sites and a series of rock shelters along the Clarence River and its tributaries.

Reference	Aboriginal sites	Results / conclusions
Piper 1991	0	The Pacific Highway upgrade corridor immediately south of the boundary of the project had little potential to impact Aboriginal heritage values.
Byrne 1986	0	The Shire of Maclean would have had a low level use of the sub-coastal uplands by small mobile groups exploiting the relatively dispersed resources.
Appleton and Beck 1995	9	A total of 28 artefacts from nine locations were identified. Undertaken for the Corindi sewerage scheme directly to the west of Corindi, near Kangaroo trail road.
Hill and Murphy 2000	1	Details the salvage of the Kangaroo Trail S4 site previously identified by Appleton and Beck 1995. Located on Kangaroo Trail Road. The result was a total of 208 artefacts (including indurated mudstone, chert, greywacke) with most recovered from the trail itself in areas of disturbance.
Smith 1998	1	A shell midden located at Arrawarra.

2.2. Predictive model for site type and distribution

It is commonly recognised that archaeological sites tend to occur in favourable environmental settings. Predictive models use these patterns to identify the environmental characteristics of places where sites are more likely to occur. Craib (1992: 10), states that;

> "The goal of predictive models is to correctly identify important aspects of the natural and/or social environment that influenced the location of human activities, and to interpret the archaeological record as the result of a set of functional, temporal, spatial and behavioural responses to a varied environment."

Providing the available data is reliable, it is possible to extrapolate from a relatively small sample of known locations and apply the information to a much broader but similar landscape area (Collins 2008).

The predictive model applied to this study was based on a 'land system' or 'archaeological landscape' model of site location. This enables the prediction of site location based on known patterns of site distribution in similar land systems or archaeological landscapes. To ensure that the predictive model was specific, the predictive model presented here was developed by defining further specific landscape characteristics, where possible, within each land system. High risk landforms that are likely to contain Aboriginal archaeological sites were then highlighted within each of these landscape characteristics. Each high risk landform was assigned an archaeological sensitivity rating based on:

- Ethnohistory and cultural knowledge (refer to Volume 1, Chapter 5).
- Previous impacts to the landform and the potential effects of these impacts on the archaeological record (refer to Volume 1, Chapter 4).
- Previous models developed for the boundary of the project and surrounds.

- Previous survey results in and adjacent to the boundary of the project.
- Distribution patterns of known sites and site types in each landform (as previously discussed above and in Volume 1, Chapter 6).

Archaeological sensitivities assigned to landforms were low (L), low-moderate (L-M), moderate (M), moderate-high (M-H) and high (H) based on previous findings and average levels of ground disturbance across the landforms. These sensitivities essentially reflect the degree of likelihood for particular site types to be found within them.

Table 2-2 shows the predictive model for Aboriginal archaeological sites within the boundary of the project. It should be noted that sensitivity ratings in Table 2-2 relate to the likelihood of finding Aboriginal archaeological sites, not necessarily the significance of any site found. As there are few records of the sub-surface nature of archaeological sites across the boundary of the project, the predictive model is consequently skewed towards extrusive (surface) and shallow, eroding sites.

The location of archaeological sites within the landscape is not caused by pure environmental determinism. It is also important to note that cultural preferences may increase the likelihood of archaeological material or unidentified cultural places in or around the boundary of the project in areas not accounted for in the predictive model.

Recent Geographic Information System (GIS) predictive modelling undertaken by the Office of Environment and Heritage (OEH) is also useful to review here. This model is based on the locations of sites registered on the AHIMS within specific landforms and accounts for the accumulated impact of post-1750 land use impacts (Appendix G)[1] on specific site types.

Appendix G includes a series of maps provided by OEH that show the results of predictive modelling of the region around the boundary of the project for a range of site types (artefact sites, scarred trees, shell middens, and burials). Land impacts in the region are an important part of this modelling. For example, logging would have a significant impact on the distribution of scarred trees, but a more moderate impact on artefact scatters. This modelling is useful as a supplementary overview of the project and surrounding region, and generally accords with Table 2-2, however the model may not be sensitive enough to capture smaller scale variability. The predictive model presented in Table 2-2 is designed to account for this variability.

[1] For more information on the basis of this modelling, see http://www.environment.nsw.gov.au/licences/AboriginalSitesDecisionSupportTool.htm.

Table 2-2 Landforms where Aboriginal archaeological sites are likely to occur within the boundary of the project between Woolgoolga and Wells Crossing

Project section	Land system	Specific landscape characteristics	Location within / near the boundary of the project	Landforms with high probability of containing Aboriginal sites	Sensitivity rating	Likely site types	Characteristics of landforms influencing probability
1	Coastal plain	Relatively flat plain behind dune barrier on coast, with depressions comprising brackish lagoons, swamps and marshes.	Arrawarra and south of Corindi Wells Crossing, Halfway Creek, ending around Dirty Creek.	Any raised areas.	Moderate	Isolated stone artefacts and small stone artefact scatters, shell middens.	Infilling from aeolian dune mobility, aggrading alluvium, and colluviums may have concealed sites and even sensitive landforms.
1, 2, 3	Coastal range	Ridgelines dissected by ephemeral and permanent waterways and small river valleys. Overlooking Coastal plain and swamps.	Wells Crossing, Halfway Creek, ending around Dirty Creek, includes Dirty Creek Range (also known as Coast Range.	In close proximity to freshwater sources on locally elevated well-drained land. Would have formed walking paths between coastal and inland resources.	Moderate	Isolated stone artefacts and small stone artefact scatters.	Relatively shallow soils have limited potential for stratified and in situ deposits due to post-contact land-use activities.
1,2		Foot slopes and spurs of range adjacent valley flats. Gradients are generally gentle and elevation less than 40 m above sea level.	Dirty Creek, Corindi and Arrawarra.	Flat, low spur crests near substantial creeks and resource-rich swamps.	High	Small and more substantial stone artefact scatters, bora/ceremonial rings.	Relatively shallow soils have limited potential for stratified and in situ deposits due to post-contact land-use activities.

Project section	Land system	Specific landscape characteristics	Location within / near the boundary of the project	Landforms with high probability of containing Aboriginal sites	Sensitivity rating	Likely site types	Characteristics of landforms influencing probability
1		Broad alluvial valley flats.	Corindi River, Dirty Creek.	Flat alluvial terraces near substantial creeks, rivers and resource-rich swamps. Burials may occur in deep alluvial deposits.	Moderate-High	Small and more substantial stone artefact scatters, burials, bora/ceremonial rings.	Aboriginal sites may be concealed by aggrading alluvium.

2.2.1. Expected site types within the boundary of the project

The predictive model for site types developed for the region (Table 2-2) indicates that certain site types are more likely to be prevalent in the landscape. The degree of preservation and intactness would vary depending on historical and current land use and the nature of the site. The maps generated from the predictive model (Appendix G) show that there has been substantial disturbance of Aboriginal archaeological sites within the boundary of the project from post-1750 land-use practices. This is particularly evident for scarred trees, burials and shell middens. However, the model outputs also show that sites may persist within a number of areas both within and outside the boundary of the project.

Site types likely to remain within the boundary of the project are described in Table 2-3.

Table 2-3 Summary of potential site types within the boundary of the project between Woolgoolga and Wells Crossing

Site type	Description
Artefact scatters	Artefact scatters are the most likely sites to have survived in the archaeological record, due to the durability of their contents (predominantly stone). They are scatters of stone artefacts, occasionally with associated food material such as shell and bone. Areas subject to higher degrees of impact, such as from sugar cane farming or sand quarrying would be unlikely to preserve intact archaeological deposits, but may retain artefacts in a disturbed context. Consequently, intact archaeological deposits/sites are less likely to be found in these disturbed areas. Likely places for artefact scatters or isolated artefacts within the boundary of the project are on terraces or low, flat spurs adjacent to and above swamps or permanent creeks, and occasionally on ridgelines that may have been pathways. Suitable locations occur throughout the boundary of the project, especially on flat raised areas adjacent to water sources within the Coastal plain and the Glenugie Creek Catchment.
Scarred and carved trees	Scarred trees are identified by the purposeful removal of bark for use in the manufacture of artefacts such as containers, shields and canoes. The bark was also used for the construction of shelters. Carved trees also exhibit evidence of purposeful removal of bark but differ from scarred trees in that geometric patterns and figures are cut into the tree. The motifs of the mid-north coast region are mostly linear geometric patterns (Craib and Bonhomme 1995: 27). Although it is likely that scarred/carved tree sites would have been present in the boundary of the project in the past, the fact that there has been heavy clearing of old growth timber within and around the boundary of the project implies a low potential for this site type. The maps in Appendix G support this notion, showing that there is a significant difference between the pre-contact (1750) predicted condition of the likelihood of scarred trees within and around the boundary of the project, and the current predicted condition (accounting for accumulated impact). Likely locations for scarred and carved trees in the boundary of the project are within areas of extant mature native trees, such as road reserves or private property adjacent to national parks and state forests.

Site type	Description
Burials	Burials are most commonly found in soft sandy, alluvial deposits because such conditions (ie light easily dug soil) facilitate interment. Burial locations are sometimes marked by carved trees. The designs on these trees were usually geometric patterns and may have signified the totemic kinship affiliations of the deceased. Likely locations for burial sites in the boundary of the project are in areas of easy to dig soils of depths greater than a metre, such as sand dunes and hills in the Coastal plain land system, or in sandy alluvial terraces, such as in alluvial valleys in the Coastal range land system.
Shell middens	These are common along the coast, and in estuarine and creek areas. In archaeological terms, a midden refers to an accumulation of shell deposited after people had collected and eaten shellfish. Middens may also contain faunal remains, stone artefacts and charcoal from cooking fires. In many areas, burials have been recorded in direct association with midden deposits. Midden sites vary widely in size, preservation and content. Likely locations for middens in the boundary of the project are in the vicinity of river and creek banks and swamps, such as Corindi Creek and Halfway Creek.
Bora/Ceremonial sites	These are usually identified as flat mounded earth rings which were used for ceremonial activities. The nature of these sites makes them particularly susceptible to impact, such as from ploughing, cane farming and logging. These sites are often known only from the oral traditions of local Aboriginal groups. Several bora rings exist or were known to have existed in the proximity of the study area. The locations of bora sites are hard to predict, but generally occur in areas of high archaeological potential.
Natural/ mythological/ ritual sites	These may not exhibit any physical or archaeological evidence, but their identification is derived from local Aboriginal tradition and oral history. These sites often have mythological associations and are associated with ceremonial activity in the past. These sites are sometimes prominent landmarks, such as mountains, rivers, rocky outcrops, and headlands (eg Glenugie Peak). A myriad of landscape factors as well as intangible cultural and social factors, influence where these sites are located. Consequently, it is very difficult to predict where currently unknown natural, mythological and/or ritual sites may be located, although they may be more likely to occur in landforms of high archaeological sensitivity. Consultation with relevant knowledge holders is usually required to locate these sites.
Stone arrangements	In the Mid-North Coast of NSW, stone arrangements usually consist of cairns and/or alignments of rocks. These features are considered by the Gumbaynggir people as having ceremonial significance and are often found in relatively high and/or inaccessible places such as mountain peaks and coastal headlands. Likely locations for these sites would be in the ranges and are thus unlikely to occur within the boundary of the project.
Waterholes or wells	Waterholes or wells can be any natural or excavated water retaining feature of either historic or prehistoric significance. In order to be considered as an archaeological site, there should be some evidence of modification or use of the site. Likely locations for waterholes or wells are within the ranges surrounding the boundary of the project. The underlying sandstone of the boundary of the project would be unsuitable for waterhole modification and consequently, there is little likelihood of waterholes being located within the boundary of the project.

3. Field Survey

3.1. Introduction

The team undertook the archaeological survey for the project between Woolgoolga and Wells Crossing between August 2010 and December 2011. The technical requirements for the survey standards are set out in the OEH Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales 2010 and these were referred to prior to commencing works.

3.2. Previous surveys

Prior to the field survey undertaken for this report, surveys were undertaken by Kuskie (2008) for the concept design stage of the Woolgoolga to Wells Crossing Pacific Highway Upgrade. Through community consultation and analysis of the report it was determined that approximately 90 per cent of the boundary of the project (corrected to account for previously significantly disturbed areas) had been subject to previous survey and would not require further survey. This meant that the remaining 10 per cent of the boundary of the project required survey.

3.3. Survey aims

The primary aims of the archaeological survey were to:

- Improve the survey coverage of the boundary of the project.
- Identify sites and areas of PADs within the boundary of the project.
- Collaborate and consult with registered Aboriginal stakeholders.

Priority areas identified for archaeological survey comprised areas which had not been previously surveyed. A secondary aim of the archaeological survey was to undertake consultation along the project with nominated Aboriginal site officers representing the registered Aboriginal stakeholders. The objective of their participation was to:

- Obtain any information relating to cultural heritage sites (archaeological and cultural) along or adjacent to the boundary of the project.
- Understand Aboriginal significance of sites or PAD located during the field survey.
- Discuss preliminary recommendations for Aboriginal sites and PADs located within the boundary of the project during the field survey.
- Discuss recommendations for further archaeological assessment of PADs located during the field survey.

3.4. Survey timing and personnel

The archaeological survey was undertaken on the following dates:

- 23 to 27 August 2010
- 24 to 27 August 2011
- 4 to 7 October 2011
- 25 October to 22 December 2011 (various dates throughout the sub-surface testing program)
- 12 March 2012
- 14 May 2012

The field teams comprised project team archaeologists and nominated Aboriginal site officers representing registered Aboriginal stakeholders (Table 3-1). A mix of male and female archaeologists was incorporated into the field team to allow for potential Aboriginal stakeholder preferences when sharing cultural information.

Well defined boundaries exist for Local Aboriginal land councils (LALCs), which have been developed for the most part by government agencies to assist with health, housing and other matters. However, these boundaries do not necessarily reflect traditional Aboriginal tribal or clan boundaries. Consequently, Aboriginal communities have their own views about their cultural affiliations to each other and the landscape. Where possible, the archaeology survey team enabled the registered Aboriginal stakeholders to speak for themselves as to which parts of the project they assumed cultural heritage responsibility for via the Aboriginal focus group meetings (AFG). This approach resulted in the Coffs Harbour LALC, Yarrawarra Aboriginal Corporation and Garlambirla Guuyu-girwaa Corporation agreeing to work together, and the Grafton-Ngerrie LALC and Coffs Harbour LALC agreeing on an overlap area within approximately one kilometre of their shared boundary.

Table 3-1 Survey personnel (Woolgoolga to Wells Crossing)

Organisation	Name	Role	Dates of participation
Yarrawarra Cultural Centre (Garby Elders)	Milton Duroux	Senior Aboriginal Site Officer	25 August 2010 7 October 2011 5-6 December 2011 7 March 2012 14 May 2012
Grafton-Ngerrie LALC	Wes Fernando	LALC CEO	7 October 2011
Grafton-Ngerrie LALC	Rod Duroux	Senior Aboriginal Site Officer	7 October 2011 14 May 2012
Grafton-Ngerrie LALC	Rod Duroux	Trainee Aboriginal Site Officer	14 May 2012

Organisation	Name	Role	Dates of participation
Garlambirla Guuyu-girrwaa Corporation	Mark Ferguson	Senior Aboriginal Site Officer	25 August 2010 7 October 2011 7 March 2012 14 May 2012
Yarrawarra Cultural Centre (Garby Elders)	Anthony Dootson	Trainee Aboriginal Site Officer	25 August 2010 7 October 2011
Yarrawarra Cultural Centre (Garby Elders)	Tim Cowan	Senior Aboriginal Site Officer (volunteer)	25 August 2010
Yarrawarra Cultural Centre (Garby Elders)	Rick Cain	Trainee Site Officer	5-6 December 2011
Coffs Harbour LALC	Ian Brown	Senior Aboriginal Site Officer	25 August 2010 14 May 2012
Coffs Harbour LALC	Mark Flanders	Senior Site Officer	7 October 2011 5-6 December 2011 7 March 2012
Coffs Harbour LALC	Jake Kennedy	Trainee Aboriginal Site Officer	6 December 2011
SKM	Vanessa Edmonds	Supervisor/ Archaeologist	23-27 August 2010
SKM	Robyn Jenkins	Supervisor / Archaeologist	5-6 December 2011 7 March 2011
SKM	Andrew Costello	Supervisor/ Archaeologist	4-7 October 2011
SKM	Joseph Brooke	Supervisor/ Archaeologist	23-27 August 2010 4-7 October 2011
SKM	Rani Attwood	Archaeologist	23-27 August 2010
SKM	Erica Weston	Archaeologist	4-7 October 2011
SKM	Clair Davey	Archaeologist	7 March 2011
Sub-consultant	Jay Yost	Archaeologist	5-6 December 2011
Sub-consultant	Tom Hoyle	Archaeologist	5-6 December 2011
Sub-consultant	Morgan Wilcox	Archaeologist	5-6 December 2011

3.5. Survey methodology

The field program focused approximately on the 10 per cent of the boundary of the project which had not previously been surveyed, and areas where design changes had occurred. The methodology for the survey followed a standard approach:

- Survey areas were defined on the basis of landholder information. A survey area was constituted by a block of land with unique property information in a previously un-surveyed area within the boundary of the project.
- Property access limited the areas that could be surveyed. Therefore, the sampling strategy developed was to survey as many properties as possible within the boundary of the project, which had not previously been subject to survey.
- Two teams of archaeologists and Aboriginal site officers undertook a pedestrian survey in five to 10 metre wide transects across each survey area.
- Particular attention was given to areas where ground surface visibility was possible or where the sub-surface was exposed.
- Where property access was not available, an assessment of the survey area was made from the property boundary for Aboriginal heritage potential.
- PADs were identified through a combination of desktop landform analysis and onsite landform and geomorphological analysis, in conjunction with Aboriginal site officers.

Approximately 20 per cent of the entire project has been significantly disturbed by previous earthmoving works and construction (predominantly, the existing Pacific Highway). In these areas there is negligible potential for any Aboriginal heritage evidence to have survived. Consequently, these areas were marked as 'significantly disturbed' and visual inspection was used to confirm that negligible potential for heritage evidence existed in these areas. The remainder of the project comprised of land where there was varying degrees of potential for Aboriginal heritage material (as per the predictive model in Table 2-2).

Where property access was possible, the locations of all Aboriginal sites and PADs were recorded using a mobile GIS Unit (Trimble® GeoXH™ GeoExplorer® or the Trimble® Nomad). This allowed for the spatial datasets collected in the field to be post-processed to sub-metre level accuracy once the Global Positioning System (GPS) co-ordinates have been differentially corrected.

Ground surface visibility and any sub-surface exposures were noted for each survey area, along with other observations of the area, such as; vegetation type, previous modification/disturbance, landform and land-use.

Sites were defined on the basis of the spatial extent of visible objects and where possible, the logical boundary of the landform unit on which they lay.

3.6. Survey coverage

Prior to current investigations the majority of the project (approximately 90 per cent) had been surveyed or disturbed to the point where Aboriginal heritage potential had been removed. The entire project has now been subject to cultural heritage investigation, with most of this being through field survey (99 per cent – see Table 3-2, Figure 3-1 and Figure 3-2) and only a small portion of the assessment undertaken from the property boundary to assess for Aboriginal heritage potential.

The main constraints to survey coverage were property access permission and vegetation cover (such as heavily water-logged swamp); however, such properties were, for the most-part, still able

to be assessed either from the road or an adjacent property. Where this was not possible, survey areas were assessed based on in-field consultation with site officers and observations, topographic data, and predictive modelling. The remainder of the project is not considered a risk for cultural heritage sites or places, due to previous significant impacts, and so does not require survey.

Table 3-2 summarises the survey coverage across the boundary of the project. Figure 3-1 and Figure 3-2 show survey coverage across the boundary of the project between Woolgoolga and Wells Crossing. Appendix I provides details of survey areas, including visibility for each survey area from 2010-2012 survey (previous survey data can be found in Kuskie 2008). Survey coverage falls under the following two categories:

- Small amounts of survey which were undertaken for projects other than the Pacific Highway Upgrade Program between Woolgoolga and Wells Crossing.
- Pre-2010 Pacific Highway Upgrade Program survey, which was undertaken for the project, though prior to 2010 (Kuskie 2008).
- 2010 - 2012 Pacific Highway Upgrade Program survey.

Table 3-2 Survey coverage of the boundary of the project between Woolgoolga and Wells Crossing

Land system	Corridor area (m^2)*	Survey coverage (m^2/%)*	Visibility	Exposure	Effective coverage (m^2/%)
Coastal plain	380,393	354,432 (93%)	50%	10%	177,221 (5%)
Coastal range	2,513,409	2,501,820 (96%)	60%	20%	300,218 (12%)
Total	**2,893,802**	2,856,252 **(99%)**	**59%**	**19%**	**477,439 (11%)**

Generally surface visibility and sub-surface exposure encountered across the boundary of the project (see Table 3-2) was good (average of 59 per cent visibility and 19 per cent exposure). The higher coverage within the Coastal range is predominantly a result of the higher levels of erosion within this landsystem. The overall level of effective coverage (11 per cent) is considered quite high and sufficient to present an effective assessment of the Aboriginal heritage resources identified.

The survey coverage summarised in Table 3-2 was comprehensive for obtrusive site types (eg scarred trees, rock shelters), but more limited for the less obtrusive site types (eg stone artefacts, middens, burials). However, these areas were identified as PADs and assessed during the sub-surface testing program (refer to Chapter 4). The substantial survey work to date also assists in drawing broad scale conclusions on the Aboriginal values and resources in the boundary of the project and the impact the project may have.

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3.7. Survey results

As a result of all survey (including survey undertaken by Kuskie (2008) and that undertaken since then by the Alliance (2011-2012)), a total of 14 new sites were recorded and (three new areas of stand-alone PAD were identified, totalling 15 sites with one previously recorded site. Additionally, at the same time as this survey program but independent of the Pacific Highway Upgrade investigations, a site was registered with AHIMS as a scarred tree – Pacific Highway Scarred Tree 1. A subsequent site inspection was undertaken with nominated Aboriginal site officers to get accurate details and the location of this site. During the site inspection, it was agreed by all on site, that the tree had not been scarred by Aboriginal people as a result of traditional activities. Subsequently, a site update was submitted to AHIMS recommending that the status of this record be changed to 'not a site'. To date, no confirmation from AHIMS has been forthcoming. Table 3-3 summarises all identified archaeological sites and PADs within the boundary of the project between Woolgoolga and Wells Crossing.

Table 3-3 Identified archaeological sites and PADs near or within the boundary of the project between Woolgoolga and Wells Crossing

Project section	AHIMS ID	Name	Site type(s)	Description	Landscape unit	Potential archaeological sensitivity	Method of identification	Near or within
1	22-1-0348	WWC 5/A	Site – Artefact scatter and PAD	Located on spur crest at Farm Trail on west side of existing highway. Potentially many more artefacts; shallow skeletal soil.	Coastal plain	Moderate	Pre-2010 PHU survey	Near
1	22-1-0346	WWC 18	Site – Artefact scatter and PAD	Broad area on spur crest at Sherwood Creek Road, west of existing highway. Partially within, partially adjacent to boundary of the project. Potentially many more artefacts; shallow skeletal soil	Coastal range and coastal plain	Moderate	Pre-2010 PHU survey	Within
1	22-1-0345	WWC 26/A	Site – Isolated artefact	Located on east side of existing highway and west of Eggins Drive.	Coastal plain	Low	Pre-2010 PHU survey	Within
1	22-1-0402	Sherwood North	Site – Artefact scatter and PAD	Located on a spur in a closed woodland, with a cleared section for single-carriage gravel roadways	Coastal range	Moderate	2011 ground survey	Within
1	22-1-0401	Sherwood Creek Road to Kangaroo Trail	PAD	Broad low-lying portion of coastal plain from north of Sherwood Creek Road to near Kangaroo Trail Road. Known Aboriginal burials in similar context nearby. Additional survey during the 2011 sub-surface testing program resulted in the revision to not a PAD. The area had been subject to disturbance from a Banana plantation, previous road construction and powerlines. There is also swamp which covered approximately 60% of the PAD area.	Coastal plain	Low (revised to not a PAD within the boundary of the project following additional survey)	Pre-2010 PHU survey, 2011 ground survey	Near

Project section	AHIMS ID	Name	Site type(s)	Description	Landscape unit	Potential archaeological sensitivity	Method of identification	Near or within
1	22-1-0344	WWC 37/A	Site – Artefact scatter and PAD	South of Corindi River; shallow skeletal soil	Coastal range	Moderate	Pre-2010 PHU survey	Within
1	22-1-0343	WWC 39	Site – Artefact scatter and PAD	Prominent very gentle ridge crest south of the Corindi River and adjacent gentle simple slope leading north to creek and creek flats. Several less common artefact types. Deposits potentially relatively deep and intact in places, although levels of disturbance also possibly high in portions of this area. High potential for sub-surface deposit	Coastal range and coastal plain	Moderate	Pre-2010 PHU survey	Within
1	22-1-0342	WWC 46/A	Site – Isolated artefact and PAD	Located on vehicle track in forest on flat north of Corindi Creek. PAD extends over alluvial plain; deep alluvial soils inferred. Known Aboriginal burials in similar contexts nearby.	Coastal plain	Moderate-High	Pre-2010 PHU survey and 2010 ground survey	Within
1	22-1-0349	WWC 53/A	Site – Isolated artefact	Located on margin of vehicle track north of Redbank Creek.	Coastal range	Low	Pre-2010 PHU survey	Within
1	22-1-0403	WWC Dirty Creek 1	PAD	Located on upper slopes and crests of spurs north of Redbank Creek	Coastal range	Low-Moderate	2012 ground survey	Within
1	13-4-0178	Dirty Creek PAD	PAD	Swamp, lower and mid-slopes, ridge	Coastal range	Low-Moderate	2010 survey – boundary assessment only 2012 ground survey	Within
1	13-4-0162	WWC 78/A	Site – Isolated artefact	Located east of existing highway and Range Road.	Coastal range	Low	Pre-2010 PHU survey	Within

Project section	AHIMS ID	Name	Site type(s)	Description	Landscape unit	Potential archaeological sensitivity	Method of identification	Near or within
1	13-4-0161	WWC 92/A	Site – Isolated artefact	Located east of existing highway and Falconers Road.	Coastal range	Low	Pre-2010 PHU survey	Near
1	13-4-0160	WWC 115/A	Site – Artefact scatter and PAD	East of existing highway at Halfway Creek duplication near 'Milleara'. Moderate potential for sub-surface deposit	Coastal range	Moderate-High	Pre-2010 PHU survey	Within
1	13-4-0092	IA2	Site – Isolated artefact	Already impacted by Halfway Creek duplication and therefore not considered further in this assessment.	Coastal range	Low	Previous survey	Within
2	13-4-0159	WWC 135/A	Site – Artefact scatter and PAD	East of existing highway immediately north of Wells Crossing. Moderate to high potential for sub-surface deposit	Coastal range	Moderate-High	Pre-2010 PHU survey	Within
2	13-4-0158	WWC 138/A	Site – Isolated artefact	Artefact on vehicle track north of Wells Crossing and east of existing highway and Parker Road. Shallow skeletal soil restricts potential for sub-surface deposit.	Coastal range	Low	Pre-2010 PHU survey	Within
2	13-4-0157	WWC 139/A	Site – Isolated artefact and PAD	On vehicle track north of Wells Crossing and east of existing highway and Parker Road. Moderate potential for sub-surface deposit	Coastal range	Moderate	Pre-2010 PHU survey	Within

Project section	AHIMS ID	Name	Site type(s)	Description	Landscape unit	Potential archaeological sensitivity	Method of identification	Near or within
2	13-4-0174	Pacific Highway Scar Tree 1	Site – Scarred tree	Eucalypt tree with scar facing highway – probably made by lightning strike. This scar tree is not considered to be a site and therefore is not considered further in this assessment.	Coastal range	Low	Registered independently of current investigations. Inspection and consultation with traditional owners during 2011 ground survey recommended that the records for this tree be changed on AHIMS to be 'not a site'.	Within

4. Sub-surface testing

4.1. Introduction

As 12 areas of PAD were identified, according to PACHCI, and the of the Department of Planning and Infrastructure's Director-General requirements, sub-surface testing should be undertaken in these areas to better determine the impact to Aboriginal cultural heritage values within the boundary of the project. Only 10 of these PADs required sub-surface testing, as two of these areas of PAD occurred outside the current boundary of the project (and Sherwood Creek Road to Kangaroo Trail PAD was determined to no longer be a PAD upon re-inspection).

4.2. Aims

The aims for the sub-surface testing, within the Woolgoolga and Wells Crossing section, were to determine the sub-surface nature of the 10 PADs (either sites with PAD components or stand-alone PADs) identified during survey (Table 4-1), specifically to:

- Determine the presence of sub-surface deposits for all PADs.
- Determine the nature, depth, extent and significance of archaeological deposits within the boundary of the project.
- Consult with registered Aboriginal stakeholders in regards to this work and the sites being tested.
- Develop recommendations to minimise or mitigate potential impacts.
- Consult with Aboriginal stakeholders in regards to these recommendations.
- Excavate consistently with the geomorphology of the relevant landform.
- Comply with the DP&I Director-General's environmental requirements.
- Undertake excavation with regard to the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales 2010 and in accordance with the Director-General's requirements.
- Undertake a small amount of 'control' excavations outside PADs to test predictive model accuracy.

Table 4-1 PADs and sites within the boundary of the project between Woolgoolga and Wells Crossing, noting requirement for sub-surface testing

Project section	Name (AHIMS ID)	Description	Sub-surface testing required
1	WWC 18 (22-1-0346)	Broad area on spur crest at Sherwood Creek Road, west of existing highway. Partially within boundary of the project. Potentially many more artefacts; shallow soil.	Yes
1	WWC 26/A (22-1-0345)	Located on east side of existing highway and west of Eggins Drive.	No
1	Sherwood North (22-1-0402)	Located on a spur in a closed woodland, with a cleared section for single-carriage gravel roadways. Several artefacts recorded on the surface outside the project corridor.	Yes
1	WWC 37/A (22-1-0344)	South of Corindi River; shallow skeletal soil.	Yes
1	WWC 39 (22-1-0343)	Prominent very gentle ridge crest south of the Corindi River and adjacent gentle simple slope leading north to creek and creek flats. Several less common artefact types. Deposits potentially relatively deep and intact in places, although levels of disturbance also possibly high in portions of this area. High potential for sub-surface deposit.	Yes
1	WWC 46/A (22-1-0342)	Located on vehicle track in forest on flat north of Corindi Creek. Deep alluvial soils inferred. Known Aboriginal burials in similar contexts nearby.	Yes
1	WWC 53/A (22-1-0349)	Located on margin of vehicle track north of Redbank Creek.	No
1	WWC Dirty Creek 1 (22-1-0403)	Located on upper slopes and crests of spurs north of Redbank Creek	Yes
1	Dirty Creek PAD (13-4-0178)	Slopes and top of rise nearby Dirty Creek.	Yes
1	WWC 78/A (13-4-0162)	Located east of existing highway and Range Road.	No
1	WWC 115/A (13-4-0160)	East of existing highway at Halfway Creek duplication near "Milleara". Moderate potential for sub-surface deposit	Yes
1	IA2 13-4-0092	Already impacted by Halfway Creek duplication.	No
2	WWC 135/A (13-4-0159)	East of existing highway immediately north of Wells Crossing. Moderate to high potential for sub-surface deposit.	Yes
2	WWC 138/A (13-4-0158)	Artefact on vehicle track north of Wells Crossing and east of existing highway and Parker Road. Shallow skeletal soil restricts potential for sub-surface deposit.	No
2	WWC 139/A (13-4-0157)	On vehicle track north of Wells Crossing and east of existing highway and Parker Road. Moderate potential for sub-surface deposit.	Yes

4.3. Timing and personnel

Sub-surface testing for the project between Woolgoolga and Wells Crossing was undertaken over the period 14 November and 18 December 2011, and 14 and 15 May 2012.

Table 4-2 outlines the personnel involved in sub-surface testing.

Table 4-2 Timing and personnel involved in sub-surface testing

Week number	Alliance supervisors	Alliance Archaeologists	Alliance Assistants	Aboriginal site officers
14 November – 20 November 2011	Robyn Jenkins	Erica Weston Clair Davey Christian Thurmer Tom Hoyle	Tristan Minter	**Yarrawarra Aboriginal Corporation** Anthony Dootson **Grafton-Ngerrie LALC** Brett Duroux Rod Duroux **Garby Elders** Milton Duroux
21 November – 27 November 2011	Joseph Brooke Michael Jones Vanessa Edmonds	Erica Weston Amanda Goldfarb Morgan Wilcox Tom Hoyle Christian Thurmer	Tristan Minter	**Yarrawarra Aboriginal Corporation** Milton Duroux Rick Cain **Coffs Harbour LALC** Mark Flanders Jake Kennedy **Garlambirla Guuyu-girrwaa Corporation** Mark Ferguson

Week number	Alliance supervisors	Alliance Archaeologists	Alliance Assistants	Aboriginal site officers
28 November – 4 December 2011	Michael Jones	Erica Weston Amanda Goldfarb Christian Thurmer Tom Hoyle Morgan Wilcox Jay Yost	Tristan Minter	**Yarrawarra Aboriginal Corporation** Milton Duroux Rick Cain **Coffs Harbour LALC** Mark Flanders Jake Kennedy **Garlambirla Guuyu-girrwaa Corporation** Mark Ferguson
5 December – 11 December 2011	Robyn Jenkins	Erica Weston Jay Yost Tom Hoyle Morgan Wilcox		**Yarrawarra Aboriginal Corporation** Milton Duroux Rick Cain **Coffs Harbour LALC** Mark Flanders Jake Kennedy
12 December – 18 December 2011	Vanessa Edmonds	Erica Weston Simon Coxe Laura Bates		**Yarrawarra Aboriginal Corporation** Milton Duroux Noeline Kennedy **Coffs Harbour LALC** Mark Flanders Jake Kennedy **Garlambirla Guuyu-girrwaa Corporation** Mark Ferguson

Week number	Alliance supervisors	Alliance Archaeologists	Alliance Assistants	Aboriginal site officers
14 and 15 May 2012	Andrew Costello	Robyn Jenkins Jared Brindley		**Yarrawarra Aboriginal Corporation** Milton Duroux **Grafton-Ngerrie LALC** Brett Duroux Rod Duroux **Coffs Harbour LALC** Ian Brown **Garlambirla Guuyu-girrwaa Corporation** Mark Ferguson

4.4. Methodology

Sub-surface test excavations took place only at PADs identified within the boundary of the project. The methodology was initially restricted to following the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales 2010 until the Director-General requirements were issued on 23 November 2011. This restriction included:

- Excavating only within the boundary of the project.
- Excavating a series of 0.5 metre x 0.5 metre test-pits by hand tools and in a controlled manner.
- Excavating below archaeological deposits and into sterile soils.
- Excavating no more than 0.5 per cent of the test area (site with PAD, PAD, or control area), unless the site is less than 50 square metres.
- All analysis of Aboriginal objects that were uncovered during test excavation were analysed in the field.

The methodology used to test the PADs for sub-surface Aboriginal objects involved the hand excavation of 0.5 metre x 0.5 metre test pits, removing soils in excavation units of 50 millimetres. The following hand tools were used: trowel, spade, shovel and where necessary (eg heavy compact clay or gravels), mattock. In test pits where potential *in situ* Aboriginal cultural heritage material was encountered (eg in well-cemented alluvial deposits), hand tools such as trowels and straight-edged spades were used. These 0.5 metre x 0.5 metre test pits were employed to investigate the sub-surface character of soil deposits and to define the extent of sites. Test pits were aligned in either transects (spaced evenly along a line) or placed on a grid pattern, to

systematically sample the PADs. Test pits were spaced at 10 metre and 20 metre intervals, depending on the observed disturbance of the area, and the predicted sensitivity of the landforms on which the PAD was located. Transects were used to sample thinner areas, whereas grids were used to sample wider areas.

Five control areas outside site/PAD boundaries were sampled to test the predictions in the predictive model; the same methods and sample approach was used in control areas. Control areas were located in areas the predictive model identified to be not likely to be sensitive for archaeological material, such as flat, flood-prone areas, or steep-gradient slopes

Soil deposits were sieved using three and five millimetre gauge mesh sieves. Dependent on property access a mechanical sieve (five millimetre mesh) was also used in conjunction with hand sieves. The location of the excavation sub-surface test pits were recorded using a mobile GIS Unit (Trimble® GeoXH™ GeoExplorer® or the Trimble® Nomad). This allowed for the spatial datasets collected in the field to be post-processed to sub-metre level accuracy once the GPS co-ordinates have been differentially corrected.

All Aboriginal objects, features and other non-cultural inclusions were recorded according to their excavation unit. Records were kept of the objects provenance and cultural material of excavated soil in relation to the estimated volume of soil removed. Changes in the deposit, stratigraphy and any unusual features were recorded by the use of context sheets related to photographic records. Stratigraphic profiles of representative test pits were drawn for all PADs/sites. Descriptions of sediment colours were assessed through reference to a Munsell soil colour chart and pH values were determined through a colorimetric test. Sub-surface testing only ceased when enough information had been recovered to adequately characterise the objects present with regard to their nature and significance.

The analysis of all Aboriginal objects was undertaken in the field. All artefacts retrieved during sub-surface testing were double bagged and labelled with appropriate contextual information. Analysis was then undertaken which included all measurements, identification of material, depth and test pit locations and photos. Following detailed analysis in the field, all artefacts were left *in situ*, or reburied in the one location on the site to make relocation easier.

All excavations were backfilled with the original soil on completion of excavation and recording. Where possible, ground cover was retained for reinstatement of the test pits following backfilling. Any residual soil was scattered within the vicinity of the site at a low density.

4.4.1. Constraints

The primary constraint was related to the restriction of the excavation methodology prior to the Director-General's environmental assessment requirements being issued. In accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales 2010* sub-surface investigation could not be undertaken in the following areas:

- In or within 50 metres of an area where burial sites are known, or are likely to exist.
- In or within 50 metres of a declared Aboriginal place.
- In or within 50 metres of a rock shelter, shell midden or earth mound.
- In areas known or suspected to be Aboriginal missions or previous Aboriginal reserves or institutes.
- In areas known or suspected to be conflict or contact sites.

Initially, two areas in the project between Woolgoolga and Wells Crossing fell into one of the above categories (as previous investigation had identified these to be areas where burials are known to occur nearby):

- Sherwood Creek Road to Kangaroo Trail PAD.
- WWC 46.

However, following consultation with registered Aboriginal stakeholders, it was determined that Sherwood Creek Road to Kangaroo Trail PAD was not a PAD within the boundary of the project, and the actual sensitive area for burials lies to the west of the boundary of the project (Table 4-1). Similarly for WWC46, further consultation with registered Aboriginal stakeholders also determined that the area sensitive for burials also lay to the west of the boundary of the project. To be certain, excavation of WWC46 did not proceed until Director-General requirements were issued.

General constraints included wet weather, which caused the cancellation of some fieldwork days, and property access. WWC Dirty Creek 1 was not able to be test-excavated due to lack of property access.

Due to limitations in property access, control areas were excavated on the same properties as PADs.

4.5. Results

A total of nine PADs were excavated within the boundary of the project between Woolgoolga and Wells Crossing (Table 4-3). Of these PADs, five contained sub-surface Aboriginal deposits. No control test pits contained Aboriginal archaeological material (Table 4-4). These Aboriginal deposits were recovered during excavation of 346 STPs (0.5 metre x 0.5 metre). No new sites were recorded as a result of test-excavation.

A summary and details of all sites and the location of all excavations can be found in Appendices J, K and L, with Figure 4-2, Figure 4-3, Figure 4-4, Figure 4-5, Figure 4-6 and Figure 4-7 showing the locations of all excavations.

Table 4-3 Summary of sub-surface test excavations

Site name (AHIMS ID)	GPS co-ordinates easting/northing (MGA Zone 56)	Potential archaeological sensitivity	Landscape unit	Number of investigations (shovel test pits)	Aboriginal objects
WWC18 (22-1-0346)	517855 E / 6675639 N	Low-Moderate	Coastal range (foot slopes)	20 (0.5 m x 0.5 m)	1 Artefact (silcrete)
Sherwood North (22-1-0402)	517907 E / 6676141 N	Low-Moderate	Coastal range (spur)	11 (0.5 m x 0.5 m)	None

Site name (AHIMS ID)	GPS co-ordinates easting/northing (MGA Zone 56)	Potential archaeological sensitivity	Landscape unit	Number of investigations (shovel test pits)	Aboriginal objects
WWC37 (22-1-0344)	517842 E / 6677927 N	Low-Moderate	Coastal range (spur)	33 (0.5 m x 0.5 m)	1 Artefact (chert)
WWC39 (2-1-0343)	517764 E / 6678255 N	Low-Moderate	Coastal range (spur)	99 (0.5 m x 0.5 m)	98 Artefacts (agate, chalcedony, chert, silcrete, mudstone, quartz, quartzite) 134 Surface Artefacts (bone, chalcedony, chert, glass, quartz, quartzite, silcrete)
WWC46 (22-1-0342)	517641 E / 6678631 N	Moderate	Coastal range (foot slopes)	30 (0.5 m x 0.5 m)	3 Artefacts (chert, silcrete)
Dirty Creek PAD (13-4-0178)	513909 E / 6682460 N	Low-Moderate	Coastal range (ridge and spur)	14 (0.5 m x 0.5 m)	None
WWC115 (13-4-0160)	511203 E / 6686801 N	Moderate	Coastal range (ridgelines)	4 (0.5 m x 0.5 m)	None
WWC135 (13-4-0159)	506254 E / 6692260 N	Moderate	Coastal range (ridgelines)	132 (0.5 m x 0.5 m)	5 Artefacts (silcrete, quartz, glass)
WWC139/A (13-4-0157)	505775 E / 6693388 N	Low-Moderate	Coastal range (ridgelines)	3 (0.5 m x 0.5 m)	None

Table 4-4 Summary of sub-surface testing of control areas

Potential archaeological sensitivity	Landscape units	Number of investigations	Aboriginal objects
Low	Coastal range	6 (0.5 m x 0.5 m)	None
Low	Coastal range	7 (0.5 m x 0.5 m)	None
Low	Coastal range	2 (0.5 m x 0.5 m)	None
Low	Coastal plain	4 (0.5 m x 0.5 m)	None
Low	Coastal plain	2 (0.5 m x 0.5 m)	None

Figure 4-1 Woolgoolga to Wells Crossing - Sub-surface testing

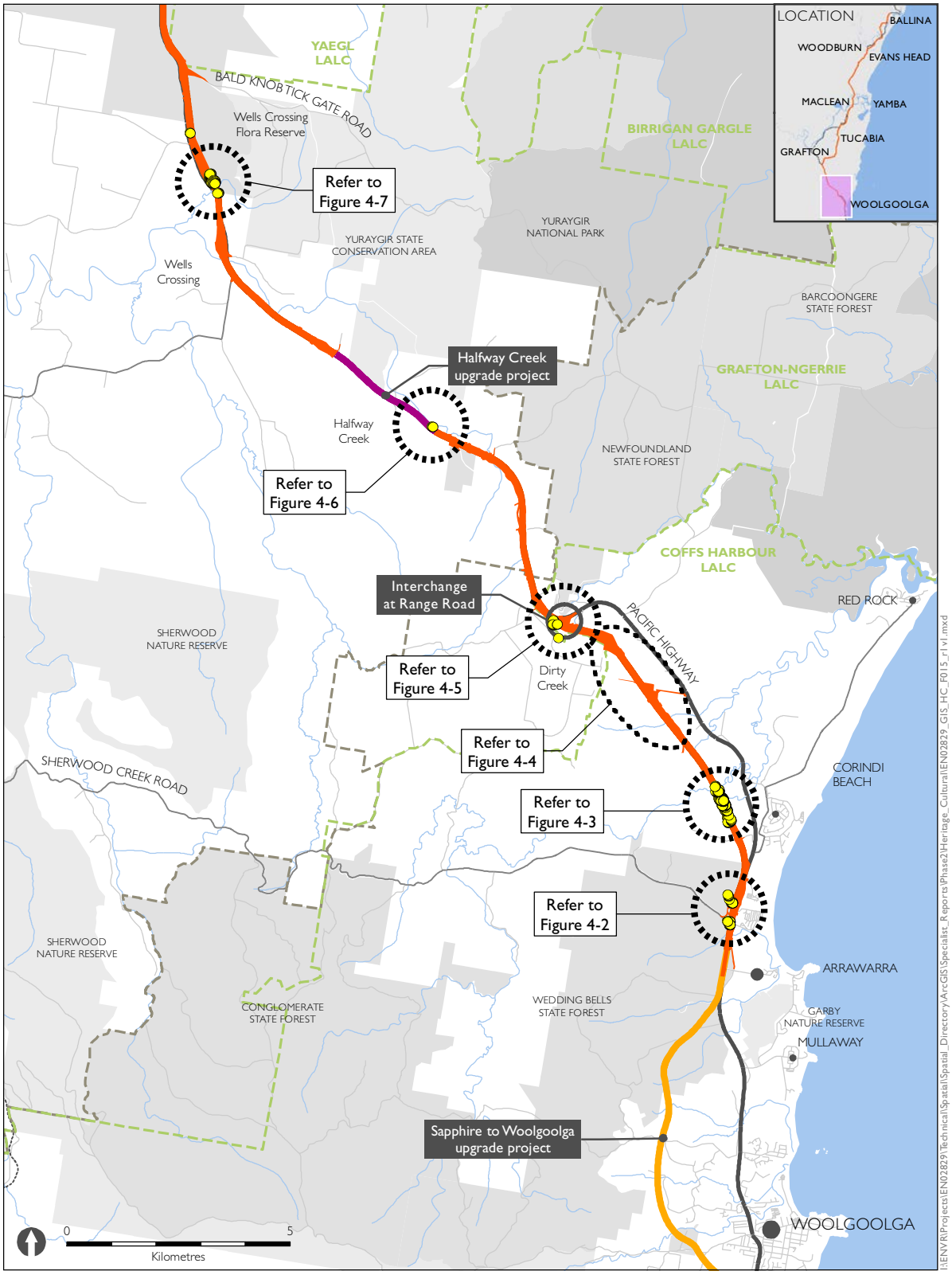


Figure 4-2 Sub-surface testing 1

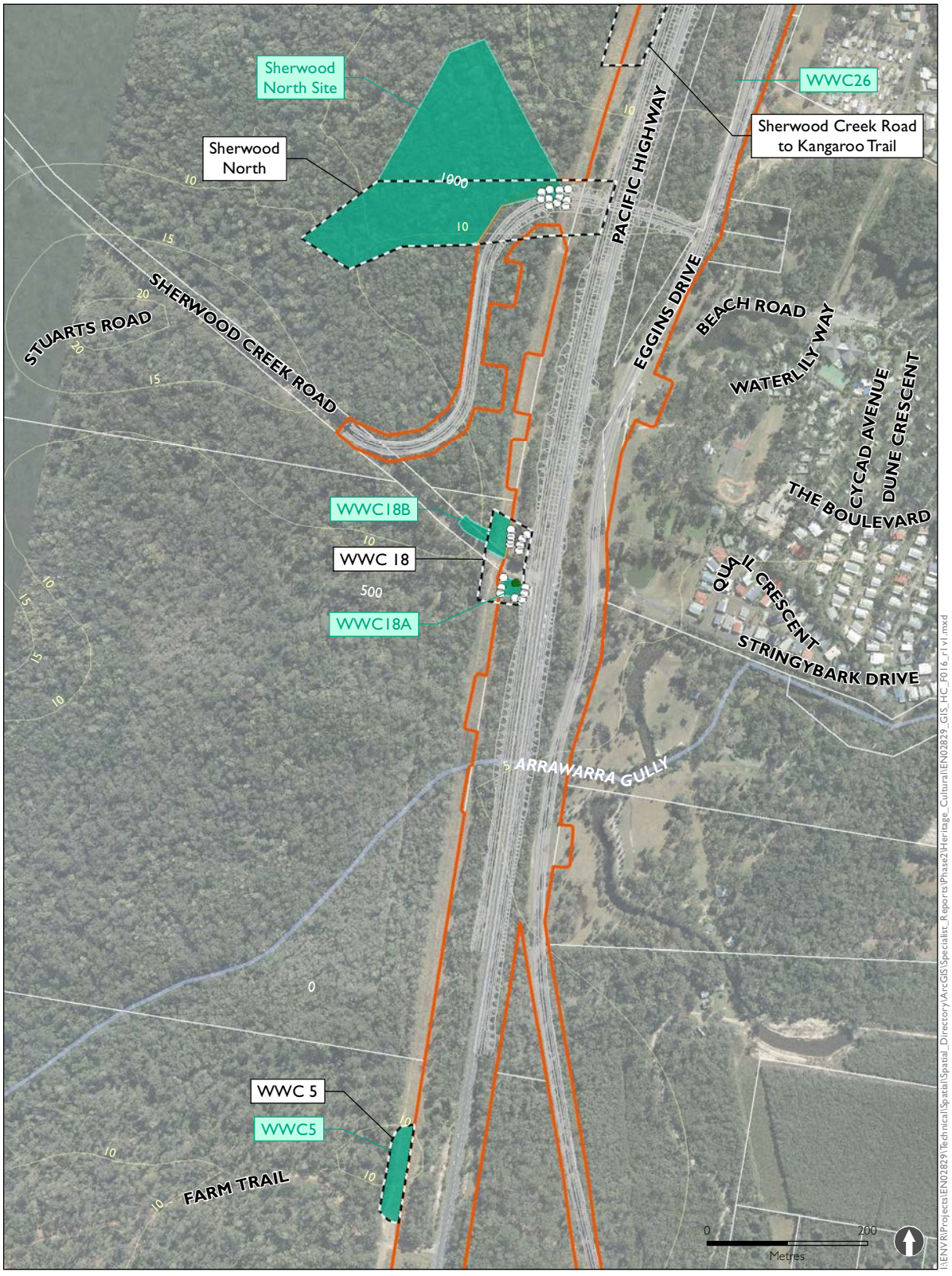


Figure 4-3 Sub-surface testing 2

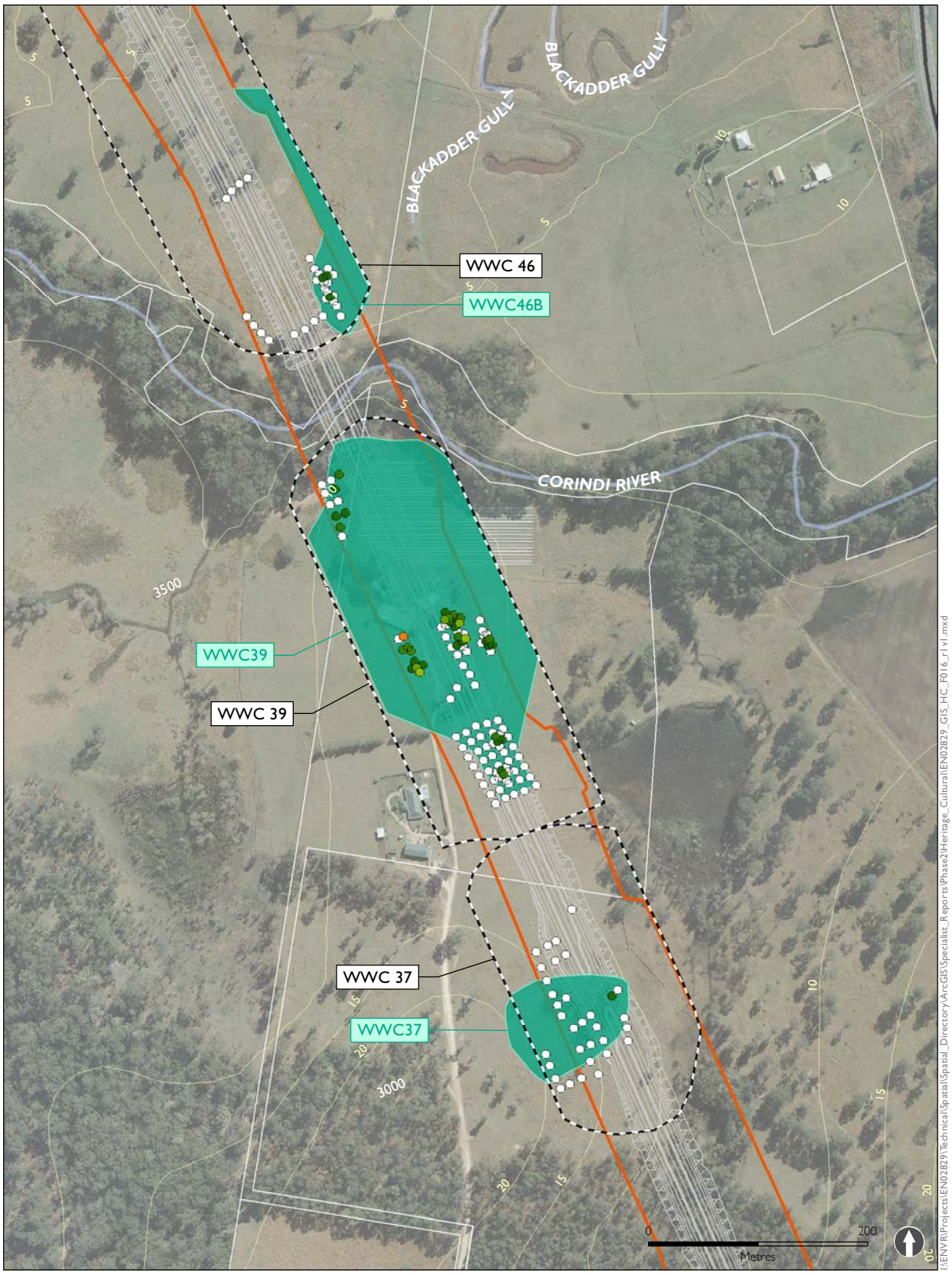


Figure 4-4 Sub-surface testing 3

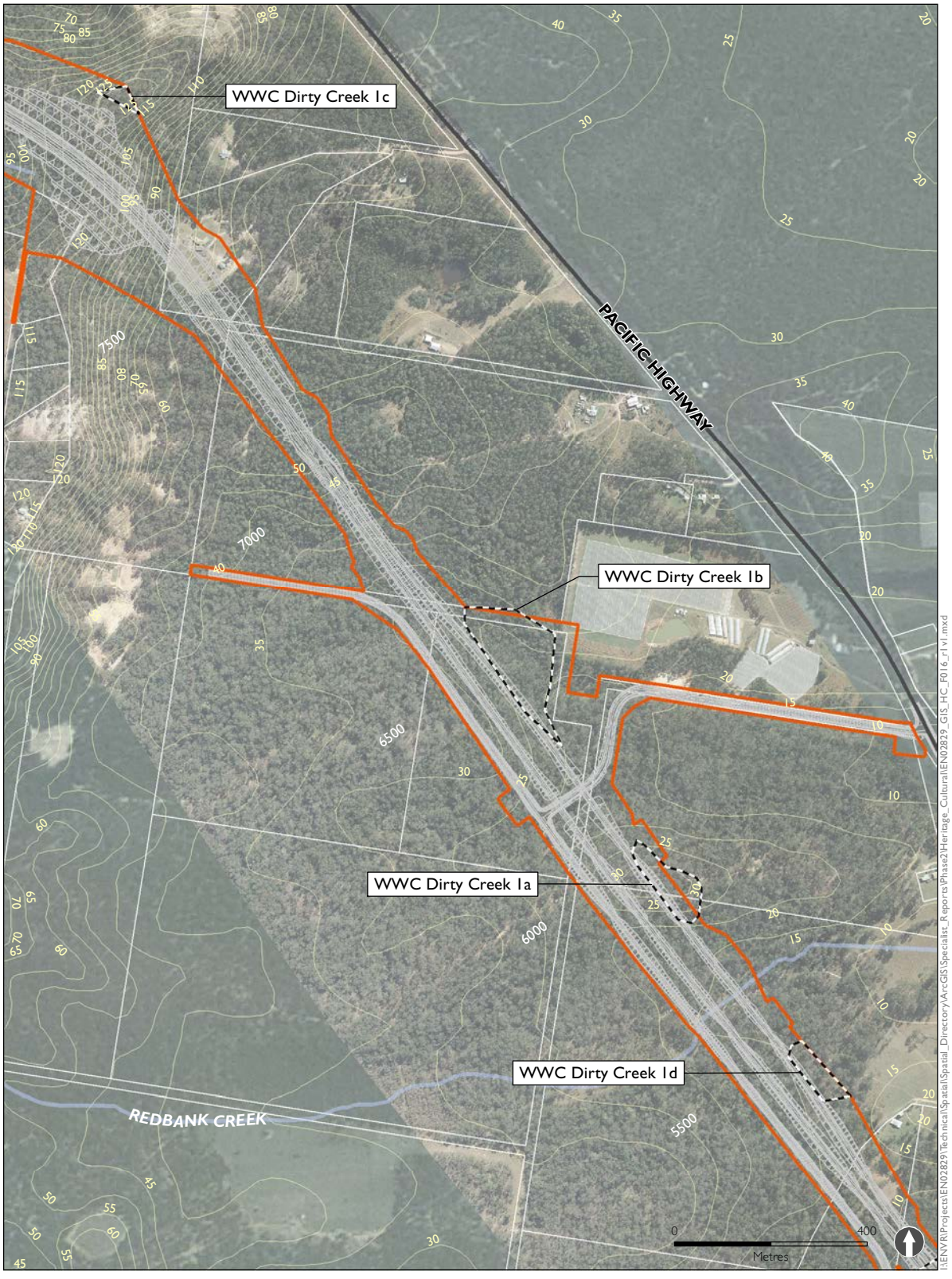


Figure 4-5 Sub-surface testing 4

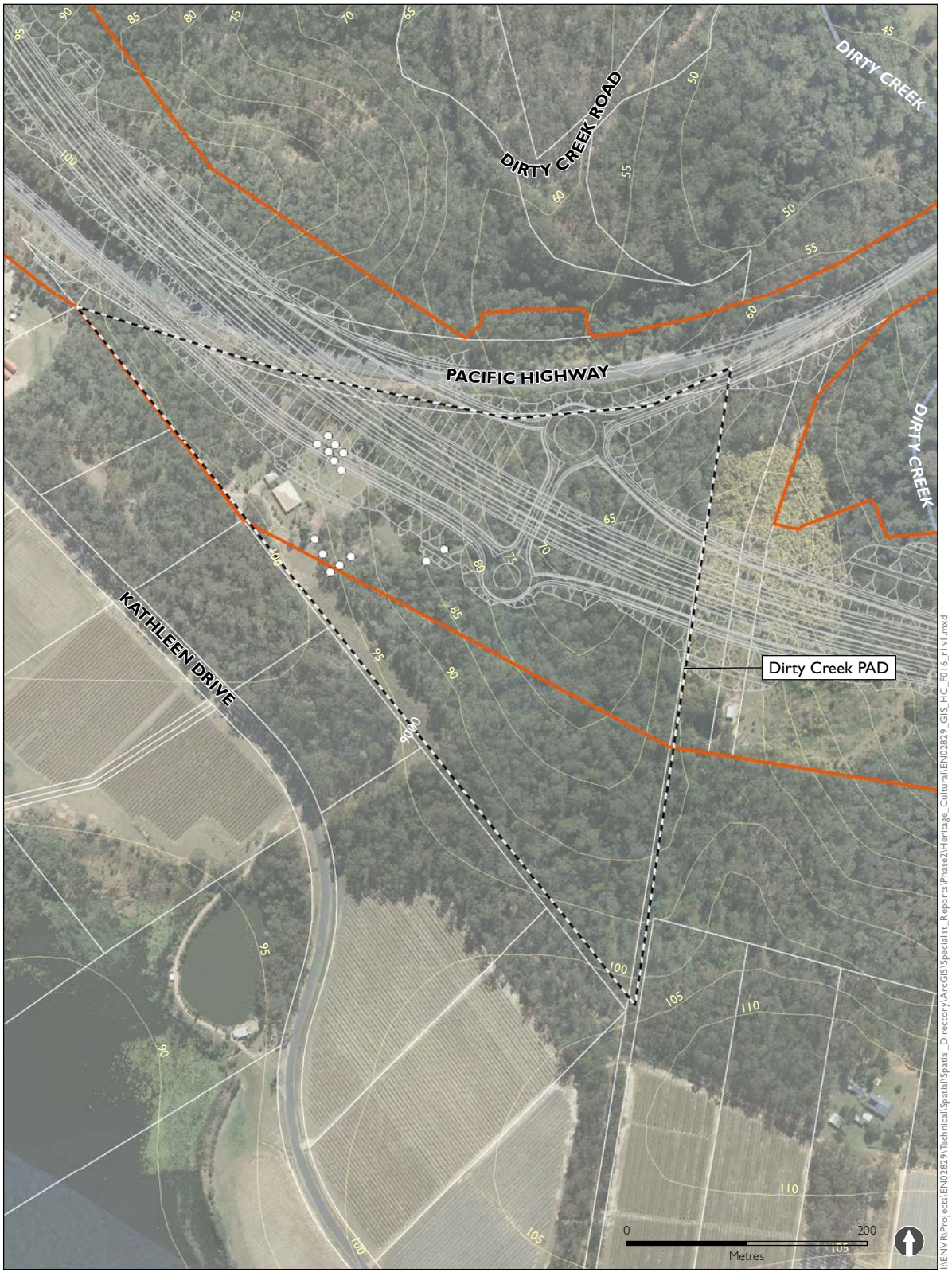
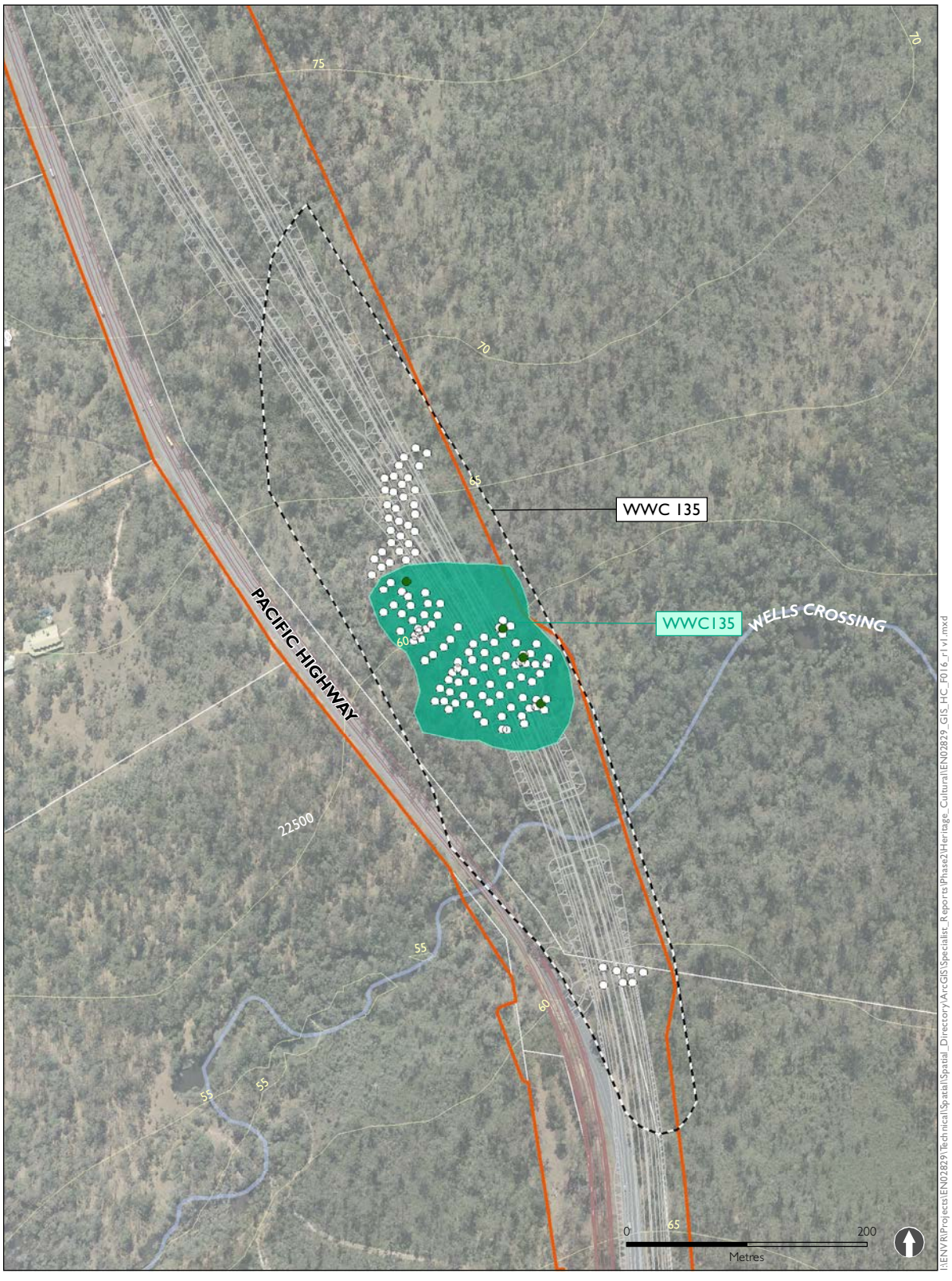


Figure 4-6 Sub-surface testing 5

Figure 4-7 Sub-surface testing 6



Prior to the sub-surface testing a total of fourteen artefact sites had been identified WWC5, WWC7, WWC18, WWC26, WWC37, WWC39, WWC46, WWC53, WWC78, WWC92, WWC115, WWC135 WWC138 and WWC139 near or within the boundary of the project). The sub-surface testing resulted in:

- A total of five sites containing further sub-surface material (Table 4-3).
- A large knapping floor was identified at WWC 39.
- Control areas sampled contained no Aboriginal archaeological material.

Stratigraphy drawings were undertaken at all PADs to ensure that any changes in soil profile were accurately recorded. These can be found in Appendix L.

5. Archaeological sites

5.1. Summary of archaeological sites

Following survey and sub-surface testing, sites/PADs were determined either:

1. To be sites.
2. To not be sites.
3. Determined to not be sites within the boundary of the project, but still sites/PADs outside the boundary of the project.

Table 5-1 outlines the revised status and the new names for all the areas that were subject to investigation.

Table 5-1 Status of PADs and sites near or within the boundary of the project between Woolgoolga and Wells Crossing following survey and sub-surface testing

Project section	Name (AHIMS ID)	Type (s)	Description	Investigation	New name	New Site type(s)	Near or within boundary of project
1	WWC5 (22-1-0348)	Site – Artefact scatter	Located on spur crest at Farm Trail on west side of existing highway.	Survey only	WWC 5	Site - Artefact scatter	Near – immediately adjacent to west
1	WWC7 (22-1-0347)	Site – Isolated artefact	Located on flat north of Farm Trail on west side of existing highway.	Survey only	WWC7	Site – Isolated artefact	Near – 20 m to west
1	WWC18 (22-1-0346)	Site – Artefact scatter and PAD	Broad area on spur crest at Sherwood Creek Road, west of existing highway. Partially within, partially adjacent to boundary of the project.	Test-excavation	WWC18	Site - Artefact scatter	Within
1	WWC26 (22-1-0345)	Site – Isolated artefact	Located on east side of existing highway and west of Eggins Drive.	Survey only	WWC26	Site – Isolated artefact	Within
1	Sherwood North (22-1-0402)	Site – Artefact scatter and PAD	The site is located on a spur, and is closed woodland, with a cleared section for single-carriage gravel roadways.	Test-excavation	Sherwood North	Site - Artefact scatter	Within

Project section	Name (AHIMS ID)	Type (s)	Description	Investigation	New name	New Site type(s)	Near or within boundary of project
1	WWC37 (22-1-0344)	Site – Artefact scatter and PAD	South of Corindi River; shallow skeletal soil.	Test-excavation and survey	WWC37	Site – Artefact scatter	Within
1	WWC39 (22-1-0343)	Site – Artefact scatter and PAD	Prominent very gentle ridge crest south of the Corindi River and adjacent gentle simple slope leading north to creek and creek flats. Several less common artefact types. Deposits potentially relatively deep and intact in places, although levels of disturbance also possibly high in portions of this area. High potential for sub-surface deposit.	Test-excavation and survey	WWC39	Site – Artefact scatter	Within
1	WWC 46 (22-1-0342)	Site – Isolated artefact and PAD	Located on vehicle track in forest on flat north of Corindi Creek. Deep alluvial soils inferred. Known Aboriginal burials in similar contexts nearby.	Test-excavation and survey	WWC46	Site – Artefact scatter	Within
1	WWC 53/A (22-1-0349)	Site – Isolated artefact	Located on margin of vehicle track north of Redbank Creek.	Survey only	WWC53	Site – Isolated artefact	Within
1	Dirty Creek PAD (13-4-0178)	PAD	Slopes and top of rise nearby Dirty Creek.	Test-excavation and survey	-	No longer a PAD	N/A
1	WWC Dirty Creek 1 (22-1-0403)	PAD	Located on spur slopes north of Redbank Creek.	Survey only	WWC Dirty Creek 1	PAD	Within
1	WWC 78/A (13-4-0162)	Site – Isolated artefact	Located east of existing highway and Range Road.	Survey only	WWC 78	Site – Isolated artefact	Within

Project section	Name (AHIMS ID)	Type (s)	Description	Investigation	New name	New Site type(s)	Near or within boundary of project
1	WWC92 (13-4-0161)	Site – Isolated artefact	Located east of existing highway and Falconers Road.	Survey only	WWC92	Site – Isolated artefact	Near – immediately adjacent to east
1	WWC115 (13-4-0160)	Site – Artefact scatter and PAD	East of existing highway at Halfway Creek duplication near 'Milleara'. Moderate potential for sub-surface deposit. Area has since been disturbed through road construction and no evidence of a site was found	Test-excavation and survey	WWC115	Site – Artefact scatter	Within
2	WWC 135/A (13-4-0159)	Site – Artefact scatter and PAD	East of existing highway immediately north of Wells Crossing. Moderate to high potential for sub-surface deposit	Test-excavation and survey	WWC135	Site – Artefact scatter	Within
2	WWC 138/A (13-4-0158)	Site – Isolated artefact	Artefact on vehicle track north of Wells Crossing and east of existing highway and Parker Road. Shallow skeletal soil restricts potential for sub-surface deposit.	Survey only	WWC138	Site – Isolated artefact	Within
2	WWC139/A (13-4-0157)	Site – Isolated artefact and PAD	On vehicle track north of Wells Crossing and east of existing highway and Parker Road. Moderate potential for sub-surface deposit.	Test-excavation and survey	WWC139/A	Site – Isolated artefact	Within
2	Pacific Highway Scar Tree 1 (13-4-0174)	Site – Scarred tree	Eucalypt tree.	Survey only	-	No longer a site	N/A

5.2. Archaeological analysis

5.2.1. Introduction

Archaeological sites are often said to be records of 'stone and bone', two of the most durable products of human activity. Stone artefacts being inorganic do not deteriorate rapidly in a human time scale and are ubiquitous reminders of human activity in the past. Understanding stone use in the past allows interpretations of human behaviour to be made. Interpretation of human behaviour from stone material is derived from fracture mechanics studies, or why different materials fracture in different ways when struck by objects.

Based on the recording undertaken of the stone artefacts in the field, analysis of the data collected from each individual archaeological site was undertaken in order to present a site specific interpretation of the stone artefacts at each locality. A more detailed stone artefact analysis undertaken under laboratory conditions would examine patterns of raw material use and movement between sites within the region; however, due to the preliminary nature of this analysis, this has not been undertaken at this stage. The occurrence and distribution of stone raw materials are discussed to attempt to gain insights into the way people were using each of the archaeological sites.

The sites that yielded a large sample (ie large numbers of artefacts) are analysed in greater detail in the following sections. The key site from south to north of the boundary of the project between Woolgoolga and Wells Crossing comprised WWC39. Other PADs tested has less than 10 artefacts present. It is not possible to undertake detailed analysis of sites with small sample sizes (few artefacts), as inferences made on these samples are not robust, consequently the analysis of these sites is in summary form.

Appendix M provides photos of a selection of Aboriginal objects uncovered from each site.

5.2.2. Methodology

Each stone artefact was classified according to its raw material type and technological type category and entered into a database. In classifying each artefact into a technological category careful examination of the artefact was undertaken. Initial examination of the artefact involved deciding the location of the ventral and dorsal sides. Negative flake scars or cortex was indicative of dorsal attributes. Bulbs of percussion, impact points, fissures and ripples indicate ventral attributes. These indicators as well as others such as a platform and termination point are the deciding factors as to which technological category each piece was assigned.

The maximum dimension measurement was taken on all stone artefacts. Measurements of length, width and thickness were taken on complete stone artefacts (flakes) only. Platform measurements and termination descriptions were taken on stone artefacts, where these attributes were present. Cortex or the amount of natural stone still left on the dorsal side of the flake was also recorded for all artefacts. The amount of cortex present on a flake has been used to indicate the reduction stage in which a flaked piece was removed from a core (the parent material). This is due to the exclusive presence of cortex on the exterior surface of the lithic raw material, and the fact that the exterior will be the first area removed during core reduction.

A glossary of the terms used in the stone analysis is provided in Appendix B.

5.2.3. Constraints

The analysis and interpretation of archaeological sites presented above has been preliminary in nature and subject to time constraints and the necessity of undertaking stone artefact analysis in the field rather than in a laboratory. Further archaeological assessment into the source of raw materials and the nature of stone artefact maintenance and manufacture will need to be undertaken at the salvage stage of the project. Additionally, stone artefacts recorded during investigations prior to 2010 are not included in this analysis, as attributes recorded differ from those here.

5.2.4. Key sites

This Chapter discusses interpretations of findings at all archaeological sites located within the boundary of the project between Woolgoolga and Wells Crossing. Linear corridor projects like this offer a cross section sample of numerous landforms within a region, allowing some degree of comparative analysis between landforms. Consequently, this section briefly examines the relationship between the occurrence of archaeological and cultural sites, and the landscape in the boundary of the project. The occurrence and distribution of stone raw materials are discussed to attempt to gain insights into the way people were occupying and moving across the landscape, and exploiting resources.

Appendix R contains photos of a selection of Aboriginal objects from each site.

5.2.4.1. WWC39

WWC39 broadly falls within the Coastal range (spur) landscape unit. The site is located on the lower slope of a spur with a swampy area at the base. The northern extent of the site is bordered by the Corindi River.

There are no gazetted Aboriginal Places under s86(4) of the *National Parks and Wildlife Act 1974* (NPW Act) the vicinity of the site, however a number of Aboriginal cultural places were identified during consultation with the local Aboriginal community including two massacre sites dating to the 1800s in the Corindi area, a burial site to the north of Kangaroo Trail Road and west of the Pacific Highway, and corridors of movement / significant cultural areas in the Corindi area. The exact locations of these sites are not specifically within the extent of WWC39, however, all potentially have links to this site as people moved around the landscape.

Identified during the survey and sub-surface testing was a total of 231 artefacts, predominantly silcrete and chert, which together make up 90 per cent of the assemblage, but with smaller quantities of quartz, chalcedony, quartzite, agate and mudstone (Figure 5-1). The predominance of silcrete and chert suggests that these materials were locally available while the lesser presence of other raw materials suggests that those materials were either more difficult to obtain or were considered to be of lesser quality. Chert is known to occur locally in river cobbles, but the sources of the various silcretes are unknown.

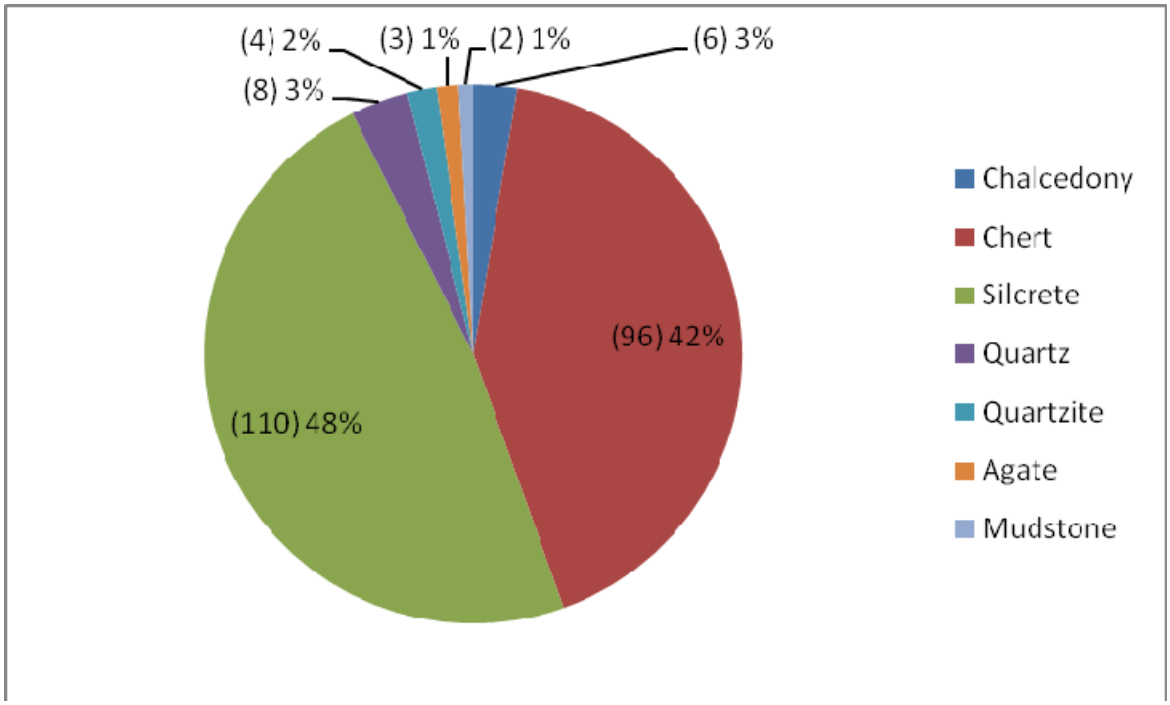


Figure 5-1 Proportion of raw material types at WWC39; n=231

The majority of the artefacts from WWC39 were free of cortex, with less than ten per cent (n=19) exhibiting cortex on the dorsal surface (Figure 5-2). This indicates that initial reduction of raw material was likely conducted off site and that the artefacts represented were in later stages of reduction. Later reduction stages can indicate heavier working of those materials, and can present when raw materials were rationed, which is a sign that the materials are either difficult to obtain, rare or are considered valuable for other reasons.

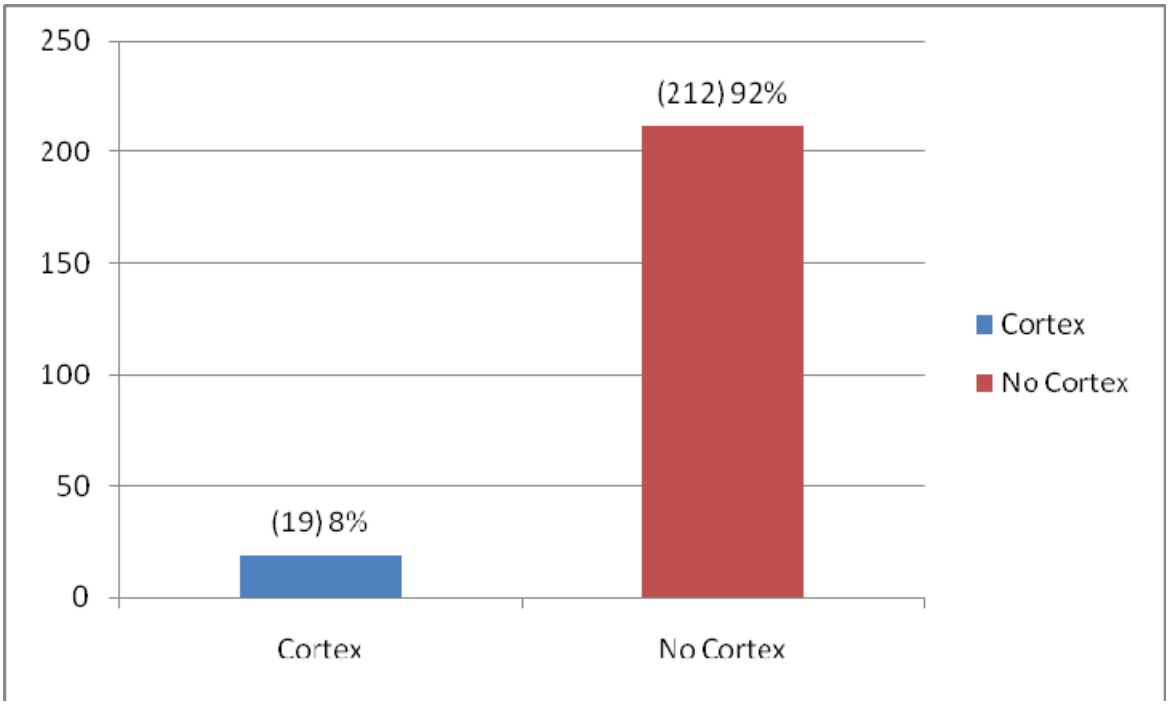


Figure 5-2 Proportion of artefacts with/without cortex from WWC39; n=231

As expected, flakes dominated the assemblage (74 per cent). Angular fragments (12 per cent) and cores (ten per cent) were also prevalent, indicating that knapping was occurring on this site (Figure 5-3 and Figure 5-4). It is also worth noting that the majority of artefacts did not show signs of retouch or use-wear (n=1, 0.4 per cent) which supports the theory that this site was used to manufacture tools and not as an area where they were used, such as a resource extraction site. It should be noted that the analysis was restricted to macroscopic examination of use-wear meaning that microscopic instances of use-wear were not noted. The lack of post-contact materials, such as worked glass or ceramics, may indicate that the site was in use prior to this period.

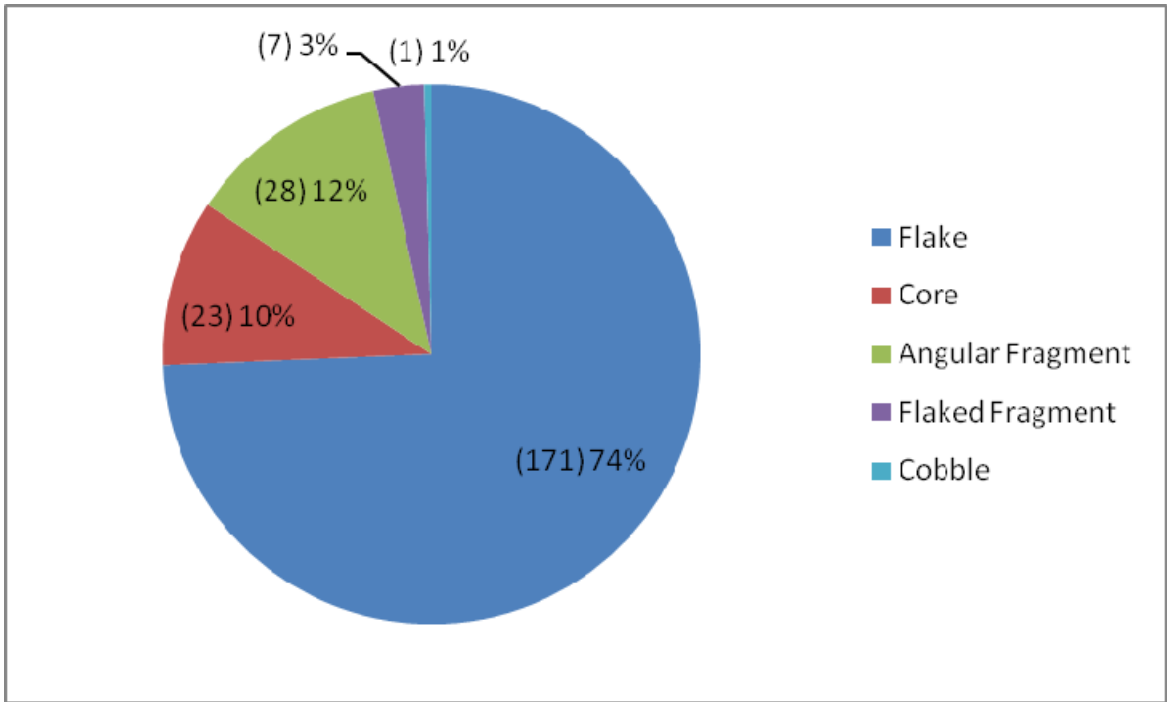


Figure 5-3 Proportion of artefacts from WWC39 in each technological type; n=231

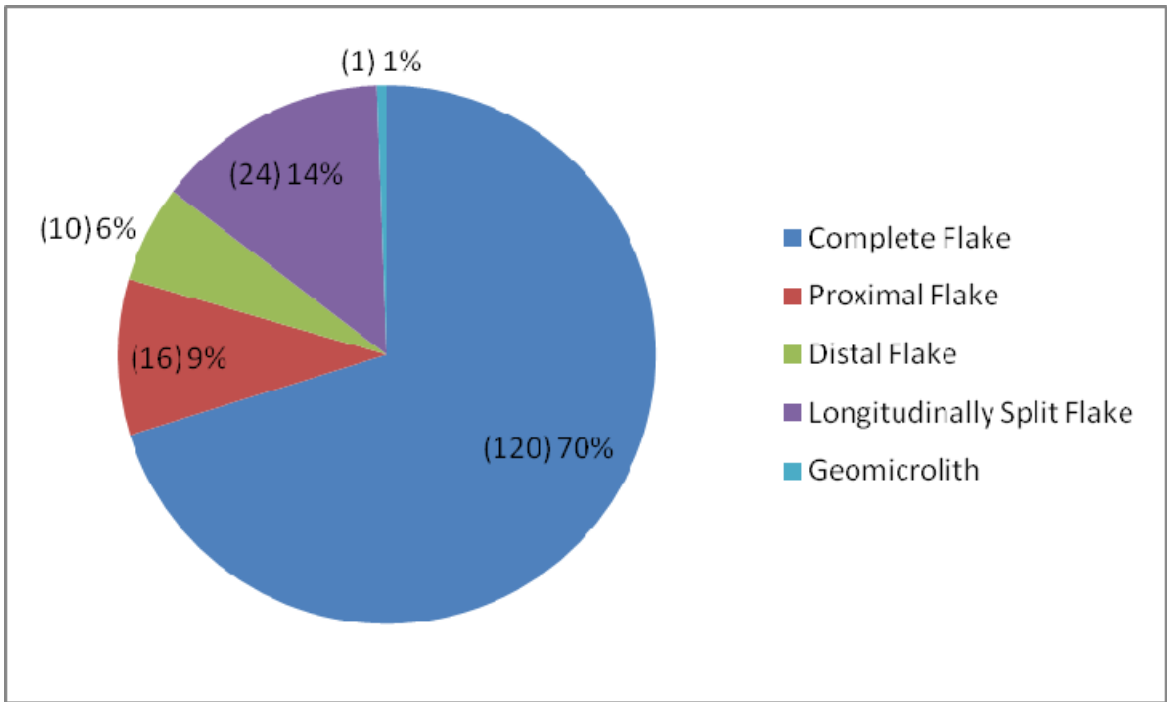


Figure 5-4 Breakdown of flake types at WWC39; n=231

The following can be inferred from the findings for WWC39:

- Initial reduction of stone may have taken place elsewhere, such as at the material's source.
- Knapping was conducted on site.
- Maintenance of the artefacts was not a common occurrence.
- Other cultural activities were potentially taking place within the area.

5.2.5. Other sites

All other PADs with less than 10 artefacts

There are three sites in the boundary of the project between Woolgoolga and Wells Crossing with less than ten artefacts recovered during sub-surface testing, WWC18 (n=1), WWC46 (n=3) and WWC135 (n=5) (Table 5-2). WWC18 contained a single silcrete complete flake. WWC46 contained one silcrete core, one silcrete proximal flake and one chert complete flake. WWC135 contained two silcrete complete flakes, one quartz core, one quartz longitudinally split flake and one glass complete flake. Much like WWC39, silcrete is the most common of the raw materials at these sites; however chert is comparatively under represented.

Two of the nine artefacts (one each from WWC46 and WWC135) exhibited cortex on the dorsal surface, a comparatively higher proportion than at WWC39. As expected flakes are the most common technological type (n=7) followed by cores (n=2) which were present at WWC46 and WWC135, again in higher proportions than at WWC39. The two quartz artefacts from WWC135 were found in far removed STPs making it very unlikely that they are associated with each other. The glass flake from WWC135 indicates that this site was still in use after contact with European people.

Table 5-2 Summary of sites with less than 10 artefacts recovered

Site name	Number of artefacts	Material	Depth range (mm)	Unique items
WWC18	1	Silcrete	150	
WWC46	3	Chert, silcrete	0-400	Core
WWC135	5	Silcrete, quartz	Surface-200	Core, longitudinally split flake, glass flake

5.2.6. Landforms and predictive model

Generally, the predictive model (Table 2-2) is supported with regard to the observed distribution of sites in the landscape. As predicted, more significant and/or greater numbers of archaeological and Aboriginal cultural sites occurred in areas which were assessed as having higher archaeological sensitivity within the boundary of the project. Very little variety in the type of sites was observed within the boundary of the project between Woolgoolga and Wells Crossing. The majority of sites were small artefact scatters or isolated artefacts, with WWC39, a large artefact scatter, being the major exception.

Archaeological sites recorded during the fieldwork to date have been found predominantly on the low rises and spurs generally close to creeks and rivers (Table 5-3). These landforms would have provided relatively flat areas suitable for camping close to resources, elevated above the flood zone and in the case of low rises and spurs with views of the surrounding landscape.

Table 5-3 Archaeological sites located within the broad archaeological landscape units

Project section	Broad archaeological landscape units	Specific landscape characteristics	Sensitivity rating (L, M, H)	Number of sites (% of total sites)	Sites
1	Coastal plain	Relatively flat plain behind dune barrier on coast, with depressions comprising brackish lagoons, swamps and marshes.	Moderate	4 (31%)	WWC18 WWC26 WWC39 WWC46
1,2	Coastal range	Ridgelines dissected by ephemeral and permanent waterways and small river valleys. Overlooking Coastal plain and swamps.	Moderate	1 (6%)	WWC Dirty Creek 1
1		Foot slopes and spurs of range adjacent valley flats. Gradients are generally gentle and elevation less than 40 m above sea level.	High	10 (69%)	WWC18 Sherwood North WWC37 WWC53 WWC78 WWC92 WWC115 WWC135 WWC138 WWC139
1		Broad alluvial valley flats.	Moderate-High	1 (6%)	WWC39

5.3. Summary

The nature of the archaeological sites recorded within the boundary of the project between Woolgoolga and Wells Crossing allows some insight into pre-contact and post-contact occupation of the area. The archaeological sites recorded within the boundary of the project between Woolgoolga and Wells Crossing represent stone artefact manufacture sites and, together with sites identified during consultation with Aboriginal stakeholders including burial sites and corridors of movement, these sites indicate that Aboriginal people were both occupying and utilising resources along the coast.

At WWC39, people manufactured stone artefacts with a preference for locally sourced raw materials, specifically silcrete and chert. Known sources of chert exist within close proximity to the

site. Although the source of the silcrete is unknown, the fact that this raw material occurs in the assemblage in a similar proportion to the chert suggests the source may also be in close proximity to the site, or otherwise, readily available through trade.

The distribution of the archaeological sites recorded in the boundary of the project reinforces the pattern suggested in the predictive model. Elevated areas, mostly spurs, adjacent to swamps, creeks, and rivers show the largest proportion of archaeological sites. These areas would have provided areas of good vantage and with good ventilation in warmer months. They would have provided access to water sources and associated resource-rich zones around them. During wetter months, these areas would have provided well-drained, drier areas above the lower lying waterlogged, flooded, or flood prone areas.

5.4. Conclusion

This archaeological assessment has added substantial data to the archaeological record of this region. It has introduced important information for informing the detailed design and impact assessment for the Pacific Highway Woolgoolga to Ballina upgrade project between Woolgoolga to Wells Crossing. The study has also enhanced the record in an area where archaeological data was limited. The extensive sub-surface testing undertaken for this assessment, has made a particularly important contribution to our understanding of the archaeology of Aboriginal occupation of this region – a region that was otherwise characterised by little information of the important, and otherwise hidden sub-surface component.

The nature of the archaeology discovered within the boundary of the project does not represent a significant difference from that located in the surrounding region. Thus the results do not present any major constraint to the project between Woolgoolga and Wells Crossing.

6. Significance assessment

A complete significance assessment of all identified Aboriginal cultural heritage values near and within the boundary of the project is presented in the CHAR, with only the archaeological sites assessed here.

6.1. Methodology

6.1.1. Basis for assessment

A significance assessment is made up of several significance criteria that attempt to define why a site is important. Evidently, this can be challenging as sites are important for different reasons to different people, and even at different times. The assessment of Aboriginal cultural heritage in this assessment is based upon the four values of the *Australia ICOMOS Burra Charter* (Australian ICOMOS 1999).

- Social values.
- Historical values.
- Scientific values.
- Aesthetic values.

Each of these values is assessed below, and an overall significance is then given based on an average across the values. This is inherently a reductive process, and oversimplifies what is important to a range of different stakeholders, but is a necessary process in being able to create comparative values between sites. The significance of each site ultimately feeds the management of sites.

6.1.2. Social significance

The significance of a site does not relate only to its scientific or research value. Aboriginal people's views on the significance of archaeological sites are usually related to traditional, cultural and educational values, although some Aboriginal people also value any scientific information a site may be able to provide.

Aboriginal cultural significance was assessed from consultation with the nominated Aboriginal sites officers and other members of the stakeholders, including Elders, both during and following field assessments. It should be noted that Aboriginal significance assessed in this manner may not reflect the views of all members of the community.

6.1.3. Scientific significance

Aboriginal site significance assessments need to consider both the scientific and social or cultural values of a site. Research potential or scientific significance of an Aboriginal archaeological site can be assessed by utilising the criteria set out below. Social or cultural values of a site can only be established through Aboriginal consultation.

Criteria used for assessing scientific significance for Aboriginal archaeological sites are described below. Ratings are low, moderate or high.

- **Site integrity –** The integrity of a site refers to its state of preservation, or condition. A site can be disturbed through a number of factors among which are: natural erosion processes, destructive land use practices or repeated use of a site in the past by both humans and animals.
- **Site structure –** Structure refers to a site's physical dimensions, that is, size and stratification, or sub-surface deposits. A large site or a site with stratified deposits has more research potential than small sites and/or surface scatters. Sometimes however, specific research questions may be aimed at smaller sites in which case they would be rated at a higher significance than normal. Site structure cannot be assessed for scarred trees or isolated artefacts.
- **Site contents –** This category refers to the range and type of occupation debris found in a site. Generally, complex art sites, extensive quarries with associated debris and surface sites that contain a large and varied amount of organic and non organic materials are considered to have greater research potential than those sites with small, uniform artefacts, single motif art sites and small quarries with little or no debris. With scarred trees contents may refer to the size and type of scar or how many there are on the one tree.
- **Representativeness and rarity –** Representativeness refers to how much variability exists between the subject site and others inside or outside the subject area. It also considers the types of sites already conserved in the area and how much connectivity between sites exists. Rarity considers how often a particular site type occurs in an area. Assessment of representativeness and rarity requires some knowledge of the background archaeology of the area or region in which a study is being undertaken. Rarity also relates to whether the subject site or area is important in demonstrating a distinctive way of life, custom, process, land use, function or design which is no longer practiced (OEH 2011:10).

6.1.4. Aesthetic significance

This refers to the 'sensory' value of a place, and can include aspects such as form, texture, and colour, and can also include the smell and sound elements associated with use or experience of a site (Australian ICOMOS 1999). Aesthetic significance can be closely linked to the social value of a site.

6.1.5. Historic significance

The historic value of a site is determined through its association with historically important people, events or activities.

6.1.6. Scale of significance

Significance of sites and places is assigned to different geographic scales, such as local, regional, State and National, appropriate to the scale of importance. For example, Uluru is significant at a National (and World) scale, whereas a local historic building may only be significant on a local scale. This is reflected in the variety of heritage lists held by local councils, up to State and Federal

government. In scale of significance, the criteria presented above as well as educational or research potential, representativeness and rarity (Australian ICOMOS 1999) have been considered in determinations of significance.

Each site has been assessed and its scale of significance has been identified as being of importance at the State, regional or local level. Each site has also been given a grading of its significance overall based on the grading of each of the individual values. The gradings of low, moderate and high have been assigned comparatively across the sites investigated in the region.

6.2. Statements of significance

6.2.1. WWC5 (AHIMS ID 22-1-0348)

Social significance

- The artefact scatter at WWC5 has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the raw materials are common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC5 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

6.2.2. WWC7 (AHIMS ID 22-1-0347)

Social significance

- Site WWC7 comprises an isolated artefact and has low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a single artefact and the raw material is common to the area. The site has a low representativeness ranking as similar stone artefacts are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC7 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

6.2.3. WWC18 (AHIMS ID 22-1-0346)

Social significance

- The artefact scatter at WWC18 has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents

ranking as the raw materials are common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC18 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

6.2.4. WWC26 (AHIMS ID 22-1-0345)

Social significance

- Site WWC26 comprises an isolated artefact and has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a single artefact and the raw material is common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC26 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density, common raw material and overall common

presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

6.2.5. Sherwood North (AHIMS ID 22-1-0403)

Social significance

- The artefact scatter at Sherwood North has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the raw materials are common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall Sherwood North is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

6.2.6. WWC37 (AHIMS ID 22-1-0344)

Social significance

- The artefact scatter of Site WWC37 has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a low density artefact scatter and the raw material is common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential. It has some limited local educational potential particularly on how Aboriginal populations used different parts of the landscape during different seasons.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC37 is of low-moderate significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to is low density, common raw material and overall common presence in the region. The site has limited research potential and some educational potential about how Aboriginal populations used different parts of the landscape during different seasons.

6.2.7. WWC 39 (AHIMS ID 22-1-0343)

Social significance

- The WWC39 site is of moderate social significance through its likely association with other important cultural sites in the region including the Corindi Massacre Sites, historical burial sites and the Corindi Corridors of Movement.

Historical significance

- The site has low historical significance through its likely association with other historical period cultural sites in the region and therefore its use by Aboriginal people at this time.

Scientific significance

- The site has moderate scientific significance as it is ranked as having low integrity, low structure moderate contents and moderate-high representativeness/rarity. The physical integrity and structure of the site is low due to some disturbance by post-contact land use practices. The contents of the site are ranked as moderate due to the wide range of both common and less readily available raw materials, and the presence of artefacts in later stages of production. This evidence indicates heavier working of those materials, and can present when raw materials were rationed, which is a sign that the materials were either difficult to obtain, rare or were considered valuable for other reasons. This supports a moderate-high

ranking of representativeness/rarity as does the presence of less common artefact types. It has some potential for research as there are potentially relatively deep and intact deposits in places. The site has potential for local educational purposes, as it could be used to educate the way Aboriginal populations interacted with waterways while examining the artefacts on site, as the site is located on the banks of Corindi Creek.

Aesthetic significance

- The site has moderate aesthetic significance due to its geographic location on a prominent very gentle ridge crest south of the Corindi River and adjacent to a gentle simple slope leading north to the creek and creek flats.

Summary statement of significance

- Overall WWC39 is of moderate significance at the local level. It is of moderate social significance through its association to other cultural sites in the region, and is of low historical significance due to its possible use into the historical period. It has moderate scientific significance through the presence of less common raw materials and artefact types, and the potential for the presence of further deep and intact archaeological deposits. It also has educational potential for teaching about the way Aboriginal populations interacted with waterways. The site's geographic location on a prominent ridge crest is of moderate aesthetic significance.

6.2.8. WWC46 (AHIMS ID 22-1-0342)

Social significance

- The artefact scatter of Site WWC46 has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way.

Historical significance

- The site has low historical significance through the presence of known Aboriginal burials in similar contexts nearby.

Scientific significance

- The site has low-moderate scientific significance as it is ranked as having low-moderate integrity, moderate structure, low contents and low representativeness/rarity. The integrity of the site is low-moderate and the structure is moderate as it has been subject to disturbance by some post-contact land-use practices and other alluvial post-depositional processes. The site has a low contents ranking as the site comprises of a low density artefact scatter and the raw materials are common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. It has some potential for local educational purposes, as it could be used to educate the way Aboriginal populations interacted with waterways while examining artefacts on site, as the site is located on the banks of Corindi Creek, and also how

Aboriginal populations used and moved between different parts of the landscape during different seasons.

Aesthetic significance

- The site has low-moderate aesthetic significance due to its geographic location adjacent to Corindi Creek.

Summary statement of significance

- Overall WWC46 has low-moderate significance at the local level. It has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way and low historical significance through the presence of known Aboriginal burials in similar contexts nearby. The site is of low-moderate scientific significance due to its moderate level of disturbance, the presence of common raw materials and its overall commonness in the region. It has some educational potential about the way Aboriginal populations interacted with waterways, and moved between different parts of the landscape during different seasons. The site's location adjacent to Corindi Creek is of low-moderate aesthetic significance.

6.2.9. WWC53 (AHIMS ID 22-1-0349)

Social significance

- Site WWC53 comprises an isolated artefact and has low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a single artefact and the raw material is common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC53 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low

scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

6.2.10. WWC Dirty Creek 1 (AHIMS ID 22-1-0403)

- The significance of WWC Dirty Creek 1 was unable to be assessed due to restricted property access and was not subject to any sub-surface investigation during this project – further assessment will be undertaken of this PAD when possible prior to construction.

6.2.11. WWC78 (AHIMS ID 13-4-0162)

Social significance

- Site WWC78 comprises an isolated artefact and has low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a single artefact and the raw material is common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC78 is of low significance at the local level. It is of low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

6.2.12. WWC92 (AHIMS ID 13-4-0161)

Social significance

- Site WWC92 comprises an isolated artefact and has low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a single artefact and the raw material is common to the area. The site has a low representativeness ranking as similar stone artefacts are common within the region. The site has limited research potential and limited local educational potential for researching and teaching the way local Aboriginal populations used this type of landform.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC92 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density, common raw material and overall common presence in the region. The site has limited research and educational potential about the way local Aboriginal populations used this type of landform.

6.2.13. IA2 (AHIMS 13-04-0092)

- The significance of this site has not been assessed as it has been destroyed by the Halfway Creek duplication.

6.2.14. WWC115 (AHIMS ID 13-4-0160)

Social significance

- Site WWC115 comprises an artefact scatter and has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a low density artefact scatter and sub-surface investigations failed to reveal any additional artefactual material. The site has a low representativeness

ranking as artefact scatters are common within the region. The site has no research or educational potential.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC115 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to its low density and overall common presence in the region. The site has no research or educational potential.

6.2.15. WWC135 (AHIMS ID 13-4-0159)

Social significance

- Site WWC115 comprises an artefact scatter and has low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way.

Historical significance

The site has low historical significance as the presence of a flaked glass artefact indicates use of the site into the historical period.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises a low number of artefacts with raw material is relatively common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has no clear research or educational potential.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC135 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low historical significance given the evidence of use of European materials in the production of artefacts. It has low scientific significance due to its low density and overall common presence in the region. The site has no research or educational potential.

6.2.16. WWC138 (AHIMS ID 13-4-0158)

Social significance

- Site WWC138 comprises an isolated artefact and has low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low contents ranking as the site comprises of a single artefact and the raw material is common to the area. The site has a low representativeness ranking as artefact scatters are common within the region. The site has no research or educational potential.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC138 is of low significance at the local level. It is of low-moderate social significance as it provides evidence of the use of the area by Aboriginal people in a limited way. It has low scientific significance due to is low density, common raw material and overall common presence in the region. The site has no research or educational potential.

6.2.17. WWC139 (AHIMS ID 13-4-0157)

Social significance

- Site WWC139 comprises an artefact scatter and has low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low scientific significance as it is ranked as having low integrity, low structure, low contents and low representativeness/rarity. The integrity and structure of the site is low as it has been heavily disturbed by post-contact land-use practices. The site has a low content ranking as the site comprises of a low density artefact scatter and sub-surface investigations failed to reveal any additional artefactual material. The site has a low representativeness

ranking as artefact scatters are common within the region. The site has no research or educational potential.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall WWC139 is of low significance at the local level. It is of low social significance as it provides evidence of the use of the area by Aboriginal people in a very limited way. It has low scientific significance due to its low density and overall common presence in the region. The site has no research or educational potential.

6.3. Summary

A summary of the scientific assessment is presented in Table 6-1, and the summary of the overall assessment is presented in Table 6-2.

Table 6-1 Summary of scientific significance assessment for archaeological sites within or near the boundary of the project

AHIMS ID	Name	Site type	Integrity	Structure	Contents	Representativeness / Rarity	Scientific significance
22-1-0348	WWC5	Artefact scatter	Low	Low	Low	Low	Low
22-1-0347	WWC7	Isolated artefact	Low	Low	Low	Low	Low
22-1-0346	WWC18	Artefact scatter	Low	Low	Low	Low	Low
22-1-0345	WWC26	Isolated artefact	Low	Low	Low	Low	Low
22-1-0403	Sherwood North	Artefact scatter	Low	Low	Low	Low	Low
22-1-0344	WWC37	Artefact scatter	Low	Low	Low	Low	Low
22-1-0343	WWC39	Artefact scatter	Low	Low	Moderate	Moderate – High	Moderate
22-1-0342	WWC46	Artefact scatter	Low-Moderate	Moderate	Low	Low	Low-Moderate
22-1-0349	WWC53	Isolated artefact	Low	Low	Low	Low	Low
22-1-0403	WWC Dirty Creek 1	Unable to be assessed, PAD requires assessment					
13-4-0162	WWC78	Isolated artefact	Low	Low	Low	Low	Low

AHIMS ID	Name	Site type	Integrity	Structure	Contents	Representativeness / Rarity	Scientific significance
13-4-0161	WWC92	Isolated artefact	Low	Low	Low	Low	Low
13-4-0092	IA2	Unable to be assessed, has been destroyed					
13-4-0160	WWC115	Artefact scatter	Low	Low	Low	Low	Low
13-4-0159	WWC135	Artefact scatter	Low	Low	Low	Low	Low
13-4-0158	WWC138	Isolated artefact	Low	Low	Low	Low	Low
13-4-0157	WWC139	Artefact scatter	Low	Low	Low	Low	Low

Table 6-2 Summary of significance assessment for archaeological sites

AHIMS ID	Name	Scientific significance	Social significance	Aesthetic significance	Historical significance	Overall significance
22-1-0348	WWC5	Low	Low-Moderate	n/a	n/a	Low
22-1-0347	WWC7	Low	Low	n/a	n/a	Low
22-1-0346	WWC18	Low	Low-Moderate	n/a	n/a	Low
22-1-0345	WWC26	Low	Low-Moderate	n/a	n/a	Low
22-1-0403	Sherwood North	Low	Low-Moderate	n/a	n/a	Low-Moderate
22-1-0344	WWC37	Low	Low-Moderate	n/a	n/a	Low
22-1-0343	WWC39	Moderate	Moderate	Moderate	Moderate	Moderate
22-1-0342	WWC46	Low-Moderate	Low-Moderate	Low-Moderate	Low	Low-Moderate
22-1-0349	WWC53	Low	Low	n/a	n/a	Low
22-1-0403	WWC Dirty Creek 1	Unable to be assessed				
13-4-0161	WWC92	Low	Low	n/a	Low	Low
13-4-0162	WWC78	Low	Low	n/a	n/a	Low
13-4-0092	IA2	Unable to be assessed				
13-4-0160	WWC115	Low	Low-Moderate	n/a	n/a	Low
13-4-0159	WWC135	Low	Low-Moderate	n/a	Low	Low
13-4-0158	WWC138	Low	Low	n/a	n/a	Low
13-4-0157	WWC139	Low	Low	n/a	n/a	Low

7. Impact assessment

A complete impact assessment of all identified Aboriginal cultural heritage values near and within the boundary of the project is presented in the CHAR, with only impact to the archaeological sites assessed here.

This Chapter looks at sites where:

- Avoidance will occur due to changes to the boundary of the project, and site may fall partially or wholly outside the boundary of the project, or some portion may remain within the boundary of the project but be avoided by construction.
- A site or place may not be directly impacted by construction of the project, but may be at risk of indirect impacts, such as a secret place becoming more visible/accessible due to the construction of the project.
- Partial impact to a site or place would occur, with avoidance to part of the site within and/or outside of the boundary of the project.
- Impact is unavoidable and the site will be totally impacted.

A total of 10 archaeological items – nine archaeological sites and one stand-alone PAD – out of 15 will be impacted by the project between Woolgoolga and Wells Crossing, with four sites being avoided by the boundary of the project and one site already impacted by previous highway works (Table 7-1). Of the nine sites to be impacted, two will only be minimally impacted, with the majority of the site remaining intact. No indirect impacts to known sites are likely from the project between Woolgoolga and Wells Crossing.

It should be noted, that the low (eight sites), low-moderate (two sites) and moderate (one site) significance of each of the sites within the boundary of the project between Woolgoolga and Wells Crossing do not warrant avoidance.

Table 7-1 Impact assessment for archaeological sites near or within the boundary of the project between Woolgoolga and Wells Crossing

AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
22-1-0348	WWC 5	Low	Artefact scatter	None	The site is located outside, immediately adjacent to the west of the boundary of the project. No direct or indirect impact is likely from the project. Fencing may be required to ensure impact from the project is avoided.
22-1-0347	WWC 7	Low	Isolated artefact	None	This site is located outside the boundary of the project, approximately 20 m to the west of the project. No direct or indirect impact is likely from the project.

AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
22-1-0346	WWC18	Low	Artefact scatter	Direct	WWC18 will be subject to excavation to provide a road cutting for approximately 25 m in length. The result would be the removal of approximately 5 per cent of the site and only minimal irreversible impact to its heritage values. Part of the site is within the boundary of the project and will be avoided by the construction footprint, and part of the site will be avoided and is outside the boundary of the project to the west.
22-1-0345	WWC26	Low	Isolated artefact	None	Within the boundary of the project, but direct impact would be avoided by the construction footprint. Fencing would be required to ensure impact from associated activities is avoided.
22-1-0403	Sherwood North	Low	Artefact scatter	Direct	Sherwood North will be subject to excavation to provide an embanked road for approximately 60 m in length. The result would be the removal of approximately 5 per cent of the site and only minimal irreversible impact to its heritage values. The majority of the site will be avoided and is outside the boundary of the project to the north-west.
22-1-0344	WWC37	Low-moderate	Artefact scatter	Direct	WWC37 will be subject to excavation to provide a cut and embanked road for approximately 85 m in length. The result would be the removal of approximately 50 per cent of the site and irreversible impact to its heritage values. Part of the site is within the boundary of the project but will be avoided by the construction footprint, and part of the site will be avoided and is outside the boundary of the project to the west.
22-1-0343	WWC39	Moderate	Artefact scatter	Direct	WWC39 will be subject to excavation through the middle of the site to provide an embanked road for approximately 360 m in length. The result would be the removal of approximately 60 per cent of the site and irreversible impact to its heritage values. Part of the site is within the boundary of the project but will be avoided by the construction footprint, and part of the site will be avoided and is outside the boundary of the project to the east and west.

AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
22-1-0342	WWC46	Low-moderate	Artefact scatter	Direct	WWC46 will be subject to excavation to provide embanked road for two sections, one approximately 75 m in length, the other approximately 30 m in length. The result would be the removal of approximately 30 per cent of both parts (locus A and B) of the site and irreversible impact to part of its heritage values. Part of the site is within the boundary of the project but will be avoided by the construction footprint, and part of the site will be avoided and is outside the boundary of the project to the east.
22-1-0349	WWC53	Low	Isolated artefact	Direct	WWC53 will be subject to excavation to provide road cutting for approximately 5 m in length. The result would be the removal of 100 per cent of the site and irreversible impact to its heritage values. This site is located close to, but outside the construction footprint, as such it may be able to be avoided during the detailed design of the project.
22-1-0403	WWC Dirty Creek 1	To be confirmed	PAD	Direct	TBC
13-4-0162	WWC 78	Low	Isolated artefact	Direct	WWC78 will be subject to excavation to provide a road cutting for approximately 20 m in length. The result would be the removal of 100 per cent of the site and irreversible impact to its heritage values.
13-4-0161	WWC 92	Low	Isolated artefact	None	The site is located outside, immediately adjacent to the east of the boundary of the project. No direct or indirect impact is likely from the project. Fencing may be required to ensure impact from the project is avoided.
13-4-0092	IA2	Low	Isolated artefact	Previously destroyed	N/A
13-4-0160	WWC115	Low	Artefact scatter	None	WWC115 is outside, immediately adjacent to the boundary of the project - no direct or indirect impact is likely from the project. Fencing may be required to ensure impact from the project is avoided.

AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
13-4-0159	WWC135	Low-moderate	Isolated artefact	Direct	WWC135 will be subject to excavation through the middle of the site to provide an embanked road for approximately 180 m in length. The result would be the removal of approximately 70 per cent of the site and irreversible impact to its heritage values. Part of the site is within the boundary of the project but will be avoided by the construction footprint, and a small portion of the site will be avoided and is outside the boundary of the project to the east and west. Fencing would be required within the boundary of the project to ensure impact from associated activities is avoided.
13-4-0158	WWC138	Low	Artefact scatter	Direct	WWC138 will be subject to excavation to provide a road embankment for approximately 5 m in length. The result would be the removal of 100 per cent of the site and irreversible impact to its heritage values.
13-4-0157	WWC139	Low	Artefact scatter	None	Within the boundary of the project, but direct impact would be avoided by the construction footprint. Fencing would be required to ensure impact from associated activities is avoided.

8. Management recommendations

A complete set of management recommendations for all identified Aboriginal cultural heritage values near and within the boundary of the project is presented in the CHAR, with only recommendations for archaeological sites included here (Table 8-1). Impact levels presented in Table 8-1 are reflective of the current construction footprint, in the situation of any changes to this, these management recommendations must be revisited and revised as necessary to reflect changes.

In acknowledgement of the traditional owners' significance of the sites recorded, and the low surface visibility and exposure encountered during investigations, inspection of the ground within the proximity of the sites following vegetation clearance is recommended (Table 8-1).

Table 8-1 Management recommendations for archaeological sites near or within the boundary of the project between Woolgoolga and Wells Crossing

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
1	WWC5 (22-1-0348)	Artefact scatter	Low-Moderate	0%	▪ Located adjacent to the boundary of the project – exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing).
1	WWC7 (22-1-0347)	Isolated artefact	Low	0%	▪ None, not impacted.
1	WWC18 (22-1-0346)	Artefact scatter	Low-Moderate	5%	▪ All previously recorded artefacts within impacted area must be recovered and removed off-site. ▪ For areas avoided by the concept plan, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing). ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.
1	WWC26 (22-1-0345)	Isolated artefact	Low	0%	▪ Located within the boundary of the project, but outside the construction footprint - exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing).
1	Sherwood North (22-1-0402)	Artefact scatter	Low to Moderate	5%	▪ All previously recorded artefacts within impacted area must be recovered and removed off-site. ▪ For areas avoided by the boundary of the project, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing). ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
1	WWC37 (22-1-0344)	Artefact scatter	Low-Moderate	50%	▪ All previously recorded artefacts must be recovered and removed off-site. ▪ For areas avoided by the concept plan and/or the boundary of the project, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing). ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.
1	WWC39 (22-1-0343)	Artefact scatter	Moderate	60%	▪ All previously recorded artefacts must be recovered and removed off-site. ▪ Salvage excavation must be undertaken of this site within the portion of the site extent to be impacted. ▪ A total of 80 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (approximately 900 mm bucket). ▪ Each excavation must be undertaken in 50 mm spits to sterile base deposits. ▪ The location of excavations should be decided upon in the field by the archaeologist and registered Aboriginal Stakeholders. ▪ All artefacts which have previously been recorded and reburied during sub-surface testing must be recovered. ▪ All cultural material recovered during salvage would be removed off-site for detailed analysis to be undertaken. Once analysed the material would be returned to the registered Aboriginal Stakeholders for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. ▪ All recovered cultural material would be subject to detailed analysis and inclusion in a technical report. ▪ For areas avoided by the concept plan and/or the boundary of the project, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing). ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
1	WWC 46 (22-1-0342)	Artefact scatter	Low to Moderate	30%	▪ Salvage excavation must be undertaken of this site within the portion of the site to be impacted closest to Corrindi Creek. ▪ A total of 40 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (approximately 900 mm bucket). ▪ Each excavation must be undertaken in 50 mm spits to sterile base deposits. ▪ The location of excavations should be decided upon in the field by the archaeologist and registered Aboriginal Stakeholders. ▪ All artefacts which have previously been recorded and reburied during sub-surface testing must be recovered. ▪ All cultural material recovered during salvage would be removed off-site for detailed analysis to be undertaken. Once analysed the material would be returned to the registered Aboriginal Stakeholders for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. ▪ All cultural material recovered would be subject to detailed analysis and inclusion in a technical report. ▪ For areas avoided by the concept plan and/or the boundary of the project, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing). ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.
1	WWC53 (22-1-0349)	Isolated artefact	Low	100%	▪ All previously recorded artefacts must be recovered and removed off-site. ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
1	WWC Dirty Creek 1 (22-1-0403)	PAD	TBA	20%	Due to restricted property access, WWC Dirty Creek 1 has only been subject to field survey. Therefore the following approach is necessary: ▪ **Sub-surface testing** - The methodology outlined in the archaeological assessment in Volume 2 must be applied to a subsurface testing program if identified as being required. ▪ **Salvage** – must be undertaken if the requirement is identified during sub-surface testing. The triggers for sub-surface testing are as follows: – More than 10 but less than 50 artefacts – a minimum of 10 m² to be excavated by machine – More than 50 but less than 100 artefacts – a minimum of 30 m² to be excavated by machine – More than 100 artefacts – a minimum of 60 m² to be excavated by machine and hand excavation – Please note: If multiple site components are identified or a higher number of artefacts (300+) are identified within the area, these salvage measures may require revision. ▪ Salvage excavation must be undertaken of this site within the site extent and within the boundary of the project. ▪ All machine excavation would be undertaken with a mechanical sieve and an excavator (900 mm bucket). ▪ Each excavation must be undertaken in 50 mm spits to sterile base deposits. ▪ The location of excavations should be decided upon in the field by the archaeologist and registered Aboriginal Stakeholders. ▪ All artefacts which have previously been recorded and reburied during sub-surface testing must be recovered. ▪ All cultural material recovered during salvage would be removed off-site for detailed analysis to be undertaken. Once analysed the material would be returned to the registered Aboriginal Stakeholders for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. All cultural material recovered would be subject to detailed analysis and inclusion in a technical report. ▪ Where necessary, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing). ▪ If a site is recorded here, for areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
1	WWC78 (13-4-0162)	Isolated artefact	Low	100%	▪ All previously recorded artefacts must be recovered and removed off-site. ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.
1	WWC92 (13-4-0161)	Isolated artefact	Low	0%	▪ Located adjacent to the boundary of the project – exclusion zones may need to be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing).
1	WWC115 (13-4-0160)	Artefact scatter	Low	0%	▪ Located adjacent to the boundary of the project – exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing).
2	WWC135 (13-4-0159)	Artefact scatter	Low-Moderate	70%	▪ All previously recorded artefacts must be recovered and removed off-site. ▪ For areas avoided by the concept plan and/or the boundary of the project, exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing). ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.
2	WWC138 (13-4-0158)	Isolated artefact	Low	100%	▪ All previously recorded artefacts must be recovered and removed off-site. ▪ For areas of the site proposed to be impacted, inspection of the ground surface by Aboriginal site officers following vegetation clearance must be undertaken within 50 m of the site. Any Aboriginal heritage material identified must be added to an updated AHIMS site record.
2	WWC139 (13-4-0157)	Artefact scatter	Low to Moderate	0%	▪ Located within the boundary of the project, but outside the construction footprint - exclusion zones should be put in place to ensure damage does not occur to archaeological deposits. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the site (eg high visibility construction webbing).

Appendix B Glossary

Aboriginal cultural heritage: The material (objects) and intangible (mythological places, dreaming stories etc) traditions and practices associated with past and present day Aboriginal communities.

Aboriginal object: Any deposit, object or material evidence (not being a handicraft made for sale), including Aboriginal remains, relating to the Aboriginal habitation of NSW.

Aboriginal place: Any place declared to be an Aboriginal place under s.94 of the *National Parks and Wildlife Act 1974*.

Aboriginal stakeholders: Members of a local Aboriginal land council, Aboriginal groups or other Aboriginal people who have registered their interest with the RTA to be consulted about a proposed RTA project or activity

Aeolian: Aeolian processes refer to the wind's alteration of the landscape.

AFG: An acronym for 'Aboriginal focus group'. This refers to organised meetings where Aboriginal stakeholders (who have registered their interest) can be consulted on RTA projects.

Agate: A form of banded chalcedony; it is characterised by layers of different colours.

AHIMS: Acronym for **'**Aboriginal heritage information management system'. AHIMS is a register that contains information about NSW Aboriginal heritage, and it is maintained by DECCW.

Alignment: The general route (eg of a roadway) in plan and elevation.

Alluvium: A deposit left by the flow of water. It can include sediments of gravel, mud or sand.

Angular fragment: A flaked piece of stone that does not have characteristic features which allow for it to be positively identified as a flake, core or tool.

Archaeological site: A location that has evidence of past Aboriginal activity (both material and mythological/ritual).

Archaeology: The scientific study of human history, with focus on material remains and ethnographic evidence.

Area of archaeological sensitivity: A part of the landscape that contains demonstrated occurrences of cultural material. The precise level of sensitivity will depend on the density and significance of the material.

Artefact: An item of cultural material created by humans.

Artefact scatter: Where two or more stone artefacts are found within an area of potential archaeological deposit or a site.

Axial termination: When the force from the strike used to detach a flake from the core travels all the way through the core.

Backed blade: Bladelets that have one edge blunted by steep retouch to form a back.

Basalt: A common volcanic rock. It is fine grained (approximately 45-50 per cent silica) and rich in iron and magnesium.

Bedrock: A consolidated rock that is unbroken and un-weathered, located beneath soil or rock fragments.

Bifacial flaking: The removal of flakes from two faces of a single platform.

Bipolar: A method of flaking stone, especially quartz, where cores are rested upon an anvil during flaking.

Bipolar core: A core used to create bipolar flakes.

Blade: A stone flake that is at least twice as long as it is wide.

Bioturbation: Disturbance in soil profiles caused by living organisms, such as ants and roots.

Bora ground: These are usually identified as flat, mounded earth rings that were used for Aboriginal ceremonial activities.

Bulb of percussion: A partial cone of force produced when a flake is struck off a core. The cone occurs on the ventral (inside surface) of the flake.

Burials: Burial sites may be composed of a single burial, isolated individuals in a general area, or cemeteries containing many individuals.

Carved trees: Carved trees exhibit evidence of purposeful removal of bark, but differ from scarred trees in that geometric patterns and figures are cut into the tree. The motifs of the mid-north coast region are mostly linear geometric patterns (Craib and Bonhomme 1995: 27).

Chalcedony: A mineral with high silica content that has a microcrystalline structure. It is often described as ‘waxy’ and can be translucent. It is found in a variety of colours such as white, grey, greyish-blue or brown.

Chert: A fine grained rock composed of cryptocrystalline silica. It exhibits a range of textures and colours including red, green or black. Chert is easy to work and retains a sharp edge for an extensive period of time before resharpening is required. It has a low to medium fracture toughness.

Clast: A broken fragment of rock or crystal particle that was created either through erosion or weathering.

Clay: A type of sediment with particles less than 4 microns in size and that is composed of clay minerals (Keary 2001: 49).

Conglomerate: Is a geological term used to describe clasts that are cemented in a fine grained matrix. It is a sedimentary rock.

Core: A stone piece from which a flake has been removed by percussion (striking it) or by pressure. It is identified by the presence of flake scars showing the negative attributes of flakes, from where flakes have been removed.

Cortical platform: This term is used to describe a platform that has cortex present and may indicate that the core's surface (where the flake was struck) was previously un-worked.

Cortex: The outer weathered surface of stone; if smooth, it can indicate the source of stone was a pebble.

Crenation: Refers to a flaked artefact's vitrified surface appearance. This appearance is caused by heat exposure and materialises as relatively uniform patterns.

Cretaceous: A geological period that dates from approximately 145 to 65 million years ago in the Mesozoic era.

Crushed platform: This term is used to describe a flake that has a damaged platform and where the platform's attributes cannot be recorded as a result.

Cultural heritage assessment report: A report combining an Aboriginal archaeological assessment and Aboriginal cultural assessment, required to be submitted to DECCW for any Part 6 *National Parks and Wildlife Act 1974* approval or prepared for projects under Part 3A of the *Environmental Planning and Assessment Act 1979* where Aboriginal cultural heritage is identified as a key issue.

Debitage: Small, unmodified flakes produced as part of the flaking process, but discarded unused.

Distal: Term of view used to describe the lower portion of a flake in respect to where the striking force terminates.

Distal flake: A broken flake with the presence of a termination and the absence of a platform or impact point.

Dolerite: A medium to fine grained volcanic rock that is the chemical and mineral equivalent of basalt.

Dorsal: The side of a flake that was originally part of the core's outer surface (often referred to as the 'dorsal surface').

Easting: This is a measurement used to determine location. The easting is the x-coordinate and relates to the vertical lines on a map, which divide east to west. It increases in size when moving further east.

Ecotone: A term used to describe the transition area between two land systems.

Edge damage: Where the edge of a tool has been used, resulting in microscopic fractures along the surface.

Exposure: The level of ground exposure is based on the whether the landform is eroding, aggrading or stable.

Faceted platform: A faceted platform has three or more flake scars present on its surface.

Feather termination: A feather termination has a 'minimal thickness at the distal end and an acute angle between the dorsal and ventral surfaces' (Crabtree 1972: 64; Holdaway and Stern 2008: 129). In appearance, a feather termination becomes gradually thinner towards the end of the flake.

Fine grained siliceous material: A rock that has a high content of silica and that is fine grained in appearance without any further identifying characteristics.

Flake: A stone piece removed from a core by percussion (striking it) or by pressure. It is identified by the presence of a striking platform and bulb of percussion, not usually found on a naturally shattered stone.

Flake scar: Often called a 'negative flake scar', it is the remnant of a previous flake that was struck from the core. This appears on the dorsal surface of a flake.

Flaked fragment: This is a chipped stone artefact which cannot be classed as a flake, core or retouched flake, the reason being that the defining attributes are missing. This often happens when a core contains a number of incipient fracture planes. Artefacts that are heavily weathered or which have been shattered in a fire are also difficult to categorise.

Flaked platform: This term is used to describe a platform that has been worked previously; one or more flakes were removed prior.

Floodplain: The area covered by water during a major flood and/or the area of alluvium deposits laid down during past floods.

Fluvial: Pertaining to or produced from a river.

Focalised platform: A small platform that is intentionally prepared for percussion by overhang removal.

Footprint: The scale, extent or mark that a development makes on the land in relation to its surroundings.

Geometric microliths: Backed at one end, the other end or both, these tools are made on geometric shaped flakes, <80 mm maximum dimension.

Geomorphic: Relating to the structure, shape and development of landforms.

Greywacke: A term used to describe a form of immature sedimentary sandstone with clay content.

Hammerstone: A piece of stone used to knock flakes from a core. Evidence of pitting or bashing can usually be seen along some part of the margins of this artefact.

Hinge termination: A hinge termination occurs when "the fracture meets the surface of the core at approximately right angles to the longitudinal axis of the flake" (Holdaway and Stern 2008: 130). This can present as a rounded surface that curves downwards at the distal end of a flake.

Holocene: The Holocene epoch forms part of the late Quaternary period and extends from about 11,000 years ago to the present day.

Hornfels: Metamorphosed aphanitic sedimentary rock with extremely small particle size. Formed by high-temperature metamorphism of shale and has flaking qualities.

Humic: Soil that contains organic matter (from 'humus').

Igneous: After magma or lava cools and solidifies, it forms igneous rock. This can happen in volcanic and plutonic (under the surface of the earth) scenarios. An example of this is basalt.

***In situ*:** A description of any cultural material that lies undisturbed in its original point of deposition.

Ironstone: A type of sedimentary rock that contains iron.

Jurassic: A geological period that dates from approximately to 200 to 145 million years ago in the Mesozoic era.

Knapping: The removal of flakes and flaked pieces from a stone core by the use of percussion.

Layer: In stratigraphy, it is used to describe a horizon (soil, rock, charcoal) that is distinct from its surrounds.

Land system: Description for an area of land based on an assessment of a series of environmental characteristics including geology, geomorphology, climate, soils and vegetation.

Loam: Soil that contains roughly equal concentrations of silt, sand and clay.

Longitudinally split flake: This is a flake that is broken (split) from the point of percussion (the strike) through to the termination.

Manuport: An unmodified piece of stone transported to a site by humans.

Mechanical trench: This refers to a trench that is excavated for archaeological purposes with a mechanical excavator. Machine excavation allows for a greater sample size to be studied in PADs of low to moderate sensitivity. Due to the large amounts of soil produced from a mechanical excavator, the soil is sieved mechanically.

Medial: Term of view referring to the intermediate section or middle section of a broken flake.

Medial flake: Absence of proximal and distal margins, but with an identifiable ventral surface.

Mesozoic: Refers to a geological era that included three periods, two of which were the Jurassic and Cretaceous. The Mesozoic era spanned from approximately 245 to 65 million years ago.

Metamorphism: The process where an existing rock (which can be sedimentary or igneous) is transformed into another mineral through the application of temperature and pressure. An example of this is hornfels.

Micron: A micron is also known as a micrometre. It is a unit of length and has the symbol ‘µm’. In metres, it is 1.0×10^{-6} metre or 0.000001 metre.

Midden: The term midden is a Danish word meaning a mound of kitchen refuse. In archaeological terms, a midden refers to an accumulation of shell deposited after people had collected and eaten shellfish. These could contain estuarine and fresh water shellfish species in addition to faunal remains, stone artefacts and charcoal from cooking fires. In northern NSW in many areas, burials have been recorded in direct association with midden deposits.

Mudstone: A sedimentary rock formed from mud/clay.

Muller: A large stone artefact which differs in construction depending on the environment. These were used as an aide for processing seeds and other low return plant material or ochre.

Multi-platform core: Is a core with more than one identifiable platform.

Munsell colour: This is a colour code chart used to standardise colour specifications.

Natural/mythological sites: These may not exhibit any physical or archaeological evidence, but their identification is derived from local Aboriginal tradition and oral history. These sites often have mythological associations and are associated with ceremonial activity in the past. These sites are sometimes prominent landmarks, such as mountains, rivers, rocky outcrops, and headlands (eg Glenugie Peak, the Clarence and Richmond Rivers).

Non-diagnostic: An amorphous piece of stone that is neither a flake, flaked fragment, core or retouched flake.

Northing: This is a measurement used to determine location. The northing is the y-coordinate and relates to the horizontal lines on a map, which divide north to south. It increases in size when moving further north.

Notched tool: Flakes that exhibit a small area of retouch, forming a concave edge on lateral or distal margin.

Oriented length: This is a measurement taken from the point of impact through to the termination.

Oriented thickness: This is a measurement taken from where the oriented width and oriented length intersect.

Oriented width: This is a measurement taken across the middle of a flake (halfway between the point of impact and the termination).

Overhang removal: This occurs when a platform is prepared for striking; small flakes are struck before a flake is detached, leaving visible scars behind.

Potential Archaeological Deposit (PAD): A PAD is a location that is considered to have a potential for sub-surface cultural material. This is determined from a visual inspection of the site, background research of the area and the landform's cultural importance.

pH: A measure of the acidity or alkalinity of the soil. Neutral is indicated by a pH of 7, with strongly acidic being 0 and strongly basic (alkaline) being 14. The 'pH' is said to stand for 'potential of hydrogen'.

Platform: On a flake, this is a core remnant from where the flake was struck off the core.

Platform width: This is a measurement taken across the width of a platform between the two lateral margins of a flake.

Platform thickness: This is a measurement taken from the ventral to dorsal surfaces of a flake (beginning at the point of impact/percussion).

Pleistocene: The Pleistocene is an epoch within the early Quaternary period, extending from about 1.6 million years ago to about 11,700 years ago. The end of the Pleistocene is marked by the last of the great ice ages.

Plunge termination: This occurs when the ventral surface "curves markedly away from the face of a core...and continues directly into the core, removing the base of the core" (Holdaway and Stern 2008: 132). This can present as a 'J' shape when holding the flake in profile.

Proximal: Term of view used to describe the upper portion of a flake in respect from where it was initially struck off a core.

Proximal flake: A broken flake with the presence of a platform, but the absence of a termination.

Pot-lidded: The damage caused by exposure to extreme heat, resulting in a circular depression on the surface of a stone artefact.

Pressure flaking: A process to remove a flake from a core by applying pressure (from a piece of wood or bone) along the core's edge.

Quarry: In this report, 'quarry' can refer to a native source of stone that was mined by Aboriginal people in the past. Rock from these sites could be used to make artefacts.

Quartz: A mineral composed of silica with an irregular fracture pattern. The quartz used in artefact manufacture is generally semi-translucent, although it varies from milky white to glassy. Glassy quartz can be used for conchoidal flaking, but poorer quality material is more commonly used for block fracturing techniques. Quartz can be derived from water worn pebbles, crystalline or vein (terrestrial) sources.

Quartzite: A form of metamorphosed sandstone. It is often white or grey in colour, but can occur in other shades due to mineral impurities.

Quaternary: This is a geological time period spanning approximately 2 million years (to the present). It includes the two epochs, the Pleistocene and the Holocene.

Refit: Knapping is a reductive technology. As such, it is possible to 'refit' tools back together after breakage or knapping (ie refitting a proximal and distal flake back together or refitting a flake back to the core it was knapped from).

Rejuvenation: This is done to prepare a new platform on a core so that more flakes can be removed. Flakes struck for this purpose are called 'rejuvenation flakes'.

Resource zone: An area of the landscape or part of the environment that provides a resource (be it food or material items such as a source of stone for making artefacts) for Aboriginal people. Swamps are good examples of rich resource zones.

Retouch: A flake, flaked piece or core with intentional secondary flaking along one or more edges.

Ridge straightening: This is a "flake that has a clearly identifiable dorsal ridge and is characterised by alternating flake removals down its dorsal surface" (Holdaway and Stern 2008: 150).

Sand: A material composed of small grains (0.625-2.0 milimetres) (Keary 2001: 233). Sand is formed from a variety of minerals and rocks, but commonly contains silica, such as quartz.

Sandstone: Is a sedimentary rock formed from sand-sized grains.

Scarred trees: Trees that feature Aboriginal derived scars are distinct due to the scar's oval or symmetrical shape and the occasional use of steel, or more rarely, stone axe marks on the scar's surface. Scarred trees are identified by the purposeful removal of bark for use in the manufacture of artefacts such as containers, shields and canoes. The bark was also used for the construction of shelters. Other types of scarring include toeholds cut in the trunks or branches of trees for climbing purposes and the removal of bark to indicate the presence of burials in the area.

Sediment: Is a mineral that has undergone erosion or weathering and that is then deposited via aeolian, glacial or fluvial means.

Sedimentary: Sedimentary rock is formed through the accumulation of sediment deposits that are then consolidated. An example of this is mudstone.

Shale: A sedimentary rock of well-defined layers comprised of small particles (less than 4 microns in size) (Keary 2001: 16) sourced from weathered or eroded materials.

Significant ground disturbance: Means disturbance of (a) the topsoil or surface rock layer of the ground; or (b) a waterway, by machinery in the course of grading, excavating, digging, dredging or deep ripping, but does not include ploughing other than deep ripping.

Silt: A sediment with grains ranging from 4.0-62.5 microns in size (Keary 2001: 245). It can be found as a soil or in water.

Single platform core: Is a core with one identifiable platform.

Scraper: A stone tool, usually with steep retouch along its edges that was ethnographically used to make wooden implements or process foods and other resources.

Silcrete: Soil, clay or sand sediments that have silicified under basalt through groundwater percolation. It ranges in texture from very fine grained to coarse grained. At one extreme it is cryptocrystalline with very few clasts. It generally has characteristic yellow streaks of titanium oxide that occur within a grey and less commonly reddish background. Used for flaked stone artefacts.

Slate: A metamorphosed mudstone**.**

Spit: Refers to an arbitrarily defined strata of soil removed during excavation (often 50 millimetres to 100 millimetres in depth).

Step termination: This occurs when a “flake terminates abruptly in a right-angle break” (Holdaway and Stern 2008: 130).

Stone arrangements: On the mid-north coast of NSW, stone arrangements usually consist of cairns and/or alignments of rocks. These features are considered by Gumbaynggir people as having ceremonial significance and are often found in relatively high and/or inaccessible places such as mountain peaks and coastal headlands.

STP: Acronym for ‘shovel test pit’. Generally, this refers to a 0.5 metre x 0.5 metre pit dug by shovel, trowel or mattock. STPs are usually laid out on a grid pattern and the soil is excavated from the pit in a controlled manner, using 50-100 mm spits. After the pits are photographed, recorded and mapped, they are then backfilled.

Stratification: The way in which soil forms in layers.

Stratigraphy: The study of soil stratification (layers) and deposition.

Sub-surface testing: An archaeological method used to determine the cultural sensitivity of an area by excavating small (0.5 metre x 0.5 metre) pits and recording the stratigraphy, material remains (such as stone tools) and disturbance.

Survey: In archaeological terms, this refers to walking over a surface while studying the location of artefacts and landmarks. These are then recorded and photographed.

Termination: Refers to the shape of the distal end of a flake.

Tool: A stone flake that has undergone secondary flaking or retouch.

TP: Acronym for ‘test pit’. Generally, this refers to a 1 metre x 1 metre or 2 metre x 1 metre pit dug by shovel, trowel or mattock. Test pits were used to determine the extent of possible features (such as shell middens) in a controlled excavation of 50 millimetre spits.

Usewear: A pattern of wear that is left on a stone artefact due to utilisation.

Ventral: The side of a flake that was originally attached to the core (often called the ‘ventral surface’). Features such as the bulb of percussion are found on this surface of a flake.

Visibility: Refers to the degree to which the surface of the ground can be observed. This may be influenced by natural processes such as wind erosion or the character of the native vegetation, and by land use practices, such as ploughing or grading. It is generally expressed in terms of the percentage of the ground surface visible for an observer on foot.

Waterholes/wells: Waterholes or wells can be any natural or excavated water retaining feature of either historic or prehistoric significance. In order to be considered as an archaeological site, there should be some evidence of modification or use of the site.