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UPGRADING THE PACIFIC HIGHWAY

Woolgoolga to Ballina Planning Alliance

UPGRADING THE PACIFIC HIGHWAY

Woolgoolga to Ballina Upgrade

Working Paper

Aboriginal Cultural Heritage Assessment

Woodburn to Ballina 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.

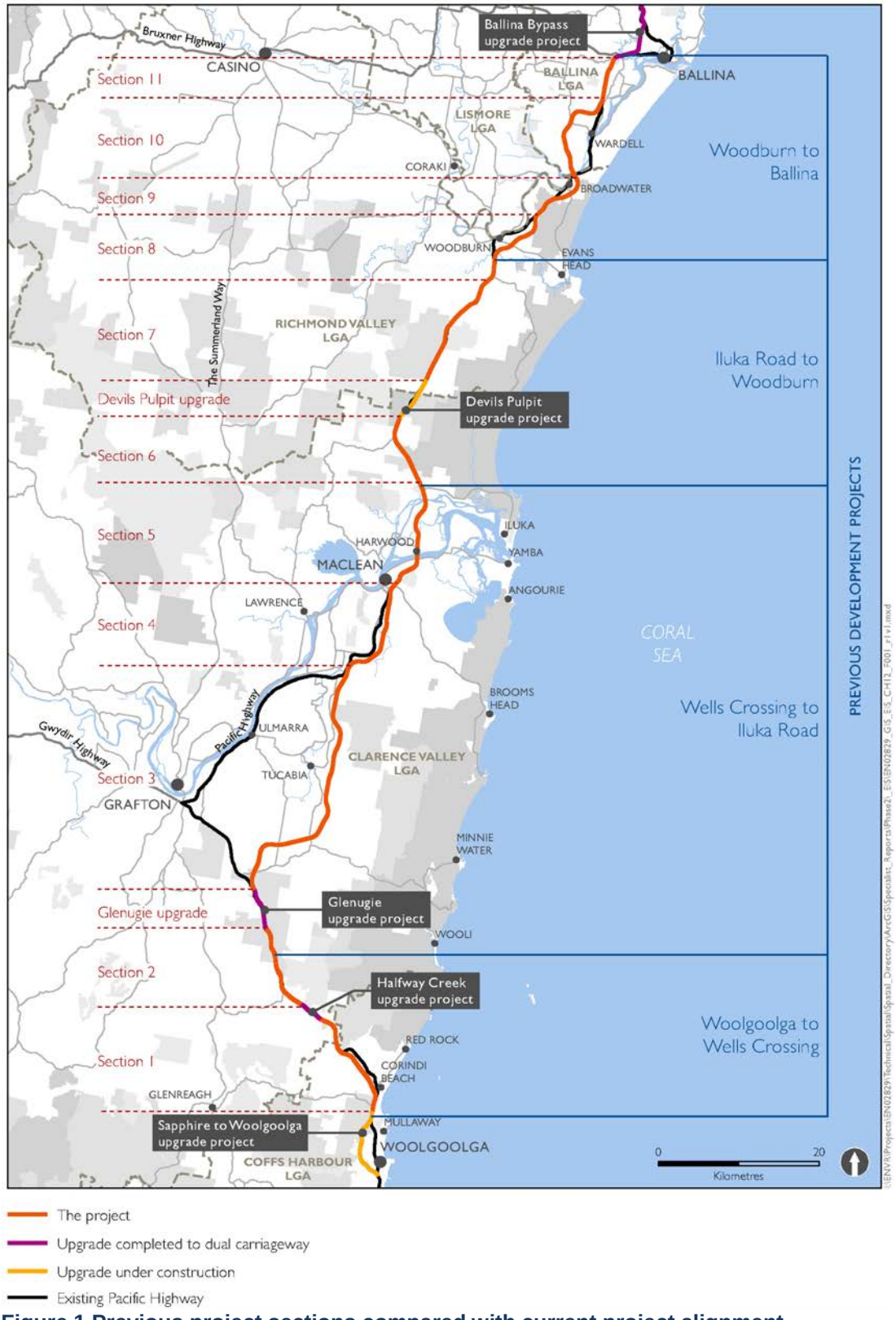


Figure 1 Previous project sections compared with current project alignment

Contents

Volume 1: Cultural heritage assessment report

Executive summary

1. Introduction 11

1.1. Overview 11
1.2. Study objectives and scope 11
1.2.1. Objectives 11
1.2.2. Scope of assessment 11
1.2.3. Study requirements 12
1.2.4. Definitions 13
1.2.5. Study area 14
1.3. The project 15
1.3.1. Project description 15
1.3.2. Project route development 15
1.3.3. Previous Aboriginal heritage assessment 16

2. Legislative context 22

3. Consultation 26

3.1. Consultation and assessment process 26
3.1.1. Overview of consultation 26
3.1.2. Director-General's environmental assessment requirements 26
3.1.3. Roads and Maritime Services consultation procedure 27
3.1.3.1. Consultation requirements for proponents 27
3.2. Previous Aboriginal community consultation 27
3.2.1. Aboriginal focus groups 2005 - 2006 27
3.3. Current consultation activities 29
3.3.1. Methodology 29
3.3.2. Aboriginal focus groups 2010 - 2012 29
3.3.3. Notification, identification and registration of stakeholders 31
3.3.3.1. Summary of issues raised at Aboriginal focus group meetings 32
3.3.4. Participation in fieldwork 33
3.3.5. Aboriginal stakeholder comment on cultural heritage assessment report 34
3.4. Consultation with government agencies 36

4. Existing environment 37

4.1. Regional context 37
4.1.1. Land systems 37
4.1.2. Geology and geomorphology 38
4.1.3. Vegetation 38

4.2. Ethnographic record 39
4.2.1. Aboriginal tribal boundaries 39
4.2.2. Social organisation 39
4.2.3. Settlement patterns 40
4.2.4. Material culture 40
4.2.5. Resources 40
4.2.6. Spiritual locations and culture 41
4.2.7. European and Aboriginal interaction 41
4.3. Historical land use and current site condition 42
4.4. AHIMS register search 45

5. Aboriginal cultural assessment 48

5.1. Introduction 48
5.2. Methodology 48
5.3. Cultural landscape 48
5.4. Identified Aboriginal cultural heritage values 49
5.5. Aboriginal cultural places within or adjacent to boundary of the project 50
5.6. Aboriginal cultural places near the boundary of the project 53

6. Summary of archaeological assessment 54

6.1. Assessment methodology 54
6.2. Ancillary works assessment 55
6.3. Results of the archaeological assessment 58

7. Significance assessment 72

7.1. Methodology 72
7.1.1. Basis for assessment 72
7.1.2. Social significance 72
7.1.3. Scientific significance 72
7.1.4. Aesthetic significance 73
7.1.5. Historic significance 73
7.1.6. Scale of significance 73
7.2. Statements of significance 74
7.2.1. Place A 74
7.2.2. Place B 74
7.2.3. Place C 74
7.2.4. Place D 75
7.2.5. Place E 75
7.2.6. Place F 76
7.2.7. Place G 76
7.2.8. Place H 77
7.2.9. Place I 77
7.2.10. Place J 78
7.2.11. Place K 78

7.2.12. Gittoes Jali (AHIMS 09-1-0204, 09-1-0205, 09-1-0203) 79
7.2.13. Gittoes Jali 2 80
7.2.14. Gittoes Jali 3 80
7.2.15. Site 11 (AHIMS ID 13-1-0189) 81
7.2.16. E2/2 (AHIMS ID 13-1-0109) 82
7.2.17. Cooks Hill, Broadwater (AHIMS ID 13-1-0038, 13-1-0010) 83
7.2.18. Gumi Site (AHIMS ID 04-4-0180) 83
7.2.19. Law PAD (AHIMS ID 04-4-0168) 84
7.2.20. Melino Scarred Tree 4 (AHIMS ID 04-4-0166) 84
7.2.21. Melino Artefact Scatter 85
7.2.22. Melino Site (AHIMS ID 04-4-0173) 86
7.2.23. MST3 (AHIMS ID 04-4-0131), C21 (AHIMS ID 04-4-0107), MSRT2 (AHIMS ID 04-4-0130) 87
7.2.24. MST1 (AHIMS ID 04-4.0129) 87
7.2.25. Site 3 (AHIMS ID 04-4-175) 88
7.2.26. Site 2 (AHIMS ID 04-4-0178) 89
7.2.27. Site 4 (AHIMS ID 04-4-0132) 90
7.2.28. Site 1 (AHIMS ID 04-4-0179) 90
7.2.29. Rudgley Scarred Tree (AHIMS ID 04-4-0170) 91
7.2.30. Rudgley Site 2 (AHIMS ID 04-4-0167) 92
7.2.31. Rudgley Site 1a and 1b (AHIMS ID 04-4-0167) 92
7.2.32. Saezza 1 (AHIMS ID 04-4-0171) 93
7.2.33. Site 12 (AHIMS ID 04-4-0176) 94
7.3. Summary 94

8. Impact assessment 97

8.1. Impact avoidance 97
8.2. Impacts 98
8.3. Cumulative impact 105
8.3.1. Introduction 105
8.3.2. Assessment 105
8.3.3. Assay of the Pacific Highway upgrade program 107

9. Management recommendations 108

9.1. General management requirements 109
9.2. Effectiveness of mitigation 110
9.3. Specific management requirements 111
9.3.1. Archaeological sites 111
9.3.2. Aboriginal cultural places 124
9.4. Management Procedures 125
9.4.1. Unexpected discovery of archaeological finds 125
9.4.2. Notification and reporting of incidents that breach this management plan 126

10. References 127

Volume 2 - Appendices

Appendix A Archaeological assessment 5
Appendix B Glossary 125
Appendix C Director-General requirements 134
Appendix D Previous Aboriginal community consultation 152
D.1 Previous summary 153
D.2 Previous documentation 155
D.3 Previous Aboriginal focus group minutes 161
Appendix E Current Aboriginal community consultation 190
E.1 Current Summary 191
E.2 Current documentation 206
E.3 Current Aboriginal focus group minutes 213
E.4 Statement of findings 232
Appendix F Ancillary works assessment matrix 278
Appendix G Predictive model maps 281
Appendix H Survey coverage and priority 289
Appendix I Survey coverage 291
Appendix J Summary of subsurface testing results 340
Appendix K Summary of all excavations 359
Appendix L Stratigraphic drawings 377
Appendix M Site photos 397
Appendix N Artefact and shell midden analysis 404
Appendix O Results of radiocarbon dating 470
Appendix P Ground penetrating radar report 477
Appendix Q Sub-surface testing report – Gumi PAD 487
Appendix R Report on Gumi scarred tree 513

List of Tables

Table 1-1 Summary of recommendations for archaeological sites 8

Table 1-1 DP&I's Director-General's environmental assessment requirements for Aboriginal heritage key issue 12

Table 1-2 Summary of project sections in relation to the CHAR assessments (bold type indicates Woodburn to Ballina project sections assessed in this report) 14

Table 2-1 Legislative framework 22

Table 3-1 Aboriginal focus group meetings held for Woodburn to Ballina route options investigations 28

Table 3-2 Aboriginal focus group meetings held for Woodburn to Ballina 2010 - 2012 30

Table 3-3 Native Title claimants relevant to Woodburn to Ballina; no Native Title holders exist for the project sections 8 to 11 31

Table 3-4 Site officers participating in field assessments 34

Table 3-5 Comments received from Aboriginal stakeholders regarding the draft CHAR between Woodburn and Ballina 34

Table 4-1 Summary of land systems within the project 37

Table 4-2 Listings on AHIMS located within 200 metres of the boundary of the project 45

Table 5-1 Cultural heritage values identified by registered Aboriginal parties 49

Table 5-2 Aboriginal cultural places near or within the boundary of the project 51

Table 5-3 Aboriginal cultural places near the boundary of the project 53

Table 6-1 Current status of areas or sites near or within the boundary of the project following survey and sub-surface testing between Woodburn and Ballina 60

Table 7-1 Summary of significance assessment of Aboriginal cultural places near or within the boundary of the project between Woodburn and Ballina 94

Table 7-2 Summary of significance assessment of archaeological sites near or within the boundary of the project between Woodburn and Ballina 95

Table 8-1 Impacts to archaeological sites and Aboriginal cultural places within and/or immediately adjacent to the boundary of the project between Woodburn and Ballina 98

Table 9-1 Summary of management recommendations for archaeological sites near or within the boundary of the project between Woodburn and Ballina 109

Table 9-2 Management requirements for archaeological sites between Woodburn and Ballina113

Table 9-3 Management requirements for Aboriginal cultural places near or within the boundary of the project between Woodburn and Ballina 124

List of Figures

Figure 1-1 The project alignment – Woodburn to Ballina 17
Figure 1-2 Section 8 - Trustums Hill to Broadwater National Park 18
Figure 1-3 Section 9 - Broadwater National Park to Richmond River 19
Figure 1-4 Section 10 - Richmond River to Coolgardie Road 20
Figure 1-5 Section 11 - Coolgardie Road to Ballina bypass 21
Figure 4-1 Accumulated impact within Woodburn to Ballina section from post-colonial land-use 44
Figure 4-2 Woodburn to Ballina - AHIMS aboriginal heritage sites 47
Figure 6-1 Management process to apply to construction ancillary sites and areas still requiring further assessment 56
Figure 6-2 Section 8 – sites and places near or within the boundary of the project 68
Figure 6-3 Section 9 – sites and places near or within the boundary of the project 69
Figure 6-4 Section 10 – sites and places near or within the boundary of the project 70
Figure 6-5 Section 11 – sites and places near or within the boundary of the project 71

Executive summary

This report is the Aboriginal cultural heritage assessment report (CHAR) for the Woolgoolga to Ballina Pacific Highway Upgrade (the project), from Woodburn to Ballina. 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 Woodburn and Ballina. 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 in as Appendix A in Volume 2, while a summary of this assessment is included in Section 6 of this report.

The Woolgoolga to Ballina upgrade of the Pacific Highway is described in eleven sections. This CHAR reports on sections 8, 9, 10 and 11 between Woodburn and Ballina.

Consultation

Aboriginal stakeholders have been involved throughout the Woodburn to Ballina sections of the project 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 [DECC] 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 Woodburn to Ballina can be found in Volume 2 which accompanies this document. The archaeological assessment was a process of building on previous assessment through ongoing consultation and revision.

A total of 3,091,988 square metres (77 per cent) of the Woodburn to Ballina sections was subject to field survey. The remaining area was assessed as not requiring survey due to previous significant disturbance of that area (primarily the existing Pacific Highway and sugar cane farms)..

Following the survey, 17 stand-alone PADs, and 13 sites were identified. Four of the sites also contained PAD components, leading to a total of 21 PADs identified. Sub-surface testing was undertaken at 20 of the PADs (either stand-alone PADs, or PADs associated with sites) to determine the nature, extent and significance of the potential deposits. One PAD was outside the proposed construction footprint, so did not require test-excavation. Ground-penetrating radar scans and then test-excavation were undertaken of a PAD at Gumi Site to test for the possible presence of a buried stone arrangement and/or a human burial; neither was detected. As a result of sub-surface testing of PADs, 14 PADs contained sub-surface Aboriginal archaeological deposits. Of these 14, nine new sites were identified, while five further explored the extent and significance of existing sites.

At the completion of the assessment, nine Aboriginal cultural places were identified near or within the Woodburn to Ballina sections – of these, one will be indeterminately impacted, four will be directly

impacted, two will be indirectly and impacted and two will be avoided by the project. At the completion of the assessment, 23 archaeological sites were identified near or within the Woodburn to Ballina sections – of these, 13 will be directly impacted by the project, three could be indirectly impacted – though impact would be easily mitigated in these instances - and six would be avoided, either through being located outside the boundary of the project, or being within the project, but not within construction footprint. One PAD is within the boundary of the project, but will be avoided by the project.

Management recommendations

A number of management recommendations were developed for Aboriginal cultural places and archaeological sites within the Woodburn to Ballina sections. A summary of the recommendations for archaeological sites is included below, while Chapter 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 and hand). Detailed analysis and reporting of cultural material. Dating of cultural material where applicable.	7	Gittoes Jali Site 11 E2/2 Melino Site Site 3 Site 2 Site 1
Fencing and protection zone established during construction	8	Gittoes Jali 2 MST3 C21 Melino Scarred Tree 4 MSRT2 Rudgley Scarred Tree Law PAD Saezza 1
Collection of artefacts. Detailed analysis and reporting of cultural material	3	Gittoes Jali 3 Rudgley Site 2 Rudgley Site 1a and 1b Melino Artefact Scatter
Collection and salvage excavations (mechanical). Detailed analysis and reporting of cultural material. Dating of cultural material where applicable.	2	Site 12 Site 4
Removal and relocation of the scarred tree to a culturally appropriate location yet to be agreed by the Aboriginal stakeholders.	1	Gumi Site
Total avoidance	2	MST1 Cooks Hill, Broadwater

Abbreviations

ACHCRP	Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010
AFG/s	Aboriginal focus group/s
AHIMS	Aboriginal heritage information management system
AHIP	Aboriginal heritage impact permit
AMS	Accelerator mass spectrometry
ASIRF	Aboriginal site impact recording form
BP	Before present
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 authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
GIS	Geographic information system
GPR	Ground penetrating radar
GPS	Global positioning system
H	High
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
OSL	Optically stimulated luminescence
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 Roads and Maritime Services (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 project).

The purpose of this cultural heritage assessment report (CHAR) is to describe and assess Aboriginal and cultural heritage impacts that would occur as a result of the proposed upgrade of the Pacific Highway between Woodburn and Ballina (see Figure 1-1). This CHAR has been prepared to inform the Environmental Impact Statement (EIS), which accompanies the project approval application.

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

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 Woodburn to Ballina sections 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 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), Glossary (Appendix B) and supporting information (Appendices C - P).

1.2.2. Scope of assessment

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

- Meet the Department of Planning and Infrastructure's (DP&I) Director-General's environmental assessment requirements (see Appendix C).
- Identify gaps in previous Aboriginal heritage assessment (Collins 2005) 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 potential archaeological deposits (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 Office of Environment and Heritage's (OEH) Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (NSW) 2010, Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011), the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (ACHCRP) 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's Procedure for Aboriginal Cultural Heritage Consultation and Investigation 2011 (PACHCI).

Additionally, this assessment was based upon the DP&I Director-General's environmental assessment requirements for the project relating to Aboriginal heritage, issued on the 23 November 2011 (Appendix C).

Table 1-1 details the DP&I's 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 project. However, it should be noted that areas near but outside 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 DP&I's Director-General's environmental assessment requirements for Aboriginal heritage key issue

Requirements	Where addressed in report?
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

Requirements	Where addressed in report?
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 (DEC 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 Appendices D and E
■ 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 Appendices A, and J - O

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).

1.2.4. 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* [NPW Act]), and intangible or non-archaeological Aboriginal cultural places (not necessarily declared *Aboriginal places* as per *National Parks and Wildlife Act 1974*), respectively.

The terms ‘project’ and ‘boundary of the project’ are used to refer to, and include, the project corridor and construction and operational footprints of the Woolgoolga to Ballina upgrade of the Pacific Highway, that is, the outer most extent of the approximate 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 Woodburn to Ballina (sections 8, 9,10 and 11 – refer to Table 1-2 below).

A glossary of terms used in this report and Volume 2 is included in Appendix B.

[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.

1.2.5. Study area

The area subject to this assessment includes the sections of the project between Woodburn and Ballina. The project within the context of the region is shown in Figure 1-1.

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 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 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 listed in Table 1-2. For the purposes of this report, only the Woodburn to Ballina sections are examined, specifically project section 8 (Figure 1-2), section 9 (Figure 1-3), section 10 (Figure 1-4) and section 11 (Figure 1-5).

Table 1-2 Summary of project sections in relation to the CHAR assessments (bold type indicates Woodburn to Ballina project sections assessed in this report)

Project section	Location	Relevant 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
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 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 between Woodburn and Ballina is shown in Figure 1-1.

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.
- Ten grade-separated interchanges to provide access to and from the upgraded highway.
- Bridges for waterway crossings, including major bridges for the crossings of the Clarence River and Richmond River.
- 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 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.

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

The route development process for the previous development project between Woodburn and Ballina 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.

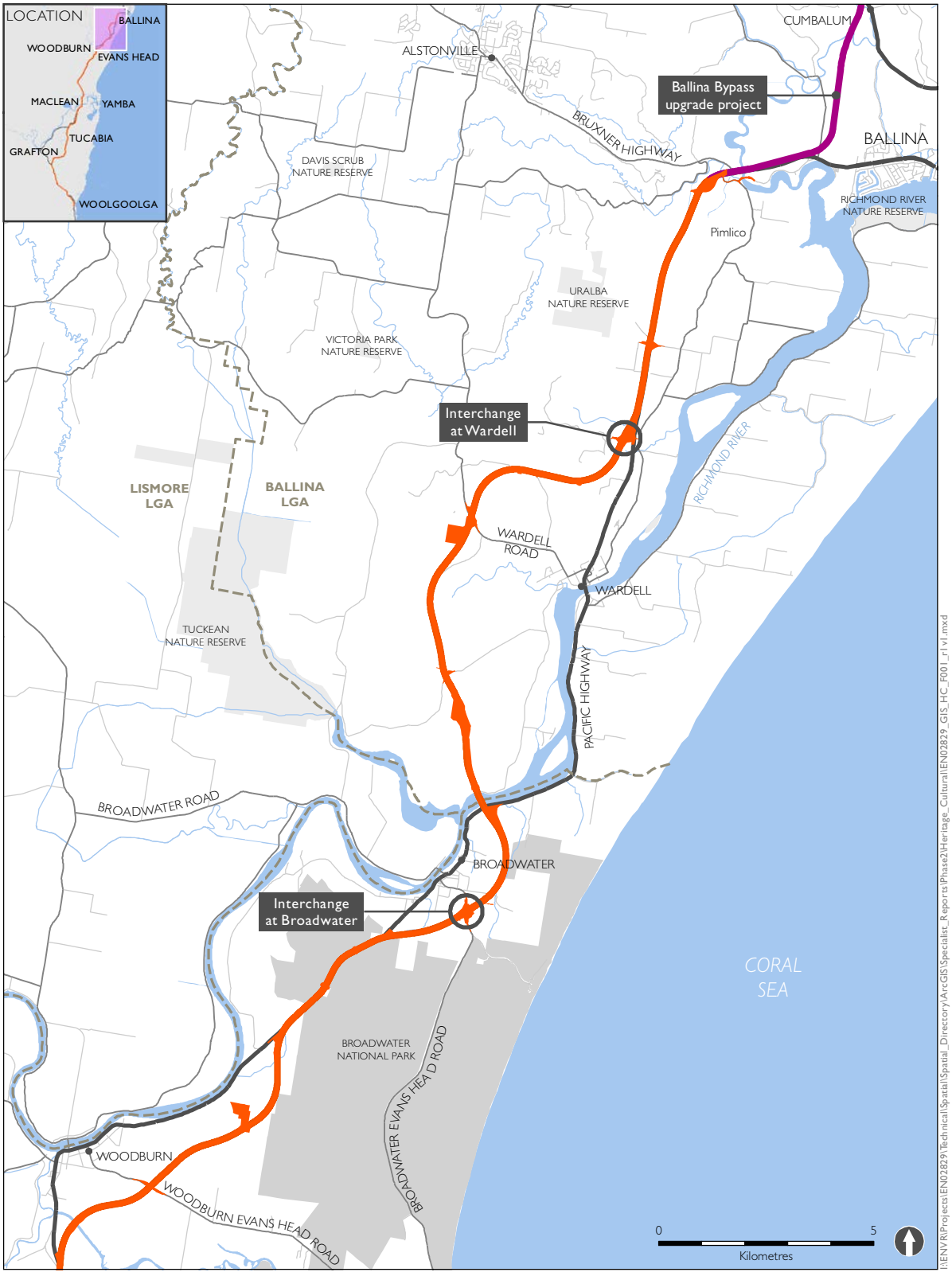
Additional documentation supporting the development of the preferred route and concept design for the project, including methodology, working papers and outcomes of community and stakeholder involvement, is available on the RMS website www.pacifichighwayupgrade.com.au (click on Woolgoolga to Ballina).

1.3.3. Previous Aboriginal heritage assessment

Preliminary Aboriginal heritage assessment has previously been undertaken for the project sections between Woodburn and Ballina during the route selection phase (Collins 2005). Collins' (2005) assessment commenced in 2004 and considered a number of route options, including the current route. Collins (2005) aimed to identify the main Aboriginal heritage constraints for each of the route options, so that these could be considered in selecting the most appropriate route. Collins (2005) undertook:

- Consultation with relevant (at the time) Aboriginal stakeholders to identify known Aboriginal cultural places within the relevant route options. Collins' consultation was in general accordance with the NSW DECC's Interim Community Consultation Requirements for Applicants (2005) and the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation [DEC 2005].
- Sample field survey across the route options, targeting areas that had previously not been surveyed for Aboriginal heritage, including some areas within the current Woodburn to Ballina sections.

Figure 1-1 The project alignment - Woodburn to Ballina

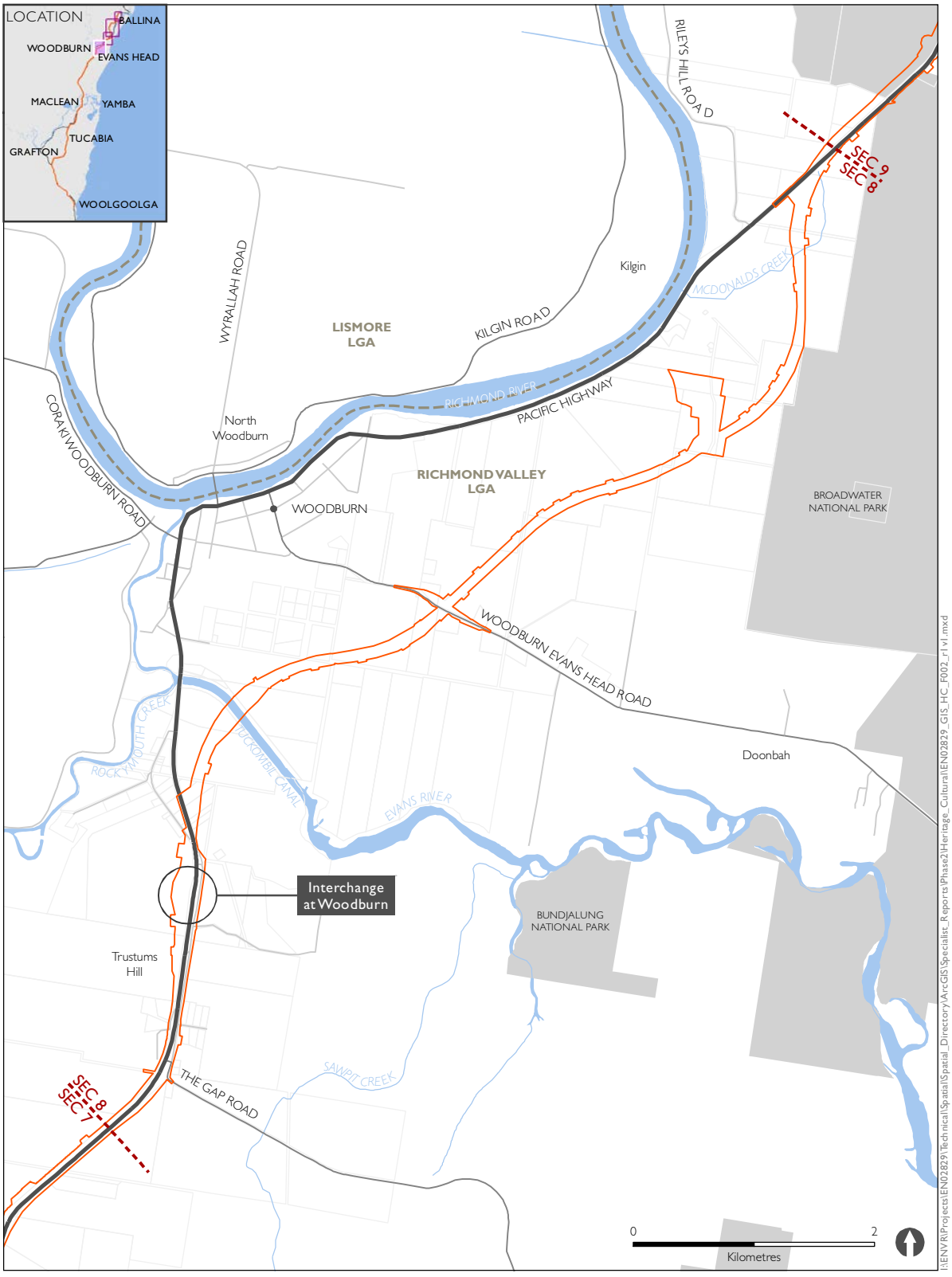


The project

Upgrade completed to dual carriageway

Existing Pacific Highway

Figure 1-2 Section 8 - Trustums Hill to Broadwater National Park

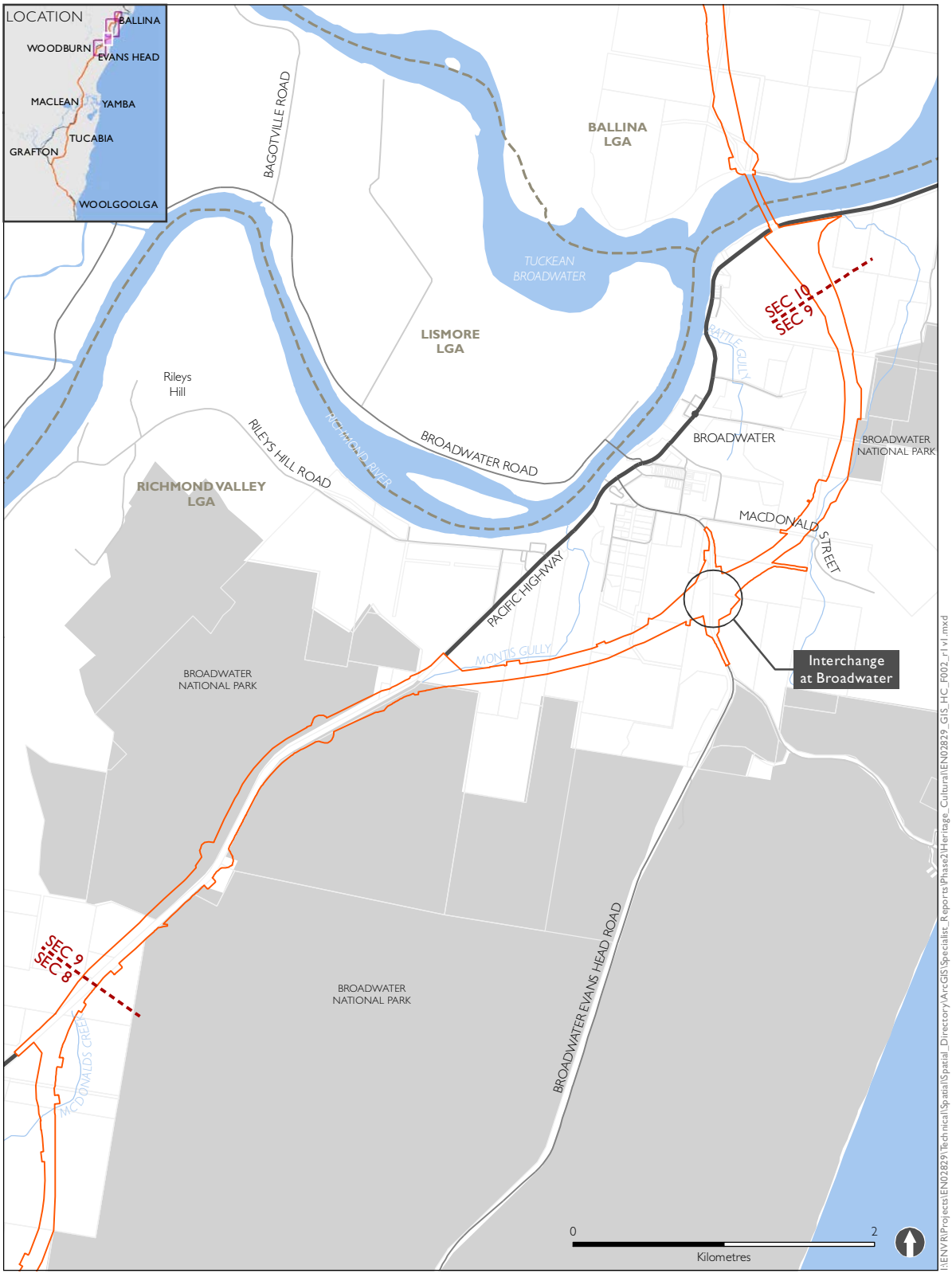


The project

Upgrade completed to dual carriageway

Existing Pacific Highway

Figure 1-3 Section 9 - Broadwater National Park to Richmond River

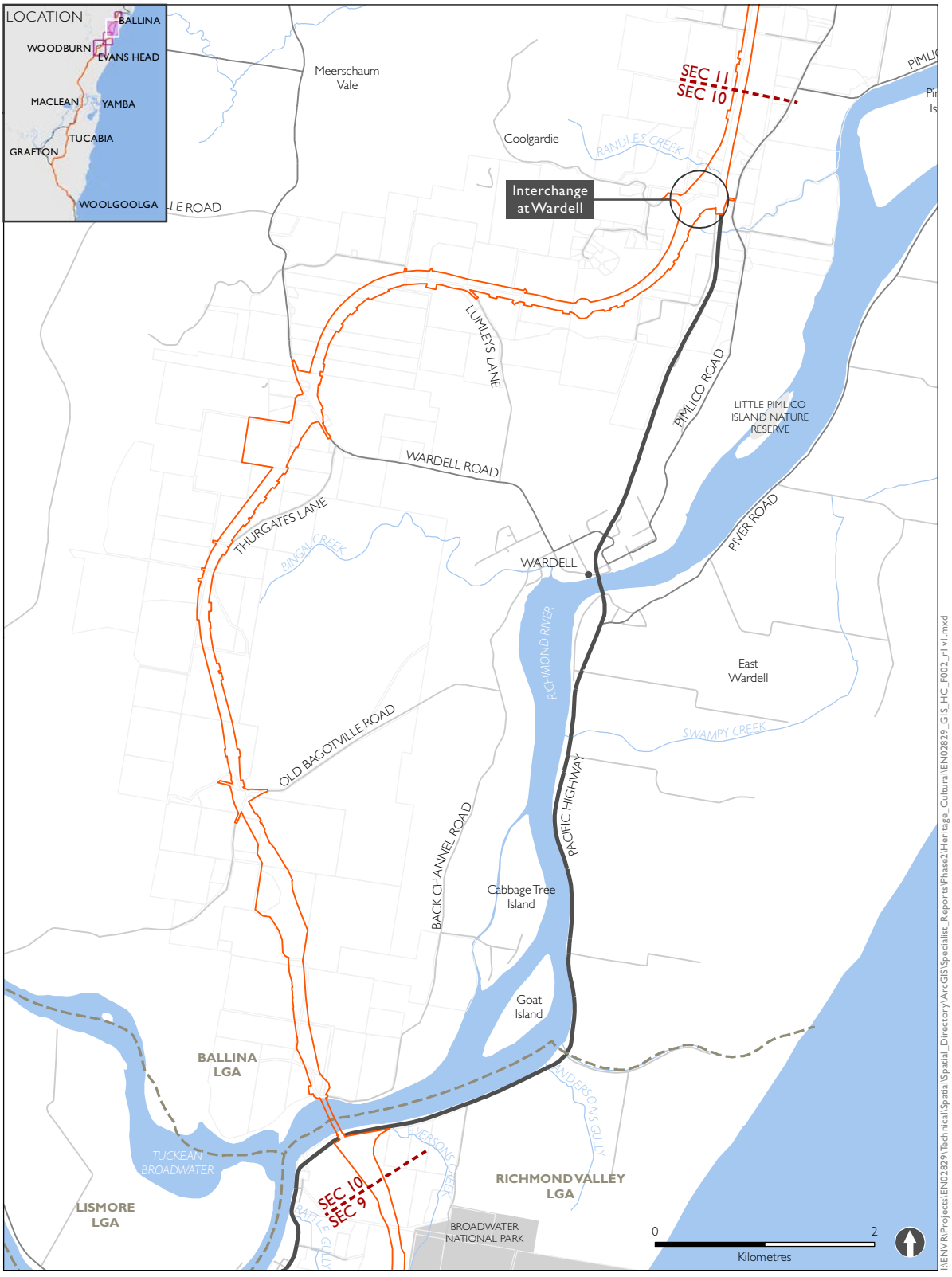


The project

Upgrade completed to dual carriageway

Existing Pacific Highway

Figure 1-4 Section 10 - Richmond River to Coolgardie Road

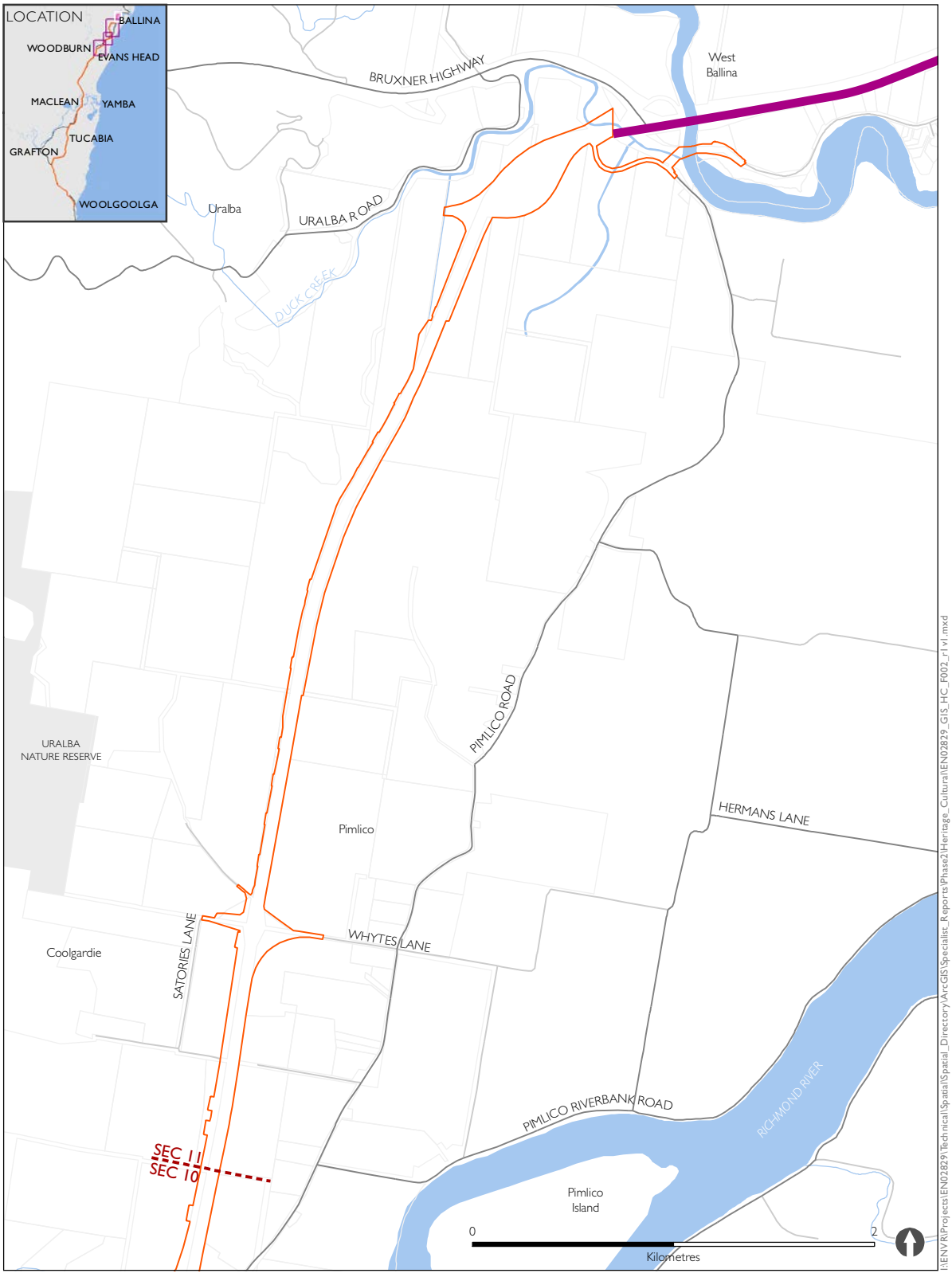


The project

Upgrade completed to dual carriageway

Existing Pacific Highway

Figure 1-5 Section 11 - Coolgardie Road to Ballina bypass



2. Legislative context

The following legislation is relevant to this project:

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 NPW Act would not be required to investigate Aboriginal objects within the project, provided that the investigations would address the DP&I Director-General's environmental assessment 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 New South Wales. 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 NPW Act Section 90 AHIPs.

Reference	Requirements
***National Parks and Wildlife Act 1974* (NPW Act)**	■ Administered by the OEH. ■ Serves to protect Aboriginal objects and Aboriginal places in NSW. ■ Under the terms of the NPW Act, 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 NSW, 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. ■ 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.
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 Woodburn to Ballina section. 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 began in 2004, with key stakeholders as part of the route options investigation to select a preferred route for Woodburn to Ballina (Collins 2005).
- Following the introduction of the Interim Community Consultation Requirements for Applicants (DECC 2005), updates to the consultation process (namely advertising for interested stakeholders) were undertaken to generally comply with these requirements. This occurred part way through the options assessment (Collins 2005).
- In 2010 when the environmental impact assessment for the project commenced, 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 (NSW Department of Environment, Climate Change and Water [DEECW] 2010), including re-advertising and notifying potential interested parties.
- In the intervening period from 2010, the PACHCI 2011 was revised and this required some further updates so that the consultation complied with PACHCI.

Relevant guidelines and the consultation process are detailed below.

3.1.2. Director-General's environmental assessment requirements

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 undertaken consistent with the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005). These guidelines have now been superseded by the 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's environmental assessment requirements. The Director-General environmental assessment requirements also require consultation with local Aboriginal land councils (LALCs) 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 boundary of the project, as Native Title holders have specific rights in relation to cultural heritage. Several claimants exist for the project and were consulted during this assessment; see below for more discussion on this.

3.1.3. Roads and Maritime Services consultation procedure

Consultation with registered Aboriginal parties followed the process described in the RMS PACHCI. 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 is being undertaken up to and including 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.

3.1.3.1. 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 (DECC 2005). 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 the ACHCRP being issued (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 ACHCRP 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.

3.2. Previous Aboriginal community consultation

3.2.1. Aboriginal focus groups 2005 - 2006

The Woodburn to Ballina sections of the Pacific Highway Woolgoolga to Ballina upgrade project has been subject to numerous investigations at various stages, such as during route selection and previous

development projects. During the route selection stages, Aboriginal stakeholders were consulted at AFG meetings with regard to potential Aboriginal cultural heritage issues.

The Woodburn to Ballina selections of the preferred route option commenced prior to 2005. Consultation undertaken for the Woodburn to Ballina route investigations did not commence with the formal advertisement in accordance with the Interim Community Consultation Requirements for Applicants (DECC 2005). Instead, an AFG was formed and consultation was undertaken; however, stakeholders were not formally registered and only Jali LALC was invited to the first AFG in August 2005. In total, six AFG meetings were held between August 2005 and March 2006 as detailed in Table 3-1.

Table 3-1 Aboriginal focus group meetings held for Woodburn to Ballina route options investigations

Aboriginal focus group meetings	Dates
AFG 1	17 August 2005
AFG 2	6 September 2005
AFG 3	13 September 2005
AFG 4	25 October 2005
AFG 5	6 December 2005
AFG 6	22 March 2006

Site officers nominated to represent the AFG were invited to attend fieldwork activities and accompanied the 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 Appendix D and E. The following Aboriginal stakeholder organisations were invited to attend the Woodburn to Ballina AFGs for the route options investigations prior to 2010:

- Birrigan Gargle Local Aboriginal Land Council.
- Bundjalung Aboriginal Corporation.
- Bandjalang People (1) Native Title Group.
- Bandjalang People (2) Native Title Group.
- Bogal LALC.
- Bunjum Aboriginal Co-Operative Ltd.
- Burabi Aboriginal Corporation.
- Jali LALC.
- Ngulingah LALC.
- Numbahjing Clan within the Bunjalung Nation.
- NSW Aboriginal Land Council.
- Widjabul Aboriginal People.
- Yabur and Yulgun Community Development and Employment Program Aboriginal Corporation.
- Yaegl Native Title Claimants.

3.3. Current consultation activities

3.3.1. 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 contacted since the route options investigation AFGs in 2006.
- 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 Woodburn to Ballina 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 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.

3.3.2. 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 Appendix E.

Table 3-2 Aboriginal focus group meetings held for Woodburn to Ballina 2010 - 2012

Aboriginal focus group meetings	Dates
AFG 1	20 August 2010
AFG 2	14 September 2010
AFG 3	8 December 2010
AFG 4	6 October 2011
AFG 5	14 December 2011
AFG 6	6 March 2012
AFG 7	29 May 2012

For AFGs 1 - 3, a background to the Woodburn to Ballina sections 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.

Two AFG meetings were held after completion of the field survey. The primary aims of these 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 6 was held. The primary aims of this AFG meeting was to:

- Present the results of the subsurface 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.

In March 2012, a restricted AFG was held primarily to address issues surrounding the recent identification of the Gumi site; this meeting included a field visit to the site with stakeholders and a local knowledge holder, Uncle Lewis Cook. The meeting was restricted to attendees with cultural interest in this area to ensure that important cultural knowledge was not inadvertently passed to inappropriate people/parties.

3.3.3. Notification, identification and registration of stakeholders

Letters were sent to a number of agencies on 19 October 2010 with a closing date of 3 November 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 11 potential stakeholders. Letters were sent on the 11 November 2010 to those nominated stakeholders seeking registration of interest. The closing date for registration was 2 December 2010 with an AFG scheduled for 8 December 2010. Stakeholders were made aware of this meeting date as they registered, and were followed by a formal invitation two weeks prior to the meeting (approximately 25 November 2010).

Advertisements appeared in November 2010 in the following publications:

- *The Northern Star* (next available).
- *Ballina Shire Advocate* (11 and 25 November).
- *National Indigenous Times* (11 and 25 November).
- *Deadly Vibe Magazine* (November issue).
- *In Vibe Magazine* (November issues).
- *The Koori Mail* (3 and 17 November).

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 (refer to Table 3-3) and new Native Title claimants identified as stakeholders were included in any subsequent consultation. Native Title searches were also conducted in February 2012 and April 2012 to check for any new groups; no new groups were identified.

Table 3-3 Native Title claimants relevant to Woodburn to Ballina; no Native Title holders exist for the project sections 8 to 11

Project sections	Native Title group
8 – 9	Bandjalang People (2)
8 – 9	Bandjalang People (1)
9 – 11	Widjabul Aboriginal People
10 – 11	Numbahjing Clan within the Bundjalung Nation

Project sections	Native Title group
11	Byron Bay Bundjalung People (Byron Bay Bundjalung People 3)

3.3.3.1. Summary of issues raised at Aboriginal focus group meetings

The following issues were raised at the first round of AFG meetings:

- Concerns over the restrictions placed on pay rates by the RMS PACHCI document.
- Marcus Ferguson (Jali LALC) noted that he had recorded approximately 300 new Aboriginal sites, including 15 scarred trees located in close proximity to the alignment and raised concerns over the impact a road would have on the large Potoroo population in the Wardell Heath area.

The following issues were raised at the post-survey AFG meetings:

- Lois Cook (Burabi Aboriginal Corporation) raised concerns regarding the route alignment behind Cooks Hill and the bridge over the Richmond River; and she also had concerns regarding the lack of consultation with Aboriginal stakeholders during the design phase. Kate Wiggins (RMS) stated that there would be an opportunity for Aboriginal stakeholders to voice their concerns after the formal registration of stakeholders for this section of the project. Cultural heritage investigations have been significant around the Richmond River crossing area, due to the high cultural sensitivity of this area. It has been ensured that consultation has been very thorough since this meeting.
- Barbara Taylor (Gubba Gunya Aboriginal Corporation) raised concern over the destruction of sites by other authorities and Shane Higgins (RMS) stated that the RMS has a stop work requirement if artefacts are found during construction without a relevant approval.

The following issues were raised at the post-excavation AFG meeting:

- Concerns about the Gittoes Jali site were raised by Marcus Ferguson (Jali LALC). His concerns were over the *in situ* material, (grinding groves and Place A) there and what would happen to them even though they may not be impacted by the highway. Vanessa Edmonds (Alliance archaeologist) stated that the site was of high archaeological significance.
- The location of the road (currently going though the Gittoes Jali site) was a concern for Marcus Ferguson (Jali LALC) as the entire PAD would have to be removed for the road to be put in. Lois Cook said that there were additional issues with the site – not just Place A. Garry McPherson (RMS) said that they would consider this feedback and they would need to go through the proper assessments and come up with a solution, although it would be difficult to change the alignment.
- PAD 8 and PAD 10 had no artefacts so it was agreed that they could be removed as PADs.
- Marcus Ferguson (Jali LALC) wanted to do test pitting at McGeary's property. Joseph Brooke (Alliance archaeologist) said that there had been test pitting done before the quarry was put in. Vanessa Edmonds (Alliance archaeologist) said that part of the salvage would include sieving the material from the property.
- Lois Cook (Burabi Aboriginal Corporation) was concerned about the bone that was pushed up to the fence line. She also would like for the project to locate a massacre site, although it is probably outside of the boundary of the project. Joseph Brooke (Alliance archaeologist) said that it would be

possible for a surface investigation to be done, but sub-surface testing would probably not be able to occur. Vanessa Edmonds (Alliance archaeologist) said that an AHIP would be required for this.

- Ancillary areas will only be surveyed if they are outside the corridor. If the area is inside the corridor and not near a PAD, no further investigation will be carried out. If a site is near a PAD further consultation would be conducted. There was general agreement.
- Lance Manton (Bogal LALC) suggested that the workers for the geotechnical team would need training for identification of Aboriginal remains, which his LALC could provide.
- The care of the scarred trees on the Melino property was raised. Lois Cook suggested that they should stay in the road reserve if there was no stopping lane or anything to draw attention to them.
- Marcus raised concerns about the protection of the potoroos. Garry McPherson (RMS) said that the Fauna assessment could be discussed after February, as it was underway.

The following issues were raised at the Gumi AFG meeting:

- Dean Bolt (Jali LALC), Marcus Ferguson (Jali LALC) and Lois Cook (Burabi LALC) all raised the significance of the Gumi PAD site.
- Vanessa Edmonds (Alliance archaeologist) said that the GPR expert had said that there was very little chance of getting a definitive result from the technology. The archaeological methods were discussed – key hole investigations by trowel.
- Everyone agreed that the Gumi PAD should be registered as a PAD.
- Garry McPherson said that there would need to be full community support for the Gumi PAD to be excavated.
- Marcus Ferguson (Jali LALC) suggested that there would be difficulty getting community agreement for the excavation of the Gumi PAD, so the non-invasive method – GPR – should be tried first and the results provided to the community.

Issues raised at the CHAR review AFG meeting are described in Section 3.3.5.

3.3.4. 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 at during those surveys are detailed in Table 3-4.

Notable comments from site officers during that fieldwork included:

- From Jali LALC site officers:
  - Details regarding the nature, locations and story of a spirit associated with Place H and its connections in landscape; between tangible and intangible cultural heritage sites and important landscape features and any potential cultural significance of this.
  - Details of Place G.
- From Jali LALC and Burabi Aboriginal Corporation site officers:
  - Details of importance and sensitivity of landscapes and landforms in the respective areas.
  - Discussion of type, scope and methodology for potential further investigation (eg survey, sub-surface testing, etc).

- Discussion of potential significance of archaeological sites and sensitivity of PADs recorded during the field survey.

The above described sites and places are detailed further in section 5.5.

Table 3-4 Site officers participating in field assessments

Organisation	Name	Role	Dates of participation
Jali LALC	Marcus Ferguson	Senior Aboriginal Site Officer	23–24 August 2010 2–4 August 2011 4 October 2011 7 November 2011 – 23 December 2011
Jali LALC	Dean Bolt	Senior Aboriginal Site Officer	24–25 August 2010 2–4 August 2011 4 October 2011 7 November 2011 – 23 December 2011
Jali LALC	Leonie Watson	Site Officer	7–13 November 2011
Jali LALC	Sean Bolt	Site Officer	12–18 December 2011
Burabi Aboriginal Corporation	Lois Cook	Senior Aboriginal Site Officer	2–4 August 2011 7 November 2011 – 23 December 2011
Burabi Aboriginal Corporation	Dwaine Cook	Trainee Aboriginal Site Officer	2–4 August 2011 7–13 November 2011 28 November 2011 – 18 December 2011
Burabi Aboriginal Corporation	Anthony Cook	Trainee Aboriginal Site Officer	14 November 2011 – 23 December 2011
Bandjalang Native Title Group	Daniel Wilson	Site Officer	7–20 November 2011 12–18 December 2011
Bandjalang Native Title Group	Doug Wilson	Site Officer	7–20 November 2011 12–18 December 2011

3.3.5. 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 29 May 2012. At the request of specific stakeholders, meetings were held to present and further discuss the CHARs and management recommendations. Comments and recommendations made within 13 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 these comments were considered and incorporated into this CHAR where possible.

Table 3-5 Comments received from Aboriginal stakeholders regarding the draft CHAR between Woodburn and Ballina

Registered stakeholder group	Received comments?	Comments

Registered stakeholder group	Received comments?	Comments
Jali LALC	Yes	▪ Disagrees with the recommendation to excavate the shell midden at Gumi/Melino sites; if it must take place, will a site officer be present? Disagrees with the recommendation about the Gumi Scarred Tree and the options evaluation. Several points which they required verification on raised in the CHAR were clarified by the Alliance archaeologists. Jali is disappointed with the process (not defined). ▪ Is comfortable with the alignment at Gittoes Jali site, but not supportive of the use of the hill as a fill source.
Bunjum Aboriginal Corporation	No	
Bandjalang Native Title Claimants	Yes	The Bandjalang NT claimants prefer the alignment in the proximity of Gittoes Jali site as well as partial use of the hill as a fill source, and are otherwise supportive of the CHAR – most of the sites between Woodburn and Ballina are outside of their traditional boundary, so they do not wish to speak for that country.
Bandjalang LALC	No	Have provided feedback through Bandjalang Native Title Claimants.
Gubba Gunya Aboriginal Corporation	Yes	They are quite happy with the CHAR. Asked about the possibility of the presence of monitors for the works. Keen to be included in further work
Burabi Aboriginal Corporation	Yes	They would like the following recommendations taken into account: ▪ Lang Hill Option 2 – current alignment and partial use of the hill as a fill source ▪ Melino Site and Gumi Site: Burabi supports the project alignment to avoid four scarred trees (MST2, MST3, Melino Scarred Tree 4 and C21), located on private property just north of the Richmond River. Three of these (MST2, MST3 and C21) are in very close proximity (approximately 5 m) to each other, making them quite rare. The recommended mitigation strategy is to fence an exclusion zone around the trees and retain them within the project corridor, to afford them more protection than if they were located in private property outside the corridor. ▪ Burabi would like to support RMS' offer the services of an arborist to assess the health of scar trees and implement an agreed management strategy as soon as possible. ▪ They are grateful for RMS offering to relocate the trunk of the Gumi Scarred Tree to a location identified by the Aboriginal stakeholders. Burabi further recommend more consultation to conclude recommendations with the Community.
Tweed, Byron and Ballina Community Transport Inc	Yes	Happy to have received the CHAR. They will be guided by the comments of their cultural advisor, Marcus Ferguson (Jali LALC), and will fully support the decision that he is in favour of.
Bogal LALC	No	

Registered stakeholder group	Received comments?	Comments
Numbahjing Title Claimants	No	
Birrigan Gargle LALC	Yes	No concerns with the current recommendations.

3.4. Consultation with government agencies

Consultation was undertaken with government agencies throughout the project, including with the DP&I to gain Director-General's environmental assessment requirements.

Regular consultation was undertaken with OEH and the Environmental Protection Authority (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.

Additionally, regular phone conversations were held with OEH and EPA on project developments as they arose.

4. Existing environment

This chapter provides an overview of the land use, cultural, geological conditions that characterise the project between Woodburn and Ballina.

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 project

Project section	Land system	Location within/near the boundary of the project	Specific landscape characteristics
8, 9, 10,11	Coastal barriers	Woodburn to Ballina	A Pleistocene sand plain which is characterised by low-relief dunes and swales. Poorly-drained areas and swamps occur in the swales and in deflation depressions on the barriers (Collins 2005: 7-8).
9, 10	Coastal ramp	Woodburn to Ballina: Forms the eastern edge of the Blackwall Range which extends southwards from the Alstonville Plateau and forms outlying hills around Broadwater	The Richmond River is lined by a relatively featureless alluvial floodplain, consisting of unconsolidated clays, sands, silts and gravels dating to the Holocene period (Collins 2005: 7-8).
8, 9, 10, 11	Richmond alluvial plain	Woodburn to Ballina: Richmond River	The coastal ramp forms the eastern edge of the Blackwell Range which extends southwards from the Alstonville Plateau. It also separates the smaller drainage basins lining the western edge of the alluvial plain, and forms the outlying hills around Broadwater (Collins 2005: 8).

4.1.1. Land systems

Just south of Woodburn in project section 8, the rolling hills grade into Richmond River estuarine alluvial plain deposits, made up of mud overlain by clay, gravel, sand and silt. The estuarine nature of this area is reflected in the dominance of alluvial soils, with less stable, waterlogged soils occurring on the alluvial plains and low-lying areas, while more stable soils and clays occur on higher and undulating ground, and

are characterised by drainage depressions and broad crests. Much of the area to the south of Woodburn consists of quartz, sandstone and shale, with thin beds of finer sediments (Collins 2005: 9). The Richmond River alluvial plain intersects the study area in sections 8, 9, 10 and 11.

The boundary of the project intersects the coastal ramp, primarily the Blackwall Ranges, in sections 10 and 11. The coastal ramp is composed of metamorphic rocks belonging to the Neranleigh-Fernvale group, which includes siltstones, sandstones and thinly bedded shales, with the occasional inclusion of units such as tuff, greywacke, sandstones and cobble conglomerates. Further inclusions include occurrences of basalt. While many of these raw materials are suitable for use in the production of stone artefacts, there is an absence of rock shelters and overhangs, which could have been used as occupation areas (Collins 2005: 9).

4.1.2. 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. These resources have been identified and utilised at local quarries such as Cooks Hill.

North of the Richmond River, the boundary of the project follows the eastern boundary of the Blackwell Ranges, which are determined by the outcropping bedrock. The boundary of the project then traverses a series of Holocene alluvial deposits on the floodplain from Saltwater Creek to Ballina. The more successful farming areas south of Woodburn are underlain by mud, silt and clay of the Holocene estuarine plain, a younger landscape deposited onto the Pleistocene landscape.

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 [DPI] 2007). In the Woodburn to Ballina region, it is likely that the most frequently occurring raw material types will be chert, chalcedony and quartz (either cloudy or crystalline).

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. Chalcedony is similar to chert in composition. However, in microscopic view it will have a more fibrous growth habit.

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 (DPI 2007).

4.1.3. Vegetation

Before European colonisation, the native vegetation of the project largely comprised dense gallery rainforest stands, which covered the Clarence and Richmond River floodplains, and the coastal ramp land system around the Alstonville Plateau and Blackwall Range (Collins 2005: 9). 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 Richmond 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. Good examples being the coastal heath communities in the Wardell area, which were

formed during the last interglacial period between 70,000 and 80,000 years ago (Ballina Shire Council 2004).

At present, tall, open hardwood forests occur mainly within the State Forests and National Parks and Nature Reserves along the coast, such as the Tabbimoble State Forest. These forests are dominated by species such as grey gum, spotted gum and red mahogany, with acacia shrubs forming a dense understorey. These forests also occur on areas of Crown land and private land that have not been subject to clearing (Collins 2008). The 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

A total of three Aboriginal language groups are represented along the project:

- Bundjalung.
- Nyangbal.
- Yaegl (Yaygir).

The Bundjalung inhabited the region north of the Clarence River to the Logan River in south-east Queensland. Speakers of the Nyangbal language group occupied the region east of Bundjalung along the coastal plain and encompassing Ballina.

Prior to European colonisation, about 20 different dialects of the Bundjalung language were spoken north of the Clarence River to the Logan River in south-east Queensland (Collins 2005). The ethnohistoric record suggests that the lower Richmond supported one of the densest Aboriginal populations in Australia (Collins 2005). The Aboriginal population appears to have been concentrated along the coast, however, densities of up to one person per 2.5 square kilometres have been proposed for the riverine corridor. Gollan (nd cited in Collins 2005) reported that 200 to 300 Aboriginal people would gather at Woodburn for a tribal fight and corroboree. In the foothills of the coastal ramp, which lacked resources, populations were smaller; approximately one person per five square kilometres (Pierce 1971).

The lower Clarence River was occupied by Yaegl (Yaygir) Aboriginal people, who were the southern neighbours of the Bundjalung. The Clarence River separated these two Aboriginal groups who were associated with distinctly different languages (Tindale 1940; Crowley 1978). According to Crowley (1997), this type of sharp, linguistic discontinuity could have arisen due to different populations moving from the initial river mouth, north and south along the coast and eventually meeting in the middle between the major rivers. 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.

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 hare 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. At Woodburn, there were certain places where large camps were established near good fishing localities or areas of abundant resources (Gollan nd cited in Collins 2005). However, 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, both the Yaegl and Bundjalung peoples comprised a number of separate, but interrelated groupings, 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 Richmond 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 preservation 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 Woombah and Woodburn (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 Clarence-Richmond divide. 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). Much of the region from the Logan River to the mouth of the Clarence River was thickly forested particularly along the fertile lowland flats that bordered the winding rivers as they flowed to the sea (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 revealing of sacred information and a corresponding growth in social and economic status (Collins 2005). Bundjalung males passed through at least two degrees of initiation before becoming full members and were permitted to marry. The major initiation ceremonies were undertaken at *bora* grounds. Women also reportedly 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 located throughout Bundjalung country. These spots 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 sand quarrying, flood mitigation schemes, sugar cane production, cattle grazing, agriculture, timber milling and the construction of roads and dwellings. Sand quarrying was previously undertaken within the Broadwater area and the Bundjalung National Park in the north of the boundary of the project, which has led to the extensive disturbance of the coastal barriers in these areas.

The poor drainage of the alluvial plain has been largely overcome by the implementation of flood mitigation schemes, such as the construction of canals to drain the Tuckean Swamp north-east of Broadwater, and the construction of the Tuckombil Canal between Rocky Mouth Creek and the Evans River in the north of the boundary of the project (Collins 2005: 8). Extensive systems of small drainage channels have also been used to drain areas of the Richmond and Clarence floodplains for sugar cane farming.

The introduction of sugar cane production, 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, which in the areas to the west of Woodburn and Iluka, have been largely owned by the State for much of the post-contact period.

The first European settlers in the Richmond River area quickly discovered the fertile alluvial soils were suitable for growing sugar cane and maize. These crops could also be conveniently transported along the Richmond River to processing plants and markets, with the transport of sugar by river only ending in the 1970s. Cane was first introduced to the Wardell area in the north of the boundary of the project in the 1860s, and proved to be a more successful and lucrative crop than others which had been tried in the area, such as wheat and tobacco. The presence of the coast and the warmer climate to the east aided the growth of sugar cane and reduced the incidence of frost, making farming more successful here than in other areas further inland (Ballina Shire Council 2004). Sugar cane is now grown from Ballina south to Wells Crossing, with a mill at Broadwater.

Cattle have been grazed over much 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. Cedar-cutters had established themselves near Meerschaum Vale in the north of the study area by the 1850s, in order to access the cedar stands of the Big Scrub. The Big Scrub and other dry forests also yielded rosewood, teak, beech and pine (Ballina Shire Council 2004). 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 cutting and milling in the 19th century led to the logging of much of the original vegetation along the floodplains of the Clarence and Richmond Rivers.

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, sugar cane, 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 impact (shown in red/orange) are less likely to retain archaeological remains. Areas used for sugar cane farming such as many properties between Woodburn and Ballina around the Richmond River show up on this map in orange. These land uses are subject to relatively high degree of accumulated impact due to more than 100 years of clearing, followed by deep ripping for cane farming. Areas of much lower accumulated impact such as south-west of Woodburn (shown green to blue), include State Forests and National Parks. As can be seen in Figure 4-1, much of the boundary of the project traverses areas that have been subject to a high degree of accumulated impact. This suggests that less robust site types, such as human remains, shell deposits and scarred trees, are less likely to occur in the areas subject to higher levels of accumulated impact than areas subject to lower levels of impact. 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.

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

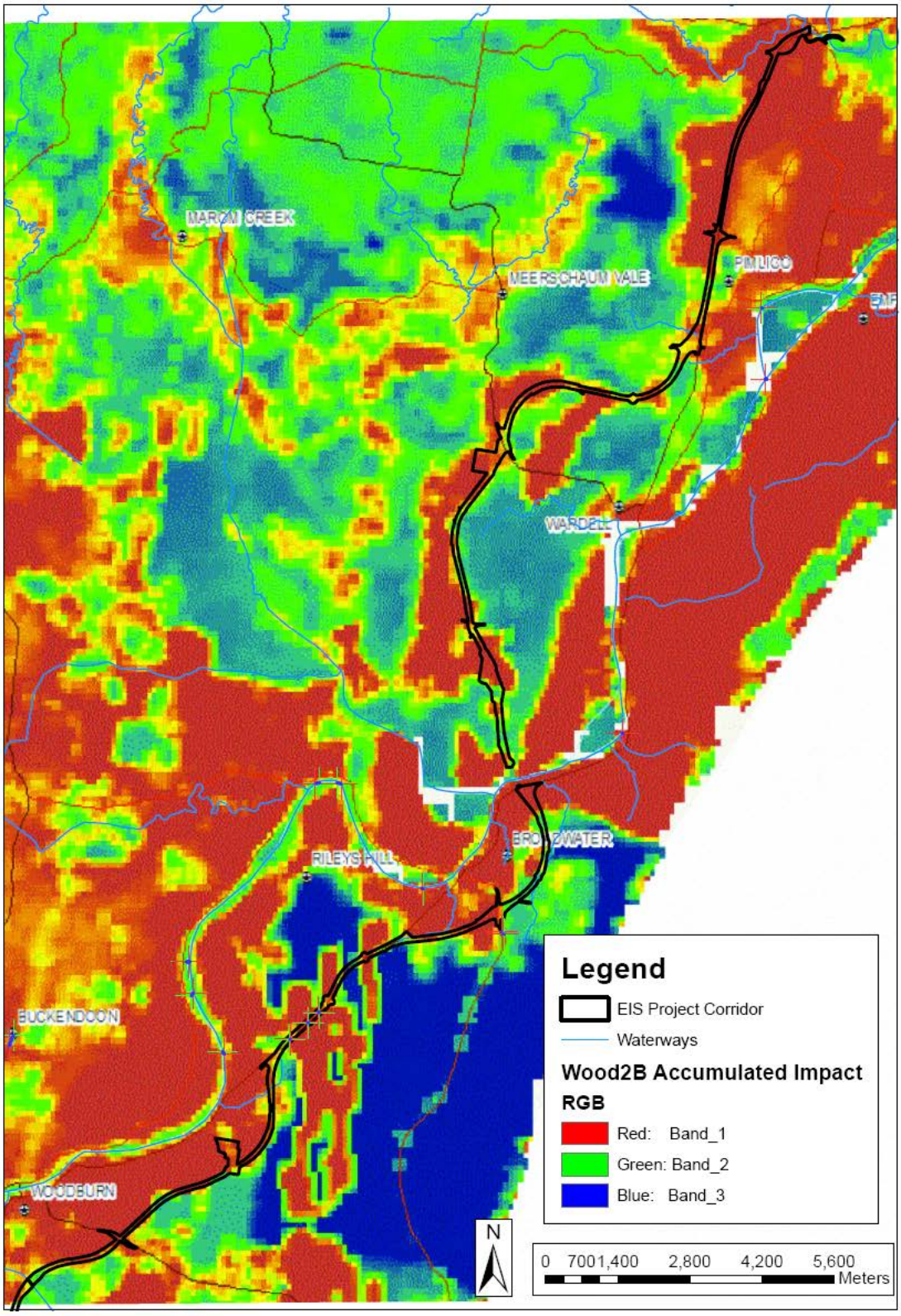


Figure 4-1 Accumulated impact within Woodburn to Ballina section from post-colonial land-use

4.4. AHIMS register search

The AHIMS register was searched in 2010 and updated in February 2012 for records relevant to the boundary of the project and surrounds. Eight sites/places were identified (Table 4-2 and Figure 4-2) as relevant to the project between Woodburn and Ballina. Two of these places (Cooks Hill, Broadwater, and Broadwater) were found to be duplicate recordings of the same site; the two sites have different grid coordinates recorded with them as they were recorded at different times, and rather than the location being updated on AHIMS, it seems a new listing was made.

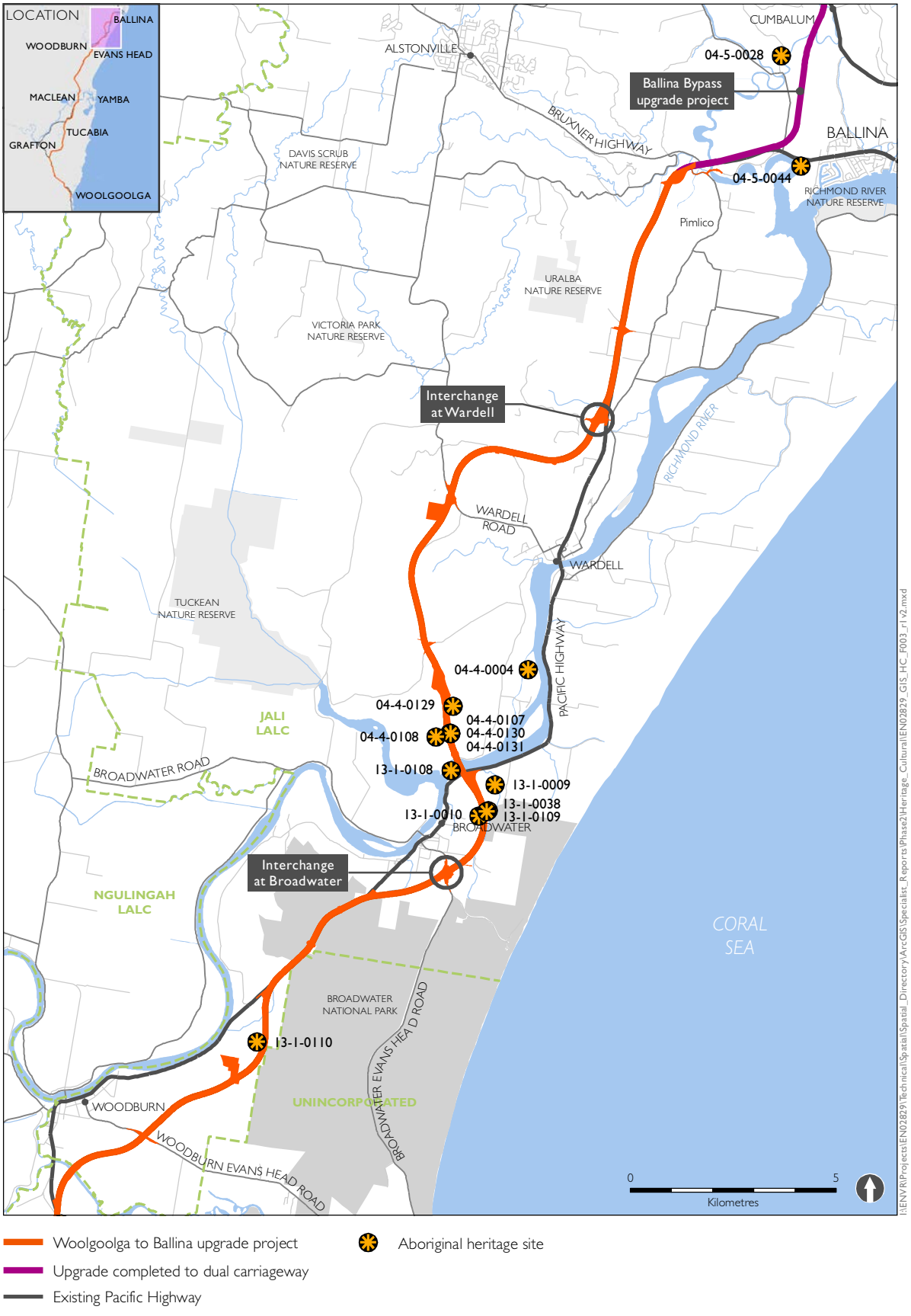
It should be noted that these results are not an indication of all cultural heritage resources relevant to the project, as very few investigations have previously been undertaken within the boundary of the project. The AHIMS results list recorded sites only, and are more an indication of previous survey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

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

Project section	AHIMS ID	Site name	Site type	Landform	Distance from boundary of the project (metres)
9	13-1-0109	E2/2	Artefact scatter and shell	Dune	Within boundary of the project
9	13-1-0038 (duplicate of 13-1-0010)	Cooks Hill, Broadwater	Ceremonial ground (Bora ring)	Slope	70 m
9	13-1-0010 (duplicate of 13-1-0038)	Broadwater	Ceremonial ground (Bora ring)	NA	70 m
10	13-1-0108	Restricted - see Table 5-3	Dreaming site	River	200 m
10	04-4-0129	MST1	Modified tree (carved or scarred)	Slope	95 m
10	04-4-0107	C21	Modified tree (carved or scarred)	Flat	Within boundary of the project
10	04-4-0131	Msrt3	Modified tree (carved or scarred)	Flat	Within boundary of the project

Project section	AHIMS ID	Site name	Site type	Landform	Distance from boundary of the project (metres)
10	04-4-0130	Msrt2	Modified tree (carved or scarred)	Flat	Within boundary of the project

Figure 4-2 Woodburn to Ballina - Aboriginal heritage sites (registered on AHIMS)



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 Collins (2005).
- Reviewing literature relevant to the project and surrounding landscape.
- Consultation with elders and knowledge holders for the region during AFG meetings.
- Consultation with elders and knowledge holders 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 is 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 much of the detailed knowledge and understanding of many of the elements of the cultural landscape being lost from the Aboriginal community. 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.

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).

Ballina Shire Council is currently undertaking an Aboriginal cultural landscape assessment. With the assistance of Traditional Owners and knowledge holders in the area, sites of archaeological, social and cultural significance have been mapped within the Council's boundaries. The assessment has gathered site specific information from the knowledge holder for a specific site or area. At the time of writing, only minimal access to this information was available to the study team. However, preliminary results from the Ballina Shire Council assessment do highlight that the landscape around some of the boundary of the project is of high cultural significance to Traditional Owners.

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. The techniques and primary resource gathering locations are known and passed on through generations. This still continues with people camping in these areas such as at Broadwater near the river.
Scarred trees	Stakeholders identified scarred trees as being of sacred and ceremonial significance. 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. These pathways also link spiritual and ceremonial sites.
Water courses, water holes or springs	Permanent water bodies are culturally significant as a central location for gathering of people, resource collection and camping.
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.
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. Stories relating to creation beings *Birrugan*, and *Mindi* link a number of places across the district.

Cultural heritage value	Description
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.

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

Within the range of values in Table 5-1, this cultural assessment has identified 11 Aboriginal cultural places near or within the boundary of the project[3]. Details of each of these cultural places and their locations are listed in Table 5-2 and shown in Appendix A, Figures 3-1 to 3-4. To protect cultural knowledge, these places have been given generic names, eg Place A.

[3] The 11 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 near or within the boundary of the project

Project section	Place name	Within or near to boundary of the project	Information
8	Place A	Within	A secret story surrounding a spiritual being relates to blue stones. A piece of blue agate was found at the Gittoes-Jali site, consequently, this site is afforded more cultural importance.
9	Place B	Within	Cooks Hill was an important central point for many pathways across the landscape.
9	Place C	Exact extent of place unknown, probably partially within	Cooks Hill was the location of a massacre of Aboriginal people by the Native Mounted Police (Collins 2005).
9	Place D	Within	The coastal barrier intercepted by the boundary of the project near Cooks Hill was assessed by several stakeholders as highly significant and culturally sensitive. It was used for camping and ceremonies from prehistoric times through to the early 20th century (Steele 1984) and is believed to contain campsites (Heron and Faulkner 1998), burials and evidence of a massacre of Aboriginal people by the Native Mounted Police.
9	Place E	Within	Place E is a location where children were hidden from the Native Police and protectorate.
10	Place F	Within	The Place F was originally a European quarry, which following its discontinued use has become a water hole for local people. Due to the minerals leaching through the sediment the water was a bright blue colour. Aboriginal children from the Wardell area would regularly go swimming there in historic times. Although no longer the bright blue colour it was, this area is currently within the boundary of the project and is of contemporary social and cultural significance.
10	Place G	Within	During the current (2010) archaeological field survey two areas were identified that were associated with Chinese gambling and people who lived on Cabbage Tree Island. Gambling was not allowed on Cabbage Tree Island, so primarily Aboriginal men would go to other areas where the Chinese set up gambling tables. To access these gambling areas, people would travel between the island and various gambling sites. One of these locations is within the boundary of the project.
10	Place H	Near	During the current (2010) archaeological field survey a spiritual site was identified where a vengeful spirit lives.
10	Place I	Near	A group of three (unregistered) scarred trees were identified near Wardell Road (Collins 2005). Jali LALC requested that the scarred trees not be disturbed during construction.

Project section	Place name	Within or near to boundary of the project	Information
11	Place J	Near	This was an important meeting place near Teven Junction.
9-11	Place K	Within	This landscape includes many areas of high cultural significance to the local community (eg Cabbage Tree Island, Goat Island, etc).

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 Collins 2005.

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

AHIMS ID	Site name	General location	Information
NA	Woodburn Massacre Site	Woodburn Sports Fields	Consultation with Lawrie Wilson as part of the Woodburn-Evans Head Sewerage proposal revealed that "the proposed Woodburn STP was not far from where it is said that two Aboriginal men who had been skinning a kangaroo were mistakenly believed to be skinning a cow, and were shot. Thus the site, somewhere south of the sports fields at Woodburn, is considered to be a massacre site" (Appleton 1997: 4). This Aboriginal cultural site is not located within the boundary of the project, but near the southern extent of the Woodburn to Ballina section.
NA	Cooks Hill, Broadwater Aboriginal cultural site	Cooks Hill, Broadwater	Restricted
13-1-0108	Richmond River/Tuckean Broadwater Spiritual Site	Richmond River/Tuckean Broadwater Spiritual Site	A sacred site is located in the Richmond River near the confluence of Tuckean-Broadwater (Collins 2005). Aboriginal representatives requested that the Aboriginal cultural site not be affected by proposed bridge construction approximately 500 m downstream. Consultation with Lewis Cook (Elder and knowledge holder confirmed that this was well outside the boundary of the project.
4-4-0015	Goat Island	Goat Island, Richmond River	Although not within the boundary of the project, Goat Island on the lower Richmond River is of spiritual significance.
NA	Cabbage Tree Island	Cabbage Tree Island, Wardell	Cabbage Tree Island is an important focal point for the local Aboriginal people. It is one of the links within the landscape. In the 1880s, many Koori families relocated to Cabbage Tree Island and were involved in the sugar cane industry. The houses on Cabbage Tree Island were built from the local cabbage tree palms. It is not within the boundary of the project.
NA	Wardell Bush Camp	North of Cabbage Tree Island, west of Richmond River	The boundary of the project was moved to avoid a bush camp north of Cabbage Tree Island still regularly used by the local Aboriginal community, particularly in times of flood (Collins 2005).

6. Summary of archaeological assessment

This section summarises the archaeological assessment undertaken as part of this report. The full archaeological assessment for Woodburn to Ballina can be found in 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 an assessment of the risk of impacting sites by a number of ancillary works proposed for the project. As these were identified later in the assessment stage, they were not able to be subject to field investigation. As PACHCI states that all known areas of impact should be surveyed, it is proposed that any field investigation required be undertaken during the environmental impact statement evaluation period.

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 3.2 and 3.3.

Key to the archaeological assessment was the following steps:

- Reviewing existing data (including any previous investigations specific to the project, AHIMS searches etc) to identify any gaps in the assessments (eg Appendix H) 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.

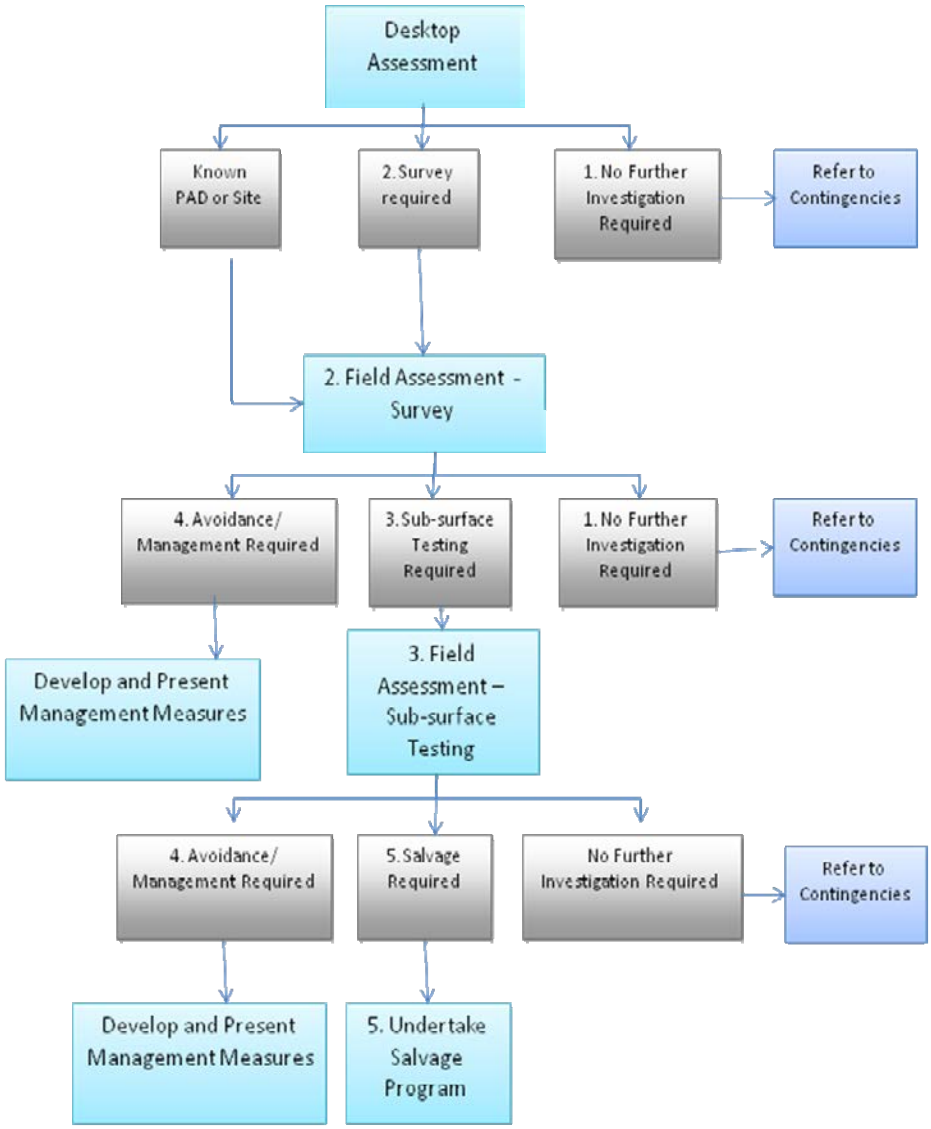


Figure 6-1 Management process to apply to construction ancillary sites and areas still requiring further assessment

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 investigation 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 sites 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.
- 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 3,091,988 square metres (309 hectares) of the project was subject to survey (including that undertaken by the Alliance as well as Collins [2005]) between Woodburn and Ballina, totalling over 77 per cent of the boundary of the project (see Appendices A and I for details). The remainder 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 sugar cane farms), 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 Alliance survey yielded an effective coverage (accounting for visibility and proportion of the sub-surface exposed) of three per cent, and 17 stand-alone PADs, and 13 sites were identified. Four of the sites contained PAD components, leading to a total of 21 PADs identified. Of the 13 sites identified, a total of seven were scarred trees, three were isolated stone artefacts, two were small artefact scatters, and one was an artefact scatter/shell midden deposit.

Despite several attempts to do so, the bora site (Cooks Hill, Broadwater; AHIMS IDs 13-1-0038 and 13-1-0010) could not be relocated – neither within the boundary of the project, nor in the immediate vicinity. It is believed that this site has either been destroyed, or is located further afield into Broadwater National Park. Consultation with Lewis Cook (Elder and knowledge holder) and Marcus Fergusson (Knowledge holder and Site officer, Jali LALC), found that AHIMS site 13-1-0108 was in fact at least 500 metres from the boundary of the project, putting it beyond the distance of any potential indirect impacts from the project; this site is consequently no longer considered in this assessment.

Ground-penetrating radar (GPR) scans were undertaken of a mound at Gumi Site to test for the possible presence of a buried stone arrangement and/or a human burial. The test suggested that there was no stone arrangement, but was inconclusive regarding human remains. However, archaeological test-excavation confirmed that there was no burial site within the mound.

Due to refinements to the boundary of the project not all PADs/sites identified during the survey required further assessment as they were avoided. A total of 20 PADs were excavated within the Woodburn to Ballina section (see Appendices A, J, K and L for details). Of the 17 stand-alone PADs, 11 contained archaeological sub-surface deposits, while three of the four PADs within sites contained sub-surface deposits. As a result of the sub-surface testing, the 11 stand-alone PADs where sub-surface archaeological deposits had been identified had their status updated to be a new 'site'. The exceptions to this were PADs 6 and 7, which were found to be part of one big continuous site with the Gittoes Jali site, and all three were merged into the one existing site. Those PADs that were not associated with a site and did not reveal Aboriginal deposits were not considered sites, and no longer considered PADs. As Law PAD is not proposed to be impacted by the project, archaeological excavation was not warranted and it was consequently not subject to test-excavation.

The Aboriginal archaeological deposits (stone artefacts and shell midden material) were discovered from:

- 492 shovel test pits (0.5 metres x 0.5 metres).
- One test pit (1 metre x 1 metre).
- One test pit (2 metres x 1 metre)
- One test pit (3 metres x 1.5 metres).
- 28 metres (in total) of mechanically excavated trenches generally 1.1 metre in width and of varying individual lengths.

At the completion of the archaeological assessment, a total of 23 archaeological sites and one untested PAD had been located within or near the project, with 21 of these sites and the PAD within the boundary of the project (Table 6-1; site photos in Appendix M). The locations of all sites near or within the boundary of the project at the completion of the archaeological assessment are shown in Figure 6-2, Figure 6-3, Figure 6-4 and Figure 6-5, while the significance of these sites is presented in Chapter 7, below. Further detail can be found in the archaeological assessment report (Appendix A); a summary is provided in Table 6-1.

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

Project section	Name (AHIMS ID)	Previous type(s)	Artefacts recovered during test excavation	Description	Updated name	Updated site type(s)
8	Gittoes Jali/PADs 6 and 7 (09-1-0204, 09-1-0205, 09-1-0203)	Site – Isolated artefact & PAD	410	The site is situated on the crest and slope of a ridgeline. The area is cleared with clumps of trees and is currently used for grazing. Adjacent paddocks are used for farming. 411 stone artefacts (chert, fine grained siliceous, cobble, basalt, chalcedony, sandstone, crystal quartz) were discovered.	Gittoes Jali	Site – Artefact scatter, Paint Wells, Ground Stone
8	Gittoes Jali 2 (TBA)	Site – Artefact scatter	N/A	Two sandstone artefacts located on a floodplain near an ephemeral floodway that probably represents an old waterway.	Gittoes Jali 2	Site – Artefact scatter
8	Gittoes Jali 3 (TBA)	Site – Isolated artefact	N/A	The site consists of one flaked river cobble located on the middle slopes of a steep hill, overlooking the Richmond River floodplain.	Gittoes Jali 3	Site – Isolated artefact
9	PAD 13 (13-1-0190)	PAD	0	Long low sandy rise above floodplain and adjacent old coast lines.	N/A	No material found from sub-surface testing – **no longer considered to be a PAD or site**
9	PAD 10 (13-1-0188)	PAD	0	Upper slopes and flat crest of rise, continuation of PAD 8 on western side of Evans Head Road.	N/A	No material found from sub-surface testing – **no longer considered to be a PAD or site**
9	PAD 8 (13-1-0187)	PAD	0	Upper slopes and flat crest of rise, approximately 1 km from Cooks Hill.	N/A	No material found from sub-surface testing – **no longer considered to be a PAD or site**

Project section	Name (AHIMS ID)	Previous type(s)	Artefacts recovered during test excavation	Description	Updated name	Updated site type(s)
9	PAD 11 (13-1-0189)	PAD	1003	The site is located on a low, sandy rise below Cook's Hill and is adjacent to a drainage line. The area is a cleared paddock, which appears to be grazed and is surrounded by woodland. A large sand quarry is located nearby. 1003 stone artefacts (chert, chalcedony and quartz) were discovered.	Site 11	Site – Artefact scatter
9	E2/2 (13-1-0109)	Site – Artefact scatter, shell midden & PAD	13	The site is located on a sandy rise, which is covered with new growth woodland. It is adjacent Cooks Hill and Richmond River floodplain. Some heavy disturbance in parts due to sand extraction. Associated with artefacts and midden material, and adjacent to bora ground in Broadwater National Park. 13 flaked stone artefacts (chert, chalcedony, quartz, silcrete, igneous material and granite/ quartzite) were discovered along with some fragments of shell (*Donax deltoides*).	E2/2	Site – Artefact scatter, shell midden

Project section	Name (AHIMS ID)	Previous type(s)	Artefacts recovered during test excavation	Description	Updated name	Updated site type(s)
9	Cooks Hill, Broadwater (13-1-0038) and Broadwater (13-1-0010)	Site - Ceremonial ground (Bora ring)	N/A	A bora ring located on the top of a sand rise near the boundary of existing sand quarry and Broadwater National Park. Duplicate records exist on the AHIMS register, and are considered one site for this project. Site was apparently identified last in the late 1990s, but has not been able to be relocated in current investigations, and has either been destroyed, or is located further east into Broadwater National Park than current recorded location.	Cooks Hill, Broadwater	Site - Ceremonial ground (Bora ring) (outside the boundary of the project)

Project section	Name (AHIMS ID)	Previous type(s)	Artefacts recovered during test excavation	Description	Updated name	Updated site type(s)
10	Gumi Site (04-4-0180)	Site – Possible scarred tree & PAD mound	0	Located adjacent to the Richmond River. A single Red Mahogany that has been scarred was located on the mid-slope of a hill. Within 20 m of the scarred tree is a mounded area with some scattered stone. The tree appears to be quite young, and the scar not consistent with those made from Aboriginal tradition or others in the region, leaving the listing of the tree as a site as questionable from an archaeological perspective. The mound was subject to GPR and test-excavation to determine if it was a burial mound or contained other archaeological deposits. Aboriginal stakeholders were concerned that a buried stone arrangement existed here. GPR survey in this area was inconclusive, but suggested that it was not likely that a stone arrangement existed here. Detailed test-excavation confirmed no archaeological deposits existed here. Jali LALC believes the tree marks the location of a spring. This spring was in evidence during heavy rains at the time of test-excavation. The spring as not been noted at any time during previous visits where it has not been raining. The conclusion is that the spring is only operational during heavy rains and would not therefore be a focus for visitation to this area. Investigation into the age and nature of the scar is ongoing.	Gumi Site	Site – Possible scarred tree

Project section	Name (AHIMS ID)	Previous type(s)	Artefacts recovered during test excavation	Description	Updated name	Updated site type(s)
10	Law PAD (04-4-0168)	PAD	No test-excavation undertaken as the PAD is unlikely to be impacted by the project.	Crest and upper slopes of ridge and flat slopes of spur. Has shallow, rocky soils, with low-moderate potential for Aboriginal heritage material to be present.	Law PAD	PAD – not likely to be impacted (outside the construction footprint)
10	Melino Scarred Tree 4 (04-4-0166)	Site – Scarred tree	N/A	A slab scarred tree that has been burnt out. Remnant axe marks can be identified on the bottom of the scar.	Melino Scarred Tree 4	Site – Scarred tree
10	Melino Artefact Scatter (TBA)	Site – Artefact scatter	N/A	This site comprises three flaked and ground stone artefacts found in a disturbed context amongst some animal pens at the bottom of a steep ridge.	Melino Artefact Scatter	Site – Artefact scatter
10	Melino PAD (04-4-0173)	PAD	212	There are two distinct landforms within this site, which is located near the floodplain of the Richmond River. One is the upper slope of a hill and the second is a relatively flat sandy area that likely represents the crest and upper slopes of a low, deflated sand dune. The area is cleared with scattered trees and is surrounded by open woodland. 212 stone artefacts (basalt, chalcedony, chert cobble, dolerite, fine grained siliceous, quartz, quartzite, silcrete) were discovered. A shell midden was also located within part of the site, the shell species was pipi (*Donax deltoides*).	Melino Site	Site – Artefact scatter, shell midden
10	MST3 (04-4-0131)	Site – Scarred tree	N/A	Mature brush box tree, with epicormic growth and steel axe-marks.	MST3	Site – Scarred tree

Project section	Name (AHIMS ID)	Previous type(s)	Artefacts recovered during test excavation	Description	Updated name	Updated site type(s)
10	C21 (04-4-0107)	Site -– Scarred tree	N/A	Mature brush box tree, with epicormic growth and steel axe-marks.	C21	Site – Scarred tree
10	MSRT2 (04-4-0130)	Site – Scarred tree	N/A	Mature brush box tree, with steel axe-marks.	MSRT2	Site – Scarred tree
10	MST1 (04-4-0129)	Site – Scarred tree	N/A	Mature brush box tree, with axe-marks.	MST1	Site – Scarred tree (outside the construction footprint)
10	PAD 2 (04-4-0178)	PAD	21	The site is located on a low, sandy rise adjacent to a swamp. The area is cleared with scattered trees and is lightly grazed. 21 flaked stone artefacts (chalcedony, chert, fine grained siliceous, quartz, silcrete) were discovered.	Site 2	Site – Artefact scatter
10	PAD 3 (04-4-0175)	PAD	4	The site is located on a rise in a swampy area. The area is cleared with isolated trees and appears to have been lightly grazed. Four flaked stone artefacts, (two of which are broken) made on the various raw materials (chert, silicified quartz, river cobble) were discovered.	Site 3	Site – Artefact scatter
10	PAD 4 (04-4-0132)	PAD	15	The site is located on the crest of a saddle, which has been cleared and is grazed. 15 flaked stone artefacts (chalcedony, chert, silcrete) were discovered.	Site 4	Site – Artefact scatter

Project section	Name (AHIMS ID)	Previous type(s)	Artefacts recovered during test excavation	Description	Updated name	Updated site type(s)
10	PAD 1 (04-4-0179)	PAD	7	The site is located on a low, sandy rise that is dominated by a large grove of trees. The area is cleared, lightly grazed and adjacent to open woodland. Seven flaked stone artefacts (chert) were discovered.	Site 1	Site – Artefact scatter
10	Rudgley Cultural PAD (04-4-0171)	PAD	0	Located on the edge of a gentle slope in cleared area with woodlands to the east and west. The area is currently grazed. No archaeological material was discovered during investigations.	N/A	No material found from sub-surface testing – **no longer considered to be a PAD or site**
10	Rudgley Scarred Tree (04-4-0170)	Site – Scarred tree	N/A	Scarred Tree located on the lower slopes of a hill.	Rudgley Scarred Tree	Site – Scarred tree
10	Rudgley PAD 2 (04-4-0169)	PAD	3	The site is located on a slight, sandy rise within open woodland. The water table was encountered at 1 m. Three flaked stone artefacts (chert) were discovered.	Rudgley Site 2	Site – Artefact scatter
10	Rudgley PAD 1a and	PAD	11	The site is located on the crest of a spur adjacent to natural springs and a swamp. The area is cleared with isolated trees and is bordered by woodland. Six flaked stone artefacts (chert, basalt) were discovered.	Rudgley Site 1a and 1b	Site – Artefact scatter

Project section	Name (AHIMS ID)	Previous type(s)	Artefacts recovered during test excavation	Description	Updated name	Updated site type(s)
	Rudgley PAD 1b (04-4-0167)			The site is located mid-slope of a ridgeline running almost north-south. The area is cleared with woodlands to the east and west and appears to be lightly grazed. Five flaked stone artefacts (chert, chalcedony) were discovered.		
11	Saezza 1 (04-4-0171)	Site – Isolated artefact and PAD	60	The site is located on a small rise above a creek. The area is extremely disturbed, with a thin soil profile situated on a compact clay layer. There are also cleared areas within an open forest, and evidence of logging. 60 flaked stone artefacts (chalcedony, quartz and chert) were discovered.	Saezza 1	Site – Artefact scatter (outside the construction footprint)
11	Saezza PAD 1 (04-4-0172)	PAD	0	Located on a small sandy rise above a swamp. Area is cleared, surrounded by open forest, and is located near a house block.	N/A	No material found from sub-surface testing – **no longer considered to be a PAD or site**
11	PAD 12 (04-4-0176)	PAD	15	The site is located on a low sandy rise. The area is grassed and is currently used for grazing, bordered by an open forest. 15 flaked stone artefacts (chert) were discovered.	Site 12	Site – Artefact scatter

Figure 6-2 Section 8 - Sites and Places near or within the project corridor

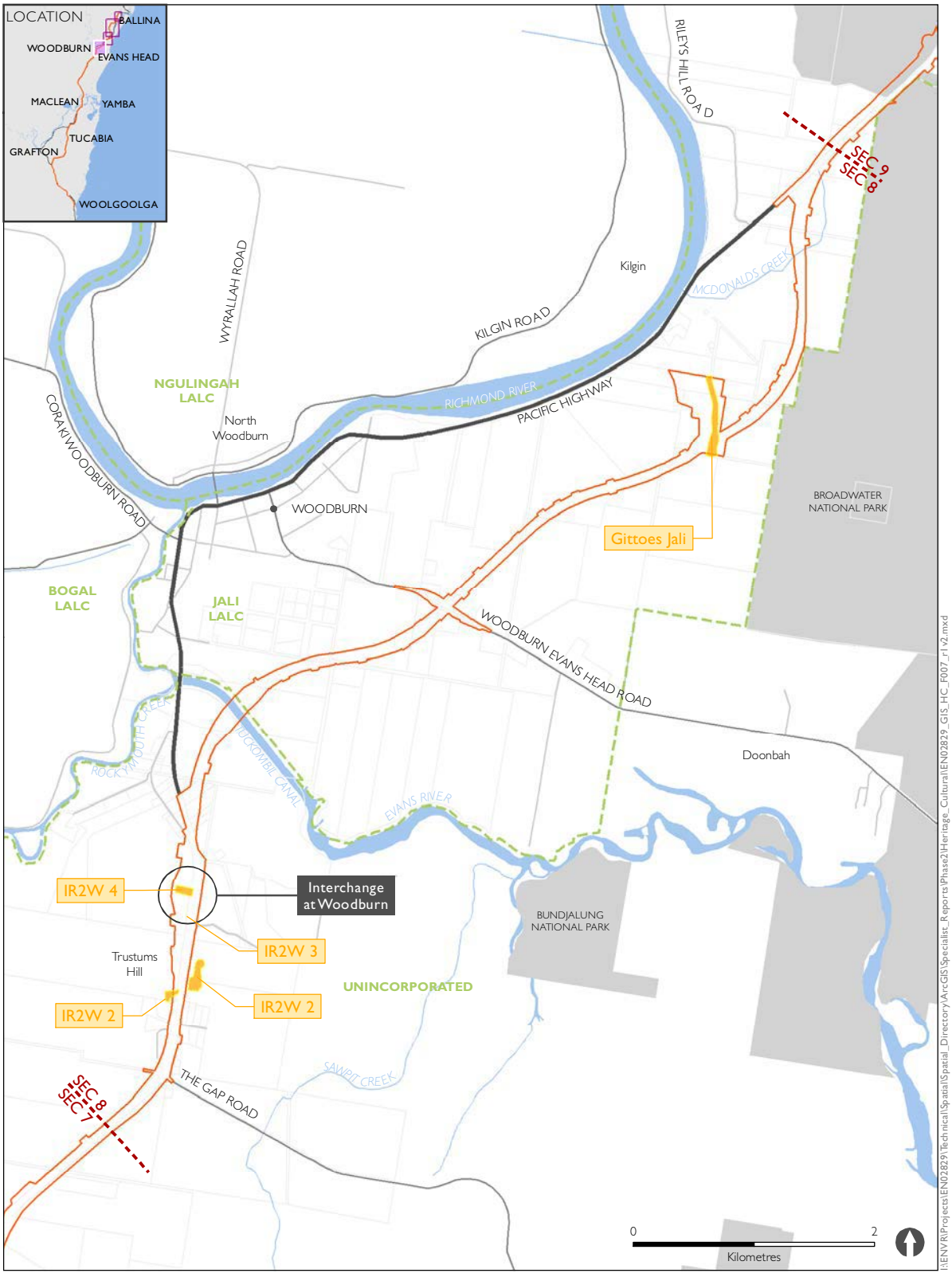


Figure 6-3 Section 9 - Sites and Places near or within the project corridor

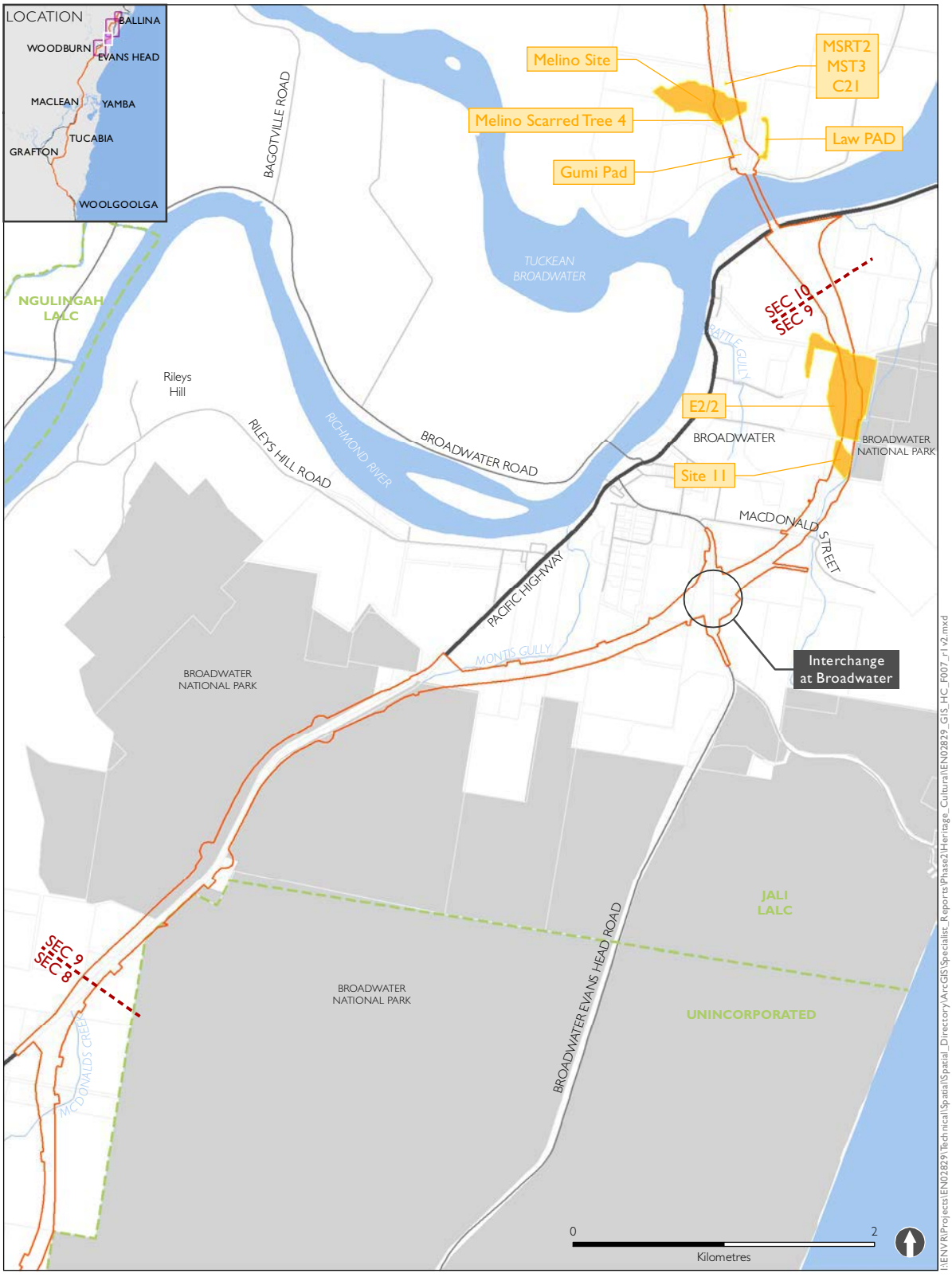


Figure 6-4 Section 10 - Sites and Places near or within the project corridor

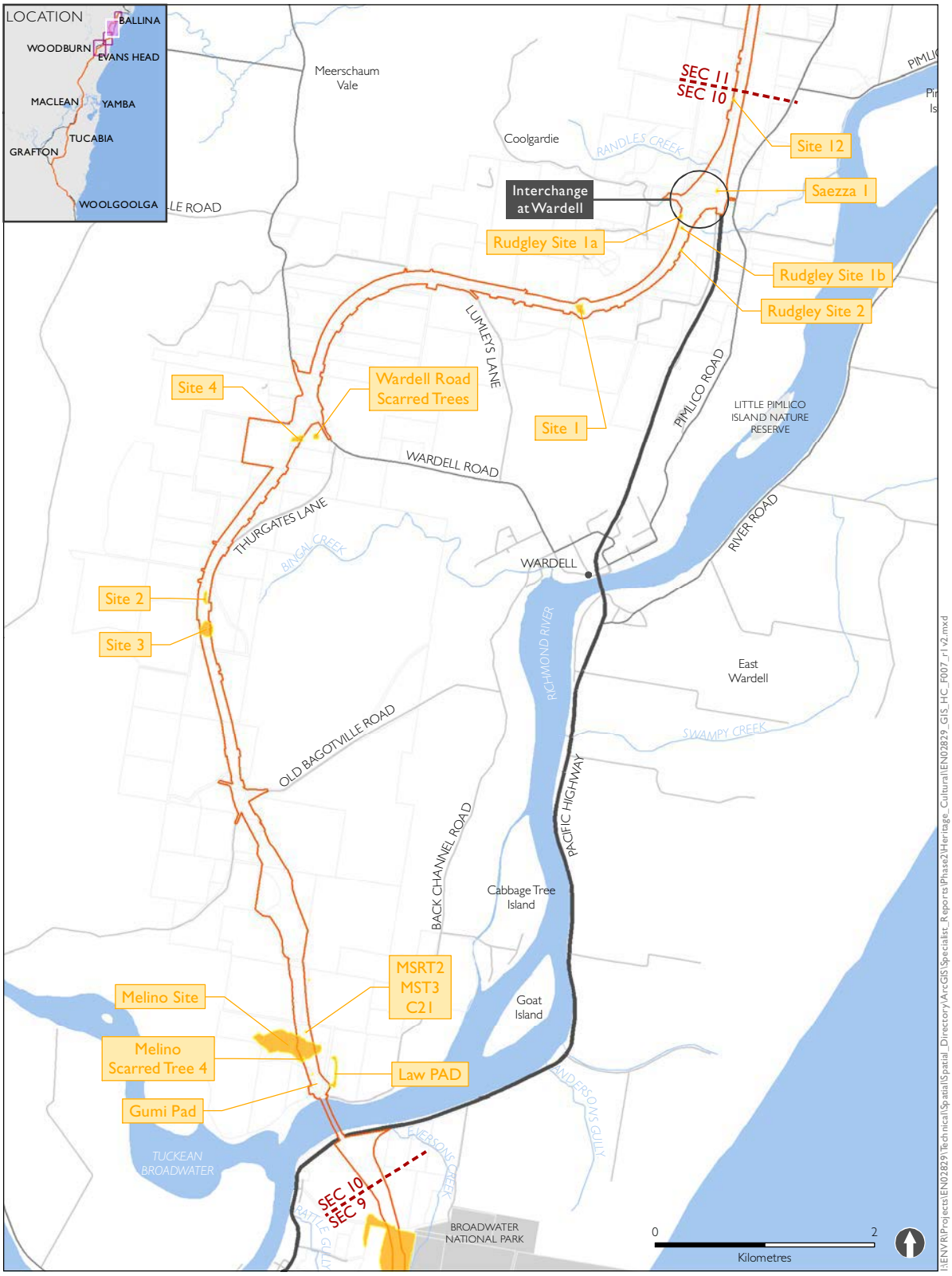


Figure 6-5 Section 11 - Sites and Places near or within the project corridor

7. Significance assessment

7.1. Methodology

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 International Council on Monuments and Sites (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 most 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 detailed 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. Place A

A secret story surrounding a spiritual being relates to blue stones. A piece of blue agate was found at the Gittoes Jali site, consequently, Gittoes Jali site is afforded more cultural importance. Refer below to significance assessment of Gittoes Jali.

7.2.2. Place B

Social significance

- This information has been removed to protect cultural knowledge.

Historical significance

- This information has been removed to protect cultural knowledge.

Scientific significance

The place does not meet this criterion.

Aesthetic significance

The place does not meet this criterion.

Summary statement of significance

- Overall Place B has a moderate level of significance at the regional scale.

7.2.3. Place C

Social significance

- Place C has high social significance to the traditional owners as it is the site of the location of a massacre of Aboriginal people by the Native Mounted Police in the 19th century. It is a culturally sensitive site.

Historical significance

- The place has moderate-high historical significance as it is a site 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 Place C has a high level of significance at the regional scale.

7.2.4. Place D

Social significance

- Place D is of high social significance as the area was used for camping and ceremonies.

Historical significance

- This information has been removed to protect cultural knowledge.

Scientific significance

- The place does not meet this criterion.

Aesthetic significance

- Place D has low aesthetic significance through its association with Cooks Hill as a distinct geographical feature in the otherwise low lying landscape.

Summary statement of significance

- Overall, the Place D has a moderate-high level of significance at the regional scale.

7.2.5. Place E

Social significance

- Place E has moderate social significance through its association with the broader Cooks Hill area.

Historical significance

- The place has moderate historical significance as it is a site that demonstrates the interaction of Aboriginal and European people and the response of Aboriginal people to the governmental and legislative structures imposed upon them.

Scientific significance

- The place does not meet this criterion.

Aesthetic significance

- This information has been removed to protect cultural knowledge.

Summary statement of significance

- Overall the Place E Site has a moderate level of significance at the local scale.

7.2.6. Place F

Social significance

- Place F has low-moderate social significance as a swimming hole for local people.

Historical significance

- The place has low-moderate historical significance through its use as a water hole for local people, following its discontinuation of a European quarry. Aboriginal children from the Wardell area would regularly go swimming in the water hole in historical times.

Scientific significance

- The place does not meet this criterion.

Aesthetic significance

- The place has low aesthetic significance as its previous distinctive bright blue colour is no longer visible but the water hole still provides some level of visual distinctiveness in the landscape.

Summary statement of significance

- Overall the Place F Site has a low-moderate level of significance at the local scale. It has low-moderate social significance to the traditional owners and low-moderate historical significance through its use as a water hole for local people. It has low aesthetic significance through its previous distinctive bright blue colour.

7.2.7. Place G

Social significance

- The Place G has low-moderate social significance through its possible use by Aboriginal men from nearby Cabbage Tree Island in the 19th century.

Historical significance

- The place has low-moderate historical significance as it is a site that demonstrates the interaction of Aboriginal and non-Aboriginal people and the response of Aboriginal people to the rules and restrictions imposed upon them.

Scientific significance

- The place does not meet this criterion.

Aesthetic significance

- The place has low-moderate aesthetic significance.

Summary statement of significance

- Overall the Place G have a low-moderate level of significance at the local scale. It has moderate social significance to the traditional owners and low-moderate historical significance as the site of interactions

between Aboriginal and non-Aboriginal people in the local area and in demonstrating the response of Aboriginal people to rules and restrictions imposed upon them. The place has low-moderate aesthetic significance.

7.2.8. Place H

Social significance

- Place H has moderate-high social significance through its association with a vengeful spirit. The spirit is still feared by many Aboriginal people today who will not go to some areas known to be occupied by the spirit.

Historical significance

- The place does not meet this criterion.

Scientific significance

- The place does not meet this criterion.

Aesthetic significance

- The place does not meet this criterion.

Summary statement of significance

- Overall Place H has a moderate-high level of significance at the regional scale. It has moderate-high social significance to the traditional owners across the region which continues to impact on Aboriginal people and their use of the area today.

7.2.9. Place I

Social significance

- Place I has a moderate-high social significance.

Historical significance

- The place has low historical significance.

Scientific significance

- The place does not meet this criterion.

Aesthetic significance

- The place has low-moderate aesthetic significance as the trees provide a distinct visual marker in the landscape.

Summary statement of significance

- Overall the Place I have a moderate level of significance at the local scale.

7.2.10. Place J

Social significance

- Place J has moderate social significance as it was a meeting place used by Aboriginal people.

Historical significance

- The place has moderate historical significance.

Scientific significance

- The place does not meet this criterion.

Aesthetic significance

- The place does not meet this criterion.

Summary statement of significance

- Overall Place J has a moderate level of significance at the local scale.

7.2.11. Place K

Social significance

- The area encompassed by Place K has moderate-high social significance as it forms a cohesive and interconnected cultural landscape including many specifically identified areas of importance including Cabbage Tree Island, Goat Island and Place F.

Historical significance

- The area has low historical significance as it demonstrates the continued importance and use of the landscape into the historical period.

Scientific significance

- The area does not meet this criterion.

Aesthetic significance

- The area has moderate aesthetic significance as the visual nature of the distinctive landforms in the region is associated with their cultural identification in the landscape.

Summary statement of significance

- Overall the area from Place K has a moderate level of significance at the regional scale. It has moderate-high social as it forms a cohesive and interconnected cultural landscape including many specifically identified areas of importance including Cabbage Tree Island, Goat Island and Place F, as well as intangible creation and secret stories associated with this landscape. Its low historical significance is demonstrated through its continued importance and use into the historical period. The visual nature of the distinctive landforms in the region provides a moderate level of aesthetic significance.

7.2.12. Gittoes Jali (AHIMS 09-1-0204, 09-1-0205, 09-1-0203)

Social significance

- The Gittoes Jali site has high social significance as it is in a culturally important area to the Aboriginal traditional owners. It is a site which has been intensively occupied as a camp site and for a range of production activities including formed stone tools, and paint wells used for mixing ochre and other materials for ceremonial purposes. A piece of blue agate was found at the Gittoes-Jali site which is associated with an important secret story surrounding a spiritual being relating to blue stones.

Historical significance

- The Gittoes Jali site does not meet this criterion.

Scientific significance

- The Gittoes Jali artefact scatter and paint wells are of high scientific significance because the site has been graded with moderate integrity, moderate-high structure, high contents, and high representativeness. The site also has high education potential. This site has moderate-high integrity as there has been minimal physical disturbance. The site's structure is ranked as moderate-high due to its large dimension along the entire top of the ridgeline and the stratigraphic integrity of the site, with very little evidence of the site being significantly disturbed. The range and type of occupational evidence found at the site (e.g. paint wells, a wide variety of raw materials and scarred tree) rank the contents of the site as high. The site is ranked as high for representativeness due to the rarity of this site type in the region. The multiple site components and the range of raw materials are unusual for this area. The site was not previously known by local property owners nor by the local traditional owners, thus due to the nature of the site, it has excellent educational potential on local and regional scales. Open sites on similar landforms and with high artefact concentrations, intra-site patterning and relative integrity are rare within the region and within NSW, as are paint wells. The site is also associated with at least one unrecorded scarred tree in an adjacent property (which could not be accessed) which increases its rarity. The site's intra-site patterning, integrity, and links to other nearby Aboriginal cultural heritage sites and places, also provides high research potential on a regional and possibly State scale.

Aesthetic significance

- The Gittoes Jali site has low aesthetic significance because it has limited apparent sensory values due to the sub-surface nature of most of the tangible evidence. The presence of a scarred tree and the paint wells above ground as well as the situation of the site on a distinctive land form of an isolated rise surrounded by floodplain provides some visual value.

Summary statement of significance

- Overall the Gittoes Jali site has a high level of significance at the regional and possibly to State level. It is highly socially significant as a well occupied site in which a range of activities were undertaken likely prior to the arrival of non-Aboriginal people in the area. It has high scientific significance due to its lack of physical disturbance, the wide range and types of occupational evidence found at the site, and its rarity in the region. The site also has high education potential due to its other scientific values and it

previously being unknown to the local traditional owners. The site has low aesthetic significance due to the sub-surface nature of most of the tangible evidence of the site.

7.2.13. Gittoes Jali 2

Social significance

- This artefact scatter is of moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people, and is located within a significant landscape and locale.

Historical significance

- The site is of low historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

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 site has low integrity and structure as it has been heavily disturbed by post-contact land-use practices and it is a low density small artefact scatter on the floodplain below a steep hill. The site has a low contents ranking as the raw material is common to the area. The site has a low representativeness ranking as artefact scatters of this type 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 Gittoes Jali 2 is of low significance at the local level. The site has moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people, and is located in close proximity of an important archaeological site. Due to the high level of disturbance, the low density of artefacts, and the presence of a common stone material, the site has low scientific significance.

7.2.14. Gittoes Jali 3

Social significance

- This isolated artefact is of moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people, and is located within a significant landscape and locale.

Historical significance

- The site is of low historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

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 site has low integrity and structure as it has been heavily disturbed by post-contact land-use practices and it is an isolated artefact on the middle slopes of a steep hill. The site has a low contents ranking as the raw material is common to the area. The site has a low representativeness ranking as stone artefacts of this type 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 Gittoes Jali 3 is of low significance at the local level. The site has moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people, and is located in close proximity of an important archaeological site. Due to the high level of disturbance, and the presence of a common stone material, the site has low scientific significance.

7.2.15. Site 11 (AHIMS ID 13-1-0189)

Social significance

- The artefact scatter of Site 11 has moderate-high social significance due to its location adjacent to Cooks Hill, an important location of meeting between various groups and for ceremonies from prehistoric times through to the early 20th century.

Historical significance

- Site 11 has moderate historical significance due to its location adjacent to Cooks Hill, an important location of meeting between various groups and for ceremonies into the early 20th century.

Scientific significance

- The site has moderate-high scientific significance because the site has been graded as having high integrity, high structure, moderate contents and moderate representativeness. The physical integrity of the site is high due to the minimal amount of sub-surface disturbance. Within the same landform (deflated sand dune) there has been significant disturbance due to a sand quarry, however Site 11 has largely remained undisturbed by this activity. The structure of the site is ranked as high because of the depth of deposits at the site, which starts at a depth below any of the minor vegetation removal on the surface. The site contains a large number and discrete concentration of artefacts (primarily two raw materials) leading to its ranking as having moderate contents. The site is of moderate representativeness as artefact scatters are common within the area, as is the raw material type; however, in-situ knapping floors are more unusual. The site has educational potential on a local scale in teaching about artefact production and analysis. The site has a high research potential due to the density and integrity of the sub-surface deposit. Due to the high number of core fragments identified it is also likely that the raw material source was within close proximity and an area that could be further

investigated. There is also further potential for dating through techniques such as OSL to gain a better understanding of the occupation history of the area, in association with the radiocarbon dates from Melino Site and E2/2 Site.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall Site 11 has a moderate-high level of significance at the regional level. It is moderate-highly socially significant for its association to the important Cooks Hill area, important for camping and ceremonies from prehistoric times through to the 20th century. It is also of moderate historical importance for this reason. The site has moderate-high scientific significance as it contains an in situ knapping floor and deep deposits and is of high research potential particularly in combination with other sites in the area.

7.2.16. E2/2 (AHIMS ID 13-1-0109)

Social significance

- The artefact scatter and shell midden at E2/2 is of moderate-high social significance due to its location adjacent to Cooks Hill, an important location of meeting between various groups and for ceremonies from prehistoric times through to the early 20th century.

Historical significance

- The site has moderate-high historical significance at a local scale due to its location on the slopes of Cooks Hill, and although it was once previously a more significant site on a regional scale, post-colonial impacts (especially sand quarrying) have diminished the scale of significance of this site to a local scale.

Scientific significance

- The site has moderate scientific significance as it is ranked as having low-moderate integrity, moderate structure, moderate contents and moderate representativeness/rarity. The physical integrity of the site is low-moderate due to the impacts particularly of sand quarrying. The structure, contents and rarity of the site are ranked as moderate as only a small number of stone artefacts were recovered from the site but did include a range of raw material and technological types. The shell material was dated at 540 +/- 32 Before Present (BP), and in conjunction with the Melino Site and Site 11 has some contribution towards the research potential for understanding the occupation history of the area.

Aesthetic significance

- The site has low aesthetic significance because it has limited apparent sensory values due to the sub-surface nature of most of the tangible evidence.

Summary statement of significance

- Overall Site E2/2 has a moderate-high level of significance at the local level. It is moderate-highly socially significant for its association to the important Cooks Hill area, important for camping and ceremonies from prehistoric times through to the 20th century. It is also of moderate-high historical importance for this reason. The site has moderate scientific significance due to its range of raw materials and the presence of dateable shell material. It has the potential to contribute to broader research into the local area.

7.2.17. Cooks Hill, Broadwater (AHIMS ID 13-1-0038, 13-1-0010)

Social significance

- The ceremonial ground (bora ring) is of moderate-high social significance.

Historical significance

- The site has moderate historical significance as an important location of meetings between various groups and for ceremonies.

Scientific significance

- The scientific significance of the site was unable to be comprehensively assessed as it was unable to be located within 100 metres of its recorded location. The site has either been destroyed or is situated outside the boundary of the project in the Broadwater National Park.

Aesthetic significance

- The aesthetic significance of the site was unable to be assessed as it was unable to be located the site within 100 metres of its recorded location. The site has either been destroyed or is situated outside the boundary of the project in the Broadwater National Park.

Summary statement of significance

- Based on the limited assessment of significance to date, Cooks Hill has a moderate-high level of significance at the regional level. It is moderate-highly socially significant as an important location for camping and ceremonies from prehistoric times through to the 20th century. It is also of moderate historical importance for this reason. The scientific and aesthetic significance of the site was unable to be assessed.

7.2.18. Gumi Site (AHIMS ID 04-4-0180)

Social significance

- The scarred tree at the Gumi Site has moderate-high social significance. One of the Aboriginal stakeholders recognises the scarred tree as a marker for a spring.

Historical significance

- This site has low local historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

Scientific significance

- The scientific significance of the site is probably moderate, but it is not certain that the tree was modified as a result of Aboriginal cultural activities as the tree appears to be too young and the scar is not consistent with Aboriginal cultural scarred trees, so there is the potential that the scientific significance would be nil.

Aesthetic significance

- The aesthetic significance of the site is low, as the tree appears to be too young and the scar is not a good example of an Aboriginal culturally scarred tree.

Summary statement of significance

- Overall, the Gumi site has a moderate level of significance at the local level. It is moderate-highly socially significant through the presence of a scarred tree. It is also of low historical importance for its association with historical period use of the general area. The aesthetic significance is low as it is not a good example of an Aboriginal culturally scarred tree. The scientific significance is moderate for now.

7.2.19. Law PAD (AHIMS ID 04-4-0168)

The significance of the LAW PAD site was unable to be assessed as it is not likely to be impacted by the project and was thus not subject to any sub-surface investigation during this project.

7.2.20. Melino Scarred Tree 4 (AHIMS ID 04-4-0166)

Social significance

- The Melino Scarred Tree 4 is of moderate-high social significance as it is in a culturally important area.

Historical significance

- The site is of low-moderate historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

Scientific significance

- The site has moderate scientific significance as it is ranked as having low integrity, moderate contents and moderate-high representativeness/rarity. The tree is dead and in poor condition. While scarred trees are rare in the local area and within NSW there is little potential for research or use of the tree for educational purposes, particularly through its association with other site types in the area including the Melino Site.

Aesthetic significance

- The site is of low aesthetic significance as it was previously a distinctive visual marker in the landscape, however its poor condition reduces its aesthetic significance.

Summary statement of significance

- Overall the Melino Scarred Three 4 has a moderate-high level of significance at the local level. It is moderate-highly socially significant as it is in a culturally important area. It is also of low-moderate historical importance for its association with historical period use and stores in the general area. The site has moderate scientific significance due to its rarity despite being in poor condition. It is also of low aesthetic significance as a visual landscape marker because of its poor condition.

7.2.21. Melino Artefact Scatter

Social significance

- This artefact scatter is of moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people, and is located within a significant landscape and locale.

Historical significance

- The site is of low historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

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 site has low integrity and structure as it has been heavily disturbed by post-contact land-use practices and it is a low density small artefact scatter on the lower slopes of a steep ridge. The site has a low contents ranking as the raw material is common to the area. The site has a low representativeness ranking as artefact scatters of this type 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 Melino Artefact Scatter is of low significance at the local level. The site has moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people, and is located within a significant landscape. Due to the high level of disturbance, the low density of artefacts, and the presence of a common single stone material, the site has low scientific significance.

7.2.22. Melino Site (AHIMS ID 04-4-0173)

Social significance

- The artefact scatter and shell midden at the Melino Site is of high social significance as it is located in a culturally important area covering several resource zones, and may once have been associated with a ceremonial bora ground to the east (the bora is believed to have been previously disturbed).

Historical significance

- The site is of moderate historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

Scientific significance

- The site has high scientific significance as it is ranked as having high integrity, high structure, moderate-high contents and high representativeness/rarity. The integrity and structure of the site is high as the dating of shell and charcoal associated with artefacts recovered from the site indicate that occupation of this site has occurred from the mid-early Holocene up to the last few hundred years. The contents of the site are all found within the region, the raw materials and shell content are both found in other areas, however, generally not within such close proximity. Melino site has a high representative value within the area, due to the rarity of the combination of site elements within the area (scarred trees, shell midden and artefact scatter). It also has a high representative value due to fact that no other sites within the region have been subjected to archaeological dating. The site has high research potential for answering questions regarding site occupation associated with the Richmond River during the Holocene which may indicate changes in resource use over an extensive period of time. Further investigations into the sources for the artefact raw material and the shell would potentially provide further information regarding movement across the landscape. The shell has likely been transported across the Richmond River as it is coastal beach species and the artefact material is also located in higher densities at sites such as E2/2 and Gittoes Jali which are also on the opposite side of the river. Further detailed analysis of the stone artefacts within a stratigraphic context (and in association with radiocarbon dating) may also reveal changes in stone tool manufacture over time. Due to an ongoing utilisation of the area, including stories of occupation of Jali and Burabi elders in the early 1900s, the site has a high education potential. The associated scarred trees which may have made small canoes to cross the Richmond River when linked with the results of the archaeological investigations within the Broadwater and Wardell area enables tangible links to be established between various points in the landscape. This further demonstrates the links create by pathways between the ranges and the coast.

Aesthetic significance

- The site has low aesthetic significance because it has limited apparent sensory values due to the sub-surface nature of most of the tangible evidence.

Summary statement of significance

- Overall the Melino site is has a high level of significance at the regional level. It is of high social significance as it is located in a culturally important area covering several resource zones, and may once have been associated with a ceremonial bora ground. The site is of moderate historical

significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area. The site has high scientific significance due to the presence of dateable shell and charcoal in association with stone artefacts, and scarred trees. It has high research potential for answering questions about Holocene era site occupation associated with the Richmond River and changes to resource use over time. The site also has high educational potential.

7.2.23. MST3 (AHIMS ID 04-4-0131), C21 (AHIMS ID 04-4-0107), MSRT2 (AHIMS ID 04-4-0130)

The three scarred trees (MST3, C21 and MSRT2) are all located within an area of approximately five metres radius and are assessed below as a complex. They are also associated with the archaeological deposit recorded at Melino site.

Social significance

- The three trees have high social significance as they are located in a culturally important area and together are a culturally rare item.

Historical significance

- The three trees have low-moderate historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

Scientific significance

- The three trees have high scientific significance as they are ranked as having moderate integrity, high structure, high contents and high representativeness/rarity. Such a complex is regionally rare, in addition to the rarity of scarred trees more generally locally and within NSW. Due to the rarity of this site complex, this complex of sites has high local educational significance for passing on Aboriginal stories and traditions.

Aesthetic significance

- The three trees have moderate-high aesthetic significance, as they are a distinctive visual marker in the landscape.

Summary statement of significance

- Overall the three scarred trees designated MST3, C21 and MSRT2 have a high level of significance at the regional level. They have high social significance through their association with the nearby Melino Site. The site is of low-moderate historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area. The site has high scientific significance due to the rarity of the site complex.

7.2.24. MST1 (AHIMS ID 04-4.0129)

Social significance

- The scarred tree at MST1 is of moderate-high social significance as it is located in a culturally important area.

Historical significance

- The tree is of low-moderate historical significance due to post-contact Aboriginal occupation of this area, and several historic stories associated with this general area.

Scientific significance

- The tree has moderate-high scientific significance as they are ranked as having moderate integrity, moderate contents and moderate-high representativeness/rarity. The tree is reasonably good condition. The site is relatively rare due to the overall rarity locally and within NSW of scarred trees. The tree has some potential for educational purposes in passing on knowledge regarding traditions and activities that result in the scarring of trees.

Aesthetic significance

- The site is of low-moderate aesthetic significance as it is a distinctive visual marker in the landscape.

Summary statement of significance

- Overall MST1 has a moderate-high level of significance at the local level. It is of moderate-high social significance as it is located in a culturally important area. The site is of low-moderate historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area. The site has moderate-high scientific significance due to the good condition of the tree and the overall rarity of scarred trees in NSW.

7.2.25. Site 3 (AHIMS ID 04-4-175)

Social significance

- The artefact scatter of Site 3 is of moderate social significance because it is situated on a deflated dune that was part of an important pathway used by Aboriginal people leading from the Richmond River to the ranges.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low-moderate scientific significance as it is ranked as having low-moderate integrity, low structure, low contents and low-moderate representativeness/rarity. The site has a low ranking for integrity and low-moderate for structure. The deflated dune is continually subject to rising and falling ground water table and is a low density small scatter. 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. The only value for research or education would be that this deflated dune is part of the pathways which lead from the Richmond River to the ranges.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall Site 3 has a low-moderate level of significance at the local level. It is of moderate social significance as it is located on a deflated dune that was part of an important pathway used by Aboriginal people leading from the Richmond River to the ranges. It has low-moderate 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.

7.2.26. Site 2 (AHIMS ID 04-4-0178)

Social significance

- The artefact scatter of Site 2 is of moderate social significance because it is situated on a deflated dune that was part of an important pathway used by Aboriginal people leading from the Richmond River to the ranges.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low-moderate scientific significance as it is ranked as having low integrity, low-moderate structure, low contents and low-moderate representativeness/rarity. The site has a low ranking for both integrity and structure. The deflated due is continually subject to rising and falling ground water table and is a low density small scatter. 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. The main value for research or education would be that this deflated dune is part of the pathways which lead from the Richmond River to the ranges.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall Site 2 has a low-moderate level of significance at the local level. It is of moderate social significance as it is located on a deflated dune that was part of an important pathway used by Aboriginal people leading from the Richmond River to the ranges. It has low-moderate scientific significance due to is 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.

7.2.27. Site 4 (AHIMS ID 04-4-0132)

Social significance

- The artefact scatter at Site 4 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 Site 4 has a low-moderate level of significance at the local level. It is of low-moderate social significance as it 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 and educational potential about the way local Aboriginal populations used this type of landform.

7.2.28. Site 1 (AHIMS ID 04-4-0179)

Social significance

- The artefact scatter at Site 1 is of 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 site has a low ranking for integrity and structure as it is a low density small artefact scatter in a low relief erosional landscape of rolling hills, undulating rises and low gradient slopes. The site has a low contents ranking as the single 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 Site 1 has a low-moderate level of significance at the local level. It is of low-moderate social significance as it 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 and educational potential about the way local Aboriginal populations used this type of landform.

7.2.29. Rudgley Scarred Tree (AHIMS ID 04-4-0170)

Social significance

- The Rudgley Scarred Tree is of moderate-high social significance as it demonstrates the use of the tree as an important marker in the landscape of a culturally important area.

Historical significance

- The tree does not meet this criterion.

Scientific significance

- The site has moderate-high scientific significance as it is ranked as having moderate integrity, moderate contents and moderate-high representativeness/rarity. The tree is dead but the scar is in reasonable condition meaning the tree has a moderate level of integrity and contents. The Rudgley Scarred Tree is rare as scarred trees in general are rare locally and within NSW. The tree has some limited potential for local educational purposes and research potential, particularly related to how people moved and traded between the hinterland and the coast, as the tree is located at the foot of the Blackwall Ranges.

Aesthetic significance

- The tree has low aesthetic significance as it provides some visual distinction in the landscape.

Summary statement of significance

- Overall the Rudgley Scarred Tree is of moderate-high significance at the local level. The site is of moderate-high social significance as it demonstrates the use of the tree as an important marker in the landscape of a culturally important area. The site has moderate-high scientific significance through its condition and rarity and potential for local educational purposes. The tree has low aesthetic significance as it provides some visual distinction in the landscape.

7.2.30. Rudgley Site 2 (AHIMS ID 04-4-0167)

Social significance

- The artefact scatter of Rudgley Site 2 is of low-moderate social significance because it is situated on a deflated dune that was part of any important pathway used by Aboriginal people leading from the Richmond River to the ranges.

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 site has a low ranking for integrity and structure. The deflated dune on which the site is situated is continually subject to rising and falling ground water table and is a low density small scatter. The site has a low contents ranking as the single 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. The only value for research or education would be that this deflated dune is part of the pathways which lead from the Richmond River to the ranges.

Aesthetic significance

- The site does not meet this criterion.

Summary Statement of Significance

- Overall the Rudgley Site 2 is of low significance at the local level. The site has low-moderate social significance through its association with a nearby pathway used by Aboriginal people. Due to the high level of disturbance, the low density of artefacts, and the presence of a common single stone material, the site has low scientific significance.

7.2.31. Rudgley Site 1a and 1b (AHIMS ID 04-4-0167)

Social significance

- The artefact scatter at Rudgley Site 1a and 1b is of low-moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people.

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 site has low integrity and structure as it has been heavily disturbed by post-contact land-use practices and it is a low density small artefact scatter in a

low relief erosional landscape of rolling hills, undulating rises and low gradient slopes. The site has a low contents ranking as the single 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 the Rudgley Site 1a and 1b is of low significance at the local level. The site has low-moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people. Due to the high level of disturbance, the low density of artefacts, and the presence of a common single stone material, the site has low scientific significance.

7.2.32. Saezza 1 (AHIMS ID 04-4-0171)

Social significance

- The artefact scatter at Saezza 1 is moderate social significance as it comprises a moderate amount of physical evidence of use of the site by Aboriginal people.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low-moderate scientific significance as it is ranked as having low integrity, low structure, moderate contents and low-moderate representativeness/rarity. The integrity and structure of the site is low as it has been moderately disturbed by post-contact land-use practices. The content of the site is moderate due to the range of artefacts types and several raw materials. The representativeness/rarity of the site is low-moderate as the site contains raw material common to the area in addition to artefact scatters also being common within the region. It has some limited 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 a small stream.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall the Saezza 1 site is of moderate significance at the local level. The site is of moderate social significance as it contains a moderate level of physical evidence representative of the use of the area by Aboriginal people. Due to the moderate level of disturbance, the low density of artefacts, and the presence of commonly available raw materials, the site has low-moderate scientific significance.

7.2.33. Site 12 (AHIMS ID 04-4-0176)

Social significance

- The artefact scatter at Site 12 has moderate social significance as it comprises a moderate amount of physical evidence of use of the site by Aboriginal people.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low-moderate scientific significance as it is ranked as having low integrity, low structure, low-moderate contents and low-moderate representativeness/rarity. The integrity and structure of the site is low as it has been moderately disturbed by post-contact land-use practices. The content of the site is low-moderate due to the limited range of artefacts types and a single raw material present. The representativeness/rarity of the site is low-moderate as the site contains raw material common to the area in addition to artefact scatters also being common within the region.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall Site 12 is of moderate significance at the local level. The site is of moderate social significance as it contains a moderate level of physical evidence representative of the use of the area by Aboriginal people. Due to the moderate level of disturbance, the low density of artefacts, and the presence of commonly available raw materials, the site has low-moderate scientific significance.

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 Woodburn and Ballina

Project section	Place name	Social significance	Historic significance	Scientific significance	Aesthetic significance	Overall significance
9	Place A	Moderate	N/A	None	N/A	Moderate (Also assessed as part of Gittoes Jali site - see Table 7-2)
9, 10	Place B	Moderate	Moderate	None	None	Moderate
9, 10	Place C	High	Moderate-high	None	None	High
9, 10	Place D	High	Moderate	None	Low	Moderate-high

Project section	Place name	Social significance	Historic significance	Scientific significance	Aesthetic significance	Overall significance
9	Place E	Moderate	Moderate	None	Low-moderate	Moderate
10	Place F	Low-moderate	Low-moderate	None	Low	Low-moderate
10	Place G	Low-moderate	Low-moderate	None	Low-moderate	Low-moderate
10	Place H	Moderate-high	None	None	None	Moderate-high
10	Place I	Moderate-high	Low	None	Low-moderate	Moderate
11	Place J	Moderate	Moderate	None	Low	Moderate
9,10,11	Place K	Moderate-High	Low	None	Moderate	Moderate

Table 7-2 Summary of significance assessment of archaeological sites near or within the boundary of the project between Woodburn and Ballina

AHIMS ID	Name	Scientific significance	Cultural significance	Aesthetic significance	Historical significance	Overall significance
09-1-0204, 09-1-0205 and 09-1-0203	Gittoes Jali	High	High	Low	None	High
TBA	Gittoes Jali 2	Low	Moderate	Low	Low	Low
TBA	Gittoes Jali 3	Isolated artefact	Low	Low	Low	Low
13-1-0189	Site 11	Moderate-high	Moderate-high	None	Moderate	Moderate-high
13-1-0109	E2/2	Moderate	Moderate-high	Low	Moderate-high	Moderate-high
13-1-0038 and 13-1-0010	Cooks Hill, Broadwater	Unknown	Moderate-high	Unknown	Moderate	Unknown
04-4-0180	Gumi Site	Moderate	Moderate-high	Low	Low	Moderate
TBA	Melino Artefact Scatter	Low	Moderate	Low	Low	Low
04-4-0168	Law PAD	Unknown	Unknown	Unknown	Unknown	Unknown
04-4-0166	Melino Scarred Tree 4	Moderate	Moderate-high	Low	Low-moderate	Moderate-high
04-4-0173	Melino Site	High	High	Low	Moderate	High
04-4-0131	MST3	High	High	Moderate-high	Low-moderate	High
04-4-0107	C21	High	High	Moderate-high	Low-moderate	High

AHIMS ID	Name	Scientific significance	Cultural significance	Aesthetic significance	Historical significance	Overall significance
04-4-0130	MSRT2	High	High	Moderate-high	Low-moderate	High
04-4-0129	MST1	Moderate-high	Moderate-high	Low-moderate	Low-moderate	Moderate-high
04-4-0175	Site 3	Low-moderate	Moderate	Low	None	Low-moderate
04-4-0178	Site 2	Low-moderate	Moderate	Low	None	Low-moderate
04-4-0132	Site 4	Low	Low-moderate	None	None	Low-moderate
04-4-0179	Site 1	Low	Low-moderate	Low	None	Low-moderate
04-4-0170	Rudgley Scarred Tree	Moderate-high	Moderate-high	Low	None	Moderate-high
04-4-0169	Rudgley Site 2	Low	Low-moderate	Low	None	Low
04-4-0167	Rudgley Site 1a and 1b	Low	Low-moderate	None	None	Low
04-4-0171	Saezza 1	Low-moderate	Moderate	Low	None	Moderate
04-4-0176	Site 12	Low-moderate	Moderate	Low	None	Moderate

8. Impact assessment

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

- Avoidance of a site or place will occur due to changes to 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 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 Woodburn to Ballina sections 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 Woodburn to Ballina upgrade alignment was selected to avoid all impact to Place H.
- Woodburn to Ballina upgrade was realigned to avoid impact to a massacre site at Woodburn.
- The Woodburn to Ballina upgrade alignment was selected to avoid impact to the Wardell Bush Camp and Cabbage Tree Island, as these were seen to be highly significant contemporary places. There was a perception in parts of the Aboriginal community that this realignment was a very positive adjustment to the route options then under consideration.
- The Woodburn to Ballina upgrade was realigned and the concept design redesigned to avoid four scarred trees (MST2, MST3, Melino Scarred Tree 4 and C21) just north of the Richmond River. Three of these (MST2, MST3 and C21) are in very close proximity (approximately five metres) to each other, making them quite rare. The trees are retained within the boundary of the project, to afford them more protection than if they were outside the corridor.
- Rudgley Scarred Tree has been avoided by the construction footprint, but has been retained within the Woodburn to Ballina upgrade to ensure its protection.

Despite the refinements described above, some impacts would still occur at a number of identified sites and places. The majority of direct impacts to Aboriginal cultural and archaeological sites along the Woodburn to Ballina sections 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. Some of the impacts, especially the indirect impacts are avoidable through management measures.

8.2. Impacts

Of the nine Aboriginal cultural places near or within the boundary of the project between Woodburn and Ballina, one will be indeterminately impacted, four will be directly impacted, two will be indirectly and directly impacted and two will be avoided by the project. Of the 21 archaeological sites near or within the boundary of the project, 13 will be directly impacted by the project, three could be indirectly impacted – though impact would be easily mitigated in all instances - and five would be avoided, either through being located outside the boundary of the project, or being within the boundary of the project but not within construction footprint. Additionally, one PAD within the boundary of the project will be avoided by the construction footprint. Table 8-1 presents the impact assessment.

Table 8-1 Impacts to archaeological sites and Aboriginal cultural places within and/or immediately adjacent to the boundary of the project between Woodburn and Ballina

Section	AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
8	N/A	Place A	Moderate	Aboriginal cultural place	Indirect	This is an intangible place, but is associated with an artefact at the Gittoes Jali site. Gittoes Jali site will be almost entirely impacted (see below), but the artefact itself would be recovered and preserved. Subsequently, the context of the place would be removed through excavation for resource extraction (see Gittoes Jali), but the cultural heritage values of the place would not be removed, as they relate to a story not specifically related to a physical location.

Section	AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
8	09-1-0204, 09-1-0205, 09-1-0203	Gittoes Jali	High	Artefact scatter, paint wells, ground rock, scarred tree	Direct	Resource extraction over an area of approximately 79,800 m^2 is proposed to be undertaken that would result in the excavation and removal of sediments that would result in the complete destruction of approximately 95 per cent of the site. At the southern extent of this site, the site will be subject to excavation to provide level construction of road for approximately 200 m in length; this area overlaps the resource extraction area. These impacts would result in the removal of most of the site and irreversible impact to its heritage values. The scarred tree is currently outside the boundary of the project and is not likely to be impacted. Avoidance of this site has been considered, however, due to a large number of other constraints nearby the boundary of the project in this location, this may not be possible. For example, moving the boundary of the project to the south would result in direct impacts to an Endangered Ecological Community and a threatened species, and impacts further along the corridor on Broadwater National Park, moving to the west would likely result in impact further along the corridor to wetlands, endangered fauna, and a known Aboriginal burial site. Undertaking resource extraction at another site is difficult economically, as this would result in significant financial impacts to the project. The Alliance is continuing investigation of avoiding parts of this site.
8	TBA	Gittoes Jali 2	Low	Artefact scatter	None	This site is located within the boundary of the project, but outside the construction footprint. Consequently, no direct or indirect impact is likely from the project. Fencing may be required to ensure impact from associated activities is avoided.
8	TBA	Gittoes Jali 3	Low	Isolated artefact	Direct	Resource extraction over an area of approximately 79,800 m^2 is proposed to be undertaken that would result in the excavation and removal of sediments that would result in the complete destruction of the site and irreversible impact to its heritage values. The Alliance is continuing investigation of avoiding parts of this area, which may result in avoidance of this site.
9	13-1-0189	Site 11	Moderate-high	Artefact scatter	Direct	Site 11 will be subject to excavation to provide level construction of road for approximately 150 m in length. The result would be the removal of approximately 80 per cent of the site and irreversible impact to its heritage values. Most of the site is outside the construction footprint and will not be impacted by the project.

Section	AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
9, 10	N/A	Place C	High	Aboriginal cultural place	Indeterminate	Through consultation it appears that this place didn't have a specific focal point but probably spread across a large area on and around Cooks Hill. Thus, it is difficult to determine the extent of impact of this place, due to its diffuse and indeterminate extent. Impact would partially diminish the cultural heritage significance of the place, but not the event.
9, 10	N/A	Place D	High	Aboriginal cultural place	Direct	Efforts have been made to reduce the impact to this general area, including an intact portion of E2/2. This place occurs over a large, indeterminate area, though linked to E2/2 site – likely partially impacted by excavation for construction of the road; the cultural heritage values and significance of this place will be diminished by the impact.
9	13-1-0109	E2/2	Moderate-high	Artefact scatter, shell midden	Direct	E2/2 will be subject to excavation to provide construction of road, including level, cutting and embanked road, for approximately 600 m in length. The result would be the removal of approximately 50 per cent of the site and irreversible impact to its heritage values. More significant deposits of this site exist immediately outside the boundary of the project to the east and west, including one intact protected portion of the sand plain, so impact to the values of the site would be low-moderate. Part of the site is outside the construction footprint and will not be impacted by the project.
9	13-1-0038 and 13-1-0010	Cooks Hill, Broadwater	Moderate	Ceremonial ground (Bora ring)	None	This site is outside the boundary of the project and no direct or indirect impact is likely from the project.
9	N/A	Place E	Moderate	Aboriginal cultural place	Indirect	Within boundary of the project, but avoided – may be indirectly impacted by increased and/or polluted water run-off during construction and/or operation of the project.

Section	AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
10	04-4-0180	Gumi Site	Moderate	Scarred tree	Direct	Currently, Gumi site is proposed to be subject to excavation to provide embanked construction of road for approximately 40 m in length. The result would be the complete removal of the scarred tree and irreversible impact to its heritage values. Attempting to avoid impact to this site by realigning the project further to the west is likely to result in impact to Aboriginal sites (possibly MST3, MSRT2, C21, and almost certainly Melino Scarred Tree 4, and denser shell deposits of Melino site) that would otherwise be avoided further to the north of Gumi, so it is difficult to justify avoidance to this site. Based on the majority of stakeholder comments, impact to Gumi site was preferred over realignment and impact to Melino Scarred Tree. It should be noted that Jali LALC was not happy with either of these options and not happy with impact to the tree. Further investigation is being undertaken of the tree to confirm whether or not it has been culturally scarred.
10	04-4-0168	Law PAD	Unknown	PAD	None	A small portion of this PAD is located within the boundary of the project, however, no construction is proposed in this area. Consequently, no direct or indirect impact to Law PAD is likely.
10	TBA	Melino Artefact Scatter	Low	Artefact scatter	Direct	Melino Artefact Scatter will be subject to fill to construct the road for approximately 20 m in length. The result will be the complete covering of 100% of the site by the road, and irreversible impact to its heritage values.
10	04-4-0173	Melino Site	High	Artefact scatter, shell midden	Direct	The exact extent of this site has not been fully determined as the site extends beyond the boundary of the project, however, the extent has been estimated based on the landform on which it occurs, and the location of shell material identified at the western extent. Based on the estimated extent, Melino Site will be subject to excavation to provide construction of cut and embanked road for approximately 220 m in length. The result would be the removal of approximately 20 per cent of the site and irreversible impact to its heritage values. Deposits of this site exist immediately outside the boundary of the project to the west so impact to the values of the site would be moderate. Most of this site is outside the construction footprint and will not be impacted by the project.

Section	AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
10	04-4-0166	Melino Scarred Tree 4	Moderate-high	Scarred tree	Indirect	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. Low-level indirect impact may occur to the values of the site through the site being visible from the road during construction and operation.
10	04-4-0131	MST3	High	Scarred tree	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. No indirect impact would occur from visibility, as the scar faces away from the proposed road.
10	04-4-0107	C21	High	Scarred tree	Indirect	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. Low-level indirect impact may occur to the values of the site through the site being visible from the road during construction and operation.
10	04-4-0130	MSRT2	High	Scarred tree	Indirect	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. Low-level indirect impact may occur to the values of the site through the site being visible from the road during construction and operation.
10	04-4-0129	MST1	Moderate-high	Scarred tree	None	No direct or indirect impact is likely from the project.
10	N/A	Place F	Low-moderate	Aboriginal cultural place	Direct	Place F will be subject to excavation to provide construction of cut and embanked road for approximately 110 m in length. The result would be the removal of approximately 80 per cent of the place, which would completely destroy the physical aspect of this place and irreversible impact to its heritage values.
10	04-4-0175	Site 3	Low-moderate	Artefact scatter	Direct	Site 3 will be subject to excavation to provide construction of embanked road for approximately 140 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 outside the construction footprint and will not be impacted by the project.

Section	AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
10	04-4-0178	Site 2	Low-moderate	Artefact scatter	Direct	Site 2 will be subject to excavation to provide construction of embanked road for approximately 120 m in length. The result would be the removal of approximately 90 per cent of the site and irreversible impact to almost all its heritage values. Part of the site is outside the construction footprint and will not be impacted by the project.
10	N/A	Place G	Low-moderate	Aboriginal cultural place	Direct	The southern of the two stands of clustering bamboo associated with Chinese gambling will be at least partially removed for excavation to provide construction of embanked road for approximately 35 m in length. The result would be the removal of approximately 50 per cent of the overall place and irreversible diminishment of the overall heritage values of the place. Part of the site is outside the construction footprint and will not be impacted by the project.
10	N/A	Place H	Moderate-high	Aboriginal cultural place	None	This intangible place is outside the boundary of the project and is unlikely to be directly or indirectly impacted by the project.
10	04-4-0132	Site 4	Low-moderate	Artefact scatter	Direct	Site 4 will be subject to excavation to provide construction of road cutting for approximately 55 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 outside the construction footprint and will not be impacted by the project.
10	04-4-0179	Site 1	Low-moderate	Artefact scatter	Direct	Site 1 will be subject to excavation to provide construction of embanked road and culvert for approximately 70 m in length. The result would be the removal of 100 per cent of the site and irreversible impact to all its heritage value.
10	04-4-0170	Rudgley Scarred Tree	Moderate-high	Scarred tree	None	Within the boundary of the project, but avoided by the construction footprint. No indirect impact would occur from visibility, as the scar faces away from proposed road. Fencing would be required to ensure impact from associated activities is avoided.

Section	AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
10	04-4-0169	Rudgley Site 2	Low	Artefact scatter	Direct	Approximately 40 per cent of Rudgley Site 2 is outside the boundary of the project and would not be impacted. Approximately 40 per cent is within the boundary of the project, but would not be impacted by the construction footprint. The remaining 20 per cent of Rudgley Site 2 will be subject to excavation to provide construction of road embankment for approximately 25 m in length. The result would be the removal of approximately 20 per cent of the site and irreversible impact to this part of its heritage values. Part of the site is outside the construction footprint and will not be impacted by the project.
10	04-4-0167	Rudgley Site 1a and 1b	Low	Artefact scatter	Direct	Approximately 50 per cent of Rudgley Site 1a and 1b (the 1a portion) is within the boundary of the project, but is not likely to be impacted by the construction footprint; fencing would be required to ensure impact from associated activities is avoided. The remaining 50 per cent of the site (the 1b portion) will be subject to excavation to provide construction of road cutting for approximately 30 m in length. The result would be the removal of approximately 50 per cent of the site and irreversible impact to this part of its heritage values. Part of the site is outside the construction footprint and will not be impacted by the project.
11	04-4-0171	Saezza 1	Moderate	Artefact scatter	None	Within the boundary of the project, but avoided by the construction footprint. Fencing would be required to ensure impact from associated activities is avoided.
11	04-4-0176	Site 12	Moderate	Artefact scatter	Direct	This entire site is within the boundary of the project, but according to the construction footprint, only approximately 10 per cent of Site 12 is likely to be subject to excavation to provide construction of road embankment for approximately 35 m in length. The result would be the removal of approximately 10 per cent of the site and irreversible impact to this part of its heritage values. Most of the site is outside the construction footprint and will not be impacted by the project.
11	N/A	Place J	Moderate	Aboriginal cultural place	None	This area is outside the boundary of the project and is unlikely to be directly or indirectly impacted by the project.
9,10,11	N/A	Place K	Moderate-High	Aboriginal cultural place	Direct	Unavoidable partial impact to this landscape as encompasses whole region. The construction of the road across this corridor would result in irreversible impact to the cultural heritage values, as well as the connectivity between sites and places within this landscape

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 25 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. Outside these areas, activities such as sand-quarrying, cane farming and 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 Pacific Highway Upgrade 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 23 archaeological sites are within 200 metres of the project (only seven of which were known prior to the current investigations). Of these sites, direct impact would be avoided to nine sites, while 13 sites will likely be directly impacted by the project. The scientific significance of each of the archaeological sites individually fall within a range between low and high, with slightly more towards lower significance, and the cultural significance is generally moderate or higher. It is important to consider the archaeological sites in a regional context; regionally they provide a reasonable distribution of sites across culturally important landforms. The regional Aboriginal cultural heritage values across the boundary of the project would be moderately reduced 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.

Modelling by OEH (http://www.environment.nsw.gov.au/licences/AboriginalSitesDecisionSupportTool.htm) shows that prior to Aboriginal cultural heritage investigations for the project, the areas of moderate or high knowledge gaps (called *survey priority* in the OEH modelling) in regards to archaeological and cultural resources across the project were present across about 50 per cent of the boundary of the project. Aboriginal cultural heritage investigations for the project have significantly added to the knowledge and understanding of Aboriginal cultural heritage in the project region. A total of 77 per cent of the boundary of the project has been surveyed (the remainder is considered to have little to no cultural heritage potential), and all PADs but one have been sample excavated to test for their archaeological potential. This has provided an important addition to the archaeological record, which was previously not well studied. Particularly important has been the enhancement in our understanding of the sub-surface nature of sites in the region. As mentioned above, the areas investigated were in high need of archaeological assessment, and consequently, the survey and sub-surface testing program for a project this size has added value to regional knowledge and significantly helped to address investigation priority issues. Importantly, the data gathered during this investigation and the data to be gathered as part of the impact mitigation (particularly salvage) recommended in Chapter 9 are considered sufficient to mitigate and off-set the cumulative regional impacts of the project.

Within and near the boundary of the project there are nine cultural places identified (Table 5-2). Six of these Aboriginal cultural places were identified during consultation and from the cultural heritage reports, but are not within the immediate vicinity of the boundary of the project (see Table 5-3). It is clear that the landscape along and adjacent to the corridor between Cooks Hill and Teven Junction is of high cultural significance to the traditional owners of the area, with ceremonial sites, massacres, burials, middens and campsites, dreaming sites and resource gathering areas known to occur there (some within the boundary of the project, some outside). Some of these cultural places have been documented as part of this and previous studies. In addition, the traditional owners of the area (during fieldwork and AFG meetings for the current study) consider the corridor to have an impact on the cultural landscape values between Cooks Hill and Teven Junction.

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 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 archaeological resources due to the project is considered low-moderate.

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 preserved 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-QLD 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. However it can be noted that the majority of the archaeological sites are common (e.g. 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 understanding of archaeology and Aboriginal occupation in the regions, and thus 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 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 Aboriginal archaeological sites is displayed in Table 9-1 and detailed recommendations in Table 9-2. Management recommendations for Aboriginal cultural places are discussed in Section 9.3.2.

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).

Table 9-1 Summary of management recommendations for archaeological sites near or within the boundary of the project between Woodburn and Ballina

Management recommendations	Number of sites	Name of site
Collection and comprehensive salvage excavations (mechanical and hand). Detailed analysis and reporting of cultural material. Dating of cultural material where applicable.	7	Gittoes Jali Site 11 E2/2 Melino Site Site 3 Site 2 Site 1
Fencing and protection zone established during construction	8	MST3 C21 Melino Scarred Tree 4 MSRT2 Rudgley Scarred Tree Law PAD Saezza 1 Gittoes Jali 2
Collection of artefacts. Detailed analysis and reporting of cultural material	3	Rudgley Site 2 Rudgley Site 1a and 1b Melino Artefact Scatter
Collection and salvage excavations (mechanical). Detailed analysis and reporting of cultural material. Dating of cultural material where applicable.	2	Site 12 Site 4
Removal and relocation of the scarred tree to a culturally appropriate location yet to be agreed by the Aboriginal stakeholders.	1	Gumi Site
Total avoidance (outside the boundary of the project)	2	MST1 Cooks Hill, Broadwater

9.1. General 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 would 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 management requirements have also been included for sites to be protected and avoided. Broadly these fit into three categories (with Gumi Site being the exception):

- Collection of cultural material located during the survey and sub-surface testing program – only excavation required to collect already discovered material would be undertaken.
- 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.
- 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 between Woodburn and Ballina

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact (%)	Mitigation strategy/ recommendations
8	Gittoes Jali (09-1-0204, 09-1-0205, 09-1-0203)	Artefact Scatter, Paint Wells, Grinding Rock, Scarred Tree	High	95	The project would directly impact on this site. **Due to its high significance and significant impact that is proposed to this site, where possible, impacts to this site should be reduced or avoided.** Where possible to avoid impact, **avoided areas must be fenced** to ensure full avoidance. If avoidance is not an option, then extensive salvage is recommended due to the discovery of several dense areas of artefacts, paint wells, and scarred tree in close association. The scarred tree is currently outside the boundary of the project and is not likely to be impacted. **1. Artefact scatter** • Salvage excavation must be undertaken of this site within that part of the site within the construction footprint of the project. • A total of 250 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). • Hand excavation of 130 m² that would be impacted. This would be excavated in a controlled manner using trowels and/or shovels and 5 mm hand or mechanical sieve. • 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 parties. • All artefacts which have previously been recorded and reburied 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 parties 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. • Any sediment to 0.6 m depth from this site that is proposed to be used (eg as fill) outside the boundary of the Gittoes Jali site should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. **2. Paint wells and grinding rock** • No impact is proposed of this component of the site. • It is recommended that the location of these paint wells be accurately plotted and drawn. **Geomorphology study** A geomorphology assessment should be undertaken that encompasses this site (and Site 11, E2/2 and Melino Site). The study should be non-invasive, but can use observations of the machine salvage excavation.
8	Gittoes Jali 2 (TBA)	Artefact Scatter	Low	100	None, not impacted
8	Gittoes Jali 3 (TBA)	Isolated artefact	Low	100	If this site is to be impacted by the project, all artefacts from within the construction footprint which have previously been recorded and reburied must be recovered and removed off-site.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact (%)	Mitigation strategy/ recommendations
9	E2/2 (13-1-0109)	Artefact Scatter, Shell Midden	Moderate to high	50	The project would impact directly on this site. There are distinct areas of shell deposit located close to the fenceline as well as cultural material throughout the site. • Salvage excavation must be undertaken of this site within the site extent and within the construction footprint of the project. • 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 parties. • 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 parties 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. • Large portions of this site are located outside the boundary of the project or outside the construction footprint; exclusion zones must be put in place to ensure damage does not occur to archaeological deposits outside of the corridor. 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. Shell midden** • Shell midden deposits were recorded close to the fence line which divides the two properties. It is within this location that hand excavation should occur, the exact location should be within the boundary of the project and directed by the registered Aboriginal parties. • Hand excavation of 10 m² of the midden that would be impacted to a total depth of 500 mm. This would be excavated in a controlled manner using trowels and 3 mm and 5 mm nested sieves. • All shell recovered would be subject to analysis including Minimum Number of Individuals (MNI) and weight (g). Number of Individual specimens (NISP) may also be used if deemed appropriate. • It is recommended that a sequence of dates (radiocarbon or AMS) be collected from the hand excavation **2. The rest of the site** • A total of 80 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). • Any sediment to 1.5 m depth from this site that is proposed to be used (eg as fill) outside the boundary of E2/2 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. **3. Overburden** • All overburden within the boundary of the project should be removed and sieved for cultural materials, to ensure any cultural material located within the overburden is collected. **4. Geomorphology study** A geomorphology assessment should be undertaken that encompasses this site (and Gittoes Jali, Site 11 and Melino Site). The study should be non-invasive, but can use observations of the machine salvage excavation.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact (%)	Mitigation strategy/ recommendations
9	Site 11 (13-1-0189)	Artefact Scatter	Moderate to high	80	The project would impact directly on this site. Due to the discovery of a dense knapping floor (963 artefacts in one location). • A minimum of 100 m² to be excavated within the construction footprint by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). • A minimum of 20 m² should also be excavated by hand within the construction footprint within the vicinity of the mechanical transect where a knapping floor was identified (543354E/6790489N). This would be excavated in a controlled manner using trowels and 3 mm and 5 mm nested sieves. • All artefacts recorded during sub-surface testing within the construction footprint must also be recovered. • All artefacts within the construction footprint must be removed off-site in order to be analysed and then returned to the registered Aboriginal parties. • Any sediment to 1.5 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Site 11 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. • A large portion of this site is located outside the boundary of the project; an exclusion zone should be put in place to ensure damage does not occur to archaeological deposits outside of the corridor. 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). **Geomorphology study** A geomorphology assessment should be undertaken that encompasses this site (and Gittoes Jali, E2/2 and Melino Site). The study should be non-invasive, but can use observations of the machine salvage excavation.
9	Cooks Hill, Broadwater (13-1-0038 and 13-1-0010)	Ceremonial ground (Bora ring)	Moderate	0	None, not impacted
10	Gumi Site (04-4-0180)	Scarred Tree	Moderate	100	• The Gumi scarred tree must be removed and relocated to an area within the boundary of the project and protected with fencing – an arborist should be consulted to guide in the removal and relocation of the tree. The removal would likely result in the death of the tree. • The location must be visually protected during the construction and operation of the road with culturally sensitive plantings or by existing vegetation. • Access to the tree must be provided for local Aboriginal people to enable them to be able to use the tree as a teaching site. • Recommendations of the PAD component of this site will be provided following completion of on-going investigations at the site.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact (%)	Mitigation strategy/ recommendations
10	Law PAD	PAD	Unknown	0	• A small portion of this PAD is located inside the boundary of the project, but is not likely to be impacted. An exclusion zone should be put in place to ensure damage does not occur to this PAD. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the PAD (eg high visibility construction webbing).
10	Melino Scarred Tree 4 (04-4-0166)	Scarred Tree	Moderate to High	0	The project design has been altered to ensure the scarred tree is within the boundary of the project, but avoided. Protection is required to ensure no impacts during construction. • Prior to construction a 15 m exclusion zone must be placed around the scarred tree. This must remain in place until construction activities have ceased. • This exclusion zone would be fenced using chain wire or plastic mesh and star pickets. Attached would be appropriate signage which indicated 'Do Not Enter' the area. • This fencing should be undertaken with a representative of the LALC present. • An arborist must be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree.
10	Melino Artefact Scatter (TBA)	Artefact Scatter	Low	100	All artefacts from within the construction footprint which have previously been recorded and reburied must be recovered and removed off-site.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact (%)	Mitigation strategy/ recommendations
10	Melino Site (04-4-0173)	Artefact Scatter, Shell Midden	High	20	Although Melino Site covers a large area, there are 3 distinct areas which have different salvage requirements. The general requirements for this site are as follows: • Salvage excavation must be undertaken of this site within the site extent and within the construction footprint of the project. • 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 parties. • All artefacts within the construction footprint 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 parties for reburial or storage at a chosen and recorded location. • All cultural material recovered would be subject to detailed analysis and inclusion in a technical report. • A large portion of this site is located outside the boundary of the project and an exclusion zone would be put in place to ensure damage does not occur to archaeological deposits outside of the corridor. • Any sediment to 1.5 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Melino Site should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. **1. Artefact scatter including a discrete knapping floor was located on the top of the rise.** • The knapping floor is within the boundary of the project, but avoided. It must be fenced to ensure exclusion of people, plant and impact to the site. • Salvage excavation of 30 m² to be excavated by machine. This would be undertaken with a mechanical sieve and excavator (900 mm bucket). • All artefacts proposed to be impacted (including of those recorded during sub-surface testing) would be removed and analysed. • If any datable material is located in appropriate context, at least 2 samples should be subject for radiocarbon dating. **2. Shell Midden** • Where possible, the midden within the construction footprint should be covered with geo-textile fabric and covered with fill to protect from compaction. Where it can't be avoided, hand salvage excavation must be undertaken of up to 20 m² of the midden that would be impacted up to a total depth of 1.5 m. This would be excavated in a controlled manner using trowels and 3 mm and 5 mm sieves. It is recommended that a sequence of dates (radiocarbon or AMS) be collected from the hand excavation. • All shell recovered would be subject to analysis including Minimum Number of Individuals (MNI) and weight (g). Number of Individual specimens (NISP) may also be used if deemed appropriate. **3. Area surrounding the shell midden** • A total of 100 m² to be excavated by machine, undertaken with a mechanical sieve and an excavator (900 mm bucket). **Geomorphology study** A geomorphology assessment should be undertaken that encompasses this site (and Gittoes Jali, Site 11 and E2/2). The study should be non-invasive, but can use observations of the machine salvage excavation.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact (%)	Mitigation strategy/ recommendations
10	MST3 (04-4-0131)	Scarred tree	High	0	The project alignment has been altered to ensure the scarred tree is within the boundary of the project, but avoided. Protection is required to ensure no impacts during construction. • Prior to construction a 15 m exclusion zone must be placed around the scarred tree. This must remain in place until construction activities have ceased. • This exclusion zone would be fenced using chain wire or plastic mesh and star pickets. Attached would be appropriate signage which indicated 'Do Not Enter' the area. • This fencing should be undertaken with a representative of the LALC present. • An arborist must be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree.
10	C21 (04-4-0107)	Scarred tree	High	0	The project alignment has been altered to ensure the scarred tree is within the boundary of the project, but avoided. Protection is required to ensure no impacts during construction. • Prior to construction a 15 m exclusion zone must be placed around the scarred tree. This must remain in place until construction activities have ceased. • This exclusion zone would be fenced using chain wire or plastic mesh and star pickets. Attached would be appropriate signage which indicated 'Do Not Enter' the area. • This fencing should be undertaken with a representative of the LALC present. An arborist must be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree.
10	MSRT2 (04-4-0130)	Scarred tree	High	0	The project alignment has been altered to ensure the scarred tree is within the boundary of the project, but avoided. Protection is required to ensure no impacts during construction. • Prior to construction a 15 m exclusion zone must be placed around the scarred tree. This must remain in place until construction activities have ceased. • This exclusion zone would be fenced using chain wire or plastic mesh and star pickets. Attached would be appropriate signage which indicated 'Do Not Enter' the area. • This fencing should be undertaken with a representative of the LALC present. An arborist must be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree.
10	MST 1 (04-4-0129)	Scarred tree	High	0	None, not impacted, outside the boundary of the project

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact (%)	Mitigation strategy/ recommendations
10	Site 3 (04-4-0175)	Artefact Scatter	Moderate	50	Due to constraints (fenceline and a swamp), the nature of the deposit could not fully be established, except that artefacts were found at over 900 mm depth. Therefore, it is recommended that further mechanical excavation be undertaken in order to reach the depth of the archaeological deposit. • A total of 40 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures should be taken to safely stabilise and then proceed with deeper excavation. • Salvage excavation must be undertaken of this site within the site extent and within the construction footprint of the project. • 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 parties. • All artefacts which have previously been recorded and reburied 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 parties for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. • A minimum of 2 samples should be collected and subject to radiocarbon (standard or accelerated mass spectrometry) dating. • Any sediment to 1.5 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Site 3 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. • Portions of the extent of this site will not be impacted by the project; exclusion zones would be put in place to ensure incidental damage does not occur to these 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). **Please note** that excavation must be undertaken at a time of the year when the water table is at its lowest, to ensure maximum depth can be reached with a machine.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact (%)	Mitigation strategy/ recommendations
10	Site 2 (04-4-0178)	Artefact Scatter	Moderate	90	Due to constraints (water table), the nature of the deposit could not fully be established, except that artefacts were found generally at the top of and into the water table. Therefore, it is recommended that further mechanical excavation be undertaken in order to reach the depth of the archaeological deposit. • A total of 30 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures should be taken to safely stabilise and then proceed with deeper excavation. • Salvage excavation must be undertaken of this site within the site extent and within the construction footprint of the project. • 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 parties. • All artefacts which have previously been recorded and reburied 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 parties for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. • A minimum of 2 samples should be collected and subject to either radiocarbon or AMS dating. • Any sediment to 1.5 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Site 2 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. • A small portion of this site will not be impacted by the project; exclusion zones would be put in place to ensure incidental damage does not occur to these 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). **Please note** that excavation must be undertaken at a time of the year when the water table is at its lowest, to ensure maximum depth can be reached with a machine.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact (%)	Mitigation strategy/ recommendations
10	Site 4 (04-4-0132)	Artefact Scatter	Low to moderate	70	Site 4 has been heavily disturbed through land use (ploughing, power lines, track) and has maintained very little site integrity. • A total of 20 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures should be taken to safely stabilise and then proceed with deeper excavation. • Salvage excavation must be undertaken of this site within the site extent and within the construction footprint of the project. • 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 parties. • All artefacts which have previously been recorded and reburied 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 parties for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. • Any sediment to 0.5 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Site 4 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. • Portions of this site will not be impacted by the project; exclusion zones would be put in place to ensure incidental damage does not occur to these 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).
10	Site 1 (04-4-0179)	Artefact Scatter	Low	100	• A total of 10 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures should be taken to safely stabilise and then proceed with deeper excavation. • Salvage excavation must be undertaken of this site within the site extent and within the construction footprint of the project. • 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 parties. • All artefacts which have previously been recorded and reburied must be recovered and removed off-site. • 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 parties for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. • Any sediment to 1.0 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Site 1 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact (%)	Mitigation strategy/ recommendations
10	Rudgley Scarred Tree (04-4-0170)	Scarred Tree	Moderate to high	0	The project alignment has been altered to ensure the scarred tree falls outside of the road corridor. Protection is required to ensure no impacts during construction. • Prior to construction a 15 m exclusion zone must be placed around the scarred tree. This must remain in place until construction activities have ceased. • This exclusion zone would be fenced using chain wire or plastic mesh and star pickets. Attached would be appropriate signage which indicated 'Do Not Enter' the area. • This fencing should be undertaken with a representative of the LALC present. • An arborist must be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree.
10	Rudgley Site 2 (04-4-0169)	Artefact Scatter	Low	20	• All artefacts from within the construction footprint which have previously been recorded and reburied must be recovered and removed off-site. • Much of the extent of this site will not be impacted by the project; exclusion zones would be put in place to ensure incidental damage does not occur to these 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).
10	Rudgley Site 1a/1b (04-4-0167)	Artefact Scatter	Low	50	• All artefacts from within the construction footprint which have previously been recorded and reburied must be recovered and removed off-site. • A portion of the extent of this site will not be impacted by the project; an exclusion zone would be put in place around part **1a** of this site to ensure incidental damage does not occur to these 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).
10,11	Saezza 1 (04-4-0171)	Artefact Scatter	Moderate	0	• This site will not be impacted by the project, but is located within the boundary of the project; exclusion zones would be put in place to ensure incidental damage does not occur to this site. 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).

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact (%)	Mitigation strategy/ recommendations
10, 11	Site 12 (04-4-0176)	Artefact Scatter	Moderate	10	• A total of 10 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures should be taken to safely stabilise and then proceed with deeper excavation. • Salvage excavation must be undertaken of this site within the site extent and within the construction footprint of the project. • 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 parties. • All artefacts which have previously been recorded and reburied must be recovered and removed off-site. • 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 parties for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. • Any sediment to 1.2 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Site 12 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. • Portions of this site will not be impacted by the project; exclusion zones would be put in place to ensure incidental damage does not occur to these 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 several of the cultural places they cover a broad area of land so specific management measures may not be possible. In these cases other types of management is appropriate, such as:

- Enabling access to the areas for 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 Woodburn and Ballina

Project section	Place name	Cultural significance	Impact	Mitigation strategy/recommendations
8	Place A	N/A – directly part of Gittoes Jali	Indirect impact	In recognition of the cultural significance of this place and its general relation to Gittoes Jali, the salvage quota for Gittoes Jali site was increased beyond what would have otherwise been justified for such a site. For example, 130m^2 of hand excavation is recommended instead of 100m^2, and 250m^2 of mechanical excavation instead of 200m^2.
9, 10	Place B	Moderate	Direct impact	To maintain connectivity, provide access across the project from end of Richmond Road, Pine Tree Road, Fischer St, or other suitable location, to Broadwater National Park during construction and operation, in consultation with Traditional Owners.
9, 10	Place C	High	Indeterminate impact	Due to the potential size of the area no specific management recommendations can be provided. An education package should be prepared to pass information associated with this area onto future generations. This should include at a minimum a printed document outlining the story of the occupation of this area and the ensuing massacre in as much detail as possible. Further research and interviews should be undertaken for this purpose. Where possible, oral recordings and/or video footage should also be compiled into the package. Caution should be undertaken in and around the boundary of the project in this area with regard to potential human remains – refer to the contingencies Section 9.4.
9, 10	Place D	High	Direct impact	Due to the indistinct size of the area no specific management recommendations can be provided. Signage acknowledging the Traditional Owners of the area could be put in place within the Cooks Hill area (or at the nearest rest area). The signage could also include stories of contact-period Aboriginal occupation of the area. The education package suggested for Place C (above) would also include content on and mitigate impact to the Place D. See also mitigation for archaeological site E2/2, as mitigation for this E2/2 has been augmented in reflection of the significance of this site (Table 9-2).

Project section	Place name	Cultural significance	Impact	Mitigation strategy/recommendations
9	Place E	Low-moderate	Indirect impact	This place should be fenced prior to and during construction to avoid incidental impact to this site. Additionally, ensuring this place is protected from increased and/or polluted run-off should be considered in detailed design for during construction and operation of the project.
10	Place F	Low-moderate	Direct impact	Due to the low-moderate significance of this place, the recording of this place in this report forms the mitigation for this place.
10	Place G	Low-moderate	Direct impact to one of the two identified areas	Due to the low-moderate significance of this place, the recording of this place in this report forms the mitigation for this place.
11	Place K	Moderate-High	Partial direct impact - unavoidable as encompasses whole region	Salvage quotas for sites within this landscape have been increased to reflect the sensitivity of the general area. In order to gather further information on the formation and changes in the broader landscape, it is recommended that a geomorphological assessment of this landscape, with a focus on the sites within this place be undertaken which would take into account the cultural and scientific significance of the landscape and the sites and places within. The report must be produced by a geomorphologist in conjunction with an archaeologist/anthropologist.

9.4. Management Procedures

9.4.1. Unexpected discovery of archaeological finds

The below procedure is consistent with the Unexpected Archaeological Finds Procedure (RMS 2011b), 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 Unexpected Archaeological Finds Procedure (RMS 2011b) 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 Unexpected Archaeological Finds Procedure (RMS 2011b), 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 the Unexpected Archaeological Finds Procedure (RMS 2011b).
- Assess whether heritage impact is consistent with the project approval or if project approval modification is required from the DP&I.
- 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 Woodburn to Ballina 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 Woodburn and Ballina. 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 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 Woodburn and Ballina. 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 boundary of 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 2.2 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

Collins (2005) conducted an Aboriginal heritage assessment partially within the current boundary of the project as part of a route option assessment for the Woodburn to Ballina Pacific Highway upgrade. Three archaeological sites were identified during the survey: a cluster of four scarred trees, a stone artefact scatter and a contemporary campsite. The artefact scatter comprises approximately 100 visible artefacts distributed along a 150 metres former sand extraction area near Bagotville Road. The artefacts consist primarily of small flakes and multiplatform and bipolar cores manufactured from white fine-grained siliceous stones and chalcedony. The site is located between an alluvial floodplain and a swampy sand plain to the west.

Hall and Lomax (1993) conducted an Environmental Impact Assessment for the Casino district forests in the Richmond hinterland. In the coastal ranges, artefacts were most commonly found on the crests of ridges and low spurs, although some occurred on slopes, flats and plains. All of the sites (n=19) contained less than 13 visible artefacts and 16 were isolated finds. Only three isolated finds were recorded in the lowlands, one on a plain, one on a lower slope and one on a low ridge, at distances of over 600 metres from the nearest water source. The comparative low density and low occurrence of Aboriginal sites in the coastal ranges and lowlands was attributed to the reduced availability of suitable raw materials and a general lack of occupation along drainage and ridge lines.

Collins (2008) conducted an Aboriginal heritage assessment mostly to the south of the current boundary of the project, between the township of Woodburn and Iluka Road, Woombah. A total of five archaeological sites were identified within Collins' (2008) study area and comprise three

isolated stone artefacts, a low-density stone artefact scatter and an engraved (scarred) tree. Furthermore, a previously registered burial (Sawpit Creek Burial, Aboriginal heritage information management system [AHIMS] ID 13-1-059) is located within the boundary of the project. The isolated artefacts were identified on the crest of a ridgeline, the upper slope of a ridge and on a creek bank. The low density artefact scatter was identified on the upper slope and crest of an undulating ridgeline. The stone artefacts were manufactured from petrified wood, siltstone, chert, tuff, greywacke and chalcedony. The burial (Sawpit Creek Burial, AHIMS ID 13-1-059) is located on a hill south of The Gap Road. No information regarding the landform associated with the scarred tree was provided.

In addition to the Aboriginal heritage assessment discussed above, several other archaeological investigations have been undertaken near the boundary of the project (see below). A reported massacre site, a cluster of possible Aboriginal scarred trees and an Aboriginal sacred site are believed to be in close proximity to the boundary of the project.

Table 2-1 Other previous assessments undertaken within the boundary of the project

Assessment author and date	Number of sites identified	Project section
Appleton 1994	0	7–8
Appleton 1997	0	8
Piper 1998	0	9
Heron and Faulkner 1998	1+	9
Starling 1974	2	10
Undocumented Jali LALC Surveys (cited in Navin Officer 2009a)	3	10
Collins 1998	0	11

2.1.2. Previous Aboriginal archaeological investigations near the boundary of the project between Woodburn and Ballina

Piper (1982) conducted a cultural heritage assessment of a proposed 66 kilovolt transmission line near Iluka for the Northern Rivers County Council. A total of two Aboriginal sites were identified during the survey and consist of an artefact scatter and shell midden.

Byrne (1985) produced a background report for the management of Aboriginal archaeological resources in the Ulmarra Shire Council. Byrne (1985) assessed the archaeological potential of the four landforms within the study area (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 will be the most common Aboriginal site type and will be located on high ground in and around the periphery of the floodplain. A previously recorded bora ground and burial site indicate that there is a likelihood of find other such sites in this 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 length of the Orara. Site density will 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 will 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 sclerophyll country along the coast. Finally, small fish traps and burials may also occur within the region.

Piper (1999) conducted an Aboriginal cultural heritage assessment of land on the Pacific Highway at North Ballina for David Ardill & Associates. No Aboriginal sites were identified during the survey which the authors attributed to poor surface visibility. Furthermore, as the study area consisted of poorly drained floodplain, the archaeological potential for Piper's study area was low.

Piper (1997) conducted an Aboriginal cultural heritage assessment of land 5 kilometres southwest of Ballina along the Pacific Highway for David Ardill & Associates Pty Ltd. No Aboriginal archaeological material was identified within his study area which has been subject to ground disturbance in the past.

Piper (2000) conducted an Aboriginal cultural heritage assessment of two parcels of land fronting Manly St in East Ballina, New South Wales (NSW) for Kovalan Pty Ltd. Two shell scatters were identified (Manly St 1 and Manly St 2). Subsequently, Piper and Collins (2001) conducted sub-surface excavation of the shell scatters. In 31 per cent of auger holes excavated at Manly St 1 that contained shell, the material was mixed with European materials (glass, metal, gravel and plastic) indicating that extensive disturbance has taken place at the site. In addition to the shell material, three stone artefacts were also recovered and consist of flakes manufactured from white chalcedony. Surface stone artefacts were also identified at the Manly St 1 and consist of basalt flake, a basalt multi-platform core, a basalt single platform core and a chert core tool. No sub-surface archaeological material was identified at Manly St 2.

Table 2-2 Previous archaeological investigations in general 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.
Gollan and Bowdler 1983	Numerous	Relatively few Aboriginal sites are recorded in the forest environment of the Crown timberlands of the NSW North Coast.

Reference	Aboriginal sites	Results / conclusions
Navin and Officer 1990	39 artefact scatters 4 scarred trees 4 rock shelters 3 quarry sites (silcrete) 6 isolated finds	Fewer sites were identified on the lowland hills compared to the rangelands. The authors attributed this to the effects of European land-use and aggrading landforms. Furthermore, stream flats and elevated ground adjacent to wetlands or floodplains was considered the most archaeological sensitive locations with the exception of rock shelters.
Piper 1998	0	The Pacific Highway upgrading corridor immediately south of the study area 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 1998	0	-
Appleton and Beck 1995	0	-
Davies 1993	0	-

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

- Previous survey results in and adjacent to the boundary of the project (see above).
- Distribution patterns of known sites and site types in each landform (see above and 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 2-3 shows the predictive model for Aboriginal archaeological sites within the boundary of the project. It should be noted that sensitivity ratings in Table 2-3 relate to the likelihood of finding Aboriginal archaeological sites, not necessarily the significance of any site found there. 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 obtrusive (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 mapping undertaken by OEH is also useful to review here. This mapping 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[1] on specific site types.

Appendix G includes a series of maps previously provided by OEH that show the results of this predictive mapping 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 mapping. For example, logging will have a significant impact on the distribution of scarred trees, but a more moderate impact on artefact scatters. This mapping is useful as a supplementary overview of the boundary of the project and surrounding region, and generally accords with Table 2-3, however this mapping may not be sensitive enough to capture smaller scale variability, as it is designed at a regional scale. The predictive model presented in Table 2-3 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 2-3 Landforms where Aboriginal archaeological sites are likely to occur within the boundary of the project between Woodburn and Ballina

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
8, 9, 10	Coastal Barriers	Sand plain characterised by low-relief dunes and swales.	Woodburn to Ballina	Un-mined sand rises and creeks, gullies and swamps.	H	Stone artefact scatters, middens, bora/ceremonial rings and burials.	Aboriginal sites may have been covered by shifting sands and vegetation.
8, 10, 11		Poorly drained swamps		On margins of swamps.	M-H	Stone artefact scatters	-
9, 10	Coastal Ramp	Low relief erosional landscape of rolling hills, undulating rises and low gradient slopes.	Woodburn to Ballina: Forms the eastern edge of the Blackwall Range which extends southwards from the Alstonville Plateau and forms outlying hills around Broadwater	Foot slopes and crests of rises and low spurs that offer level ground close to creeks and wetlands especially where these elements supported schlerophyll forest rather than rainforest. Larger campsites may potentially exist on flat creek banks.	M-H	Isolated stone artefacts and small stone artefact scatters, and scarred trees	Disturbance due to land clearance, cattle trampling, cane cultivation, quarrying, house construction and erosion.
8, 9, 10, 11	Richmond Alluvial Plain	Alluvial plain of low lying flat terrain, approximately 5 metres above sea level. Area has been drained, cleared and extensively cultivated.	Woodburn to Ballina: Richmond River	Locally elevated rises, particularly those on swamp/forest ecotones and the banks of swamps and estuaries.	L-M	Stone artefact scatters and isolated artefacts	Erosion and disturbance in the historical period due to land-clearance.

2.2.1. Expected site types within the boundary of the project

The predictive model for site types developed for the region (Table 2-3) indicates that certain site types are more likely to be prevalent in the landscape. The degree of preservation and intactness will vary dependent on historical and current land use and the nature of the site. The maps generated from the OEH predictive modelling (Appendix G) show that there has been substantial disturbance of Aboriginal archaeological sites within the boundary of the project from post1750 land-use practices. This is particularly pronounced for scarred trees, burials and shell middens. However, the model outputs also show that these site types may persist within a number of areas both within and outside the boundary of the project.

Site types likely to persist within the boundary of the project are described in Table 2-4.

Table 2-4 Summary of potential site types within the boundary of the project between Woodburn and Ballina

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 will 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 Ramp, and Coastal Barriers (see Table 2-3 for general locations of sensitive areas).
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. 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 to be located. 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). The most likely locations of scarred and carved trees in the boundary of the project are within areas of extant mature native trees, such as east of Wardell Road, and road reserve or private property adjacent to National Parks and State Forests.

Site type	Description
Burials	Burials are most commonly found in soft sandy, alluvial deposits. This tends to be 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. The most likely locations of 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 Barrier 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. The most likely locations for middens in the boundary of the project are in the vicinity of river and creek banks and swamps, such as Evans River and Richmond River.
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, for example near Bingall Creek and just outside the boundary of the project around Cooks Hill. The most likely location for bora sites in the boundary of the project are on the flat raised alluvial terraces of Bingall Creek, or around Cooks Hill.
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 the Richmond River). 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 Gumbaynggir people as having ceremonial significance and are often found in relatively high and/or inaccessible places such as mountain peaks and coastal headlands. The most 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. The most likely locations of 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; 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 Woodburn to Ballina section in four phases 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, survey was undertaken by Collins (2005) for the route selection stage of the Woodburn to Ballina Pacific Highway Upgrade. Through community consultation and analysis of the report it was determined that approximately 20 per cent of the boundary of the project had been subject to previous survey and would not require further survey. That meant that the remaining 80 per cent of the boundary of the project required survey. It should be noted that some areas (such as some areas north and south of the Richmond River) originally surveyed by Collins (2005), were re-inspected as part of the current assessment, at the request of the traditional owners and to establish the level of sub-surface testing that would potentially be required.

3.3. Survey aims

The primary aims of the archaeological survey were:

- To improve the survey coverage of the boundary of the project.
- To identify sites and areas of PADs within the boundary of the project.
- To 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 boundary of 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
- 2 to 4 August 2011
- 4 to 7 October 2011
- 25 October to 22 December 2011 (various dates throughout the sub-surface testing program).
- 7 March 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 methodology worked well with site officers from registered Aboriginal stakeholders working together during the survey.

Table 3-1 Survey personnel (Woodburn to Ballina)

Organisation	Name	Role	Dates of participation
Jali LALC	Marcus Ferguson	Senior Aboriginal Site Officer	23-24 August 2010 2-4 August 2011 4 October 2011 20 December 2011 7 March 2012
Jali LALC	Dean Bolt	Senior Aboriginal Site Officer	24-25 August 2010 2-4 August 2011 4 October 2011 20 December 2011 7 March 2012
Burabi Aboriginal Corporation	Lois Cook	Senior Aboriginal Site Officer	2-4 August 2011 7 March 2012
Burabi Aboriginal Corporation	Dwaine Cook	Trainee Aboriginal Site Officer	2-4 August 2011 7 March 2012
Alliance	Joseph Brooke	Supervisor/ Archaeologist	23-27 August 2010 2-4 August 2011 4-7 October 2011

Organisation	Name	Role	Dates of participation
Alliance	Andrew Costello	Supervisor/ Archaeologist	23-27 August 2010 2-4 August 2011 4-7 October 2011
Alliance	Robyn Jenkins	Supervisor / Archaeologist	23-27 August 2010 20 December 2011
Alliance	Vanessa Edmonds	Supervisor/ Archaeologist	23-27 August 2010 20 December 2011 7 March 2012
Alliance	Erica Weston	Archaeologist	4-7 October 2011
Alliance	Clair Davey	Archaeologist	7 March 2012
Alliance	Rani Attwood	Archaeologist	23-27 August 2010
Alliance	Morgan Wilcox	Archaeologist	20 December 2011

3.5. Survey methodology

The field program focused approximately on the 80 per cent of the boundary of the project, which had not previously been surveyed. 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 sites officers undertook a pedestrian survey in five to 10 metre wide transects across each survey area.
- Particular attention was given to areas of 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 15 per cent of the entire boundary of the project was extensively impacted 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 boundary of the project comprised of land where there was varying degrees of potential for Aboriginal heritage material (as per the predictive model in Table 2-3).

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.

3.5.1. Ground penetrating radar

Ground penetrating radar (GPR) survey was undertaken by MALA GPR at the Gumi site to explore the potential for a stone arrangement and/or a burial to be located below the surface on the mound identified there on 22 March 2012. The GPR data was collected by manually moving a high level GPR array systematically over the mound. Marcus Fergusson (Site Officer, Jali LALC), Dean Bolt (Site Officer, Jali LALC), Lois Cook (Site Officer, Burabi Aboriginal Corporation) and Vanessa Edmonds (Lead Archaeologist, SKM) assisted with the survey. Technical specifications of the equipment used along with the entire GPR report can be found in Appendix P.

3.6. Survey coverage

Within the Woodburn to Ballina section, 80 per cent of the boundary of the project had not previously been surveyed. The majority (77 per cent) of the Woodburn to Ballina boundary of the project has now been subject to field survey (Figure 3-1), with only a small portion of assessment undertaken from property boundaries for Aboriginal heritage potential. The remainder of the boundary 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.

The main constraints to survey coverage were property access permission and vegetation cover (such as sugar cane plantation and heavily water-logged properties); 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 sites officers and observations, topographic data, and predictive modelling.

Table 3-2 provides details of survey areas, including visibility for each survey area. Maps in Appendix I show the survey coverage. Survey coverage falls under the following three categories:

- Small amounts of survey which were undertaken for projects other than the Pacific Highway Upgrade Program.
- Pre-2010 Pacific Highway Upgrade Program survey, which was undertaken for the project, though prior to 2010.
- 2010 - 2012 Pacific Highway Upgrade Program survey.

Table 3-2 Survey coverage of the boundary of the project between Woodburn and Ballina

Land system	Boundary of the project area (m^2)	Survey coverage (m^2/%)	Visibility	Exposure	Effective Coverage (m^2/%)
Coastal Barriers	489,456	439,967 (90%)	50%	20%	43,996.75 (10%)
Coastal Ramp	490,504	426,550 (87%)	40%	10%	17,062.01 (4%)
Richmond Alluvial Plain	3,012,165	2,225,470 (74%)	30%	10%	66,764.11 (3%)
Total	**4,408,662**	**3,091,988 (77%)**	**34%**	**11%**	**127,822.86 (3%)**

Based on OEH predictive mapping, the boundary of the project traverses several areas that are considered high priority survey areas, that is areas that up to the assessment had not been surveyed and similar landforms had had little survey coverage in the region. Following from this assessment, all of the high priority survey areas within the boundary of the project have been surveyed.

Generally, the surface visibility and sub-surface exposure encountered across the boundary of the project (see Table 3-2) was good (average of 30 per cent visibility and 11 per cent exposure). Due to the relatively low effective coverage (three per cent), sub-surface testing was recommended. The coverage was comprehensive for extrusive site types (eg scarred trees, rock shelters), but limited for the less obtrusive and sub-surface site types (eg stone artefacts, middens, burials). However, areas where these sites are likely to occur were identified as PADs and were assessed during the sub-surface testing program (see Chapter 4 below).

3.7. Survey results

As a result of the several phases of survey for the current boundary of the project and the Collins (2005) route options survey, 14 new Aboriginal archaeological sites (Gittoes-Jali, Gittoes Jali 2, Gittoes Jali 3, E2/2, Gumi, Melino Artefact Scatter, Melino Scarred Tree 4, MST3, C21, MSRT2, MST1, Rudgley Scarred Tree, and Saezza 1) and 18 new PADs that were not yet sites, were identified near or within the Woodburn to Ballina boundary of the project (Table 3-3, Figure 3-1, Figure 3-2, Figure 3-3 and Figure 3-4). The 13 sites comprise three isolated artefact sites, two artefact scatters, seven scarred trees, and one was an artefact scatter/shell midden deposit.

Potential Archaeological Deposit components were identified with four of the sites (Gittoes Jali, Gumi, Melino Site and Saezza 1), due to the potential for sub-surface deposits to be present at these sites. With previously identified sites, this totals 22 areas identified as PADs (either stand-alone PADs, or PADs associated with sites) near or within the boundary of the project. However, following survey, it was determined that Tuckombil Canal PAD, which had previously been identified from a property boundary assessment, was not likely to contain sub-surface archaeological deposits, and was consequently determined to not be a PAD, which adjusts the total number of PADs to 21. Further, it should be noted that although located on separate spurs, Rudgley PAD 1a and 1b are dealt with as one PAD as the landform that both occur on is directly connected just outside the boundary of the project.

Despite several attempts to do so, the bora site (Cooks Hill, Broadwater; AHIMS ID 13-1-0038 and ID 13-1-0010) could not be relocated – neither within the boundary of the project, nor in the immediate vicinity. It is believed that this site has either been destroyed, or is located further afield into Broadwater National Park. It is included in Table 3-3, but excluded from future discussion here as has not been able to be located inside the boundary of the project, nor in the immediate vicinity.

Gumi was subject to GPR survey, which although inconclusive, suggests that there is not likely to be a stone arrangement at Gumi. One area within the mound at Gumi was highlighted as possibly having more potential to contain a burial (Appendix P), but further scrutiny of the cross-section results (Appendix P) suggests that this area has similar variation as general variation across the mound, and is thus no more or less likely than other parts of the mound (Denis Gojak pers. comm. April 2012). Table 3-3 summarises all identified archaeological sites and PADs near or within the boundary of the project.

With the discounting of Tuckombil Canal PAD and excluding Cooks Hill, Broadwater on the basis that is not near the boundary of the project, there are 28 sites/PADs near or within the boundary of the project between Woodburn and Ballina. Twenty-one of these are either sites with PAD components or are stand-alone PADs. All PADs identified to date are landform based, and are prominent raised landforms; such as ridges, spurs and terraces; and/or adjacent to or overlooking water resources, such as waterways or swamps.

Table 3-3 Archaeological sites and PADs near or within the boundary of the project between Woodburn and Ballina

Project section	AHIMS ID	Name	Site type(s)	Description	Landscape unit	Potential archaeological sensitivity*	Method of identification	Near or within
8	09-1-0207	Tuckombil Canal PAD	PAD	Located on flat land either side of Tuckombil Canal (previously Evans River).	Richmond alluvial plain	Low-Moderate	Initially identified from boundary assessment, then 2011 ground survey confirmed that this was not a PAD	N/A
8	09-1-0204	PAD 6	PAD	Connected to PAD 7 to north; low southern end of sandstone ridge, overlooking swampy floodplain. Includes a spring on lower slopes of western face.	Coastal ramp	Low-Moderate	2010 ground survey	Within
8	09-1-0205	PAD 7	PAD	Connected to Gittoes Jali site to north and PAD 6 to south; low saddle in sandstone ridge, some previous disturbance.	Coastal ramp	Low-Moderate	2010 ground survey	Within
8	09-1-0203	Gittoes Jali	Isolated artefact and PAD	'Chopper-like' core artefact. PAD is prominent sandstone ridge with areas of outcropping stone. Overlooking Richmond River and floodplain. Good vantage to surrounding landscape, including Cooks Hill, Evans River and towards coast. Connected to PAD 7 to south.	Coastal ramp	Moderate	2010 ground survey	Within
8	TBA	Gittoes Jali 2	Artefact scatter	Two sandstone artefacts located on a floodplain near an ephemeral floodway that probably represents an old waterway.	Coastal ramp	Low	2012 ground survey	Within

Project section	AHIMS ID	Name	Site type(s)	Description	Landscape unit	Potential archaeological sensitivity*	Method of identification	Near or within
8	TBA	Gittoes Jali 3	Isolated artefact	The site consists of one flaked river cobble located on the middle slopes of a steep hill, overlooking the Richmond River floodplain.	Coastal ramp	Low	2012 ground survey	Within
9	13-1-0190	PAD 13	PAD	Long low sandy rise above floodplain and adjacent old coast lines.	Coastal barriers – sand plain (dune)	Moderate	Initially identified from boundary assessment, then 2011 ground survey	Within
9	13-1-0188	PAD 10	PAD	Upper slopes and flat crest of rise, continuation of PAD 8 on western side of Evans Head Road.	Coastal barriers – sand plain (dune)	Low-Moderate	2010 ground survey	Within
9	13-1-0187	PAD 8	PAD	Upper slopes and flat crest of rise, approximately 1 kilometre from Cooks Hill.	Coastal barriers – sand plain (dune)	Low-Moderate	2010 ground survey	Within
9	13-1-0189	PAD 11	PAD	Slopes of Cooks Hill, adjacent Richmond River Floodplain and previous coastlines. Potential for human remains, artefact material and other archaeological material.	Coastal barriers – sand plain (dune)	Moderate	2010 ground survey	Within
9	13-1-0109	E2/2	Artefact scatter, shell deposit and PAD	Flat sandy raised area, adjacent Cooks Hill and Richmond River floodplain. Some heavy disturbance in parts due to sand extraction. Associated with artefacts and midden material, and adjacent to bora ground in Broadwater National Park. Potential for human remains.	Coastal barriers – sand plain (dune)	Moderate-High	Previously surveyed – also re-inspected in 2011 ground survey	Within

Project section	AHIMS ID	Name	Site type(s)	Description	Landscape unit	Potential archaeological sensitivity*	Method of identification	Near or within
9	13-1-0038 and 13-1-0010	Cooks Hill, Broadwater	Ceremonial ground (Bora ring)	A bora ring located on the top of a sand rise near the boundary of existing sand quarry and Broadwater National Park. Duplicate records exist on the AHIMS register, and are considered one site for this project. Site was apparently identified last in the late 1990s, but has not been able to be relocated in current investigations, and has either been destroyed, or is located further east into Broadwater National Park than current recorded location.	Coastal barriers – sand plain (dune)	Moderate-High	Previously surveyed – also attempted re-inspection in 2010 and 2011 ground survey – could not be relocated near or within the boundary of the project	Neither near nor within the boundary of the project
10	04-4-0180	Gumi	Scarred tree and PAD	Scarred tree with associated mound. Not likely to contain stone arrangement as originally thought, due to GPR survey results. There does, however, remain potential for a burial to be located within the mound.	Coastal ramp	Moderate-High	2011 ground survey 2012 GPR survey	Within
10	TBA	Melino Artefact Scatter	Artefact scatter	This site comprises three flaked and ground stone artefacts found in a disturbed context amongst some animal pens at the bottom of a steep ridge.	Coastal ramp	Low-moderate	2012 ground survey	Within
10	04-4-0168	Law PAD	PAD	Located on a lower slope	Coastal ramp	Moderate	2011 and 2012 ground survey	Within
10	04-4-0166	Melino Scarred Tree 4	Scarred tree	A slab scarred tree that has been burnt out. Remnant axe marks can be identified on the bottom of the scar	Coastal barriers – sand plain (dune slopes)	Low	2010 ground survey	Within

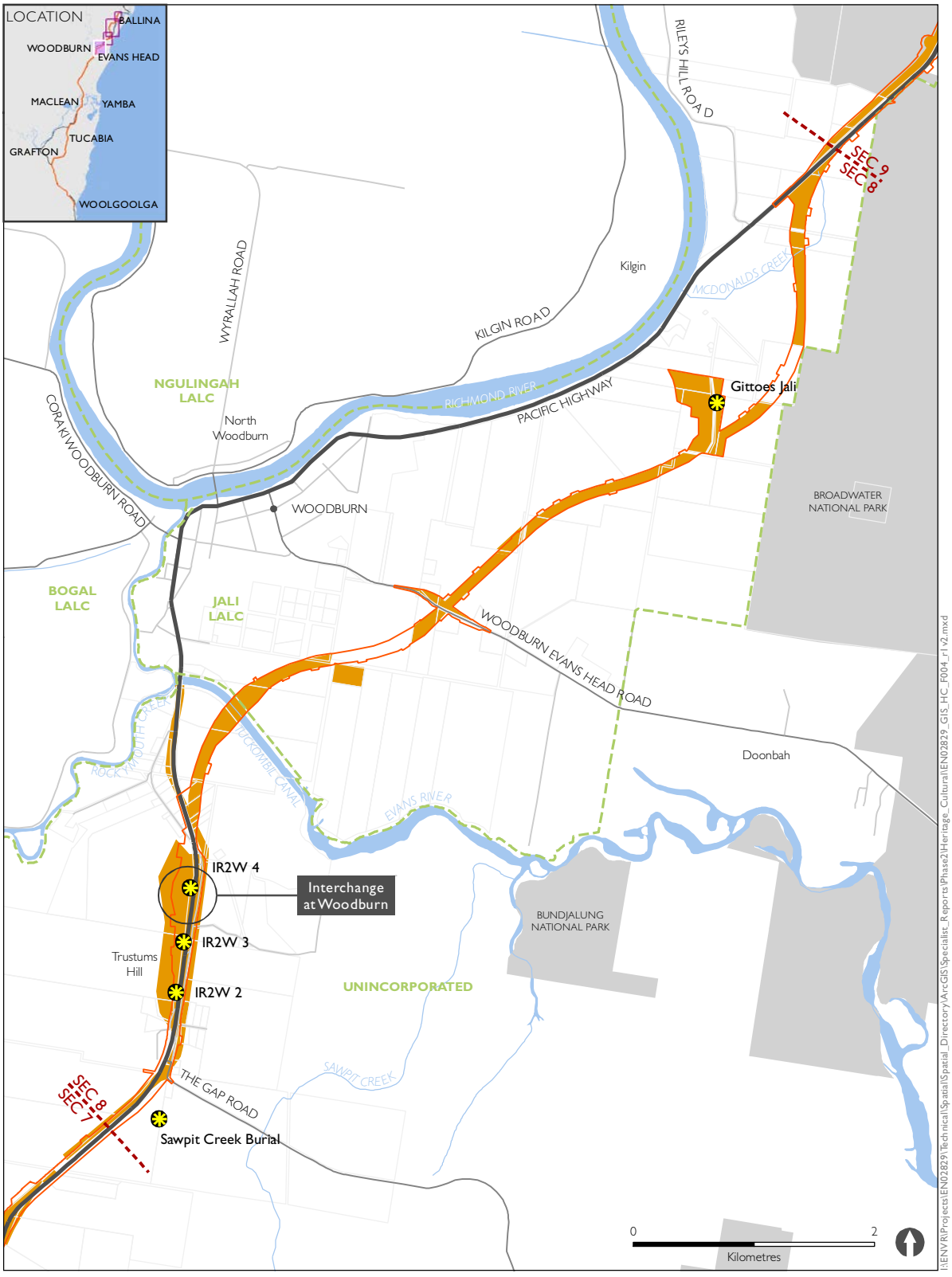
Project section	AHIMS ID	Name	Site type(s)	Description	Landscape unit	Potential archaeological sensitivity*	Method of identification	Near or within
10	04-4-0173	Melino Site	Artefact scatter and PAD	There are two distinct landforms within this site, which is located near the floodplain for the Richmond River. One is the upper slope of a hill and the second is a relatively flat sandy area that likely represents the crest and upper slopes of a low, deflated sand dune. The area is cleared with scattered trees and is surrounded by open woodland	Coastal barriers – sand plain (dune slopes)	Moderate-High	2010 ground survey	Within
10	04-4-0131	MST3	Scarred tree	Mature brush box tree, with epicormic growth and steel axe-marks.	Coastal barriers – sand plain (dune slopes)	Low	Collins (2005) survey – also re-inspected in 2011 ground survey	Within
10	04-4-0107	C21	Scarred tree	Mature brush box tree, with epicormic growth and steel axe-marks.	Coastal barriers – sand plain (dune slopes)	Low	Collins (2005) survey – also re-inspected in 2011 ground survey	Within
10	04-4-0130	MSRT2	Scarred tree	Mature brush box tree, with steel axe-marks.	Coastal barriers – sand plain (dune slopes)	Low	Collins (2005) survey – also re-inspected in 2011 ground survey	Within
10	04-4-0129	MST1	Scarred tree	Mature brush box tree, with axe-marks. Located outside the boundary of the project.	Coastal barriers – sand plain (dune slopes)	Low	Collins (2005) survey – also re-inspected in 2011 ground survey	Near
10	04-4-0178	PAD 2	PAD	Flat sandy rise adjacent Bingall Creek and low-lying swampy area (Richmond River floodplain).	Coastal barriers – sand plain	Moderate	2010 ground survey	Within

Project section	AHIMS ID	Name	Site type(s)	Description	Landscape unit	Potential archaeological sensitivity*	Method of identification	Near or within
10	04-4-0175	PAD 3	PAD	Flat sandy rise adjacent Bingall Creek and low-lying swampy area (Richmond River floodplain). Possible bora location.	Coastal barriers – sand plain	Moderate	2010 ground survey	Within
10	04-4-0132	PAD 4	PAD	Low saddle at the end of ridge-spur overlooking low-lying swampy area (Richmond River floodplain).	Coastal ramp	Low-Moderate	Initially identified from boundary assessment, then 2011 ground survey	Within
10	04-4-0179	PAD 1	PAD	Low, flat, raised sandy area at the end of the foot slopes of the Blackwall Range and the edge of low-lying swampy area (Richmond River floodplain).	Coastal ramp	Moderate	2010 ground survey	Within
10	04-4-0171	Rudgley Cultural PAD	PAD	Extending from Rudgley Scarred Tree to an isolated rock to the east. The PAD extends from the base of the Blackwall Range, east across a thin alluvial plain, sloping slightly up to a raised sandy plain. Area is currently grazed.	Coastal ramp	Low-Moderate	2010 ground survey	Within
10	04-4-0170	Rudgley Scarred Tree	Scarred tree	Scarred Tree located on the lower slopes of a hill.	Coastal ramp	Low	2010 ground survey	Within
10	04-4-0169	Rudgley PAD 2	PAD	Located on a slight, sandy rise within open woodland. Flat raised deposit of white sand, overlooking an ephemeral swampy stream, and a flat alluvial plain.	Coastal ramp	Low-Moderate	2010 ground survey	Within

Project section	AHIMS ID	Name	Site type(s)	Description	Landscape unit	Potential archaeological sensitivity*	Method of identification	Near or within
10	04-4-0167	Rudgley PAD 1b Rudgley PAD 1a	PAD	Located mid-slope of a ridgeline running almost north-south. The area is cleared with woodlands to the east and west and appears to be lightly grazed. Located on the crest of a spur adjacent to natural springs and a swamp. The area is cleared with isolated trees and is bordered by woodland.	Coastal ramp	Low-Moderate	2010 ground survey	Within
11	04-4-0171	Saezza 1	Isolated artefact and PAD	Located on a small rise above a creek. The area is extremely disturbed, with a thin soil profile situated on a compact clay layer. There are also cleared areas within an open forest, and evidence of logging.	Coastal ramp	Moderate	2010 ground survey	Within
11	04-4-0172	Saezza PAD 1	PAD	Located on a flattish spur on the lower slopes of the Blackwall Range, overlooking small stream and swampy alluvial plain. Area is cleared, surrounded by open forest, and is located near a house block	Coastal ramp	Low-Moderate	2010 ground survey	Within
11	04-4-0176	PAD 12	PAD	Low deflated dune. Some disturbance by stock and agricultural activities.	Coastal barriers – sand plain (dune)	Low-Moderate	2010 ground survey	Within

*Potential archaeological sensitivities are developed from the predictive model, adjusted for prior land disturbances and proximity to cultural places.

Figure 3-1 Section 8 - Trustums Hill to Broadwater National Park - Survey coverage



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4. Sub-surface testing

4.1. Introduction

As 21 areas of PAD have been identified, according to PACHCI, and the of the DP&I Director-General's environmental assessment 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.

4.2. Aims

The aims for the sub-surface testing, within the Woodburn to Ballina section were to explore the sub-surface nature of the 20 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 Department of Planning and Infrastructure's Director-General 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 requirements.
- Undertake a small amount of 'control' excavations outside PADs to test the accuracy of the predictive model.

Table 4-1 PADs and sites near or within the boundary of the project between Woodburn and Ballina, noting requirement for sub-surface testing

Project section	Name (AHIMS ID)	Type(s)	Sub-surface testing required
8	PAD 6 (09-1-0204)	PAD	Yes
8	PAD 7 (09-1-0205)	PAD	Yes
8	Gittoes Jali (09-1-0203)	Isolated artefact and PAD	Yes

Project section	Name (AHIMS ID)	Type(s)	Sub-surface testing required
9	PAD 13 (13-1-0190)	PAD	Yes
9	PAD 10 (13-1-0188)	PAD	Yes
9	PAD 8 (13-1-0187)	PAD	Yes
9	E2/2 (13-1-0109)	Artefact scatter, shell deposit and PAD	Yes
9	PAD 11 (13-1-0189)	PAD	Yes
10	Gumi	Scarred tree and PAD	Yes
10	Law PAD	PAD	No – not impacted
10	Law Scarred Tree	Scarred tree	N/A
10	Melino Scarred Tree 4 (04-4-0166)	Scarred tree	N/A
10	Melino Site (04-4-0173)	Artefact scatter and PAD	Yes
10	MST3 (04-4-0131)	Scarred tree	N/A
10	C21 (04-4-0107)	Scarred tree	N/A
10	MSRT2 (04-4-0130)	Scarred tree	N/A
10	MST1 (04-4-0129)	Scarred tree	N/A
10	PAD 2 (04-4-0178)	PAD	Yes
10	PAD 3 (04-4-0175)	PAD	Yes
10, 11	PAD 4 (04-4-0132)	PAD	Yes
10	PAD 1 (04-4-0179)	PAD	Yes
10	Rudgley Cultural PAD (04-4-0171)	PAD	Yes
10	Rudgley PAD 2 (04-4-0169)	PAD	Yes
10	Rudgley Scarred Tree (04-4-0170)	Scarred tree	N/A
10	Rudgley PAD 1a/b (04-4-0167)	PAD	Yes
10	Saezza 1 (04-4-0171)	Isolated artefact and PAD	Yes
10	Saezza PAD 1 (04-4-0172)	PAD	Yes
10, 11	PAD 12 (04-4-0176)	PAD	Yes

4.3. Timing and personnel

Sub-surface testing for the project between Woodburn and Ballina was undertaken over the period 7 November and 23 December 2011.

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

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

Date	Alliance supervisors	Alliance archaeologists	Alliance assistants	Aboriginal site officers
7 November–13 November 2011	Joseph Brooke Andrew Costello Matthew Schlitz	Erica Weston Simon Coxe Laura Bates Clair Davey	Tristan Minter Dani Mitchell Morgan Wilcox	**Jali LALC** Marcus Ferguson Dean Bolt **Burabi Aboriginal Corporation** Lois Cook Dwayne Cook **Bandjalang Native Title Group** Daniel Wilson Doug Wilson Leonie Watson
14 November–20 November 2011	Andrew Costello	Simon Coxe, Laura Bates Anthony Hamdorf	Dani Mitchell Jonathan Minter	**Jali LALC** Marcus Ferguson Dean Bolt **Burabi Aboriginal Corporation** Lois Cook Anthony Cook **Bandjalang Native Title Group** Daniel Wilson Doug Wilson
21 November–27 November 2011	Robyn Jenkins	Laura Bates Simon Coxe Clair Davey Shoshanna Grounds	Dani Mitchell Jonathan Minter	**Jali LALC** Marcus Ferguson Dean Bolt **Burabi Aboriginal Corporation** Lois Cook Anthony Cook
28 November–4 December 2011	Robyn Jenkins Joseph Brooke	Rebecca Andrews Clair Davey Laura Bates Simon Coxe Shoshanna Grounds	Jonathan Minter	**Jali LALC** Marcus Ferguson Dean Bolt **Burabi Aboriginal Corporation** Lois Cook Anthony Cook Dwayne Cook

Date	Alliance supervisors	Alliance archaeologists	Alliance assistants	Aboriginal site officers
5 December–11 December 2011	Andrew Costello Robyn Jenkins	Rebecca Andrews Shoshanna Grounds Simon Coxe Laura Bates Jay Yost Tom Hoyle	Jonathan Minter Morgan Wilcox	**Jali LALC** Marcus Ferguson Dean Bolt **Burabi Aboriginal Corporation** Lois Cook Anthony Cook Dwayne Cook
12 December–18 December 2011	Robyn Jenkins	Rebecca Andrews Erica Weston Amanda Goldfarb Jared Brindley Shoshanna Grounds Simon Coxe Laura Bates Tom Hoyle	Jonathan Minter Tristan Minter Morgan Wilcox	**Jali LALC** Marcus Ferguson Dean Bolt Sean Bolt **Burabi Aboriginal Corporation** Lois Cook Anthony Cook Dwayne Cook **Bandjalang Native Title Group** Doug Wilson Daniel Wilson
19 December–23 December 2011	Robyn Jenkins Vanessa Edmonds	Amanda Goldfarb Jared Brindley Shoshanna Grounds	Tristan Minter Morgan Wilcox Jonathan Minter	**Jali LALC** Marcus Ferguson Dean Bolt **Burabi Aboriginal Corporation** Lois Cook Anthony Cook

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 metres squared.
- All analysis of Aboriginal objects that were uncovered during test excavation were analysed in the field.

Further excavation was undertaken following issue of the Director-General's requirements; the methodology followed for this is described in Section 4.4.1.

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 (e.g. 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. Six 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 millimetre and five millimetre gauge mesh hand 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. Additional sub-surface testing methodology

In several areas, it was identified that areas larger than 0.5 metre x 0.5 metre were required, and/or greater depths needed to be reached to be excavated to gain a better understanding of the sub-surface nature and potential of a site. This was only undertaken once the Director-General requirements were received on the 23 November 2011. All excavation was undertaken in the same manner, but the test pits were larger sizes, for example in areas where *in situ* shell midden was located it was determined that a two metre x one metre hand trench would allow a better understanding of the site to be established.

In areas of deep sand, base was not able to be reached using hand excavation. The hand excavation was supplemented with machine excavation in six areas (PAD 13, PAD 11, E2/2, Melino PAD, PAD 3 and PAD 2). Machine excavation allowed for the excavation to proceed deeper to determine the vertical extent of any Aboriginal objects. Machine excavation was undertaken using a one metre wide bucket in two metre length trenches. Due to the unstable nature of the sand, all trenches were required to be benched (stepped-out) in order for excavation to proceed to deeper levels. A mud-bucket (flat bucket blade) was used to ensure excavation was level and controlled. Soil was removed in 50 millimetre to 100 millimetre spits. All machine excavated soils were sieved through five millimetre gauge mesh on a mechanical sieve.

Recording methods were consistent throughout all types of excavation.

4.4.2. Constraints

The primary constraint was related to the restriction of the excavation methodology prior to the DP&I 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 until the Director-General requirements were issued:

- 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.

Areas in the Woodburn to Ballina section that fall into any one of the above categories included:

- PAD 11
- E2/2
- Melino PAD
- Rudgley Cultural PAD.
- However, following issue of the Director-General requirements, excavation proceeded in these areas.

General constraints included wet weather, which caused the cancellation of some fieldwork days, and property access.

Sand areas caused excavation issues, due to the inability to reach basal deposits using hand tools and 0.5 metre x 0.5 metre test pits. As a result machine excavation was required to be undertaken in six areas (PAD 13, PAD 11, E2/2, Melino PAD, PAD 3 and PAD 2) in an attempt to reach greater depths. At PAD 13 and PAD 2, machine excavation ceased soon after reaching the water table due to continual wall collapse.

An attempt was made to get the excavator to PAD 3, however, due to surrounding swamp this could not occur. This constraint meant that the excavation was unable to determine the full nature of the sub-surface deposit. However, due to the close proximity to PAD 2 and that the landform is the same between the two PADs, it is reasonable to assume that these two sites are similar in terms of their depth, nature and potential significance.

With the exception of Melino PAD, no sterile soil profile was able to be reached at PAD 2, PAD 11, PAD 13 and E2/2, as the sand continued well below two metres. This suggests rapid soil accumulation in these areas. Even with benching through additional excavation, the sand was too unstable to continue below two metres.

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

4.5. Results

A total of 19 PADs and 6 control areas were excavated within the Woodburn to Ballina section (Table 4-3). Of these 19 PADs, 11 of these contained sub-surface archaeological deposits, and of all sampled control areas, only two control areas yielded one artefact each – both artefacts were found in close proximity to sites (Table 4-4). Aboriginal objects were discovered from:

- 492 shovel test pits (0.5 metre x 0.5 metre).
- One test pit (one metre x one metre).
- One test pit (two metres x one metre).
- One test pit (3 metres x1.5 metres).
- 28 metres of mechanically excavated trenches generally 1.1 metres in width and of varying lengths.

A summary of excavations can be found in Appendix J and details in Appendix K. The locations of all excavations can be found in Appendix M, N and O.

Table 4-3 Summary of excavations and Aboriginal objects recovered during sub-surface testing

Site name (AHIMS site ID)	GPS coordinates easting/northing (MGA Zone 56)	Potential archaeological sensitivity	Landscape unit	Number (and nature) of investigations	Aboriginal objects
Gittoes Jali (plus PAD 6, and PAD 7) (09-1-0204, 09-1-0205, 09-1-0203)	537365 E / 678075 N	Moderate	Coastal ramp	131 (0.5 m x 0.5 m)	386 artefacts (chert, fine grained siliceous, cobble, basalt, chalcedony, sandstone, crystal quartz)
PAD 13 (13-1-0190)	540622 E/ 6788923 N	Low–moderate	Coastal barriers – sand plain (dune)	20 (0.5 m x 0.5 m) 4 metres x 1 metres (mechanical trenches)	None
PAD 10 (13-1-0188)	542434 E/ 6789505 N	Moderate	Coastal barriers – sand plain (dune)	18 (0.5 m x 0.5 m)	None
PAD 8 (13-1-0187)	542611 E/ 6789518 N	Low–moderate	Coastal barriers – sand plain (dune)	12 (0.5 m x 0.5 m)	None
PAD 11 (13-1-0189)	543420 E / 6790478 N	Low–moderate	Coastal barriers – sand plain (dune)	17 (0.5 m x 0.5 m) 6 metres x 1 metres (mechanical trenches)	1003 artefacts (chert, chalcedony and quartz)
E2/2 (13-1-0109)	543303 E / 6791321 N	High	Coastal barriers	40 (0.5 m x 0.5 m) 6 metres x 1 metres (mechanical trenches)	13 artefacts (chert, chalcedony, quartz, silcrete, igneous material and granite/quartzite) Shell midden (*Donax deltoides*)
Gumi PAD (04-4-0180)	542704E/ 6792472N	Moderate-high	Coastal ramp	See Appendix Q	None

Site name (AHIMS site ID)	GPS coordinates easting/northing (MGA Zone 56)	Potential archaeological sensitivity	Landscape unit	Number (and nature) of investigations	Aboriginal objects
Melino PAD (04-4-0173)	542574 E / 6792780 N	High	Coastal barriers – sand plain (dune)	87 (0.5 m x 0.5 m) 6 metres x 1 metres (mechanical trenches) 1 (1 metres x 1 m) 1 (2 metres x 1 m)	212 artefacts (basalt, chalcedony, chert, river cobble, dolerite, fine grained siliceous, quartz, quartzite, silcrete) Shell midden (*Donax deltoides*)
PAD 3 (04-4-0175)	541687 E / 6796637 N	Moderate	Coastal barriers – sand plain	8 (0.5 m x 0.5 m)	4 artefacts (chert, silicified quartz, river cobble)
PAD 2 (04-4-0178)	541674 E / 6796907 N	Moderate	Coastal barriers – sand plain	34 (0.5 m x 0.5 m) 6 metres x 1 metres (mechanical trenches)	21 artefacts (chalcedony, chert, fine grained siliceous, quartz, silcrete)
PAD 4 (04-4-0132)	542381 E / 6798427 N	Low–moderate	Coastal ramp	35 (0.5 m x 0.5 m)	15 artefacts (chalcedony, chert, silcrete)
PAD 1 (04-4-0179)	545113 E / 6799510 N	Moderate	Coastal ramp	12 (0.5 m x 0.5 m)	7 artefacts (chert)
Rudgley Cultural PAD (04-4-0171)	545505 E/ 6800055 N	Low–moderate	Coastal ramp	12 (0.5 m x 0.5 m)	None
Rudgley PAD 2 (04-4-0169)	546025 E / 6800082 N	Low–moderate	Coastal ramp	6 (0.5 m x 0.5 m)	3 artefacts (chert)
Rudgley PAD 1b and	546007 E / 6800304 N	Low–moderate	Coastal ramp	15 (0.5 m x 0.5 m)	5 artefacts (chert, chalcedony)
1a (04-4-0167)	546020 E / 6800400 N			26 (0.5 m x 0.5 m)	6 artefacts (chert, basalt)
Saezza 1 (04-4-0171)	546360 E / 6800623 N	Moderate	Coastal ramp	7 (0.5 m x 0.5 m)	60 artefacts (chalcedony, quartz and chert)

Site name (AHIMS site ID)	GPS coordinates easting/northing (MGA Zone 56)	Potential archaeological sensitivity	Landscape unit	Number (and nature) of investigations	Aboriginal objects
Saezza PAD 1 (04-4-0172)	546222 E/ 6800628	Low–moderate	Coastal ramp	2 (0.5 m x 0.5 m)	None
PAD 12 (04-4-0176)	546505 E / 6801440 N	Low–moderate	Coastal barriers – sand plain (dune)	8 (0.5 m x 0.5 m)	15 artefacts (chert)

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

Potential archaeological sensitivity	Landscape units	Number of investigations	Aboriginal objects
Low	Coastal Barriers	2 (0.5 m x 0.5 m)	None
Low	Coastal Barriers	4 (0.5 m x 0.5 m)	None
Low	Coastal Barriers	6 (0.5 m x 0.5 m)	1 artefact (chert) – near Melino PAD, deemed to be an extension of Melino Site
Low	Coastal Ramp	4 (0.5 m x 0.5 m)	None
Low	Coastal Ramp	3 (0.5 m x 0.5 m)	None
Low	Coastal Ramp	3 (0.5 m x 0.5 m)	1 artefact (chert) – near PAD 4, deemed to be an extension of Site 4

Prior to the sub-surface testing a total of ten archaeological sites had been identified (Gittoes Jali; E2/2; Cooks Hill, Broadwater; Gumi; Melino Scarred Tree 4; MST3; C21; MSRT2; MST1; Rudgley Scarred Tree; and Saezza 1).

The sub-surface testing resulted in:

- A total of 11 new archaeological sites containing sub-surface material (Table 4-3).
- Gittoes Jali was expanded to include PAD 6 and PAD 7 as the artefact scatter was continuous along all these PADs.
- Shell midden and stone artefact deposits were identified at both Melino PAD and E2/2.
- A large knapping floor was identified at PAD 11, and several *in situ* artefact scatter features at Gittoes Jali.
- Radiocarbon dating was undertaken at both Melino PAD and E2/2 (discussed in Chapter 5).
- Stratigraphic drawings were undertaken at all excavations to ensure that any changes in soil profile were accurately recorded. These can be found in Appendix L.

Figure 4-1 Overview of sub-surface testing areas

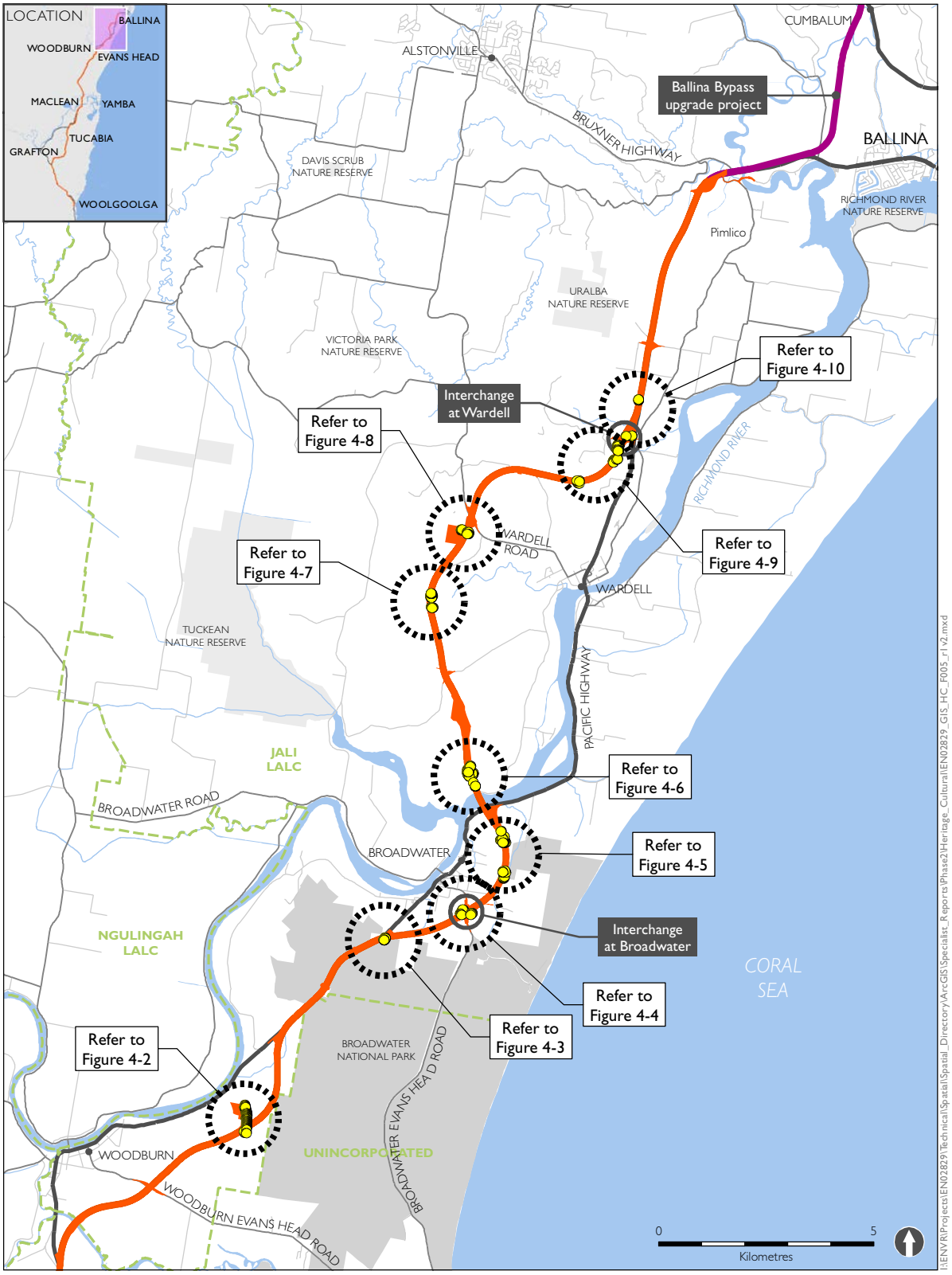


Figure 4-2 Sub-surface testing 1

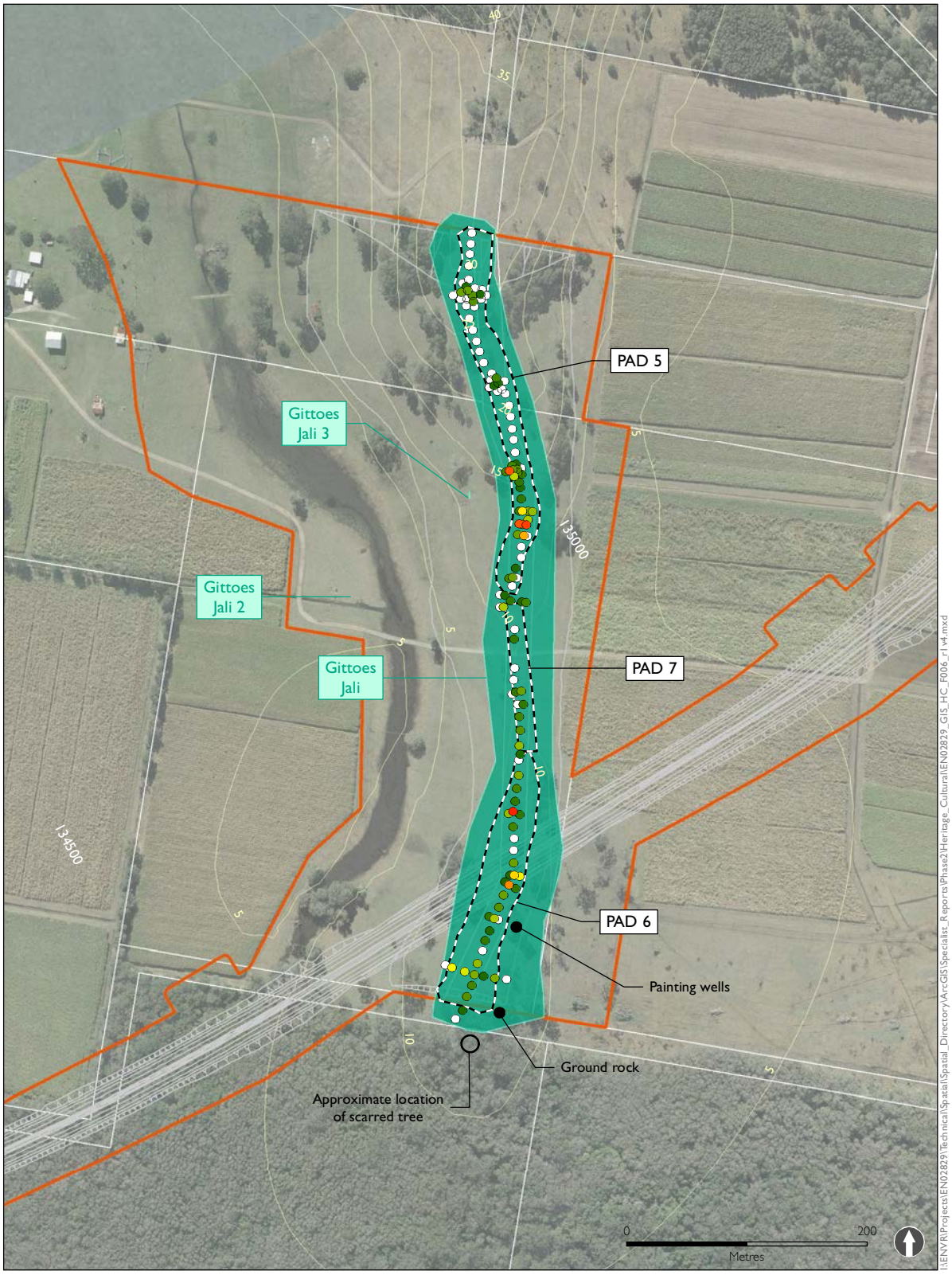


Figure 4-3 Sub-surface testing 2

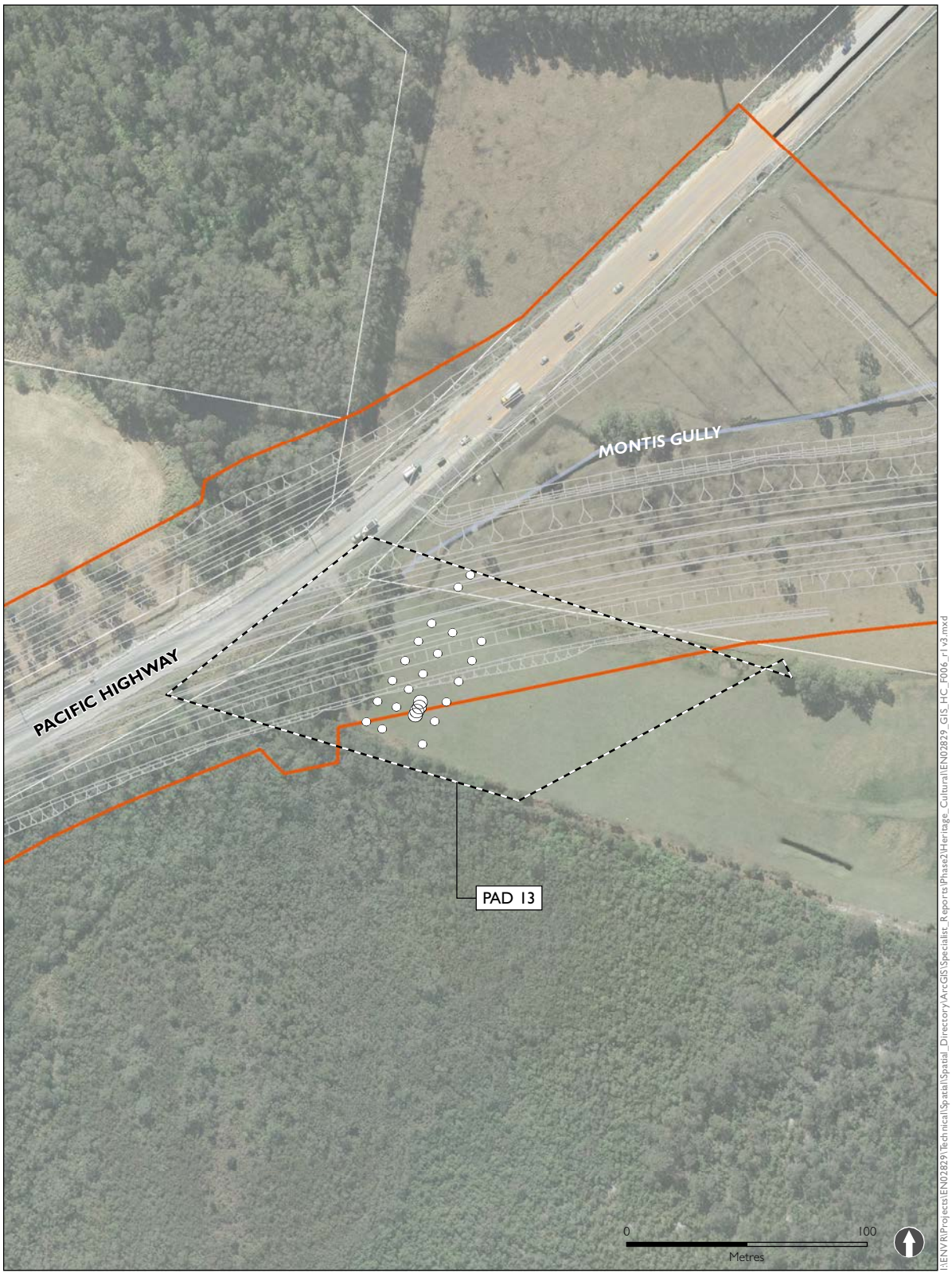


Figure 4-4 Sub-surface testing 3

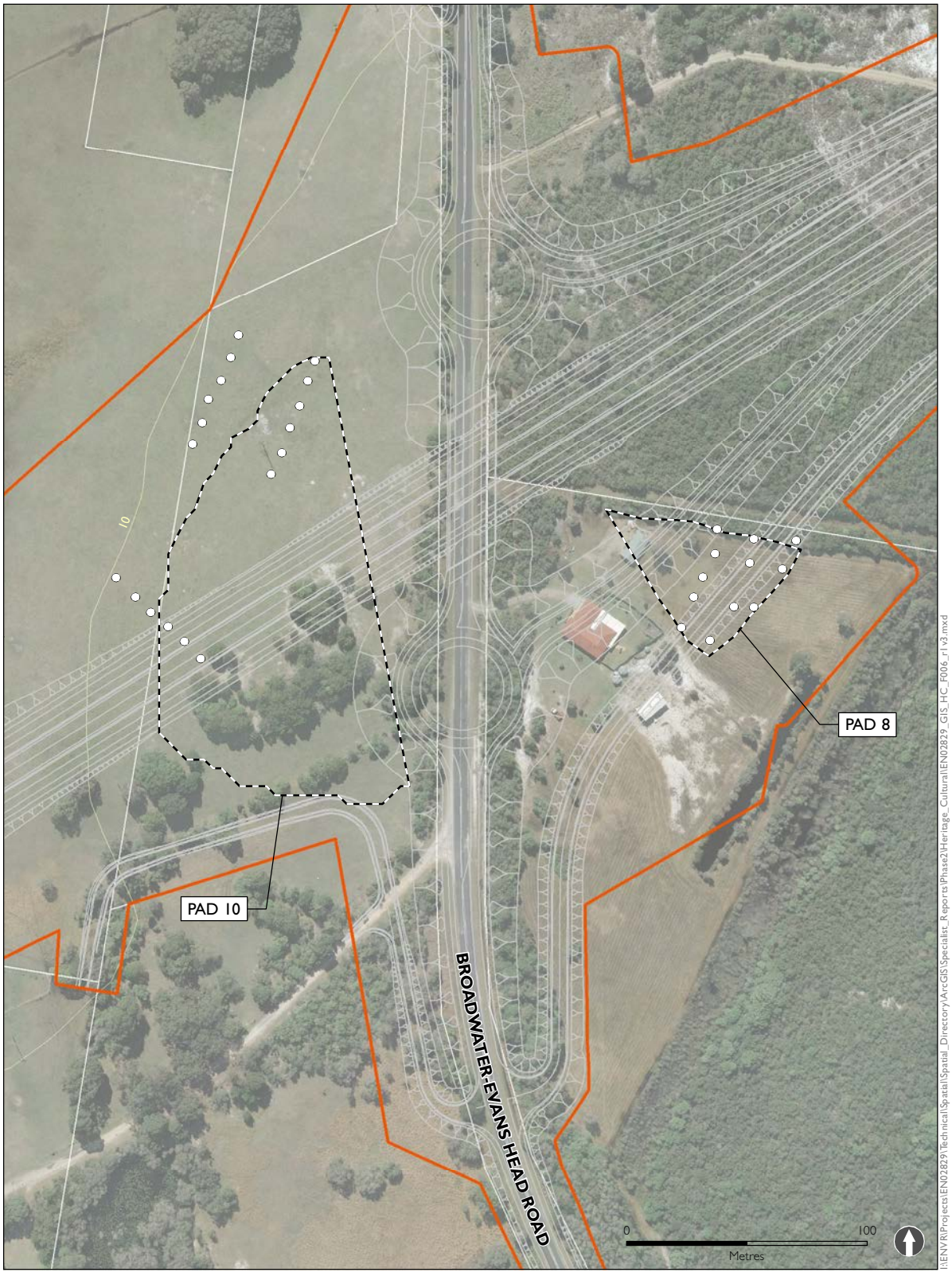


Figure 4-5 Sub-surface testing 4

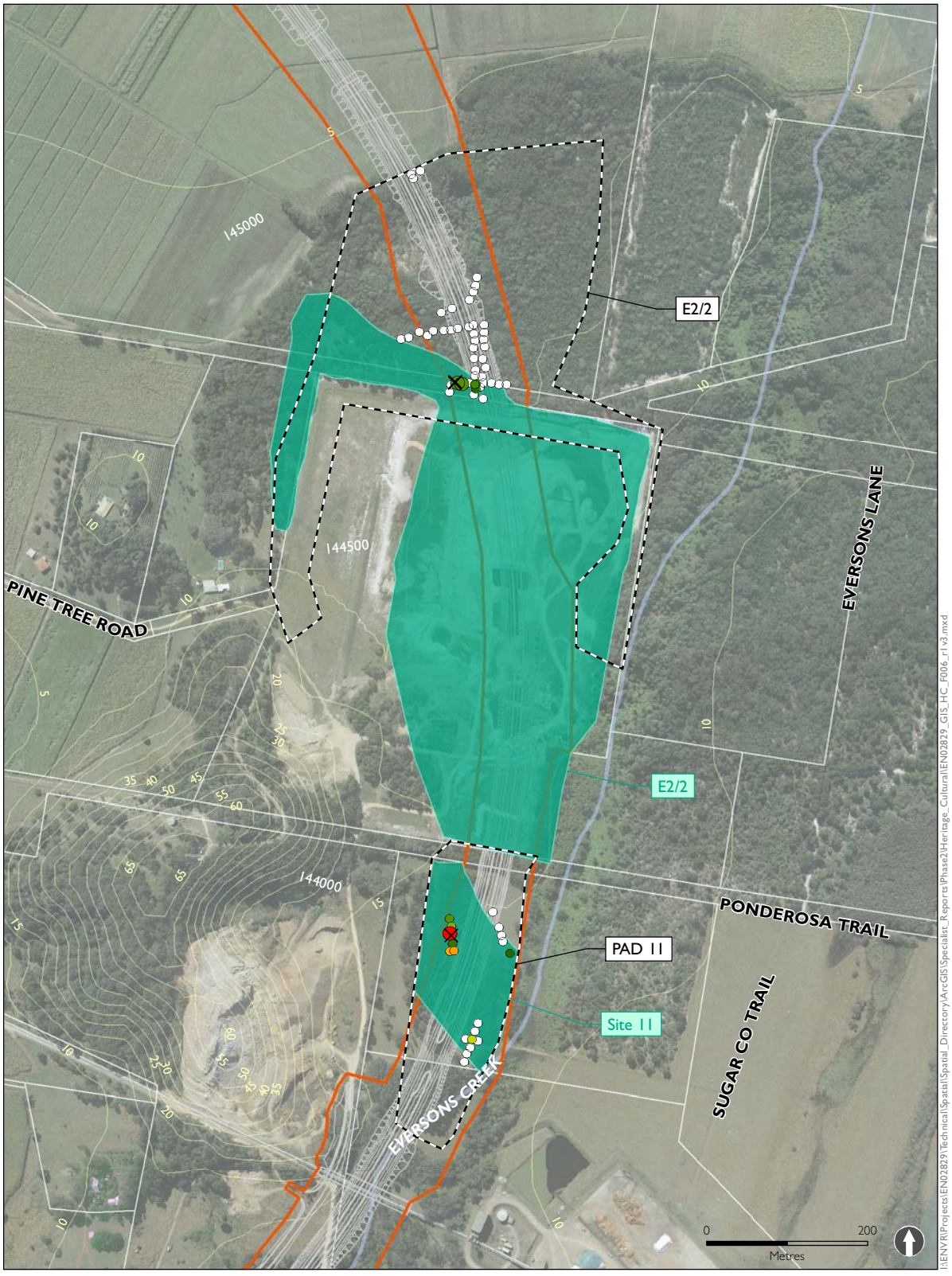


Figure 4-6 Sub-surface testing 5

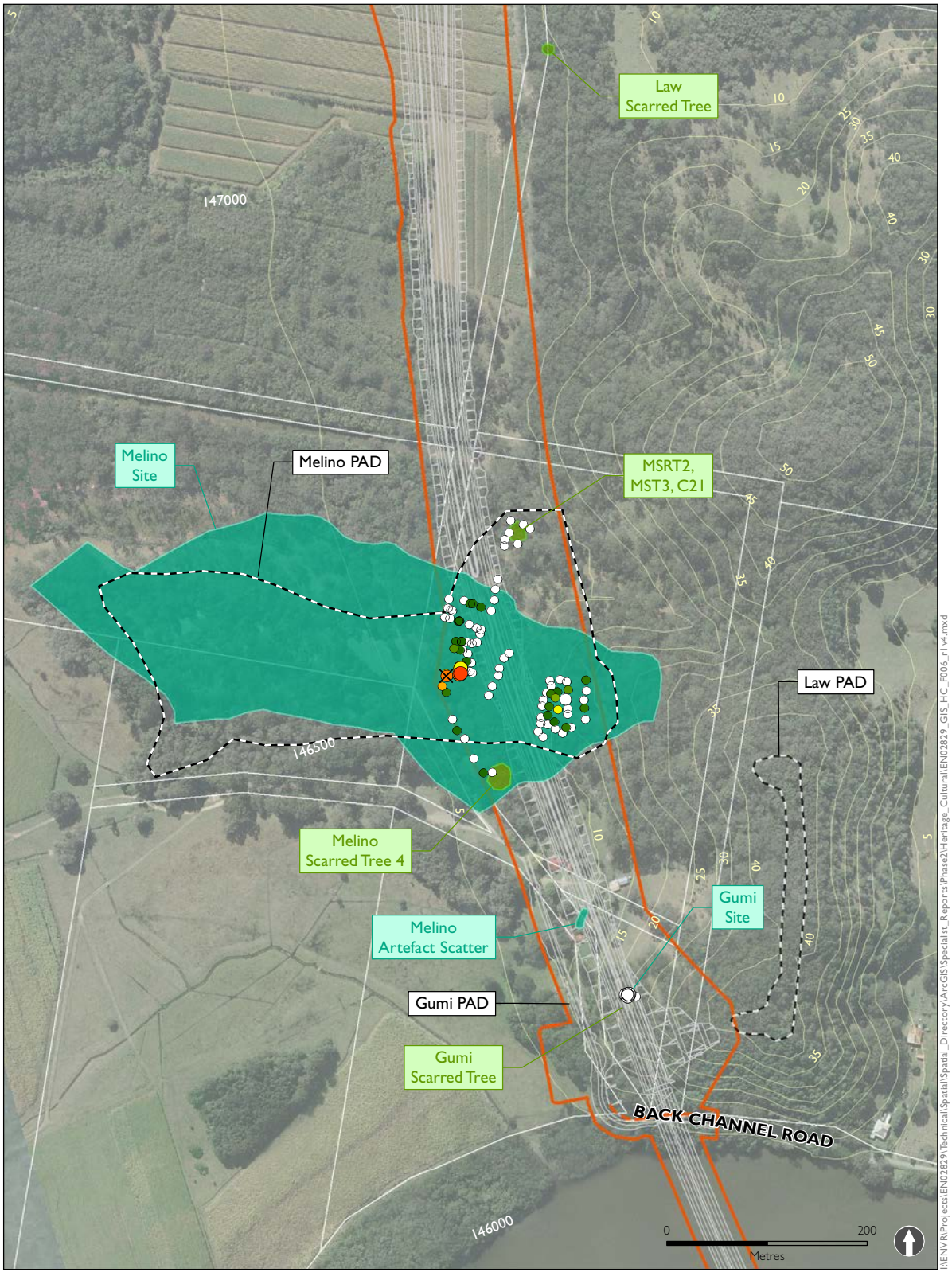


Figure 4-7 Sub-surface testing 6

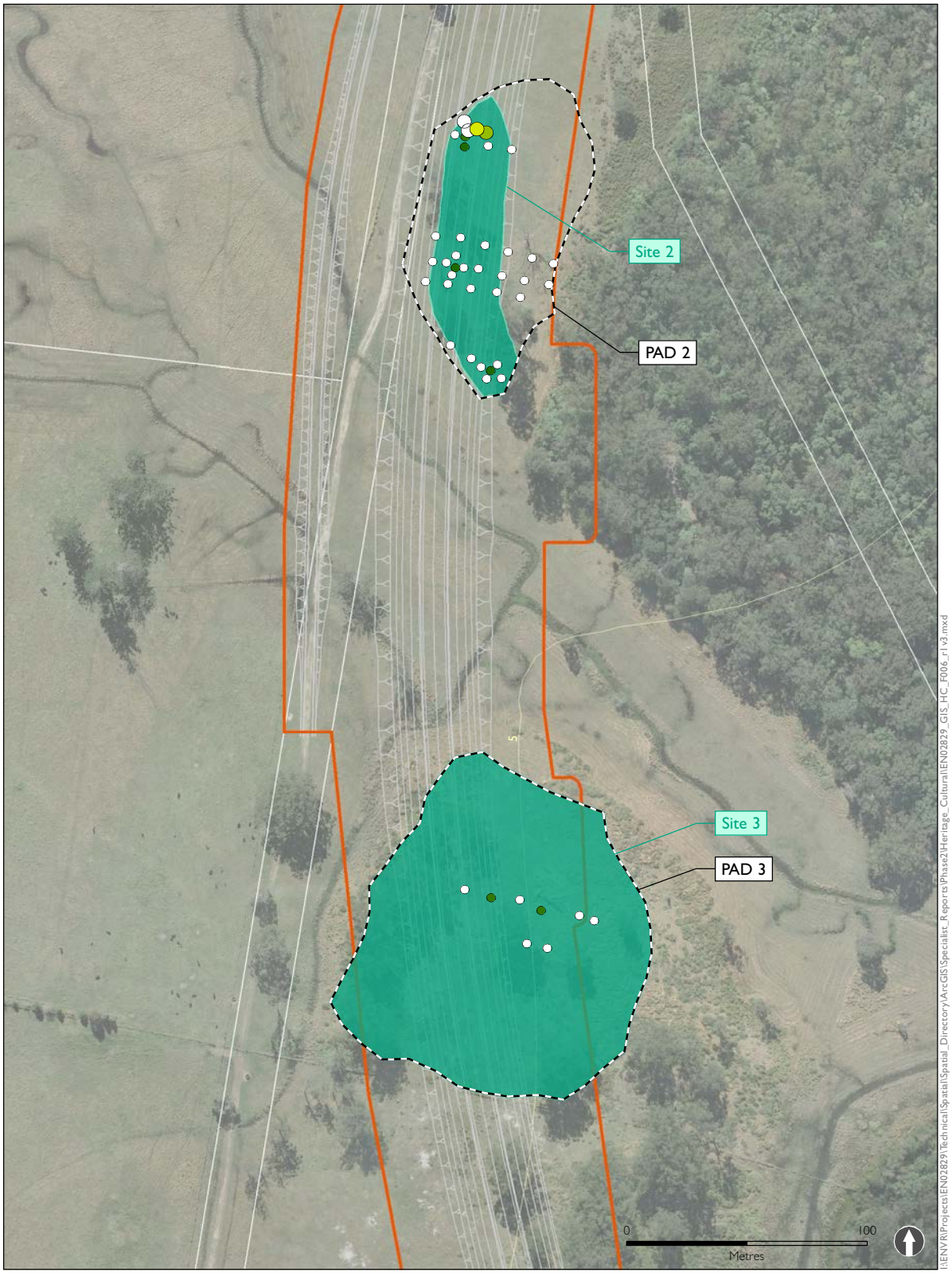


Figure 4-8 Sub-surface testing 7

Figure 4-9 Sub-surface testing 8

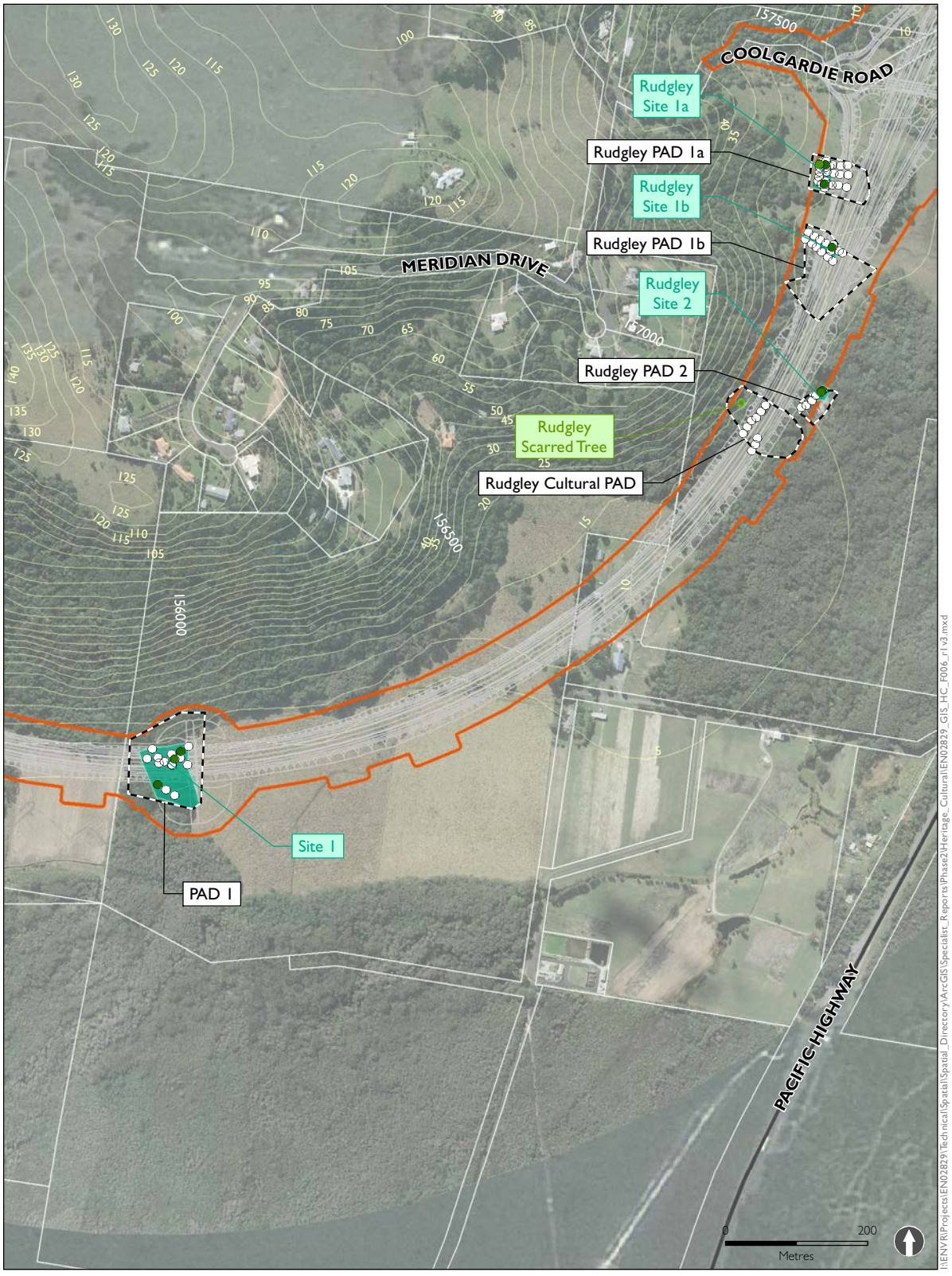
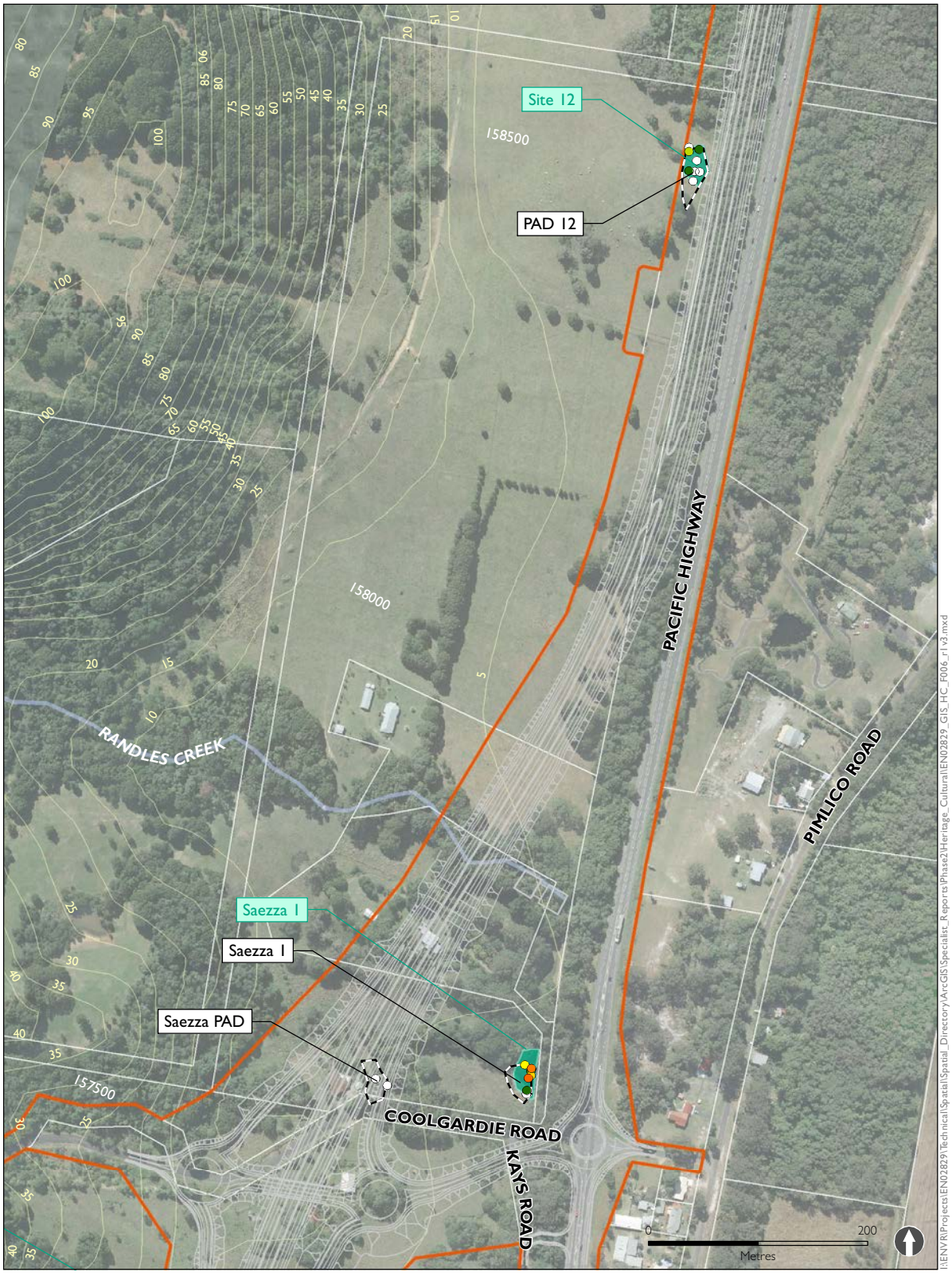


Figure 4-10 Sub-surface testing 9



5. Archaeological sites

5.1. Summary of archaeological sites

Following survey and sub-surface testing, 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 PADs outside the boundary of the project.

Table 5-1 outlines the revised status and the any 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 Woodburn and Ballina following survey or sub-surface testing

Project section	Name (AHIMS ID)	Type(s)	Description	Investigation	Updated name	New site type(s)	Near or within project
8	Gittoes Jali / PADs 5, 6, 7 (09-1-0204, 09-1-0205, 09-1-0203)	Artefact scatter	The site is situated on the crest and slope of a ridgeline. The area is cleared with clumps of trees and is currently used for grazing. Adjacent paddocks are used for farming. 411 stone artefacts (chert, fine grained siliceous, cobble, basalt, chalcedony, sandstone, crystal quartz) were recovered.	Test-excavation and survey	Gittoes Jali	Site – Artefact scatter, Paint Wells, Ground Stone, Scarred Tree	Within
8	Gittoes Jali 2 (TBA)	Artefact Scatter	Two sandstone artefacts located on a floodplain near and ephemeral floodway that probably represents an old waterway.	Survey	Gittoes Jali 2	Site - Artefact Scatter	Within
9	PAD 13 (13-1-0190)	PAD	Long low sandy rise above floodplain and adjacent old coast lines.	Test-excavation and survey	N/A	Not a site, no longer a PAD	N/A

Project section	Name (AHIMS ID)	Type(s)	Description	Investigation	Updated name	New site type(s)	Near or within project
9	PAD 10 (13-1-0188)	PAD	Upper slopes and flat crest of rise, continuation of PAD 8 on western side of Evans Head Road.	Test-excavation and survey	N/A	Not a site, no longer a PAD	N/A
9	PAD 8 (13-1-0187)	PAD	Upper slopes and flat crest of rise, approximately 1 kilometres from Cooks Hill.	Test-excavation and survey	N/A	Not a site, no longer a PAD	N/A
9	PAD 11 (13-1-0189)	PAD	Slopes of Cooks Hill, adjacent Richmond River Floodplain and previous coastlines. Potential for human remains, artefact material and other archaeological material.	Test-excavation and survey	Site 11	Site - Artefact scatter	Within
9	E2/2 / Cooks Hill 3 (13-1-0109)	Artefact scatter, shell midden & PAD	Flat sandy raised area, adjacent Cooks Hill and Richmond River floodplain. Some heavy disturbance in parts due to sand extraction. Associated with artefacts and midden material, and adjacent to bora ground in Broadwater National Park. Potential for human remains.	Test-excavation and survey	E2/2	Artefact scatter and shell midden	Within
10	Gumi PAD (04-4-0180)	Possible scarred tree and PAD	Located adjacent to the Richmond River. A single Red mahogany scar tree was located on the mid-slope of a hill.	Test-excavation, ground penetrating radar, arborist inspection, and field survey	Gumi Site	Possible scarred tree	Within
10	Law PAD (04-4-0168)	PAD	Located on a lower slope. This PAD is extends just inside the boundary of the project, but was not subject to any sub-surface investigation, as it is not likely to be impacted by this project.	Survey	Law PAD	PAD	Within

Project section	Name (AHIMS ID)	Type(s)	Description	Investigation	Updated name	New site type(s)	Near or within project
10	Law Scarred Tree (04-4-0174)	Scarred tree	Slab scarred tree, located on the lower slopes of the Blackwall Range. Shows axe marks on top and bottom.	Survey	Law Scarred Tree	Scarred tree	Near
10	Melino PAD (04-4-0173)	PAD	There are two distinct landforms within this site, which is located near the floodplain for the Richmond River. One is the upper slope of a hill and the second is a relatively flat sandy area that likely represents the crest and upper slopes of a low, deflated sand dune. The area is cleared with scattered trees and is surrounded by open woodland.	Test-excavation and survey	Melino Site	Site - Artefact scatter, shell midden	Within
10	MST3 (04-4-0131)	Scarred tree	Mature brush box tree, with epicormic growth and steel axe-marks.	Survey	MST3	Scarred tree	Within
10	C21 (04-4-0107)	Scarred tree	Mature brush box tree, with epicormic growth and steel axe-marks.	Survey	C21	Scarred tree	Within
10	Melino Scarred Tree 4 (04-4-0166)	Scarred tree	A slab scarred tree that has been burnt out. Remnant axe marks can be identified on the bottom of the scar.	Survey	Melino Scarred Tree 4	Scarred tree	Within
10	MSRT2 (04-4-0130)	Scarred tree	Mature brush box tree, with steel axe-marks.	Survey	MSRT2	Scarred tree	Within
10	Melino Artefact Scatter (TBC)	Artefact Scatter	This site comprises three flaked and ground stone artefacts found in a disturbed context amongst some animal pens at the bottom of a steep ridge.	Survey	Melino Artefact Scatter	Site – Artefact Scatter	Within
10	PAD 2 (04-4-0178)	PAD	Flat sandy rise adjacent Bingall Creek and low-lying swampy area (Richmond River floodplain).	Test-excavation and survey	Site 2	Site – Artefact scatter	Within

Project section	Name (AHIMS ID)	Type(s)	Description	Investigation	Updated name	New site type(s)	Near or within project
10	PAD 3 (04-4-0175)	PAD	Flat sandy rise adjacent Bingall Creek and low-lying swampy area (Richmond River floodplain). Possible bora location.	Test-excavation and survey	Site 3	Site – Artefact scatter	Within
10	PAD 4 (04-4-0132)	PAD	Low saddle at the end of ridge-spur overlooking low-lying swampy area (Richmond River floodplain).	Test-excavation and survey	Site 4	Site – Artefact scatter	Within
10	PAD 1 (04-4-0179)	PAD	Low, flat, raised sandy area at the end of the foot slopes of the Blackwall Range and the edge of low-lying swampy area (Richmond River floodplain).	Test-excavation and survey	Site 1	Site – Artefact scatter	Within
10	Rudgley Cultural PAD (04-4-0171)	PAD	Located on the edge of a gentle slope in cleared area with woodlands to the east and west. The area is currently grazed.	Test-excavation and survey	N/A	Not a site, no longer a PAD	N/A
10	Rudgley Scarred Tree (04-4-0170)	Scarred tree	Scar tree.	Survey	Rudgley Scarred Tree	Scarred tree	Within
10	Rudgley PAD 2 (04-4-0169)	PAD	Located on a slight, sandy rise within open woodland. The water table was encountered at 1 m.	Test-excavation and survey	Rudgley Site 2	Site – Artefact scatter	Within
10	Rudgley PAD 1b (04-4-0167)	PAD	Located mid-slope of a ridgeline running almost north-south. The area is cleared with woodlands to the east and west and appears to be lightly grazed.	Test-excavation and survey	Rudgley Site 1b and 1a	Site – Artefact scatter	Within
10	Rudgley PAD 1a (04-4-0167)	PAD	Located on the crest of a spur adjacent to natural springs and a swamp. The area is cleared with isolated trees and is bordered by woodland.	Test-excavation and survey			

Project section	Name (AHIMS ID)	Type(s)	Description	Investigation	Updated name	New site type(s)	Near or within project
11	Saezza 1 (04-4-0171)	PAD	Located on a small rise above a creek. The area is extremely disturbed, with a thin soil profile situated on a compact clay layer. There are also cleared areas within an open forest, and evidence of logging.	Test-excavation and survey	Saezza 1	Site – Artefact scatter	Within
11	Saezza PAD 1 (04-4-0172)	PAD	Located on a small sandy rise above a swamp. Area is cleared, surrounded by open forest, and is located near a house block.	Test-excavation and survey	N/A	Not a site, no longer a PAD	N/A
11	PAD 12 (04-4-0176)	PAD	Low deflated dune. Some disturbance by stock and agricultural activities.	Test-excavation and survey	Site 12	Site – Artefact scatter	Within

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 detailed 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. These key sites from south to north of the Woodburn to Ballina section are:

- Gittoes Jali.

- Site 11.
- E2/2 Site.
- Melino Site.
- Site 2.
- Site 4.
- Saezza 1.
- Site 12.

It is not possible to undertake detailed analysis of those sites with small sample sizes (few artefacts), as inferences made on these samples are not robust, consequently analysis of these sites is summary in nature.

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.

5.2.4. Key sites

This section discusses interpretations of findings at all archaeological sites located within the boundary of the project between Woodburn and Ballina. 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.

5.2.4.1. Gittoes Jali

The Gittoes Jali site broadly falls within the Richmond Alluvial Plain landscape unit. The site extends along a sandstone ridge and overlooks the Richmond River and floodplain. A known spring is present on the lower slopes of the ridgeline. Also visible from this site are distinctive landmarks, such as Cooks Hill, the Evans River and the coastline.

Identified during survey and sub-surface testing were 411 artefacts, predominately chert, but with significant quantities of basalt, chalcedony, cobble, quartzite, and silcrete (Figure 5-1). Of note was a single ‘blue agate’ which was considered to be a unique type of artefact by Aboriginal stakeholders on site during the excavation. Agate is also an uncommon raw material to be located within an archaeological deposit. The assortment of raw materials at this site indicates access to a variety of sources, some of which are potentially local, such as quartz, sandstone, cobble conglomerates and siltstones.

The majority of artefacts from Gittoes Jali were non-cortical (0 per cent cortex), with less than a third (n=106) exhibiting cortex on the dorsal surface (Figure 5-2). This indicates that the initial reduction of raw material has occurred elsewhere. Complete flakes dominated the assemblage (77.1 per cent) (Figure 5-3 and Figure 5-4). Flaked fragments (14.1 per cent) and cores (7.1 per cent) were also prevalent, indicating that knapping was occurring on this site. Broken flakes (proximal, distal and medial) account for 54.2 per cent of the flakes found on site. This may indicate trampling of artefacts during occupation at the site over time. As 13.7 per cent of the stone artefacts also showed signs of heat damage (Figure 5-5) the evidence suggests that this site was used as a camping area. It is also worth noting that only two per cent of the stone artefacts were designated as formed tools, and very few showed macroscopic signs of use-wear (Figure 5-6). The lack of post-contact materials, such as worked glass or ceramics, may indicate that the site was in use prior to this period.

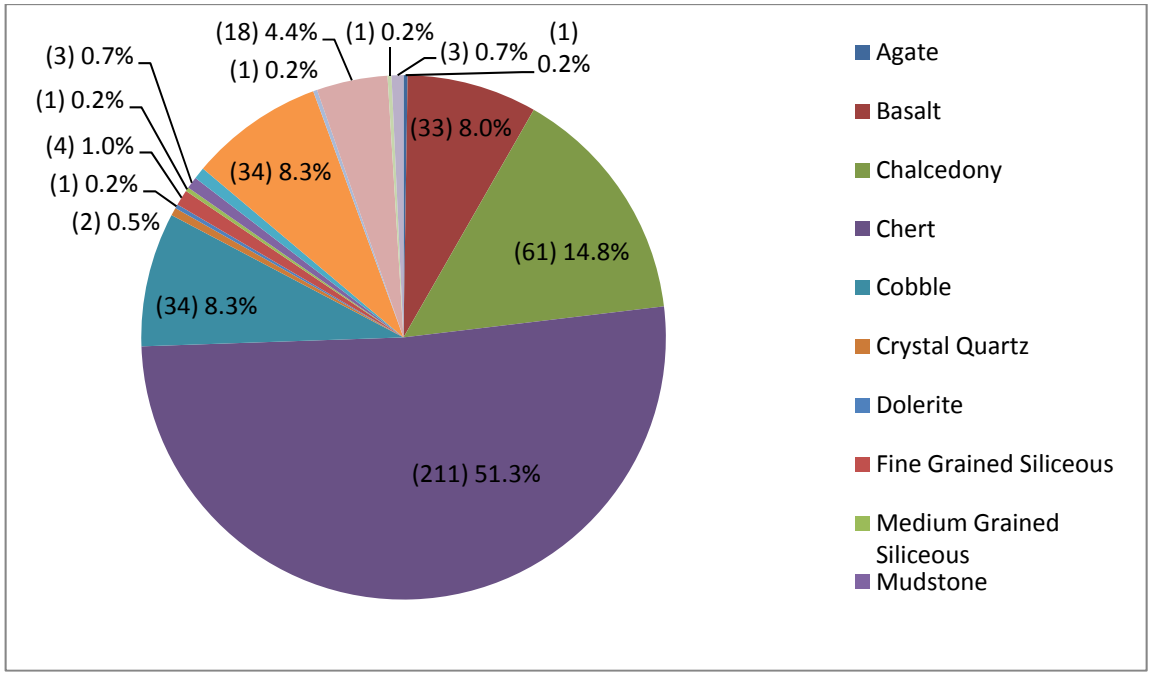


Figure 5-1 Proportion of raw material types at Gittoes Jali artefact scatter: n=411

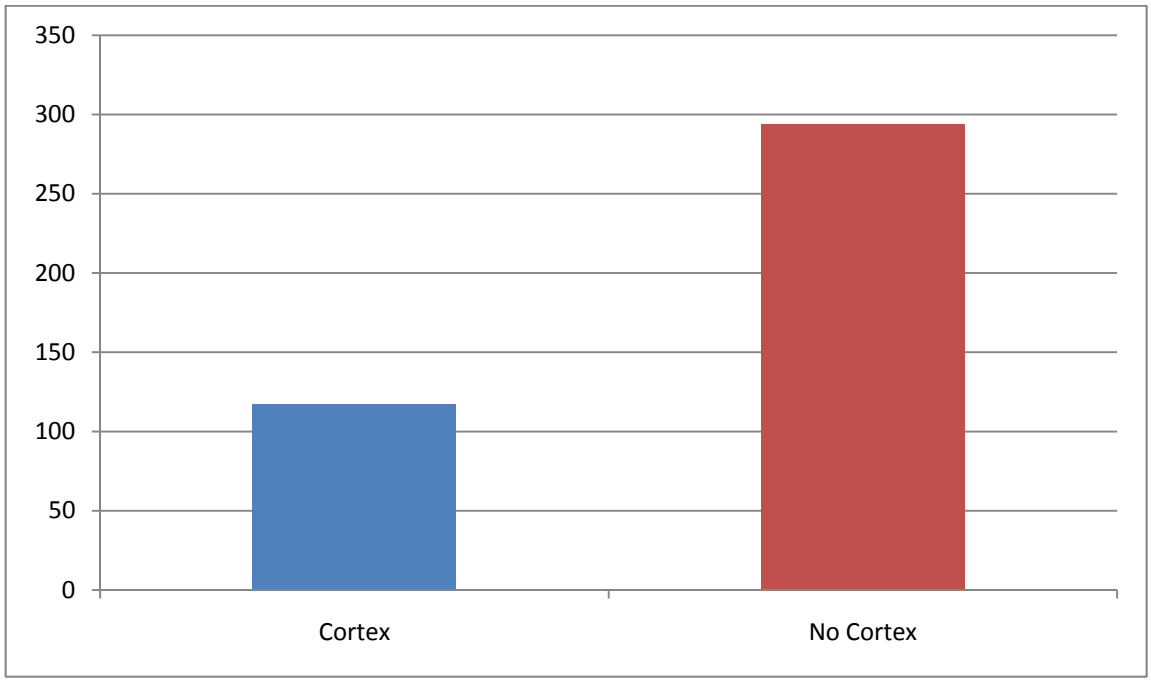


Figure 5-2 Proportion of artefacts with/without cortex from Gittoes Jali artefact scatter: n=411

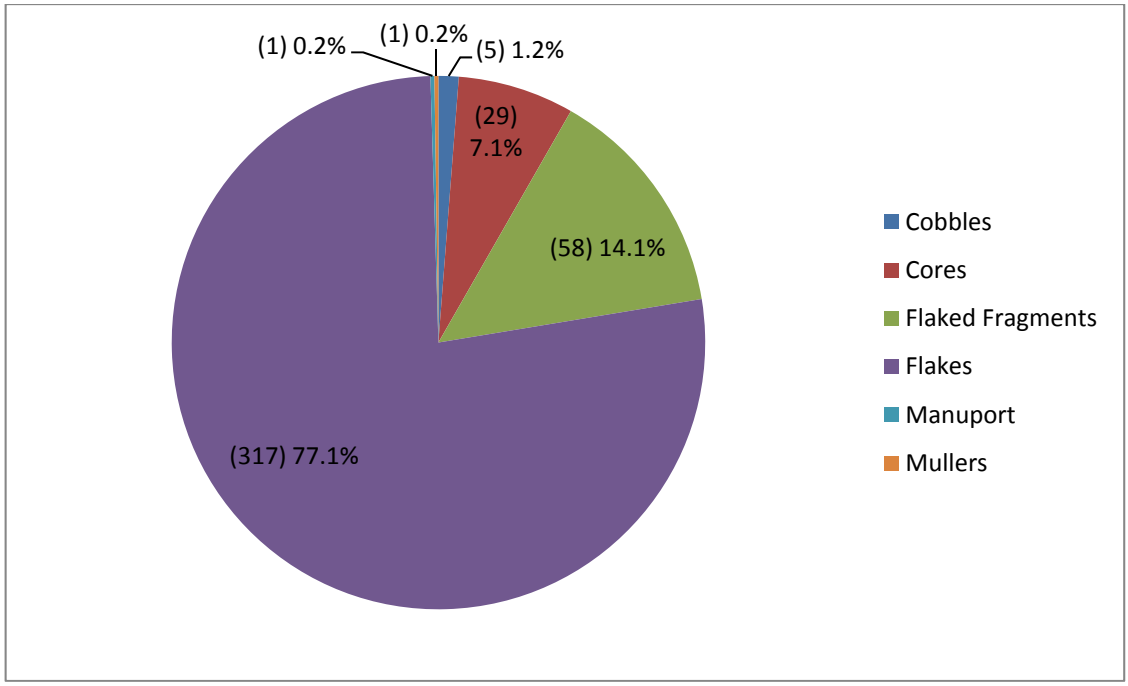


Figure 5-3 Proportion of artefacts from Gittoes Jali in each technological type: n=411

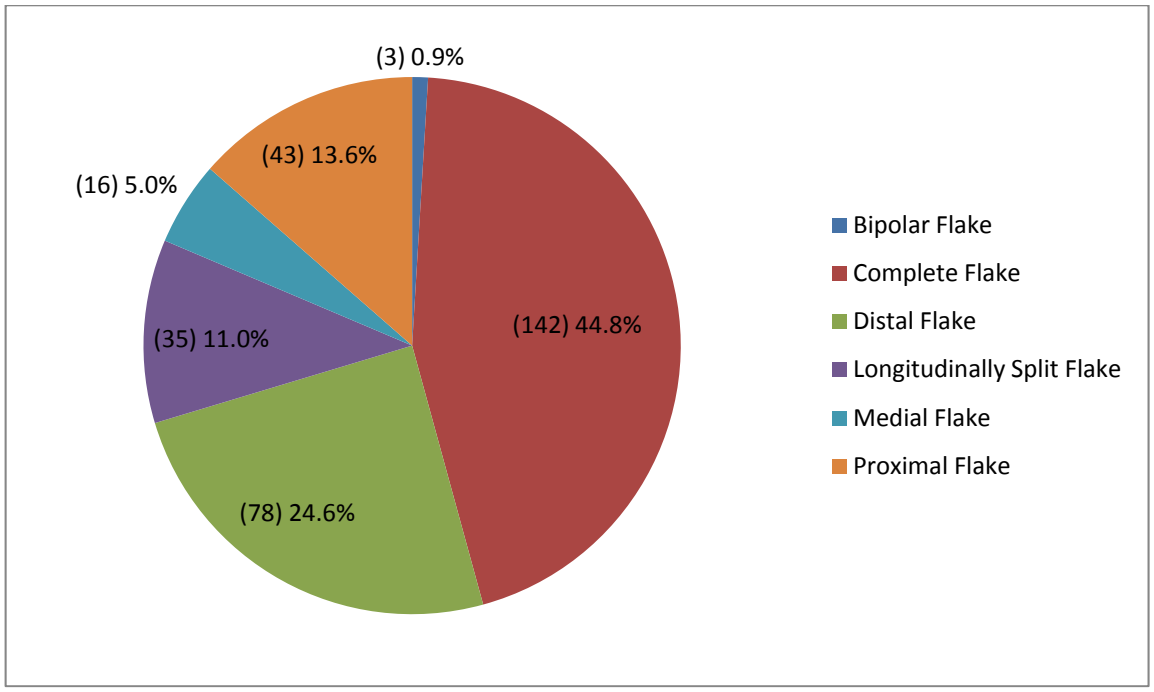


Figure 5-4 Break-down of flake types at Gittoes Jali: n=411

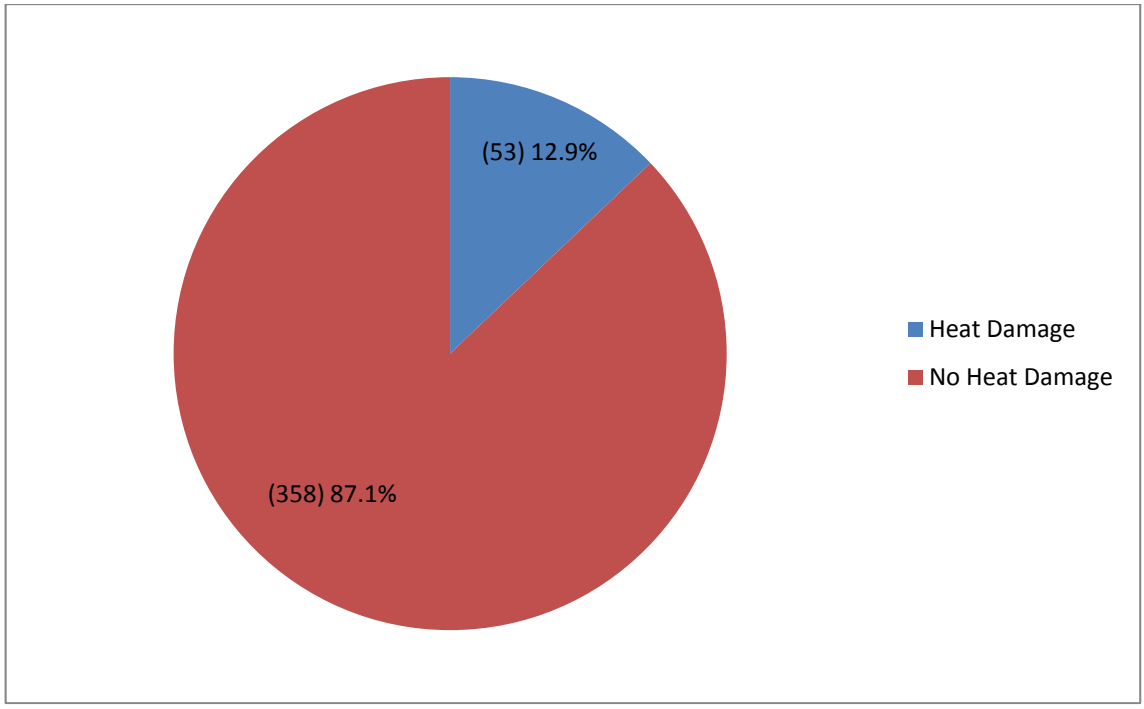


Figure 5-5 Percentage of heat damaged artefacts at Gittoes Jali: n=411

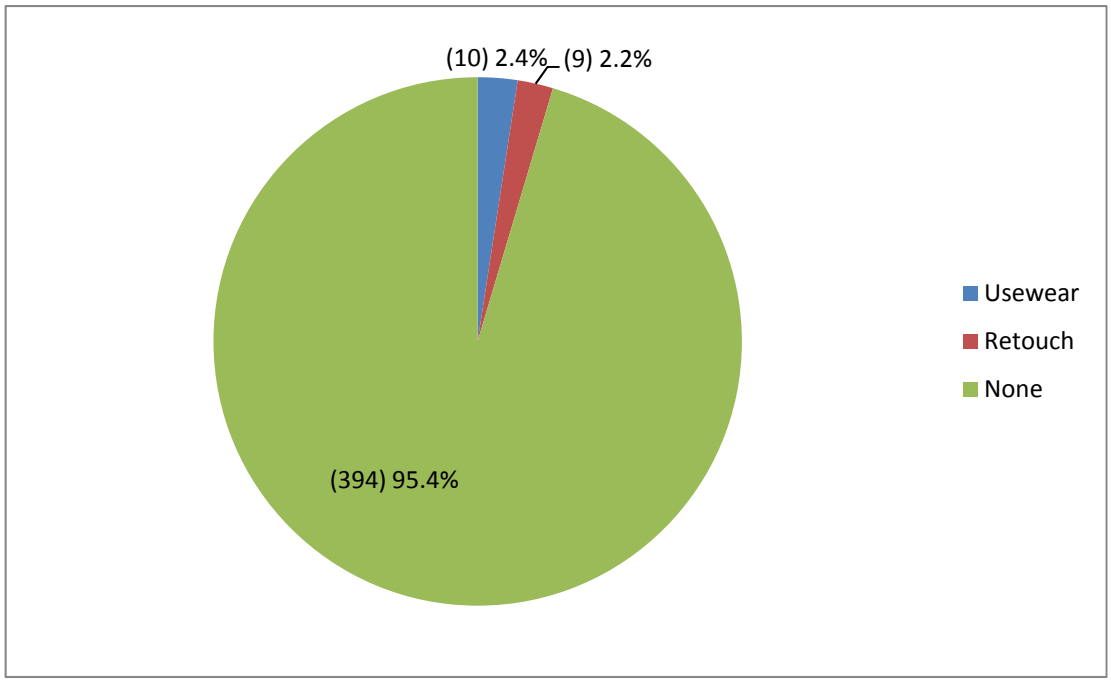


Figure 5-6 Percentage of artefacts that show signs of retouch or usewear at Gittoes Jali: n=411

Also forming part of the site is a partially buried sandstone floater or boulder which has been interpreted by site officers as a 'paint well' rock. Located mid-slope on the north-eastern side of the rock, are a series of rounded but irregular holes 90 to 100 millimetres deep in the rock which may have been used for mixing of ochre and associated with ceremonial purposes. A further sandstone boulder or floater occurs to the south of the 'paint well' rock. This boulder measures approximately 1200 millimetres x 800 millimetres and protrudes approximately 300 millimetres above the ground surface. It possesses a rounded smooth surfaced hollow measuring 200 millimetres x 200 millimetres which could potentially have been used for grinding purposes. Several scarred trees are purported to be located on an adjacent property directly to the south of the paint well rock, beyond the boundary of the project.

The following can be inferred from the findings at Gittoes Jali:

- A large range of stone raw materials were used at this site, suggesting a range of activities may have been undertaken, and was possibly more intensively occupied.
- 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.
- Artefacts show signs of heat damage that may have resulted from natural or deliberate human-constructed fires.
- Other cultural activities were potentially taking place within the area.

5.2.4.2. Site 11

Site 11 is located within the coastal barriers (sand dune) landscape unit. Cooks Hill is directly to the -west and overlooks Site 11. The area is surrounded by the Richmond River floodplain and previous coastlines. It is likely that prior to disturbance from a sand mine, the sand dune for Site 11 would have comprised part of the same landform as E2/2, which is 300 metres to the north.

Mechanical excavation of Site 11 identified a knapping floor within the centre of the site. This knapping floor accounts for 947 artefacts of the overall 1003 artefacts recovered from the site. The other 56 artefacts were located in shovel test pits (STP). It is estimated that approximately 70 per cent of the knapping floor was excavated. The knapping floor is a dense isolated occurrence within the otherwise low density scatter of artefacts across a deflated dune. The results of the test-excavation suggest that this concentration of artefacts is not likely to occur elsewhere within the site.

The results of the STPs have been separated from the results of the mechanical excavation for comparative analysis, as the two methods yielded contrasting results, suggesting either differential intra-site patterning or post depositional processes. The majority of artefacts from the STPs were chalcedony (78.6 per cent), followed by quartz (12.5 per cent) and chert (8.9 per cent) (Figure 5-7). Of the entire assemblage, only one chert flake possessed cortex. The artefacts are primarily flakes (58.9 per cent) as well as flaked fragments (39.3 per cent) and angular fragments (1.8 per cent) (Figure 5-8). No cores were found, although there was a bipolar microblade present.

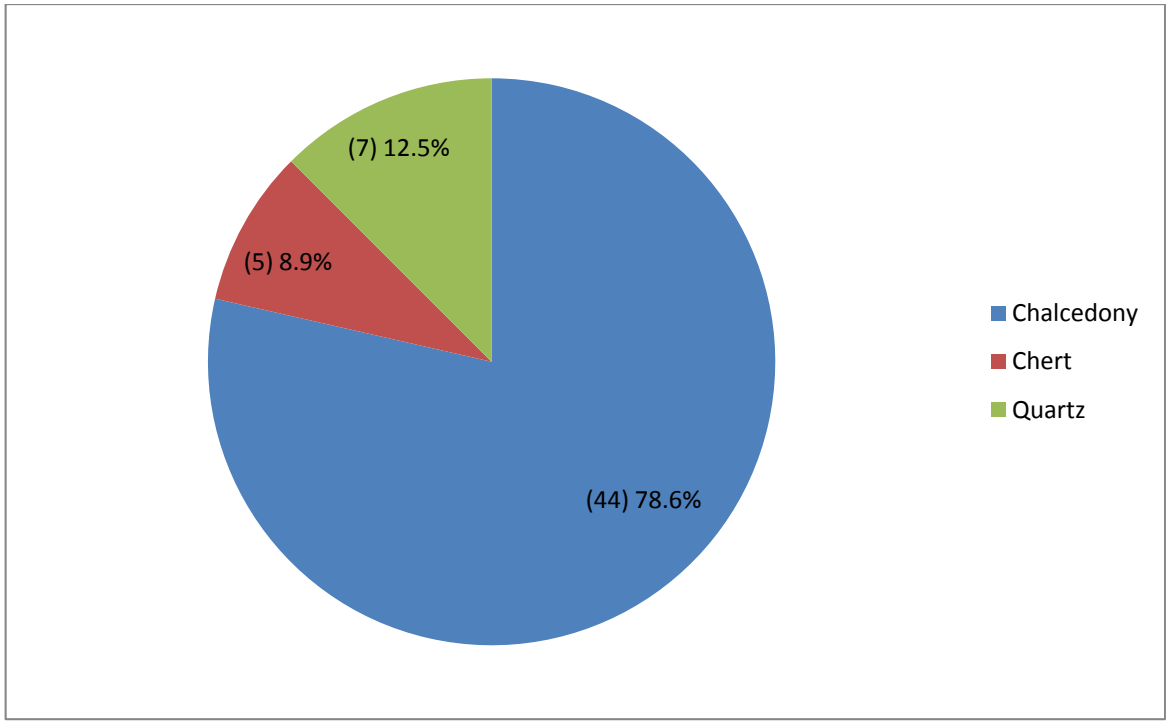


Figure 5-7 Proportion of raw material types at Site 11 in the STPs: n=56

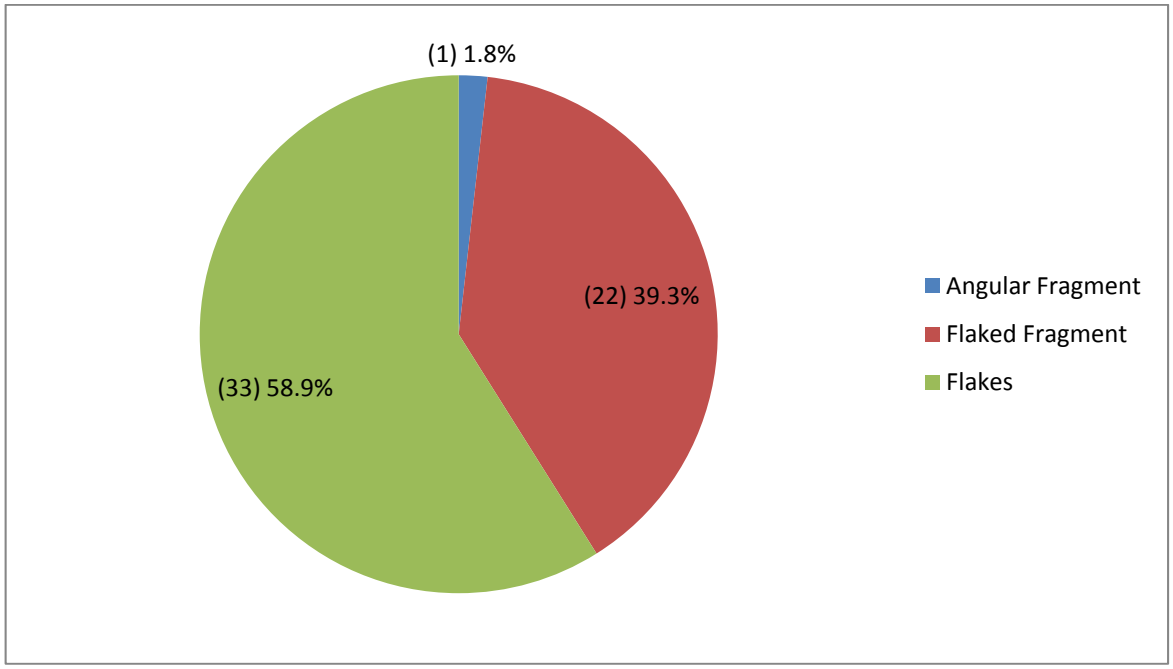


Figure 5-8 Proportion of artefacts in each technological type in Site 11 STPs: n=56

Of the 947 artefacts comprising the knapping floor, raw materials predominantly comprised chalcedony and chert (Figure 5-9). Fine grained siliceous materials, river cobble, quartz, silcrete and unidentified materials were also being utilised. Cortex was present on a high number of artefacts made from chert and chalcedony (48.3 per cent), which indicates that the artefacts made from these materials were not heavily reduced before being brought to site (Figure 5-10). It is likely that the raw material source was located within close proximity to the site.

Flakes are the most prevalent technological tool type found within the knapping floor (39.8 per cent, followed by angular fragments (37.0 per cent), flaked fragments (21.0 per cent), cores (1.2 per cent), geometric microliths (1 per cent) and a muller (0.1 per cent) (Figure 5-11), retouch was only present on 11 artefacts (1.1 per cent), and use-wear was apparent on two artefacts (one of which was the muller).

The following can be inferred from the findings at Site 11:

- Primary knapping activity took place on site (due to high level of cortex and angular fragments).
- Maintenance was not a primary activity of this site, however, retouching flakes for refinement did take place.
- Raw materials were not rationed, suggesting they may have been readily available.

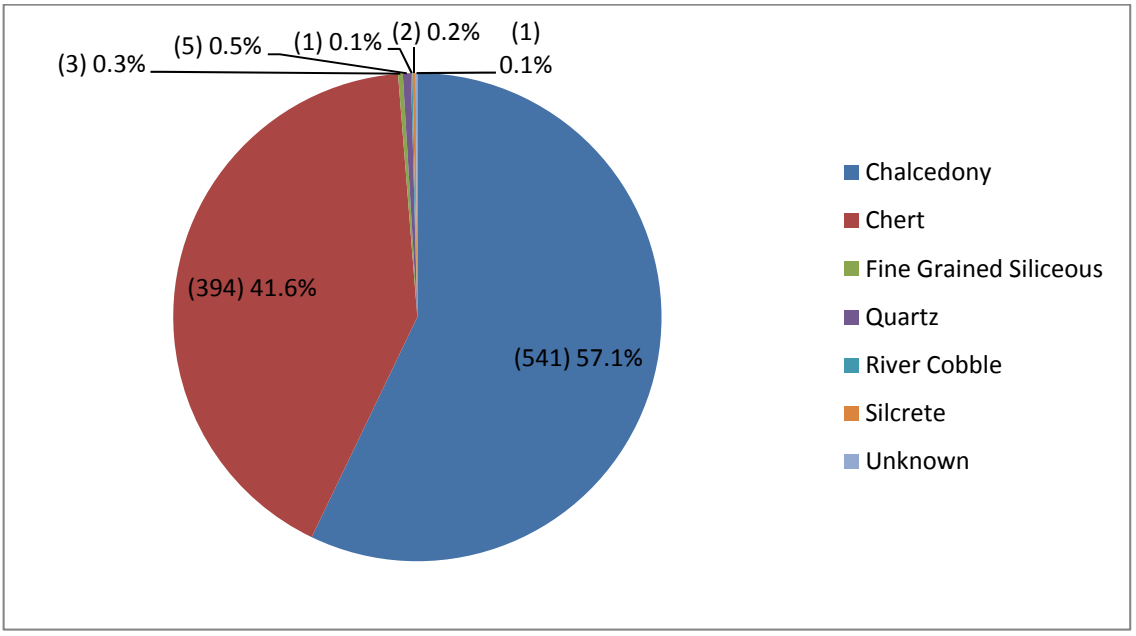


Figure 5-9 Proportion of raw material types at Site 11 from the mechanical excavation: n=947

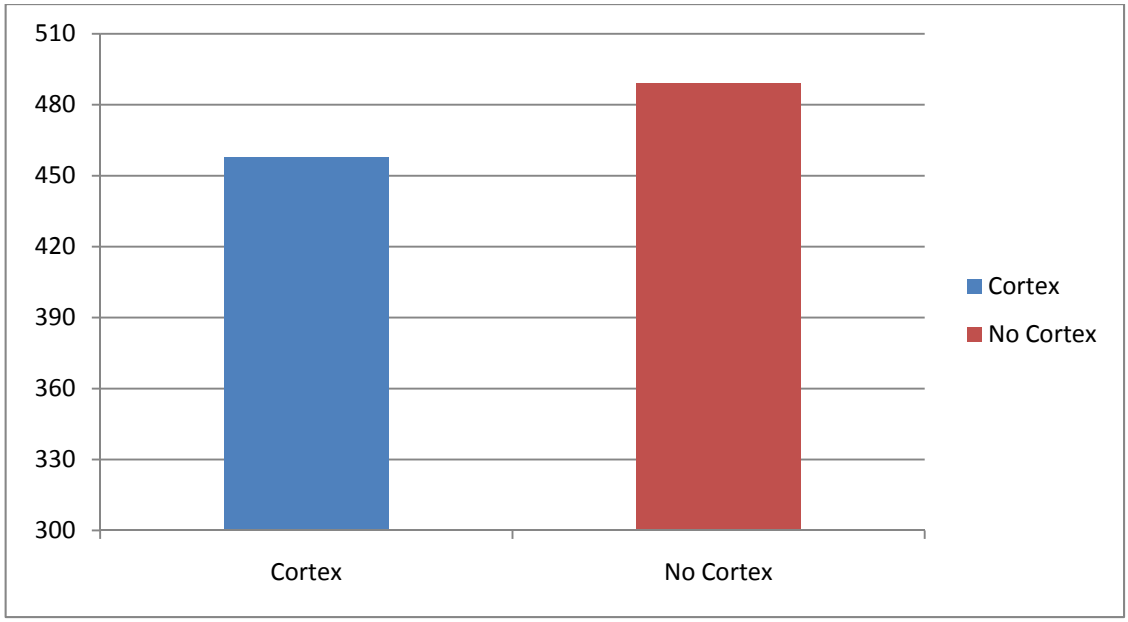


Figure 5-10 Proportion of artefacts with/without cortex from Site 11 mechanical excavations: n=947

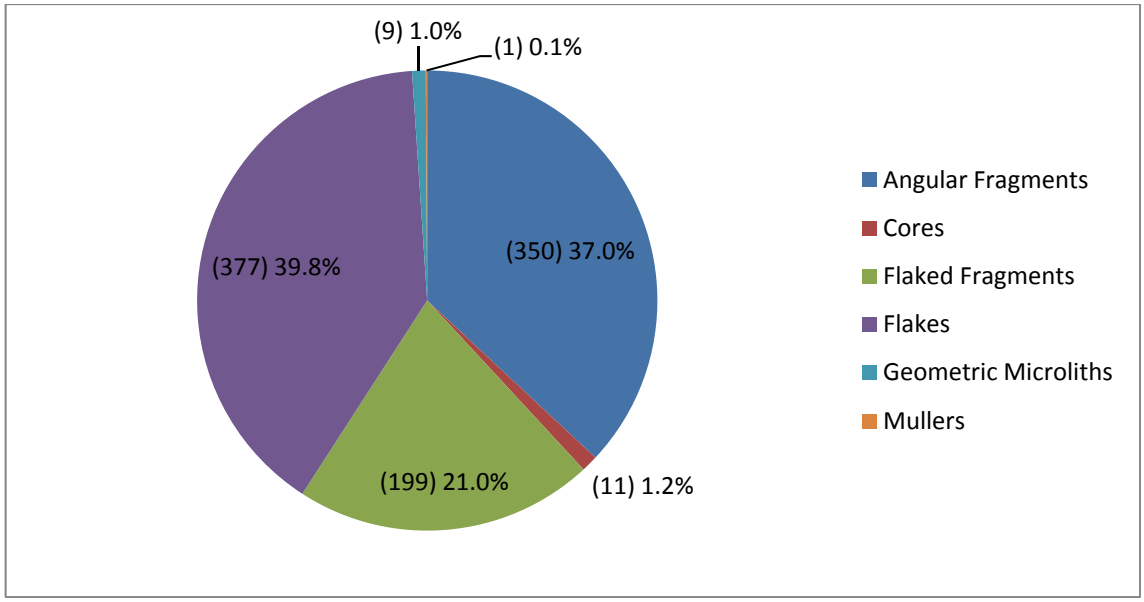


Figure 5-11 Proportion of artefacts in each technological type from Site 11 mechanical excavations: n=947

5.2.4.3. E2/2 Site

E2/2 is located within the coastal barriers (sand dune) landscape unit. Cooks Hill is directly to the south and overlooks E2/2. The area is surrounded by the Richmond River floodplain and previous coastlines. It is likely that prior to disturbance from sand mining operations, the sand dune for E2/2 would have comprised part of the same landform as Site 11, which is 300 metre to the south. E2/2 is a multi-component site with stone artefacts, shell midden and known modern occupation by the traditional owners.

The following summary analysis is based on a small artefact sample size (<15). Consequently, only broad inferences are made here. The known contents of this site include 13 flaked artefacts, predominately of chalcedony (30.8 per cent) and quartz (23.1 per cent) (Figure 5-12). The majority of artefacts (92.3 per cent) have no signs of cortex, however, two single platform cores were present (one with cortex and one with a cortical platform). Flakes make up the majority of the technological tool types (61.5 per cent) found at the site, with single platform cores (30.8 per cent) and flaked fragments (7.7 per cent) following (Figure 5-13). Retouch was present on two artefacts (15.3 per cent).

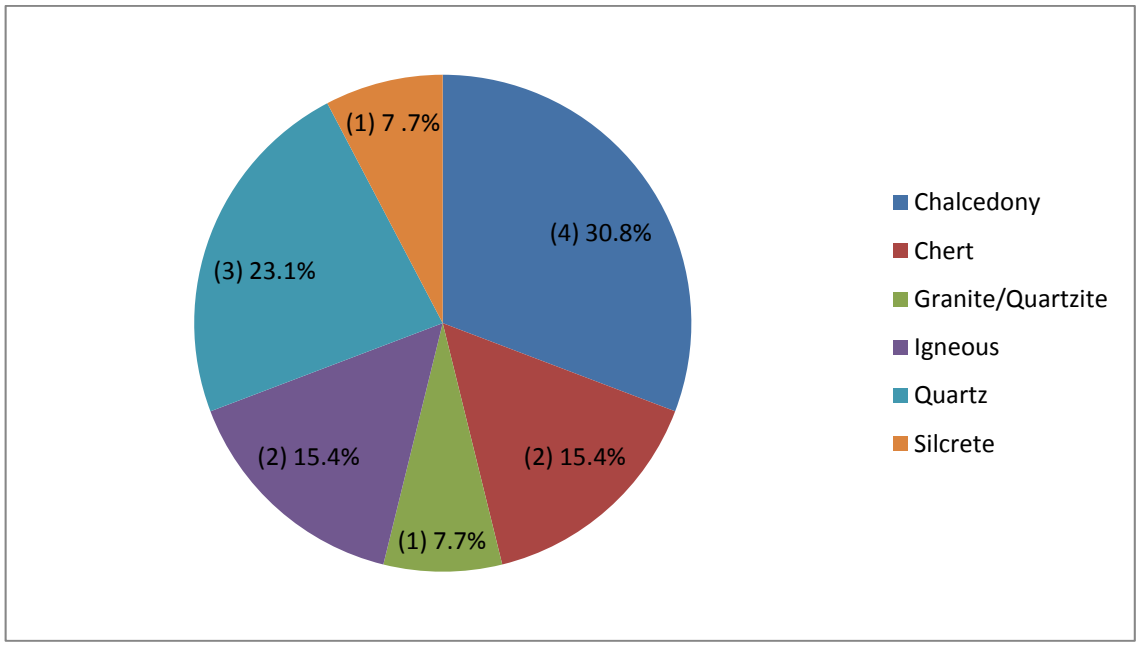


Figure 5-12 Proportion of raw material types at E2/2 Site artefact scatter: n=13

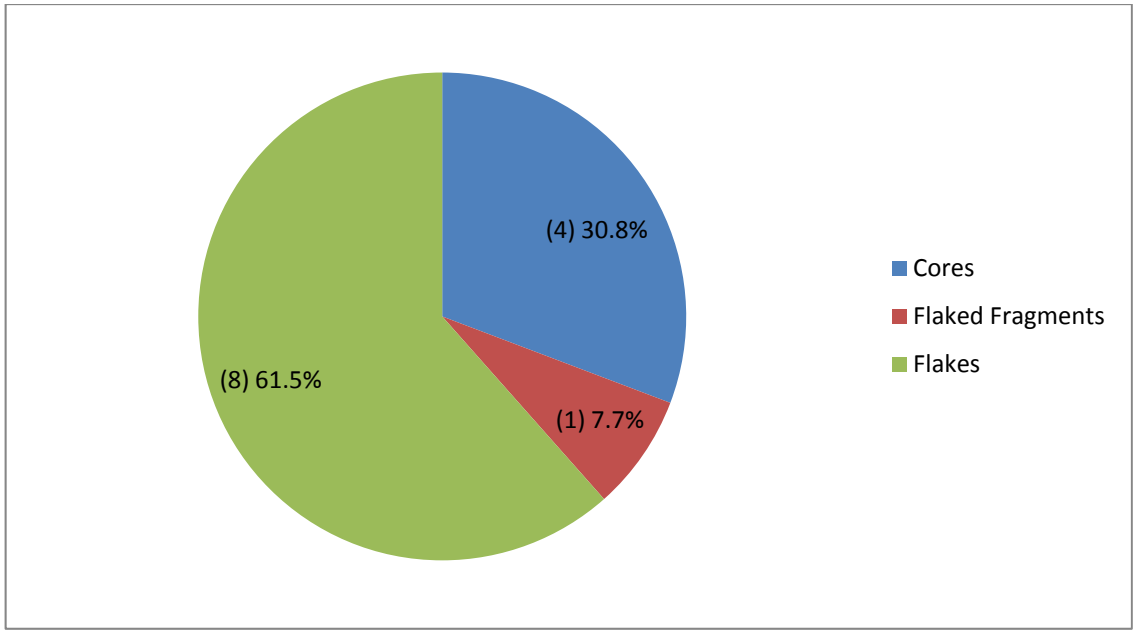


Figure 5-13 Proportion of artefacts from E2/2 Site in each technological type: n=13

Scattered shell was recovered from six shovel test pits and a mechanical trench excavated at E2/2. E2/2 is located on the coastal plain between the Richmond River and ocean beaches. The current beach is approximately three kilometres to the east of the site. The shell material was all *Donax deltoides* (pipi), a bivalve species. This species of shells is only found on ocean beaches, within the intertidal sands, in eastern Australia. A sample of the shell from STP36 was sent for radiocarbon dating to the University of Waikato Radiocarbon Laboratory. This sample which was taken at between 50 millimetres to 100 millimetres returned an age of 540 +/-32 Before Present (BP)[2] (Table 5-2). A full laboratory report of the dating process can be found in Appendix O.

Table 5-2 Summary of radiocarbon age determination for E2/2

STP number	Material	Depth (mm)	Weight (g)	Wk	dc13	F14C%	Result
STP 36	Shell (*D. deltoides*)	50 to 100	40	32979	0.9 +/- 0.2	93.5 +/- 0.4	540 +/- 32 BP

[2] BP refers to before the year 1950AD

5.2.4.4. Melino Site

Melino Site is located within the coastal barriers (sand dune) landscape unit. The Richmond River bounds the area to the south and east, while Cooks Hill can be seen directly to the southeast. There are two distinct landforms within this site, one is the upper slope of a hill and the second is a relatively level sandy area that represents the crest and upper slopes of a low deflated sand dune. The area is cleared with scattered trees and is surrounded by open woodland.

Melino Site is a multi-component site with stone artefacts, shell midden, known modern occupation by the traditional owners and scarred trees (MST3, Melino Scarred Tree 4, C21 and MSRT2).

The known contents of this site include 219 flaked artefacts, predominately of chert, but with nine other raw materials also present (Figure 5-14). The assortment of raw materials indicates that a variety of sources were exploited, locally and perhaps farther afield. Cortex was only found on 14.6 per cent of artefacts, which may indicate that initial reduction took place elsewhere (Figure 5-15).

Flakes make up the majority of the technological tool types (65.8 per cent) with flaked fragments (24.2 per cent), cores (8.7 per cent), angular fragments (0.9 percent) and a muller (0.5 per cent) (Figure 5-16). Retouch (4.6 per cent), edge damage (1.4 per cent) and backing (1.8 per cent) are present on less than 10 per cent of the artefacts found (Figure 5-17). It is likely that although the initial reduction may have taken place elsewhere, manufacture and maintenance of artefacts was conducted on site.

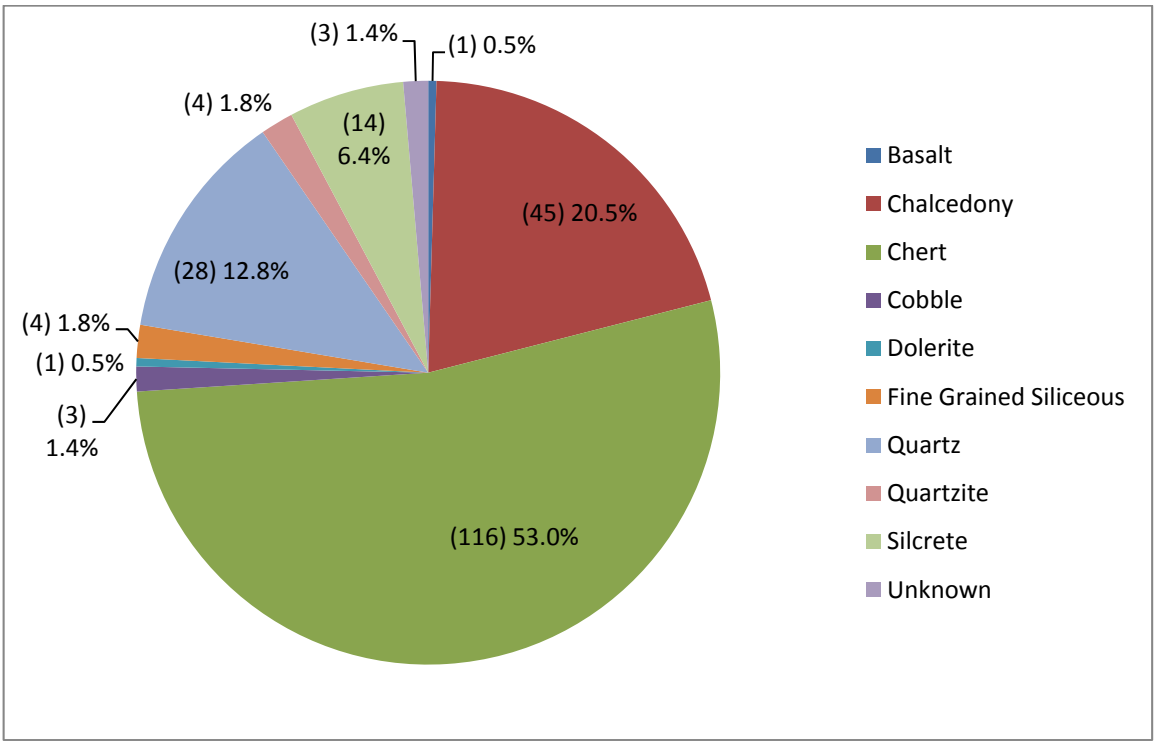


Figure 5-14 Proportion of raw material types at Melino Site artefact scatter: n=219

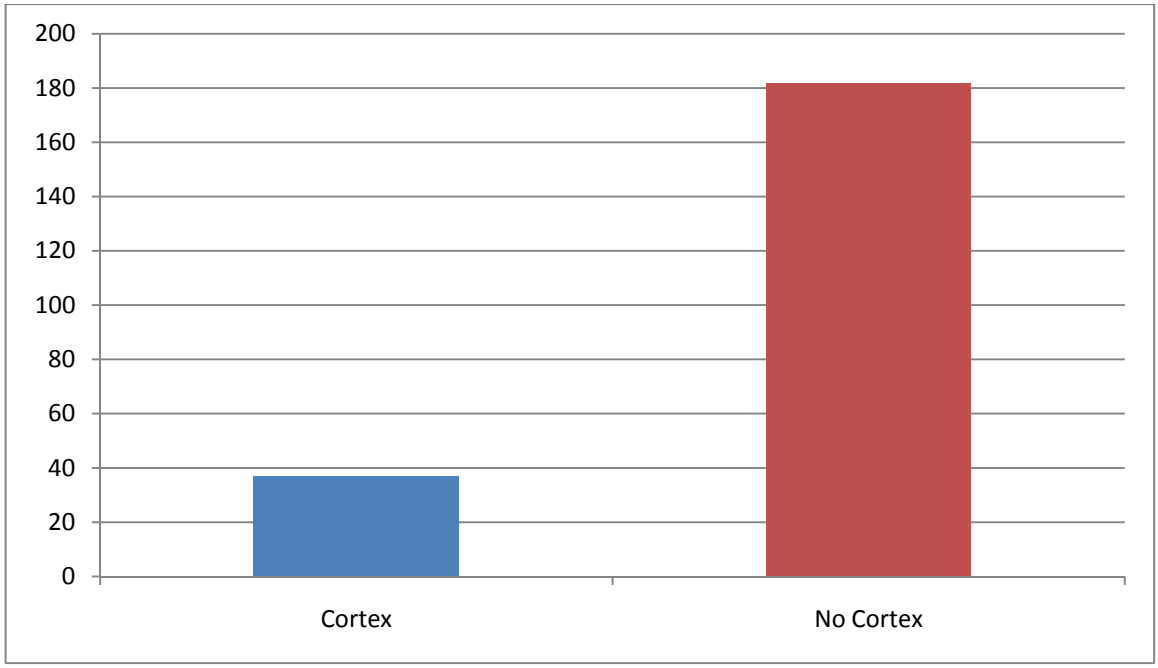


Figure 5-15 Abundance of artefacts with/without cortex from Melino Site artefact scatter: n=219

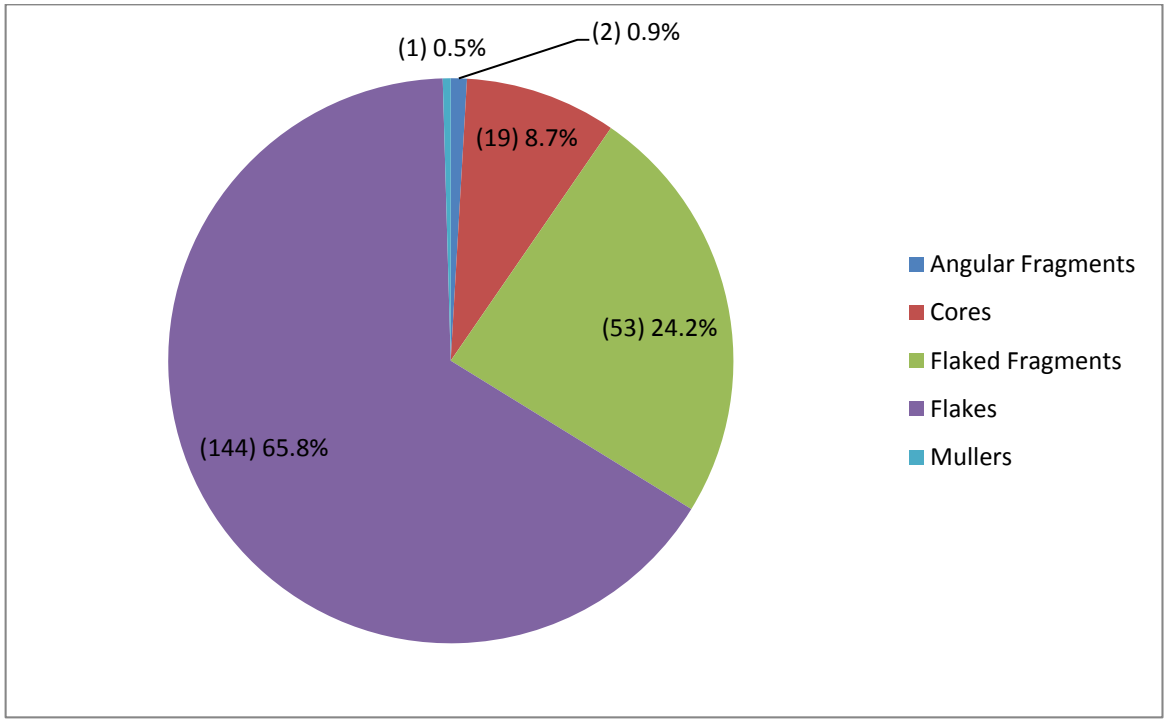


Figure 5-16 Proportion of artefacts in each technological type: n=219

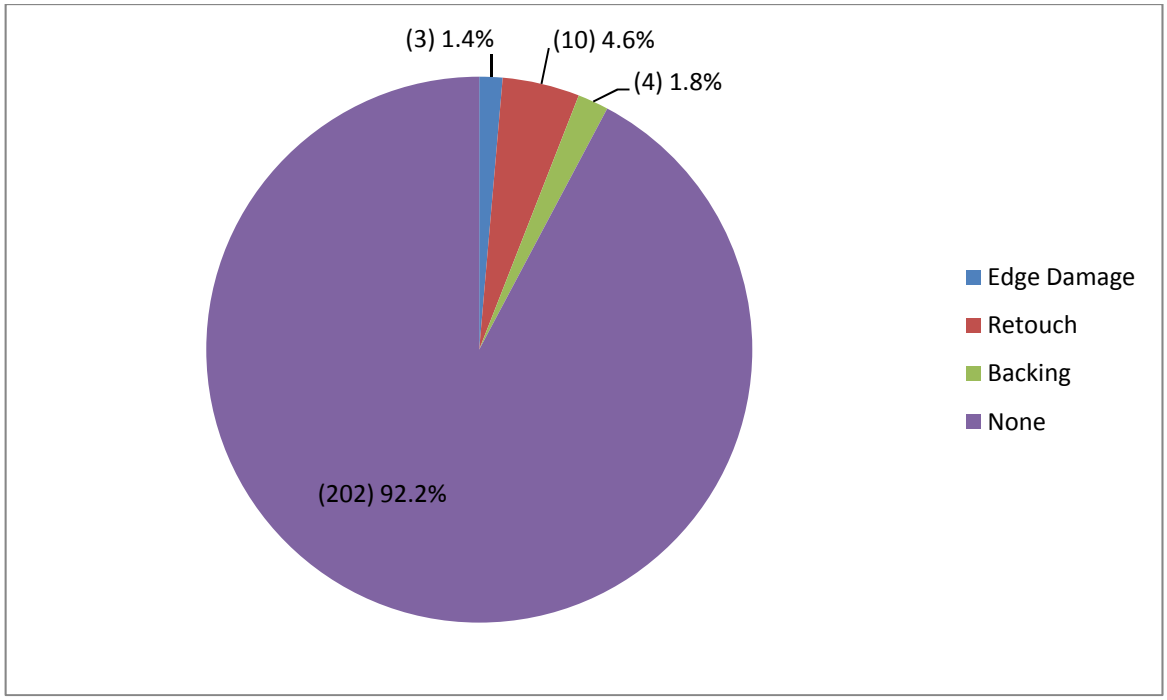


Figure 5-17 Proportion of artefacts from Melino Site that show signs of retouch, edge damage and backing: n=219

Within Trench 1 a shell lens was recorded from between 130 millimetres to 250 millimetres. This same lens was also identified at varying depths in four STPs. Melino Site is located on the western floodplain of the Richmond River. The shell midden is confined to the sandy, deflated dune. The current beach is approximately 4 kilometres to the east of the site, but access is only via crossing the Richmond River, to reach the ocean beach without crossing the River is currently over 20 kilometres distance. The shell material was all *Donax deltoides* (pipi), a bivalve species.

From Trench 1 a total of five samples were taken for dating (three radiocarbon and two Accelerator Mass Spectrometry (AMS) (Table 5-3). Two shell samples were taken from the shell lens which returned dates of 479 +/- 30 BP (100 millimetres to 150 millimetres) and 549 +/- 31 BP (150 millimetres to 200 millimetres). This reveals a contemporaneous occupation at E2/2 Site and Melino Site and supports current assumptions relating to the movement of people between the eastern coast line, across the Richmond River and the western ranges and hinterland. Another significant result of this dating is that people were occupying this area at times throughout at least the last 7,400 years.

Table 5-3 Summary of radiometric and mass spectrometry dates for Melino Site

Test number	Material	Depth (mm)	Wk	dc13	F14C%	Result
Trench 1 (Square B)	Shell (*D. deltoides*)	100 to 150 (XU3)	32977	0.4 +/- 0.2	94.2 +/- 0.4	479 +/- 30 BP
Trench 1 (Square B)	Shell (*D. deltoides*)	150 to 200 (XU4)	32978	0.5 +/- 0.2	93.4 +/- 0.4	549 +/- 31 BP

Test number	Material	Depth (mm)	Wk	dc13	F14C%	Result
Trench 1 (Square A)	Charcoal (AMS)	760 (XU12)	32980	25.6 +/- 0.2	56.9 +/- 0.2	4530 +/- 33 BP
Trench 1 (Square B)	Charcoal	800 to 900 (XU13)	32981	-26.5 +/- 0.2	51.2 +/- 0.3	5373 +/ - 54 BP
Trench 1 (Square A)	Charcoal (AMS)	1100 to 1200 (XU16)	32982	26.0 +/- 0.2	40.0 +/- 0.2	7356 +/- 37 BP

For some of the charcoal samples, AMS dating was required due to the small particle size of the charcoal sample.

A full report of the dating process can be found in Appendix O.

5.2.4.5. Site 2

Site 2 is located within the coastal barriers (sand dune) landscape unit. It is a flat sandy rise adjacent to Bingall Creek and low-lying swampy area (Richmond River floodplain). Site 3 is located on a sand rise approximately 80 metres to the south of Site 2; a swamp divides the sites. Site 4 is located approximately 800 metres to the north of Site 2 on a hill which overlooks the area

The following summary analysis is based upon a small artefact sample size (n=25). Consequently, only broad inferences are made here. The majority of artefacts (38.1 per cent) were manufactured from quartz, followed by chalcedony (23.8 per cent) with only three other raw material types present (Figure 5-18). Cortex was present on five of the artefacts (23.8 per cent) (Figure 5-19), but no cortex was present on any of the quartz artefacts. Flakes constitute the majority of technological types (76.2 per cent, Figure 5-20) followed by angular fragments (9.5 per cent), cores (9.5 per cent) and flaked fragments (4.8 per cent). The cores were produced from chert and fine grained siliceous material.

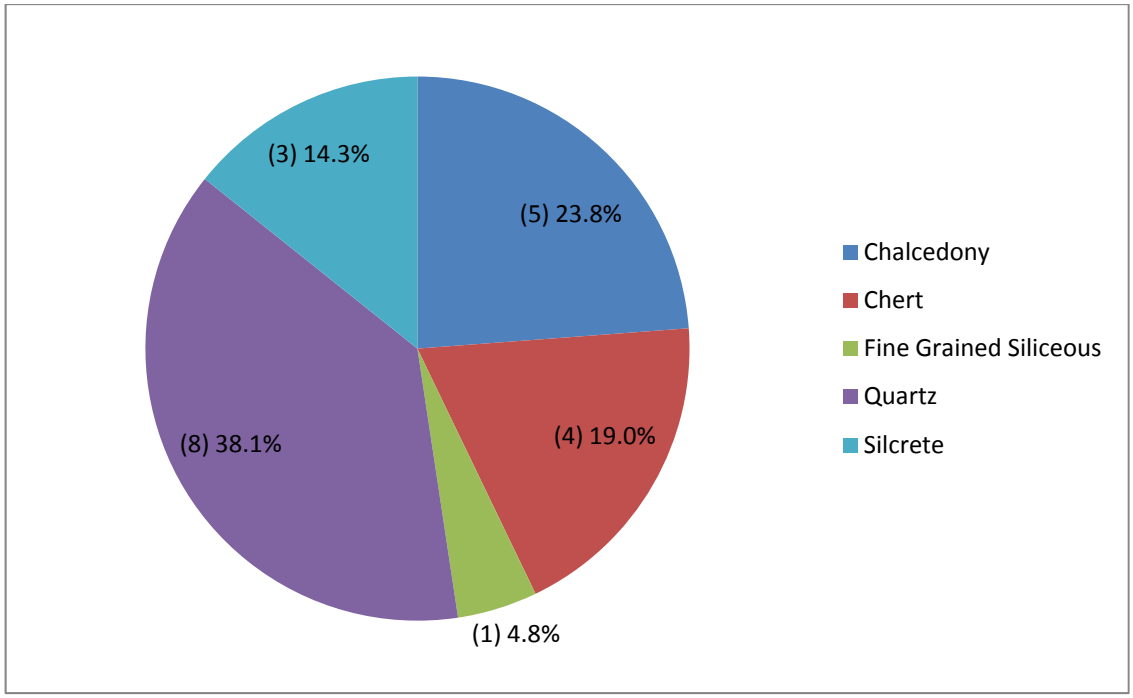


Figure 5-18 Proportion of raw material types at Site 2 artefact scatter: n=21

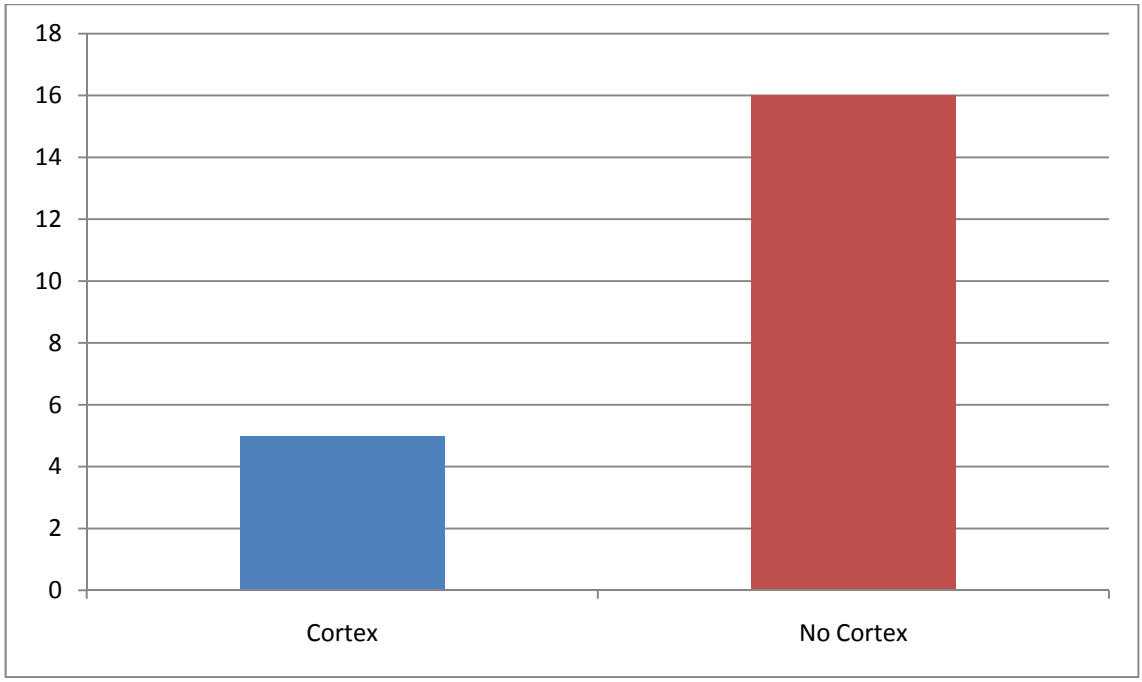


Figure 5-19 Proportion of artefacts with/without cortex from Site 2 artefact scatter: n=21

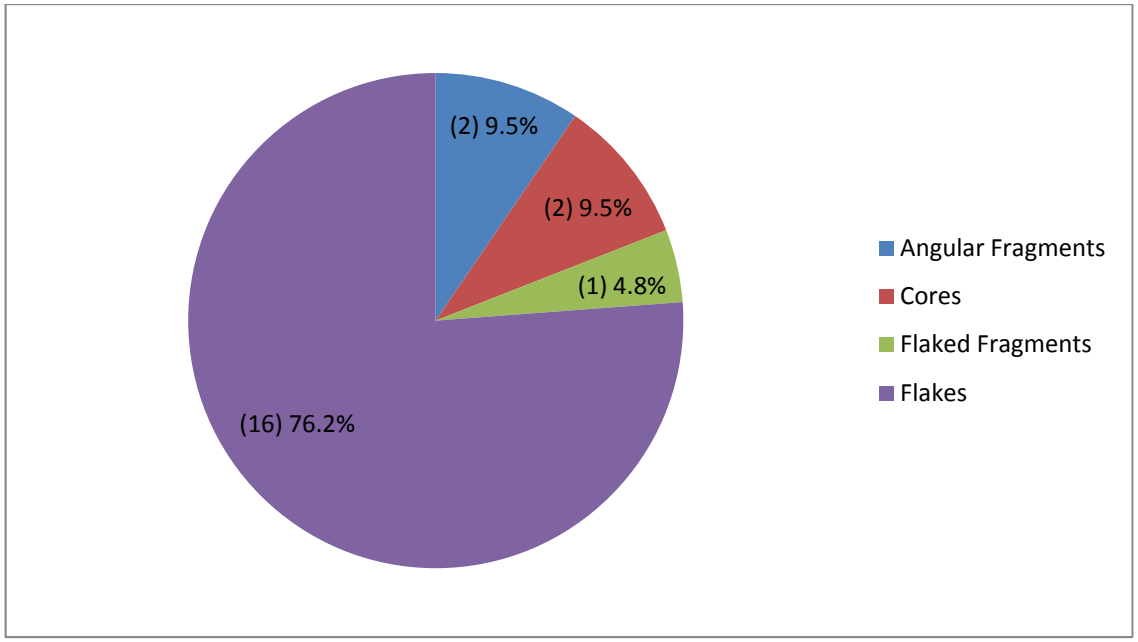


Figure 5-20 Proportion of artefacts from Site 2 in each technological type: n=21

5.2.4.6. Site 4

Site 4 is located within the coastal ramp landscape unit. It is a low saddle at the end of ridge-spur overlooking low-lying swampy area (Richmond River floodplain). Site 2 and Site 3 are located approximately 800 metres to the south of this site and can be seen, only due to the clearance of trees.

The following summary analysis is based upon a small sample size (n=15). The majority of artefacts were chalcedony (60.0 per cent), the others were silcrete (33.3 per cent) and chert (6.7 per cent) (Figure 5-21). Cortex was present on two artefacts (13.3 per cent), both of which were crafted from chalcedony. Flakes were the most common type present (66.7 per cent) with flaked fragments (6.7 per cent) and angular fragments (26.7 per cent) also recorded (Figure 5-22).

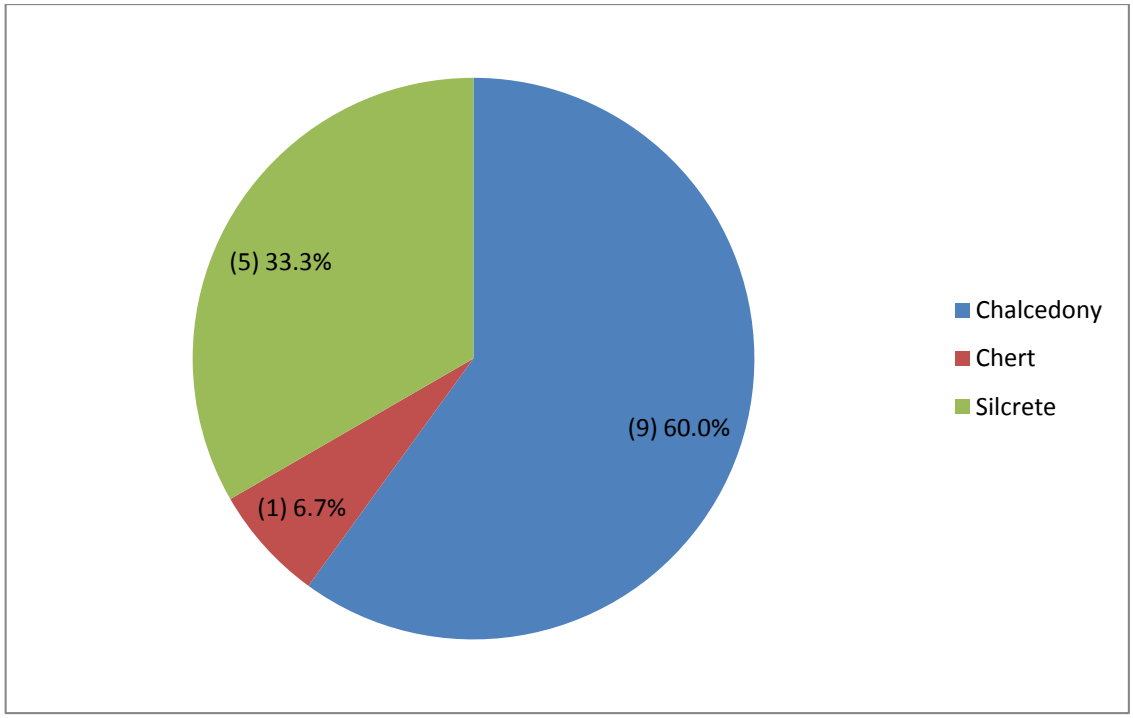


Figure 5-21 Proportion of raw material types at Site 4 artefact scatter; n=15

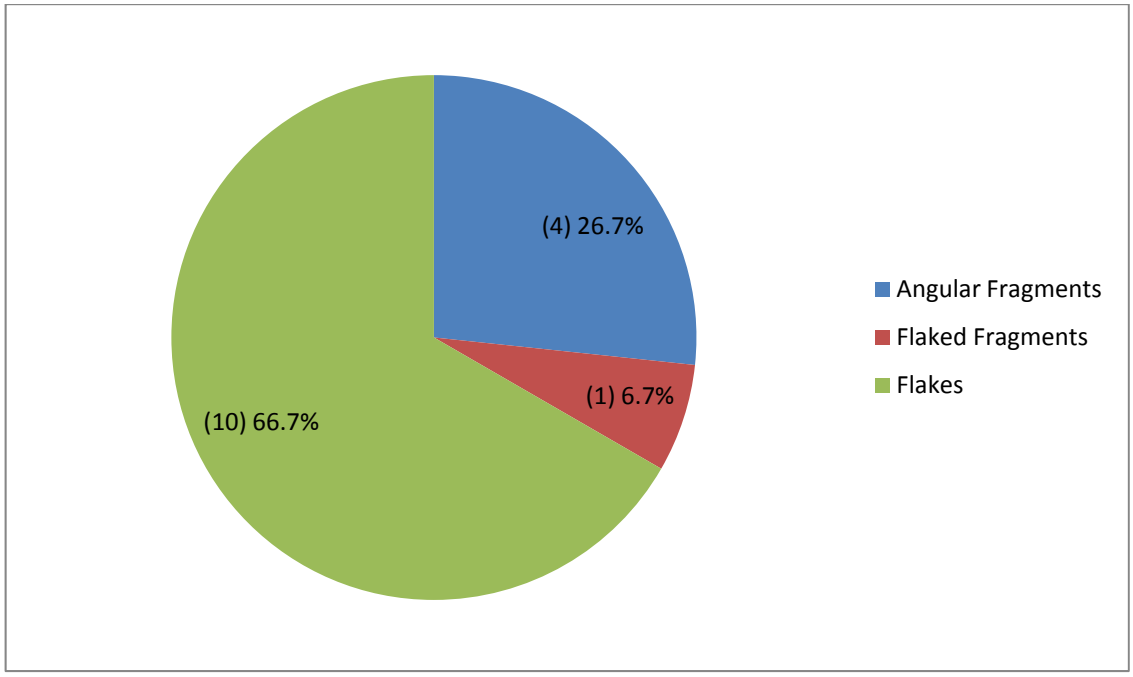


Figure 5-22 Proportion of artefacts from Site 4 in each technological type: n=15

5.2.4.7. Saezza 1

Saezza 1 is located within the coastal ramp landscape unit. The site is located on a small rise above a small waterway.

The known contents of this site include 60 flaked artefacts, predominantly of chert, with quartz and chalcedony raw materials also present (Figure 5-23). Cortex was present on 12 artefacts (20 per cent) (Figure 5-24), indicating that while reduction took place, the majority of that process may have been conducted elsewhere. This is potentially supported by the presence of three cores (five per cent of the total assemblage); two of chert and one of chalcedony Figure 5-25. Flakes, however, are the most common technological type found in the scatter (60 per cent), followed by flaked fragments (35 per cent).

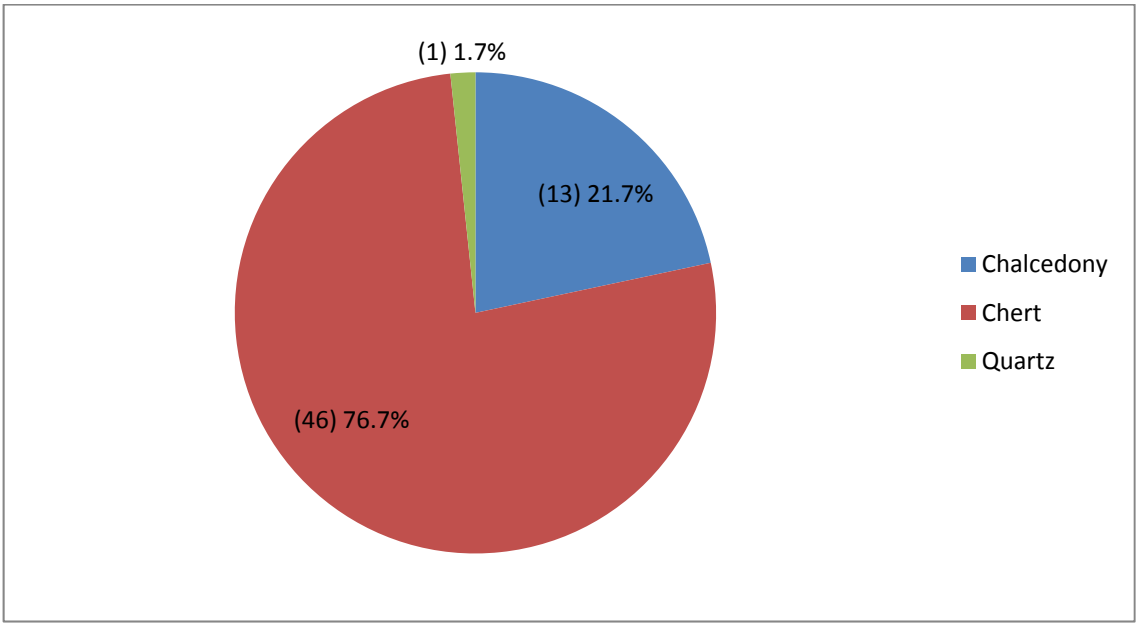


Figure 5-23 Proportion of raw material types at Saezza 1 artefact scatter: n=60

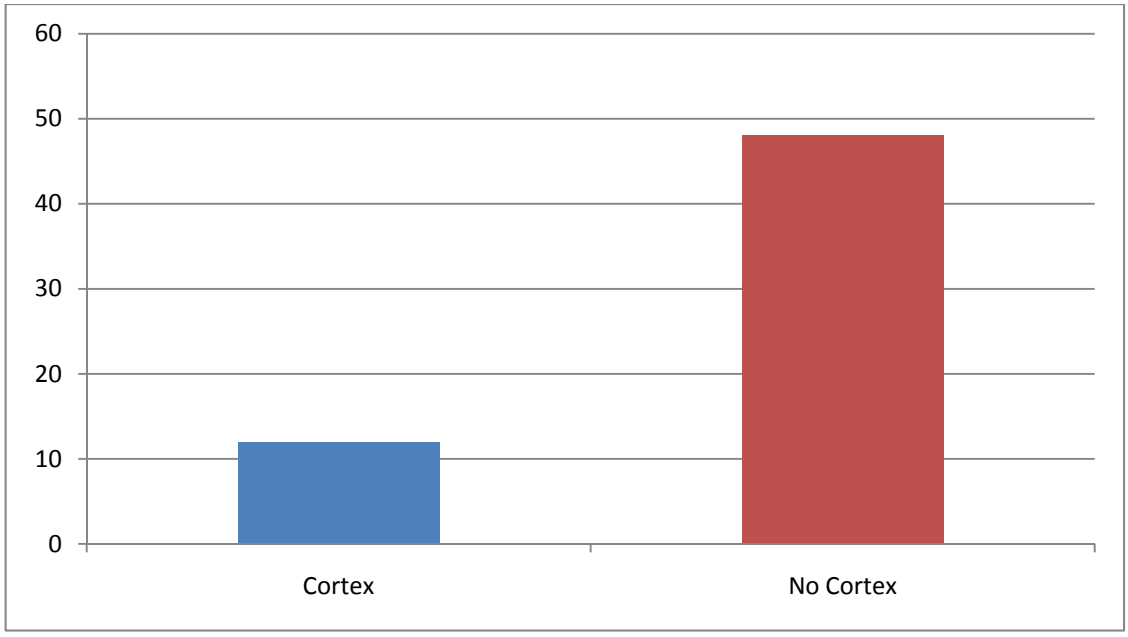


Figure 5-24 Proportion of artefacts with/without cortex from Saezza 1 artefact scatter: n=60

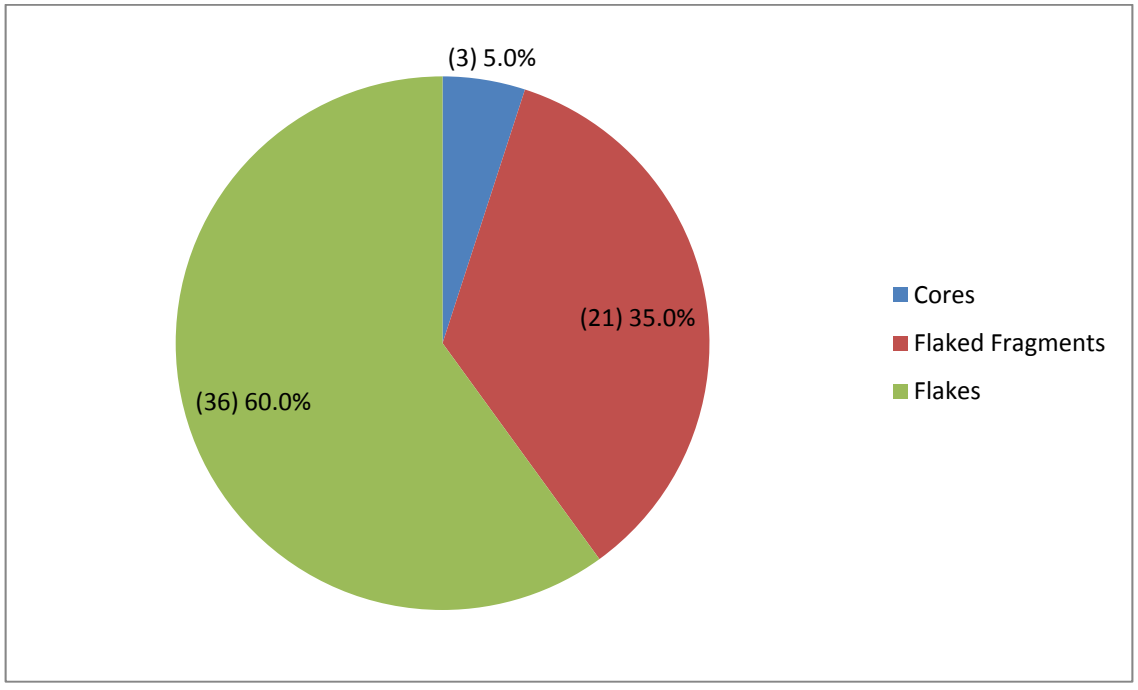


Figure 5-25 Proportion of artefacts from Saezza 1 in each technological type: n=60

5.2.4.8. Site 12

Site 12 is located within the coastal barriers (sand dune) landscape unit. The site is located on a low sandy rise. The area is grassed and is currently used for grazing, bordered by an open forest.

The known contents of this site include 15 flaked artefacts, all manufactured from chert. There are a low proportion of artefacts with cortex (13.3 per cent), and no cores were found during the testing (Figure 5-26). No retouch or edge damage was recorded, and flaked fragments were the most common technological type (66.7 per cent) recovered, compared to 33.3 per cent for flakes (Figure 5-27).

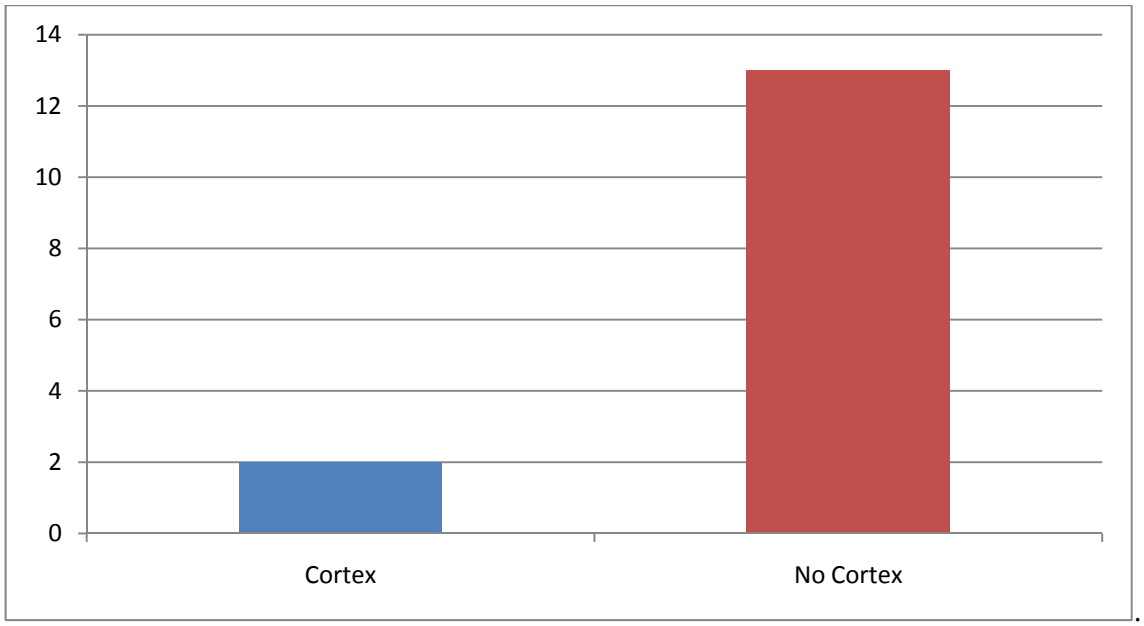


Figure 5-26 Proportion of artefacts with/without cortex from Site 12 artefact scatter: n=15

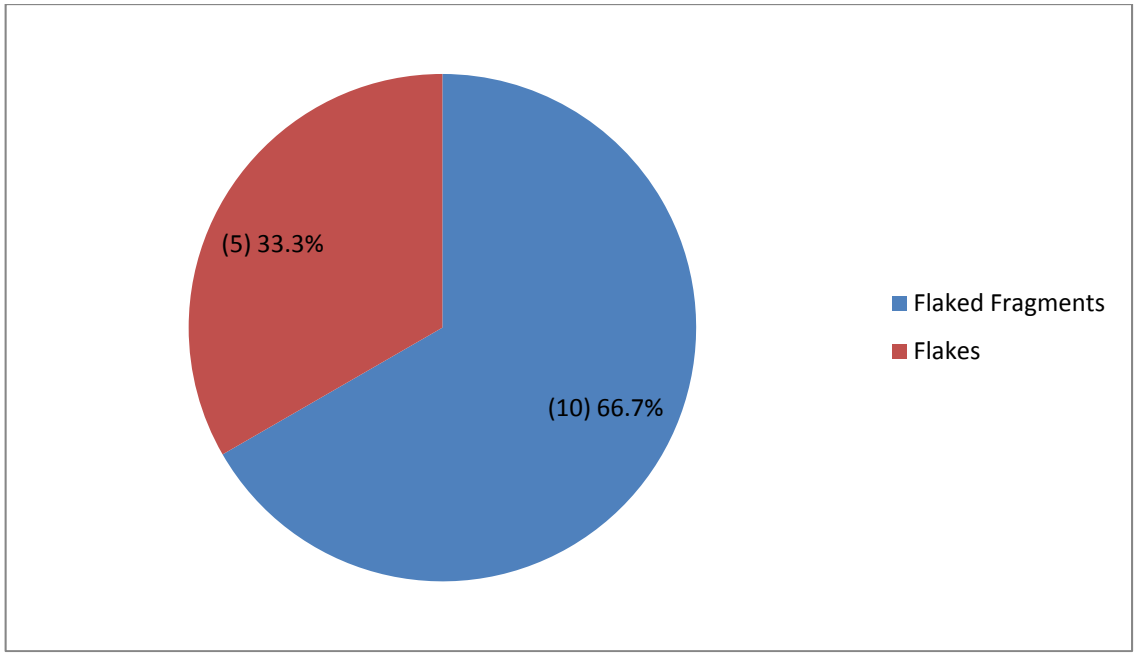


Figure 5-27 Proportion of artefacts in each technological type: n=15

5.2.5. Other sites

Of the 13 sites recorded (with a sub-surface component) within the Woodburn to Ballina section, five sites contained less than 10 artefacts. A summary of these sites and their contents is shown in Table 5-4. All of these sites were located within the Coastal Ramp landscape unit, with the exception of Site 3 which was within the Coastal Barrier landscape unit. It should be noted that Site 3 was not excavated to its fullest potential (see Section 4.4.2). It is highly likely that once deeper excavation could be undertaken here, a higher density of artefacts would be uncovered.

Table 5-4 Summary of sites with less than 10 artefacts

Site name	Landscape unit	No of artefacts	Material	Depth range (mm)	Comments
Site 3	Coastal barrier (sand dune)	3	Silicified quartz, river cobble and chert	900 - 1000	-
Site 1	Coastal ramp	7	Chert	300 - 500	Multi-platform core
Rudgley Site 2	Coastal ramp	3	Chert	550 - 800	-
Rudgley Site 1B	Coastal ramp	5	Chalcedony and chert	0 - 200	-
Rudgley Site 1A	Coastal ramp	6	Basalt and chert	0 - 400	Axe fragment and single platform core

5.2.6. Landforms and predictive model

Overwhelmingly the most commonly identified sites were scarred trees with some stone artefact sites (artefact scatters and isolated artefacts) and shell deposit observed. The absence of other site types, such as burials and bora grounds is likely due to:

- Several of these sites exist within 200 metres of the boundary of the project and were avoided through alignment refinements.
- Unless already known about, burials would only be identified in areas of high exposure or disturbance, which were generally not encountered in suitable landforms.
- Bora or other ceremonial grounds may have once been located within the boundary of the project, but are now likely to have been disturbed through post-contact land-use activities, and the knowledge of them lost through colonisation.

The distribution of the archaeological sites recorded during field investigations for the project between Woodburn and Ballina reinforces the pattern suggested in the predictive model. Elevated areas, such as ridges and rises adjacent to swamps, creeks and rivers, show the largest proportion of archaeological sites.

Generally, the predictive model (see Table 2-3) is supported with regard to the observed types and distribution of sites in the landscape (Table 5-5). As predicted, more significant and/or greater varieties and densities of archaeological and Aboriginal cultural sites occurred in areas which were assessed as having higher archaeological sensitivity within the boundary of the project; that is, the sand plains of the Coastal barriers and low rolling hills and rises of the coastal ramp.

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

Broad archaeological landscape units	Specific landscape characteristics	Project section	Sensitivity rating	Number of sites (% of total sites)	Sites
Coastal barriers	Sand plain characterised by low-relief dunes and swales.	8, 9, 10	H	10 (53%)	Site 11 E2/2 Melino Scarred Tree 4 Melino Site MST3 C21 MSRT2 Gumi Site Site 3 Site 2
	Poorly drained swamps.	8, 10, 11	H	0 (0%)	None – higher sensitivity landforms do not occur in proposal corridor

Broad archaeological landscape units	Specific landscape characteristics	Project section	Sensitivity rating	Number of sites (% of total sites)	Sites
Coastal ramp	Low relief erosional landscape of rolling hills, undulating rises and low gradient slopes.	9, 10	M-H	9 (47%)	Site 4 Site 1 Rudgley Scarred Tree Rudgley Site 2 Rudgley Site 1b Rudgley Site 1a Saezza 1 Site 12 Gittoes Jali
Richmond Alluvial Plain	Alluvial plain of low lying flat terrain, approximately 5 metres above sea level. Area has been drained, cleared and extensively cultivated.	8, 9, 10, 11	L-M	0 (0%)	None – higher sensitivity landforms do not occur in proposal corridor

Archaeological sites recorded during the field work to date have been found predominantly on the deflated sand dunes, low rises and spurlines generally close to creeks and rivers. These landforms would have provided relatively flat areas suitable for camping close to water and food resources, and in the case of low rises and spurlines with views of the surrounding landscape.

Control excavations found only trace signs of Aboriginal cultural heritage, which suggests the predictive model is well founded, though additional control testing beyond the scope of this study could refine this. Previous ground-disturbance appeared to be a major factor in PADs that didn't yield Aboriginal cultural material, suggesting that some of these areas may once have contained material remains, but were subsequently removed through post-contact activities.

Further archaeological work (eg salvage) as part of the future project stages of the project between Woodburn and Ballina, and further south to Woolgoolga, as well as other projects in the surrounding region, would be useful in further refining predictions regarding the region. Areas for particular refinement would be further categorisation and mapping of the landforms in the area to enable more accurate identification of sensitive landforms.

5.2.7. Summary

The nature of the archaeological sites recorded within the boundary of the project between Woodburn and Ballina allows for several possible insights into pre-contact and post-contact occupation of the area. Many of the archaeological sites recorded within the boundary of the project represent this movement around the landscape, such as resource gathering sites, temporary travelling route occupation sites along ridges, or occupation sites next to water sources. The location and nature of the sites indicates that Aboriginal People were utilising both coastal, river and swamp margins for resource extraction. Based on traditional knowledge of resource

availability, weather patterns, ethnohistory and the archaeological record, a sound argument could be made that occupation in many landforms was seasonal.

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

The age of the shell material found at E2/2 (540 +/-32 BP) and Melino Site (479 +/- 30 BP and 549 +/- 31 BP), and the potential antiquity of Melino Site (7,356 +/- 37 BP) when combined with ethnographic information relating to the occupation of these sites, indicates that this area has been utilised by people for an extensive length of time.

Across the sites people utilised and modified a range of stone material, specifically chert and chalcedony. Although locations of the source of these materials is currently unknown, due to a preference for fine-grained chert and chalcedony as a raw material over readily available cobbles within local waterways and other fine-grained material, such as silcrete, it is possible that sources of chert and chalcedony are within close proximity to these sites and relatively readily available.

5.2.8. 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 Woodburn and Ballina. 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.

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 and places (see Section 9).

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 most 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. Gittoes Jali (AHIMS 09-1-0204, 09-1-0205, 09-1-0203)

Social significance

- The Gittoes Jali site has high social significance as it is in a culturally important area to the Aboriginal traditional owners. It is a site which has been intensively occupied as a camp site and for a range of production activities including formed stone tools, and paint wells used for mixing ochre and other materials for ceremonial purposes. A piece of blue agate was found at the Gittoes-Jali site which is associated with an important secret story surrounding the spiritual being, *Baiamie,* which relates to blue stones.

Historical significance

- The Gittoes Jali site does not meet this criterion.

Scientific significance

- The Gittoes Jali artefact scatter and paint wells are of high scientific significance because the site has been graded with moderate-high integrity, moderate-high structure, high contents, and high representativeness. The site also has high education potential.

- This site has moderate-high integrity as there has been minimal physical disturbance. The site's structure is ranked as moderate-high due to its large dimension along the entire top of the ridgeline and the stratigraphic integrity of the site, with very little evidence of the site being significantly disturbed. The range and type of occupational evidence found at the site (e.g. paint wells, a wide variety of raw materials and scarred tree) rank the contents of the site as high. The site is ranked as high for representativeness due to the rarity of this site type in the region. The multiple site components and the range of raw materials are unusual for this area.

- The site was not previously known by local property owners nor by the local traditional owners, thus due to the nature of the site, it has excellent educational potential on local and regional scales. Open sites on similar landforms and with high artefact concentrations, intra-site patterning and relative integrity are rare within the region and within NSW, as are paint wells. The site is also associated with at least one unrecorded scarred tree in an adjacent property (which could not be accessed) which increases its rarity. The site's intra-site patterning, integrity, and links to other nearby Aboriginal cultural heritage sites and places, also provides high research potential on a regional and possibly State scale.

Aesthetic significance

- The Gittoes Jali site has low aesthetic significance because it has limited apparent sensory values due to the sub-surface nature of most of the tangible evidence. The presence of a

scarred tree and the paint wells above ground as well as the situation of the site on a distinctive land form of an isolated rise surrounded by floodplain provides some visual value.

Summary statement of significance

- Overall the Gittoes Jali site has a high level of significance at the regional and possibly to State level. It is highly socially significant as a well occupied site in which a range of activities were undertaken likely prior to the arrival of non-Aboriginal people in the area. It has high scientific significance due to its lack of physical disturbance, the wide range and types of occupational evidence found at the site, and its rarity in the region. The site also has high education potential due to its other scientific values and it previously being unknown to the local traditional owners. The site has low aesthetic significance due to the sub-surface nature of most of the tangible evidence of the site.

6.2.2. Gittoes Jali 2

Social significance

- This artefact scatter is of moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people, and is located within a significant landscape and locale.

Historical significance

- The site is of low historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

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 site has low integrity and structure as it has been heavily disturbed by post-contact land-use practices and it is a low density small artefact scatter on the floodplain below a steep hill. The site has a low contents ranking as the raw material is common to the area. The site has a low representativeness ranking as artefact scatters of this type 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 Gittoes Jali 2 is of low significance at the local level. The site has moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people, and is located in close proximity of an important archaeological site. Due to the high level of disturbance, the low density of artefacts, and the presence of a common stone material, the site has low scientific significance.

6.2.3. Gittoes Jali 3

Social significance

- This isolated artefact is of moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people, and is located within a significant landscape and locale.

Historical significance

- The site is of low historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

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 site has low integrity and structure as it has been heavily disturbed by post-contact land-use practices and it is an isolated artefact on the middle slopes of a steep hill. The site has a low contents ranking as the raw material is common to the area. The site has a low representativeness ranking as stone artefacts of this type 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 Gittoes Jali 3 is of low significance at the local level. The site has moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people, and is located in close proximity of an important archaeological site. Due to the high level of disturbance, and the presence of a common stone material, the site has low scientific significance.

6.2.4. Site 11 (AHIMS ID 13-1-0189)

Social significance

- The artefact scatter of Site 11 has moderate-high social significance due to its location adjacent to Cooks Hill, an important location of meeting between various groups and for ceremonies from prehistoric times through to the early 20th century.

Historical significance

- Site 11 has moderate historical significance due to its location adjacent to Cooks Hill, an important location of meeting between various groups and for ceremonies into the early 20th century.

Scientific significance

- The site has moderate-high scientific significance because the site has been graded as having high integrity, high structure, moderate contents and moderate representativeness.

- The physical integrity of the site is high due to the minimal amount of sub-surface disturbance. Within the same landform (deflated sand dune) there has been significant disturbance due to a sand quarry, however Site 11 has largely remained undisturbed by this activity. The structure of the site is ranked as high because of the depth of deposits at the site, which starts at a depth below any of the minor vegetation removal on the surface. The site contains a large number and discrete concentration of artefacts (primarily two raw materials) leading to its ranking as having moderate contents. The site is of moderate representativeness as artefact scatters are common within the area, as is the raw material type, however, in-situ knapping floors are more unusual.

- The site has educational potential on a local scale in teaching about artefact production and analysis.

- The site has a high research potential due to the density and integrity of the sub-surface deposit. Due to the high number of core fragments identified it is also likely that the raw material source was within close proximity and an area that could be further investigated. There is also further potential for dating through techniques such as optically stimulated luminescence (OSL) to gain a better understanding of the occupation history of the area, in association with the radiocarbon dates from Melino Site and E2/2 Site.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall Site 11 has a moderate-high level of significance at the regional level. It is moderate-highly socially significant for its association to the important Cooks Hill area, important for camping and ceremonies from prehistoric times through to the 20th century. It is also of moderate historical importance for this reason. The site has moderate-high scientific significance as it contains an in situ knapping floor and deep deposits and is of high research potential particularly in combination with other sites in the area.

6.2.5. E2/2 (AHIMS ID 13-1-0109)

Social significance

- The artefact scatter and shell midden at E2/2 is of moderate-high social significance due to its location adjacent to Cooks Hill, an important location of meeting between various groups and for ceremonies from prehistoric times through to the early 20th century.

Historical significance

- The site has moderate-high historical significance at a local scale due to its location on the slopes of Cooks Hill, and although it was once previously a more significant site on a regional scale, post-colonial impacts (especially sand quarrying) have diminished the scale of significance of this site to a local scale.

Scientific significance

- The site has moderate scientific significance as it is ranked as having low-moderate integrity, moderate structure, moderate contents and moderate representativeness/rarity.

- The physical integrity of the site is low-moderate due to the impacts particularly of sand quarrying. The structure, contents and rarity of the site are ranked as moderate as only a small number of stone artefacts were recovered from the site but did include a range of raw material and technological types. The shell material was dated at 540 +/-32 Before Present (BP), and in conjunction with the Melino Site and Site 11 has some contribution towards the research potential for understanding the occupation history of the area.

Aesthetic significance

- The site has low aesthetic significance because it has limited apparent sensory values due to the sub-surface nature of most of the tangible evidence.

Summary statement of significance

- Overall Site E2/2 has a moderate-high level of significance at the local level. It is moderate-highly socially significant for its association to the important Cooks Hill area, important for camping and ceremonies from prehistoric times through to the 20th century. It is also of moderate-high historical importance for this reason. The site has moderate scientific significance due to its range of raw materials and the presence of dateable shell material. It has the potential to contribute to broader research into the local area.

6.2.6. Cooks Hill, Broadwater (AHIMS ID 13-1-0038, 13-1-0010)

Social significance

- The ceremonial ground (bora ring) is of moderate-high social significance as Cooks Hill is an important ceremonial site with clans coming from as far away as Lismore. Any higher points surrounding Cooks Hill were also considered important as when clans come for ceremonies they camped separately at different locations around the base, before joining together for ceremonies at the top of the hill. The bora ring is at the peak, which was a focal point for the ceremonies.

Historical significance

- The site has moderate historical significance as an important location of meeting between various groups and for ceremonies into the early 20th century.

Scientific significance

- The scientific significance of the site was unable to be comprehensively assessed as it was unable to be located within 100 metres of its recorded location. The site has either been destroyed or is situated outside the boundary of the project in the Broadwater National Park.

Aesthetic significance

- The aesthetic significance of the site was unable to be assessed as it was unable to be located the site within 100 metres of its recorded location. The site has either been destroyed or is situated outside the boundary of the project in the Broadwater National Park.

Summary statement of significance

- Based on the limited assessment of significance to date, Cooks Hill has a moderate-high level of significance at the regional level. It is moderate-highly socially significant as an important location for camping and ceremonies from prehistoric times through to the 20th century. It is also of moderate historical importance for this reason. The scientific and aesthetic significance of the site was unable to be assessed.

6.2.7. Gumi Site

Social significance

- The scarred tree at the Gumi Site has moderate-high social significance. One of the Aboriginal stakeholders recognises the scarred tree as a marker for a spring.

Historical significance

- This site has low local historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

Scientific significance

- The scientific significance of the site is probably moderate, but is not certain that the tree was modified as a result of Aboriginal cultural activities as the tree appears to be too young and the scar is not consistent with Aboriginal cultural scarred trees, so there is the potential that the scientific significance would be nil.

Aesthetic significance

- The aesthetic significance of the site is low, as the tree appears to be too young and the scar is not a good example of an Aboriginal culturally scarred tree.

Summary statement of significance

- Overall, the Gumi site has a moderate level of significance at the local level. It is moderate-highly socially significant through the presence of both scarred tree. It is also of low historical importance for its association with historical period use of the general area. The aesthetic significance is low as it is not a good example of an Aboriginal culturally scarred tree. The scientific significance is moderate for now.

6.2.8. Law PAD (AHIMS ID 04-4-0168)

The significance of the LAW PAD site was unable to be assessed as it is not likely to be impacted by the project and was thus not subject to any sub-surface investigation during this project.

6.2.9. Melino Scarred Tree 4 (AHIMS ID 04-4-0166)

Social significance

- The Melino Scarred Tree 4 is of moderate-high social significance as it is in a culturally important area.

Historical significance

- The site is of low-moderate historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

Scientific significance

- The site has moderate scientific significance as it is ranked as having low integrity, moderate contents and moderate-high representativeness/rarity.
- The tree is dead and in poor condition. While scarred trees are rare in the local area and within NSW there is little potential for research or use of the tree for educational purposes, particularly through its association with other site types in the area including the Melino Site.

Aesthetic significance

- The site is of low aesthetic significance as it was previously a distinctive visual marker in the landscape, however its poor condition reduces its aesthetic significance.

Summary statement of significance

- Overall the Melino Scarred Three 4 has a moderate-high level of significance at the local level. It is moderate-highly socially significant as it is in a culturally important area. It is also of low-moderate historical importance for its association with historical period use and stores in the general area. The site has moderate scientific significance due to its rarity despite being in poor condition. It is also of low aesthetic significance as a visual landscape marker because of its poor condition.

6.2.10. Melino Artefact Scatter

Social significance

- This artefact scatter is of moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people, and is located within a significant landscape and locale.

Historical significance

- The site is of low historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

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 site has low integrity and structure as it has been heavily disturbed by post-contact land-use practices and it is a low density small artefact scatter on the lower slopes of a steep ridge. The site has a low contents ranking as the raw material is common to the area. The site has a low representativeness ranking as artefact scatters of this type 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 Melino Artefact Scatter is of low significance at the local level. The site has moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people, and is located within a significant landscape. Due to the high level of disturbance, the low density of artefacts, and the presence of a common single stone material, the site has low scientific significance.

6.2.11. Melino Site (AHIMS ID 04-4-0173)

Social significance

- The artefact scatter and shell midden at the Melino Site is of high social significance as it is located in a culturally important area covering several resource zones, and may once have been associated with a ceremonial bora ground to the east (the bora is believed to have been previously disturbed).

Historical significance

- The site is of moderate historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

Scientific significance

- The site has high scientific significance as it is ranked as having high integrity, high structure, moderate-high contents and high representativeness/rarity.

- The integrity and structure of the site is high as the dating of shell and charcoal associated with artefacts recovered from the site indicate that occupation of this site has occurred from the mid-early Holocene up to the last few hundred years. The contents of the site are all found within the region, the raw materials and shell content are both found in other areas, however, generally not within such close proximity. Melino site has a high representative value within the area, due to the rarity of the combination of site elements within the area (scarred trees, shell midden and artefact scatter). It also has a high representative value due to fact that no other sites within the region have been subjected to archaeological dating.

- The site has high research potential for answering questions regarding site occupation associated with the Richmond River during the Holocene which may indicate changes in resource use over an extensive period of time. Further investigations into the sources for the artefact raw material and the shell would potentially provide further information regarding movement across the landscape. The shell has likely been transported across the Richmond River as it is coastal beach species and the artefact material is also located in higher densities at sites such as E2/2 and Gittoes Jali which are also on the opposite side of the river. Further detailed analysis of the stone artefacts within a stratigraphic context (and in association with radiocarbon dating) may also reveal changes in stone tool manufacture over time.

- Due to an ongoing utilisation of the area, including stories of occupation of Jali and Burabi elders in the early 1900s, the site has a high education potential. The associated scarred trees which may have made small canoes to cross the Richmond River when linked with the results

of the archaeological investigations within the Broadwater and Wardell area enables tangible links to be established between various points in the landscape. This further demonstrates the links create by pathways between the ranges and the coast.

Aesthetic significance

- The site has low aesthetic significance because it has limited apparent sensory values due to the sub-surface nature of most of the tangible evidence.

Summary statement of significance

- Overall the Melino site is has a high level of significance at the regional level. It is of high social significance as it is located in a culturally important area covering several resource zones, and may once have been associated with a ceremonial bora ground. The site is of moderate historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area. The site has high scientific significance due to the presence of dateable shell and charcoal in association with stone artefacts, and scarred trees. It has high research potential for answering questions about Holocene era site occupation associated with the Richmond River and changes to resource use over time. The site also has high educational potential.

6.2.12. MST3 (AHIMS ID 04-4-0131), C21 (AHIMS ID 04-4-0107), MSRT2 (AHIMS ID 04-4-0130)

The three scarred trees (MST3, C21 and MSRT2) are all located within an area of approximately five metres radius and are assessed below as a complex. They are also associated with the archaeological deposit recorded at Melino site.

Social significance

- The three trees have high social significance as they are located in a culturally important area and together are a culturally rare item.

Historical significance

- The three trees have low-moderate historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area.

Scientific significance

- The three trees have high scientific significance as they are ranked as having moderate integrity, high structure, high contents and high representativeness/rarity.

- Such a complex is regionally rare, in addition to the rarity of scarred trees more generally locally and within NSW. Due to the rarity of this site complex, this complex of sites has high local educational significance for passing on Aboriginal stories and traditions.

Aesthetic significance

- The three trees have moderate-high aesthetic significance, as they are a distinctive visual marker in the landscape.

Summary statement of significance

- Overall the three scarred trees designated MST3, C21 and MSRT2 have a high level of significance at the regional level. They have high social significance through their association with the nearby Melino Site. The site is of low-moderate historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area. The site has high scientific significance due to the rarity of the site complex.

6.2.13. MST1 (AHIMS ID 04-4.0129)

Social significance

- The scarred tree at MST1 is of moderate-high social significance as it is located in a culturally important area.

Historical significance

- The tree is of low-moderate historical significance due to post-contact Aboriginal occupation of this area, and several historic stories associated with this general area.

Scientific significance

- The tree has moderate-high scientific significance as they are ranked as having moderate integrity, moderate contents and moderate-high representativeness/rarity. The tree is reasonably good condition. The site is relatively rare due to the overall rarity locally and within NSW of scarred trees. The tree has some potential for educational purposes in passing on knowledge regarding traditions and activities that result in the scarring of trees.

Aesthetic significance

- The site is of low-moderate aesthetic significance as it is a distinctive visual marker in the landscape.

Summary statement of significance

- Overall MST1 has a moderate-high level of significance at the local level. It is of moderate-high social significance as it is located in a culturally important area. The site is of low-moderate historical significance due to post-contact Aboriginal occupation of this area, and several historical stories associated with this general area. The site has moderate-high scientific significance due to the good condition of the tree and the overall rarity of scarred trees in NSW.

6.2.14. Site 3 (AHIMS ID 04-4-175)

Social significance

- The artefact scatter of Site 3 is of moderate social significance because it is situated on a deflated dune that was part of an important pathway used by Aboriginal people leading from the Richmond River to the ranges.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low-moderate scientific significance as it is ranked as having low-moderate integrity, low structure, low contents and low-moderate representativeness/rarity.
- The site has a low ranking for integrity and low-moderate for structure. The deflated dune is continually subject to rising and falling ground water table and is a low density small scatter. 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. The only value for research or education would be that this deflated dune is part of the pathways which lead from the Richmond River to the ranges.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall Site 3 has a low-moderate level of significance at the local level. It is of moderate social significance as it is located on a deflated dune that was part of an important pathway used by Aboriginal people leading from the Richmond River to the ranges. It has low-moderate 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.

6.2.15. Site 2 (AHIMS ID 04-4-0178)

Social significance

- The artefact scatter of Site 2 is of moderate social significance because it is situated on a deflated dune that was part of an important pathway used by Aboriginal people leading from the Richmond River to the ranges.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low-moderate scientific significance as it is ranked as having low integrity, low-moderate structure, low contents and low-moderate representativeness/rarity.
- The site has a low ranking for both integrity and structure. The deflated due is continually subject to rising and falling ground water table and is a low density small scatter. 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. The main value for research or education would be that this deflated dune is part of the pathways which lead from the Richmond River to the ranges.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall Site 2 has a low-moderate level of significance at the local level. It is of moderate social significance as it is located on a deflated dune that was part of an important pathway used by Aboriginal people leading from the Richmond River to the ranges. It has low-moderate 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.

6.2.16. Site 4 (AHIMS ID 04-4-0132)

Social significance

- The artefact scatter at Site 4 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 Site 4 has a low-moderate level of significance at the local level. It is of low-moderate social significance as it 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.

6.2.17. Site 1 (AHIMS ID 04-4-0179)

Social significance

- The artefact scatter at Site 1 is of 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 site has a low ranking for integrity and structure as it is a low density small artefact scatter in a low relief erosional landscape of rolling hills, undulating rises and low gradient slopes. The site has a low contents ranking as the single 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 Site 1 has a low-moderate level of significance at the local level. It is of low-moderate social significance as it 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.

6.2.18. Rudgley Scarred Tree (AHIMS ID 04-4-0170)

Social significance

- The Rudgley Scarred Tree is of moderate-high social significance as it demonstrates the use of the tree as an important marker in the landscape of a culturally important area.

Historical significance

- The tree does not meet this criterion.

Scientific significance

- The site has moderate-high scientific significance as it is ranked as having moderate integrity, moderate contents and moderate-high representativeness/rarity.

- The tree is dead but the scar is in reasonable condition meaning the tree has a moderate level of integrity and contents.
- The Rudgley Scarred Tree is rare as scarred trees in general are rare locally and within NSW.
- The tree has some limited potential for local educational purposes and research potential, particularly related to how people moved and traded between the hinterland and the coast, as the tree is located at the foot of the Blackwall Ranges.

Aesthetic significance

- The tree has low aesthetic significance as it provides some visual distinction in the landscape.

Summary Statement of Significance

- Overall the Rudgley Scarred Tree is of moderate-high significance at the local level. The site is of moderate-high social significance as it demonstrates the use of the tree as an important marker in the landscape of a culturally important area. The site has moderate-high scientific significance through its condition and rarity and potential for local educational purposes. The tree has low aesthetic significance as it provides some visual distinction in the landscape.

6.2.19. Rudgley Site 2 (AHIMS ID 04-4-0167)

Social significance

- The artefact scatter of Rudgley Site 2 is of low-moderate social significance because it is situated on a deflated dune that was part of any important pathway used by Aboriginal people leading from the Richmond River to the ranges.

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 site has a low ranking for integrity and structure. The deflated dune on which the site is situated is continually subject to rising and falling ground water table and is a low density small scatter. The site has a low contents ranking as the single 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. The only value for research or education would be that this deflated dune is part of the pathways which lead from the Richmond River to the ranges.

Aesthetic significance

- The site does not meet this criterion.

Summary Statement of Significance

- Overall the Rudgley Site 2 is of low significance at the local level. The site has low-moderate social significance through its association with a nearby pathway used by Aboriginal people. Due to the high level of disturbance, the low density of artefacts, and the presence of a common single stone material, the site has low scientific significance.

6.2.20. Rudgley Site 1a and 1b (AHIMS ID 04-4-0167)

Social significance

- The artefact scatter at Rudgley Site 1a and 1b is of low-moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people.

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 site has low integrity and structure as it has been heavily disturbed by post-contact land-use practices and it is a low density small artefact scatter in a low relief erosional landscape of rolling hills, undulating rises and low gradient slopes. The site has a low contents ranking as the single 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 the Rudgley Site 1a and 1b is of low significance at the local level. The site has low-moderate social significance as it contains a low level of physical evidence representative of the use of the area by Aboriginal people. Due to the high level of disturbance, the low density of artefacts, and the presence of a common single stone material, the site has low scientific significance.

6.2.21. Saezza 1 (AHIMS ID 04-4-0171)

Social significance

- The artefact scatter at Saezza 1 is moderate social significance as it comprises a moderate amount of physical evidence of use of the site by Aboriginal people.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low-moderate scientific significance as it is ranked as having low integrity, low structure, moderate contents and low-moderate representativeness/rarity.
- The integrity and structure of the site is low as it has been moderately disturbed by post-contact land-use practices. The content of the site is moderate due to the range of artefacts types and several raw materials. The representativeness/rarity of the site is low-moderate as the site contains raw material common to the area in addition to artefact scatters also being common within the region.
- It has some limited 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 a small stream.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall the Saezza 1 site is of moderate significance at the local level. The site is of moderate social significance as it contains a moderate level of physical evidence representative of the use of the area by Aboriginal people. Due to the moderate level of disturbance, the low density of artefacts, and the presence of commonly available raw materials, the site has low-moderate scientific significance.

6.2.22. Site 12 (AHIMS ID 04-4-0176)

Social significance

- The artefact scatter at Site 12 has moderate social significance as it comprises a moderate amount of physical evidence of use of the site by Aboriginal people.

Historical significance

- The site does not meet this criterion.

Scientific significance

- The site has low-moderate scientific significance as it is ranked as having low integrity, low structure, low-moderate contents and low-moderate representativeness/rarity.
- The integrity and structure of the site is low as it has been moderately disturbed by post-contact land-use practices. The content of the site is low-moderate due to the limited range of artefacts types and a single raw material present. The representativeness/rarity of the site is low-moderate as the site contains raw material common to the area in addition to artefact scatters also being common within the region.

Aesthetic significance

- The site does not meet this criterion.

Summary statement of significance

- Overall Site 12 is of moderate significance at the local level. The site is of moderate social significance as it contains a moderate level of physical evidence representative of the use of the area by Aboriginal people. Due to the moderate level of disturbance, the low density of artefacts, and the presence of commonly available raw materials, the site has low-moderate scientific significance.

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 Scientific significance assessment for archaeological sites within or near the boundary of the project between Woodburn and Ballina

AHIMS ID	Name	Site type(s)	Integrity	Structure	Contents	Representativeness	Scientific significance
09-1-0204, 09-1-0205 and 09-1-0203	Gittoes Jali	Artefact scatter, Paint wells	Moderate-high	Moderate-high	High	High	High
TBA	Gittoes Jali 2	Artefact scatter	Low	Low	Low	Low	Low
TBA	Gittoes Jali 3	Isolated artefact	Low	Low	Low	Low	Low
13-1-0189	Site 11	Artefact scatter	High	High	Moderate	Moderate	Moderate-high
13-1-0109	E2/2	Artefact scatter, shell midden	Low-moderate	Moderate	Moderate	Moderate	Moderate
13-1-0038 and 13-1-0010	Cooks Hill, Broadwater	Ceremonial ground (Bora ring)	Unknown	Unknown	Unknown	High	Unknown
04-4-0180	Gumi Site	Possible scarred tree	Moderate	N/A	Low-moderate	Moderate-high	Moderate
TBA	Melino Artefact Scatter		Low	Low	Low	Low	Low
04-4-0168	Law PAD	PAD	Unknown	Unknown	Unknown	Unknown	Unknown

AHIMS ID	Name	Site type(s)	Integrity	Structure	Contents	Representativeness	Scientific significance
04-4-0166	Melino Scarred Tree 4	Scarred tree	Low	N/A	Moderate	Moderate-high	Moderate
04-4-0173	Melino Site	Artefact scatter, shell midden	High	High	Moderate-high	High	High
04-4-0131	MST3	Scarred tree	Moderate	High	High	High	High
04-4-0107	C21	Scarred tree					
04-4-0130	MSRT2	Scarred tree					
04-4-0129	MST1	Scarred tree	Moderate	N/A	Moderate	Moderate-high	Moderate-high
04-4-0175	Site 3	Artefact scatter	Low-moderate	Low	Low	Low-moderate	Low-moderate
04-4-0178	Site 2	Artefact scatter	Low	Low-moderate	Low	Low-moderate	Low-moderate
04-4-0132	Site 4	Artefact scatter	Low	Low	Low	Low	Low
04-4-0179	Site 1	Artefact scatter	Low	Low	Low	Low	Low
04-4-0170	Rudgley Scarred Tree	Scarred tree	Moderate	N/A	Moderate	Moderate-high	Moderate-high
04-4-0169	Rudgley Site 2	Artefact scatter	Low	Low	Low	Low	Low
04-4-0167	Rudgley Site 1a and 1b	Artefact scatter	Low	Low	Low	Low	Low
04-4-0171	Saezza 1	Artefact scatter	Low	Low	Moderate	Low-moderate	Low-moderate
04-4-0176	Site 12	Artefact scatter	Low	Low	Low-moderate	Low-moderate	Low-moderate

Table 6-2 Summary of significance assessment for sites near or within the boundary of the project between Woodburn and Ballina

AHIMS ID	Name	Scientific significance	Social significance	Aesthetic significance	Historical significance	Overall significance
09-1-0204, 09-1-0205 and 09-1-0203	Gittoes Jali	High	High	Low	None	High
TBA	Gittoes Jali 2	Low	Moderate	Low	Low	Low
TBA	Gittoes Jali 3	Low	Moderate	Low	Low	Low
13-1-0189	Site 11	Moderate-high	Moderate-high	None	Moderate	Moderate-high
13-1-0109	E2/2	Moderate	Moderate-high	Low	Moderate-high	Moderate-high
13-1-0038 and 13-1-0010	Cooks Hill, Broadwater	Unknown	Moderate-high	Unknown	Moderate	Unknown
04-4-0180	Gumi Site	Moderate	Moderate-high	Low	Low-moderate	Moderate
TBA	Melino Artefact Scatter	Low	Moderate	Low	Low	Low
04-4-0168	Law PAD	Unknown	Unknown	Unknown	Unknown	Unknown
04-4-0166	Melino Scarred Tree 4	Moderate	Moderate-high	Low	Low-moderate	Moderate-high
04-4-0173	Melino Site	High	High	Low	Moderate	High
04-4-0131	MST3	High	High	Moderate-high	Low-moderate	High
04-4-0107	C21	High	High	Moderate-high	Low-moderate	High
04-4-0130	MSRT2	High	High	Moderate-high	Low-moderate	High
04-4-0129	MST1	Moderate-high	Moderate-high	Low-moderate	Low-moderate	Moderate-high
04-4-0175	Site 3	Low-moderate	Moderate	Low	None	Low-moderate
04-4-0178	Site 2	Low-moderate	Moderate	Low	None	Low-moderate
04-4-0132	Site 4	Low	Low-moderate	None	None	Low-moderate
04-4-0179	Site 1	Low	Low-moderate	Low	None	Low-moderate
04-4-0170	Rudgley Scarred Tree	Moderate-high	Moderate-high	Low	None	Moderate-high
04-4-0169	Rudgley Site 2	Low	Low-moderate	Low	None	Low
04-4-0167	Rudgley Site 1a and 1b	Low	Low-moderate	None	None	Low
04-4-0171	Saezza 1	Low-moderate	Moderate	Low	None	Moderate

AHIMS ID	Name	Scientific significance	Social significance	Aesthetic significance	Historical significance	Overall significance
04-4-0176	Site 12	Low-moderate	Moderate	Low	None	Moderate

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 section 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 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.

Of the 23 archaeological sites near or within the boundary of the project, 13 will be directly impacted by the project, three could be indirectly impacted – though impact would be easily mitigated in all instances – and five would be avoided, either through being located outside the boundary of the project, or being within the boundary of the project but not within construction footprint. Table 7-1 presents the impact assessment.

Table 7-1 Impact assessment of sites near or within the boundary of the project between Woodburn and Ballina

Section	AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
8	09-1-0204, 09-1-0205, 09-1-0203	Gittoes Jali	High	Artefact scatter	Direct	Resource extraction over an area of approximately 79,800 m^2 is proposed to be undertaken that would result in the excavation and removal of sediments that would result in the complete destruction of approximately 95 per cent of the site. At the southern extent of this site, the site will be subject to excavation to provide level construction of road for approximately 200 m in length; this area overlaps the resource extraction area. These impacts would result in the removal of most of the site and irreversible impact to its heritage values. Avoidance of this site has been considered, however, due to a large number of other constraints nearby the project in this location, this may not be possible. For example, moving the boundary of the project to the south would result in impacts further along the corridor on Broadwater National Park and an Endangered Ecological Community, moving to the west would likely result in impact further along the corridor to wetlands, endangered fauna, and a known Aboriginal burial site. Undertaking resource extraction at another site is difficult economically, as this would result in significant financial impacts to the project. The Alliance is continuing investigation of the possibility of avoiding parts of this site.
8	TBA	Gittoes Jali 2	Low	Artefact scatter	None	This site is located within the boundary of the project, but outside the construction footprint. Consequently, no direct or indirect impact is likely from the project. Fencing may be required to ensure impact from associated activities is avoided.
8	TBA	Gittoes Jali 3	Low	Isolated artefact	Direct	Resource extraction over an area of approximately 79,800 m^2 is proposed to be undertaken that would result in the excavation and removal of sediments that would result in the complete destruction of the site and irreversible impact to its heritage values. The Alliance is continuing investigation of avoiding parts of this area, which may result in avoidance of this site.
9	13-1-0189	Site 11	Moderate-high	Artefact scatter	Direct	Site 11 will be subject to excavation to provide level construction of road for approximately 150 m in length. The result would be the removal of approximately 80 per cent of the site and irreversible impact to its heritage values. Part of the site is outside the construction footprint and will not be impacted by the project.

Section	AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
9	13-1-0109	E2/2	Moderate-high	Artefact scatter, shell midden	Direct	E2/2 will be subject to excavation to provide construction of road, including level, cutting and embanked road, for approximately 600 m in length. The result would be the removal of approximately 50 per cent of the site and irreversible impact to its heritage values. More significant deposits of this site exist immediately outside the boundary of the project to the east and west, including one intact protected portion of the sand plain, so impact to the values of the site would be low-moderate. Part of the site is outside the construction footprint and will not be impacted by the project.
9	13-1-0038 and 13-1-0010	Cooks Hill, Broadwater	Moderate	Ceremonial ground (Bora ring)	None	This site is outside the boundary of the project and no direct or indirect impact is likely from the project.
10	04-4-0180	Gumi Site	Moderate	Scarred tree	Direct	Currently, Gumi site is proposed to be subject to excavation to provide embanked construction of road for approximately 40 m in length. The result would be the complete removal of the scarred tree and irreversible impact to its heritage values. Attempting to avoid impact to this site by realigning the project further to the west is likely to result in impact to Aboriginal sites (possibly MST3, MSRT2, C21, and almost certainly Melino Scarred Tree 4, and denser shell deposits of Melino site) that would otherwise be avoided further to the north of Gumi, so it is difficult to justify avoidance to this site. Based on the majority of stakeholder comments, impact to Gumi site was preferred over realignment and impact to Melino Scarred Tree. It should be noted that Jali LALC was not happy with either of these options and not happy with impact to the tree. Further investigation is being undertaken of the tree to confirm whether or not it has been culturally scarred.
10	04-4-0168	Law PAD	TBA	PAD	None	A small portion of this PAD is located within the boundary of the project, however, no construction is proposed in this area. Consequently, no direct or indirect impact to Law PAD is likely.
10	TBA	Melino Artefact Scatter	Low	Artefact scatter	Direct	Melino Artefact Scatter will be subject to fill to construct the road for approximately 20 m in length. The result will be the complete covering of 100% of the site by the road, and irreversible impact to its heritage values.

Section	AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
10	04-4-0173	Melino Site	High	Artefact scatter, shell midden	Direct	The exact extent of this site has not been fully determined as the site extends beyond the boundary of the project, however, the extent has been estimated based on the landform on which it occurs, and the location of shell material identified at the western extent. Based on the estimated extent, Melino Site will be subject to excavation to provide construction of cut and embanked road for approximately 220 m in length. The result would be the removal of approximately 20 per cent of the site and irreversible impact to its heritage values. Deposits of this site exist immediately outside the boundary of the project to the west so impact to the values of the site would be moderate. Most of this site is outside the construction footprint and will not be impacted by the project.
10	04-4-0166	Melino Scarred Tree 4	Moderate-high	Scarred tree	Indirect	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. Low-level indirect impact may occur to the values of the site through the site being visible from the road during construction and operation.
10	04-4-0131	MST3	High	Scarred tree	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. No indirect impact would occur from visibility, as the scar faces away from the proposed road.
10	04-4-0107	C21	High	Scarred tree	Indirect	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. Low-level indirect impact may occur to the values of the site through the site being visible from the road during construction and operation.
10	04-4-0130	MSRT2	High	Scarred tree	Indirect	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. Low-level indirect impact may occur to the values of the site through the site being visible from the road during construction and operation.
10	04-4-0129	MST1	Moderate-high	Scarred tree	None	No direct or indirect impact is likely from the project.

Section	AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
10	04-4-0175	Site 3	Low-moderate	Artefact scatter	Direct	Site 3 will be subject to excavation to provide construction of embanked road for approximately 140 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 outside the construction footprint and will not be impacted by the project.
10	04-4-0178	Site 2	Low-moderate	Artefact scatter	Direct	Site 2 will be subject to excavation to provide construction of embanked road for approximately 120 m in length. The result would be the removal of approximately 90 per cent of the site and irreversible impact to almost all its heritage values. Part of the site is outside the construction footprint and will not be impacted by the project.
10	04-4-0132	Site 4	Low-moderate	Artefact scatter	Direct	Site 4 will be subject to excavation to provide construction of road cutting for approximately 55 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 outside the construction footprint and will not be impacted by the project.
10	04-4-0179	Site 1	Low-moderate	Artefact scatter	Direct	Site 1 will be subject to excavation to provide construction of embanked road and culvert for approximately 70 m in length. The result would be the removal of 100 per cent of the site and irreversible impact to all its heritage value.
10	04-4-0170	Rudgley Scarred Tree	Moderate-high	Scarred tree	None	Within the boundary of the project, but avoided by the construction footprint. No indirect impact would occur from visibility, as the scar faces away from proposed road. Fencing would be required to ensure impact from associated activities is avoided.
10	04-4-0169	Rudgley Site 2	Low	Artefact scatter	Direct	Approximately 40 per cent of Rudgley Site 2 is outside the boundary of the project and would not be impacted. Approximately 40 per cent is within the boundary of the project, but would not be impacted by the construction footprint. The remaining 20 per cent of Rudgley Site 2 will be subject to excavation to provide construction of road embankment for approximately 25 m in length. The result would be the removal of approximately 20 per cent of the site and irreversible impact to this part of its heritage values. Most of the site is outside the construction footprint and will not be impacted by the project.

Section	AHIMS ID	Updated name	Overall significance	New site type(s)	Impact	Description
10	04-4-0167	Rudgley Site 1a and 1b	Low	Artefact scatter	Direct	Approximately 50 per cent of Rudgley Site 1a and 1b (the 1a portion) is within the boundary of the project, but is not likely to be impacted by the construction footprint; fencing would be required to ensure impact from associated activities is avoided. The remaining 50 per cent of the site (the 1b portion) will be subject to excavation to provide construction of road cutting for approximately 30 m in length. The result would be the removal of approximately 50 per cent of the site and irreversible impact to this part of its heritage values. Part of the site is outside the construction footprint and will not be impacted by the project.
11	04-4-0171	Saezza 1	Moderate	Artefact scatter	None	Within the boundary of the project, but avoided by the construction footprint. Fencing would be required to ensure impact from associated activities is avoided.
11	04-4-0176	Site 12	Moderate	Artefact scatter	Direct	This entire site is within the boundary of the project, but according to the construction footprint, only approximately 10 per cent of Site 12 is likely to be subject to excavation to provide construction of road embankment for approximately 35 m in length. The result would be the removal of approximately 10 per cent of the site and irreversible impact to this part of its heritage values. Most of the site is outside the construction footprint and will not be impacted by the project.

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). For full discussion of management recommendations, see the CHAR (Volume 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.

Table 8-1 Management recommendations for sites near or within the boundary of the project between Woodburn and Ballina

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
8	Gittoes Jali (09-1-0204, 09-1-0205, 09-1-0203)	Artefact Scatter, Paint Wells, Ground Rock and Scarred Tree	High	95	The project would directly impact on this site. **Due to its high significance and significant impact that is proposed to this site, where possible, impacts to this site should be reduced or avoided.** Where possible to avoid impact, **avoided areas must be fenced** to ensure full avoidance. If avoidance is not an option, then extensive salvage is recommended due to the discovery of several dense areas of artefacts and paint wells, ground rock and scarred tree. The scarred tree is outside the boundary of the project and is not likely to be impacted. **1. Artefact scatter** • Salvage excavation must be undertaken of this site within that part of the site within the boundary of the project, within the construction footprint. • A total of 250 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). • Hand excavation of 130 m² that would be impacted. This would be excavated in a controlled manner using trowels and/or shovels and 5 mm hand or mechanical sieve. • 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 parties. • All artefacts which have previously been recorded and reburied 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 parties 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. • Any sediment to 0.6 m depth from this site that is proposed to be used (eg as fill) outside the boundary of the Gittoes Jali site should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. **2. Paint wells and grinding rock** • No impact is proposed of this component of the site. • It is recommended that the location of these paint wells be accurately plotted and drawn. **Geomorphology study** A geomorphology assessment should be undertaken that encompasses this site (and Site 11, E2/2 and Melino Site). The study should be non-invasive, but can use observations of the machine salvage excavation.
8	Gittoes Jali 2 (TBA)	Artefact Scatter	Low	0	None, not impacted
8	Gittoes Jali 3 (TBA)	Isolated artefact	Low	100	If this site is to be impacted by the project, all artefacts from within the construction footprint which have previously been recorded and reburied must be recovered and removed off-site.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
9	E2/2 (13-1-0109)	Artefact Scatter, Shell Midden	Moderate to high	50	The project would impact directly on this site. There are distinct areas of shell deposit located close to the fenceline as well as cultural material throughout the site. • Salvage excavation must be undertaken of this site within the site extent and within the boundary of the project. • 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 parties. • 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 parties 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. • Large portions of this site are located outside the boundary of the project or outside the construction footprint; exclusion zones must be put in place to ensure damage does not occur to archaeological deposits outside of the corridor. 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. Shell midden** • Shell midden deposits were recorded close to the fence line which divides the two properties. It is within this location that hand excavation should occur, the exact location should be within the boundary of the project and directed by the registered Aboriginal parties. • Hand excavation of 10 m² of the midden that would be impacted to a total depth of 500 mm. This would be excavated in a controlled manner using trowels and 3 mm and 5 mm nested sieves. • All shell recovered would be subject to analysis including Minimum Number of Individuals (MNI) and weight (g). Number of Individual specimens (NISP) may also be used if deemed appropriate. • It is recommended that a sequence of dates (radiocarbon or AMS) be collected from the hand excavation **2. The rest of the site** • A total of 80 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). • Any sediment to 1.5 m depth from this site that is proposed to be used (eg as fill) outside the boundary of E2/2 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. **3. Overburden** • All overburden within the boundary of the project should be removed and sieved for cultural materials, to ensure any cultural material located within the overburden is collected. **4. Geomorphology study** • A geomorphology assessment should be undertaken that encompasses this site (and Gittoes Jali, Site 11 and Melino Site). The study should be non-invasive, but can use observations of the machine salvage excavation.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
9	Site 11 (13-1-0189)	Artefact Scatter	Moderate to high	80	The project would impact directly on this site. Due to the discovery of a dense knapping floor (963 artefacts), it is predicted that there may be other areas that contain similar deposits on this sand ridge. • A minimum of 100 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). • A minimum of 20 m² should also be excavated by hand within the vicinity of the mechanical transect where a knapping floor was identified (543354E/6790489N). This would be excavated in a controlled manner using trowels and 3 mm and 5 mm nested sieves. • All artefacts recorded during sub-surface testing would also be recovered. • All artefacts would be removed off-site in order to be analysed and then returned to the registered Aboriginal parties. • Any sediment to 1.5 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Site 11 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. • A large portion of this site is located outside the boundary of the project; an exclusion zone would be put in place to ensure damage does not occur to archaeological deposits outside of the corridor. 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).. **Geomorphology study** • A geomorphology assessment should be undertaken that encompasses this site (and Gittoes Jali, E2/2 and Melino Site). The study should be non-invasive, but can use observations of the machine salvage excavation.
9	Cooks Hill, Broadwater (13-1-0038 and 13-1-0010)	Ceremonial ground (Bora ring)	Moderate	0	None, not impacted
10	Gumi Site (04-4-0180)	Scarred Tree	Unknown	100	• The Gumi scarred tree must be removed and relocated to an area within the boundary of the project and protected with fencing – an arborist should be consulted to guide in the removal and relocation of the tree. The removal would likely result in the death of the tree. • The location must be visually protected during the construction and operation of the road with culturally sensitive plantings or by existing vegetation. • Access to the tree must be provided for local Aboriginal people to enable them to be able to use the tree as a teaching site.
10	Law PAD	PAD	Unknown	0	• A small portion of this PAD is located inside the boundary of the project, but is not likely to be impacted. An exclusion zone would be put in place to ensure damage does not occur to this PAD. This should consist of fencing such as would exclude entry by people or plant to avoid incidental impact to the PAD (eg high visibility construction webbing)..

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
10	Melino Scarred Tree 4 (04-4-0166)	Scarred Tree	Moderate to High	0	The project design has been altered to ensure the scarred tree is within the boundary of the project, but avoided. Protection is required to ensure no impacts during construction. • Prior to construction a 15 m exclusion zone must be placed around the scarred tree. This must remain in place until construction activities have ceased. • This exclusion zone would be fenced using chain wire or plastic mesh and star pickets. Attached would be appropriate signage which indicated 'Do Not Enter' the area. • This fencing should be undertaken with a representative of the LALC present. • An arborist must be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree.
10	Melino Artefact Scatter (TBA)	Artefact Scatter	Low	100	All artefacts from within the construction footprint which have previously been recorded and reburied must be recovered and removed off-site.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
10	Melino Site (04-4-0173)	Artefact Scatter, Shell Midden	High	20	Although Melino Site covers a large area, there are 3 distinct areas which have different salvage requirements. The general requirements for this site are as follows: • Salvage excavation must be undertaken of this site within the site extent and within the boundary of the project. • 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 parties. • All artefacts within the construction footprint 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 parties for reburial or storage at a chosen and recorded location. • All cultural material recovered would be subject to detailed analysis and inclusion in a technical report. • A large portion of this site is located outside the boundary of the project and an exclusion zone would be put in place to ensure damage does not occur to archaeological deposits outside of the corridor. • Any sediment to 1.5 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Melino Site should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. **1. Artefact scatter including a discrete knapping floor was located on the top of the rise.** • The knapping floor is within the boundary of the project, but avoided. It must be fenced to ensure exclusion of people, plant and impact to the site. • Salvage excavation of 30 m² to be excavated by machine. This would be undertaken with a mechanical sieve and excavator (900 mm bucket). • All artefacts propose to be impacted (including those recorded during sub-surface testing) would be removed and analysed. • If any datable material is located, at least 2 samples should be subject to either radiocarbon or AMS dating. **2. Shell Midden** • Where possible, the midden within the construction footprint should be covered with geo-textile fabric and covered with fill to protect from compaction. Where it can't be avoided and salvage excavation must be undertaken of up to 20 m² of the midden that would be impacted up to a total depth of 1.5 m. This would be excavated in a controlled manner using trowels and 3 mm and 5 mm mesh sieves. It is recommended that a sequence of samples be collected from the hand excavation for radiocarbon dating. • All shell recovered would be subject to analysis including Minimum Number of Individuals (MNI) and weight (g). Number of Individual specimens (NISP) may also be used if deemed appropriate. **3. Area surrounding the shell midden** • A total of 100 m² to be excavated by machine, undertaken with a mechanical sieve and an excavator (900 mm bucket). **Geomorphology study** • A geomorphology assessment should be undertaken that encompasses this site (and Gittoes Jali, Site 11 and E2/2). The study should be non-invasive, but can use observations of the machine salvage excavation.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
10	MST3 (04-4-0131)	Scarred tree	High	0	The project alignment has been altered to ensure the scarred tree is within the boundary of the project, but avoided. Protection is required to ensure no impacts during construction. • Prior to construction a 15 m exclusion zone must be placed around the scarred tree. This must remain in place until construction activities have ceased. • This exclusion zone would be fenced using chain wire or plastic mesh and star pickets. Attached would be appropriate signage which indicated 'Do Not Enter' the area. • This fencing should be undertaken with a representative of the LALC present. • An arborist must be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree.
10	C21 (04-4-0107)	Scarred tree	High	0	The project alignment has been altered to ensure the scarred tree is within the boundary of the project, but avoided. Protection is required to ensure no impacts during construction. • Prior to construction a 15 m exclusion zone must be placed around the scarred tree. This must remain in place until construction activities have ceased. • This exclusion zone would be fenced using chain wire or plastic mesh and star pickets. Attached would be appropriate signage which indicated 'Do Not Enter' the area. • This fencing should be undertaken with a representative of the LALC present. An arborist must be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree.
10	MSRT2 (04-4-0130)	Scarred tree	High	0	The project alignment has been altered to ensure the scarred tree is within the boundary of the project, but avoided. Protection is required to ensure no impacts during construction. • Prior to construction a 15 m exclusion zone must be placed around the scarred tree. This must remain in place until construction activities have ceased. • This exclusion zone would be fenced using chain wire or plastic mesh and star pickets. Attached would be appropriate signage which indicated 'Do Not Enter' the area. • This fencing should be undertaken with a representative of the LALC present. An arborist must be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree.
10	MST 1 (04-4-0129)	Scarred tree	High	0	None, not impacted, outside the boundary of the project

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
10	Site 3 (04-4-0175)	Artefact Scatter	Moderate	50	Due to constraints (fenceline and a swamp), the nature of the deposit could not fully be established, except that artefacts were found at over 900 mm depth. Therefore, it is recommended that further mechanical excavation be undertaken in order to reach the depth of the archaeological deposit. • A total of 40 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures should be taken to safely stabilise and then proceed with deeper excavation. • Salvage excavation must be undertaken of this site within the site extent and within the construction footprint of the project. • 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 parties. • All artefacts which have previously been recorded and reburied must be recovered. • All cultural material recovered during salvage would be removed for detailed analysis to be undertaken. Once analysed the material would be returned to the registered Aboriginal parties for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. • A minimum of 2 samples should be collected and subject to either radiocarbon or AMS dating. • Any sediment to 1.5 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Site 3 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. • Portions of the extent of this site will not be impacted by the project; exclusion zones would be put in place to ensure incidental damage does not occur to these 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).. **Please note** that excavation must be undertaken at a time of the year when the water table is at its lowest, to ensure maximum depth can be reached with a machine.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
10	Site 2 (04-4-0178)	Artefact Scatter	Moderate	90	Due to constraints (water table), the nature of the deposit could not fully be established, except that artefacts were found generally at the top of and into the water table. Therefore, it is recommended that further mechanical excavation be undertaken in order to reach the depth of the archaeological deposit. • A total of 30 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures should be taken to safely stabilise and then proceed with deeper excavation. • Salvage excavation must be undertaken of this site within the site extent and within the construction footprint of the project. • 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 parties. • All artefacts which have previously been recorded and reburied must be recovered. • All cultural material recovered during salvage would be removed for detailed analysis to be undertaken. Once analysed the material would be returned to the registered Aboriginal parties for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. • A minimum of 2 samples should be collected and subject to either radiocarbon or AMS dating. • Any sediment to 1.5 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Site 2 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. • A small portion of this site will not be impacted by the project; exclusion zones would be put in place to ensure incidental damage does not occur to these 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).. **Please note** that excavation must be undertaken at a time of the year when the water table is at its lowest, to ensure maximum depth can be reached with a machine.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
10	Site 4 (04-4-0132)	Artefact Scatter	Low to moderate	70	Site 4 has been heavily disturbed through land use (ploughing, power lines, and vehicle track) and has maintained very little site integrity. • A total of 20 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures should be taken to safely stabilise and then proceed with deeper excavation. • Salvage excavation must be undertaken of this site within the site extent and within the construction footprint of the project. • 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 parties. • All artefacts which have previously been recorded and reburied 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 parties for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. • Any sediment to 0.5 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Site 4 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. • Portions of this site will not be impacted by the project; exclusion zones would be put in place to ensure incidental damage does not occur to these 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)..
10	Site 1 (04-4-0179)	Artefact Scatter	Low	100	• A total of 10 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures should be taken to safely stabilise and then proceed with deeper excavation. • Salvage excavation must be undertaken of this site within the site extent and within the construction footprint of the project. • 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 parties. • All artefacts which have previously been recorded and reburied must be recovered and removed off-site. • 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 parties for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. • Any sediment to 1.0 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Site 1 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas.

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
10	Rudgley Scarred Tree (04-4-0170)	Scarred Tree	Moderate to high	0	The project alignment has been altered to ensure the scarred tree falls outside of the road corridor. Protection is required to ensure no impacts during construction. • Prior to construction a 15 m exclusion zone must be placed around the scarred tree. This must remain in place until construction activities have ceased. • This exclusion zone would be fenced using chain wire or plastic mesh and star pickets. Attached would be appropriate signage which indicated 'Do Not Enter' the area. • This fencing should be undertaken with a representative of the LALC present. • An arborist must be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree.
10	Rudgley Site 2 (04-4-0169)	Artefact Scatter	Low	20	• All artefacts from within the construction footprint which have previously been recorded and reburied must be recovered and removed off-site. • Much of the extent of this site will not be impacted by the project; exclusion zones would be put in place to ensure incidental damage does not occur to these 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)..
10	Rudgley Site 1a/1b (04-4-0167)	Artefact Scatter	Low	50	• All artefacts from within the construction footprint which have previously been recorded and reburied must be recovered and removed off-site. • A portion of the extent of this site will not be impacted by the project; an exclusion zone would be put in place around part **1a** of this site to ensure incidental damage does not occur to these 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)..
10,11	Saezza 1 (04-4-0171)	Artefact Scatter	Moderate	0	• This site will not be impacted by the project, but is located within the boundary of the project; exclusion zones would be put in place to ensure incidental damage does not occur to this site. 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)..

Project section	Name (AHIMS ID)	Site type	Overall Significance	Impact	Mitigation strategy/ recommendations
10, 11	Site 12 (04-4-0176)	Artefact Scatter	Moderate	10	• A total of 10 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures should be taken to safely stabilise and then proceed with deeper excavation. • Salvage excavation must be undertaken of this site within the site extent and within the construction footprint of the project. • 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 parties. • All artefacts which have previously been recorded and reburied must be recovered and removed off-site. • 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 parties for reburial or storage at a chosen location. Details of the materials nature and context should also be provided. • Any sediment to 1.2 m depth from this site that is proposed to be used (eg as fill) outside the boundary of Site 12 should be sieved to remove any cultural material to ensure new sites are not recorded in fill relocation areas. • Portions of this site will not be impacted by the project; exclusion zones would be put in place to ensure incidental damage does not occur to these 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} m or 0.000001 m.

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 mm) (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 to 100 mm 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 m x 0.5 m 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 m x 0.5 m) 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 m x 1 m or 2 m x 1 m 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 mm 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.

Appendix C Director General Requirements

NSW GOVERNMENT | Planning & Infrastructure

Contact: Lisa Chan
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Fax: (02) 9228 6355
Email: lisa.chan@planning.nsw.gov.au

Our ref: 11/713604-2

Mr Bob Higgins
General Manager Pacific Highway
Roads and Maritime Services
21 Prince Street
GRAFTON NSW 2460

Dear Mr Higgins

Environmental Assessment Requirements for the Pacific Highway Upgrade – Woolgoolga to Ballina Project (SSI – 4963)

The Department has reviewed your request for the Director-General's environmental assessment requirements (DGRs) for the preparation of an Environmental Impact Statement for the above State Significant Infrastructure project.

I have attached a copy of the DGRs which have been prepared in consultation with relevant government authorities. I have also attached a copy of the government authorities' comments for your information. The DGRs are based on the information you have provided to date. Please note that under section 115Y(4) of the *Environmental Planning and Assessment Act 1979*, the Director-General may modify these requirements at any time.

With regard to the key issue of heritage, the research design and methodologies proposed for any physical archaeological works to be undertaken as part of the initial heritage assessments for the project should be reviewed by both the Department and the Office of Environment and Heritage in relation to Aboriginal Heritage, and the Heritage Council of NSW regarding non Aboriginal Heritage, prior to the commencement of physical disturbance of the site. This will ensure that the strategies being used are appropriate and in accordance with standard archaeological practices.

Prior to exhibiting your EIS, the Department will review the document to determine if it adequately addresses the DGRs. The Department may consult with other relevant public authorities in making this decision. If the Department considers that the EIS does not satisfactorily address the DGRs, you may be required to submit an amended EIS. Once the Department is satisfied that the requirements have been addressed, you will be contacted regarding arrangements for public exhibition.

Finally, if your proposal is likely to have a significant impact on matters of National Environmental Significance, it will require an approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This approval would be in addition to any approvals required under NSW legislation and it is your responsibility to contact the Department of Sustainability, Environment, Water, Population and Communities to determine if an approval under the EPBC Act is required for your project (http://www.environment.gov.au or 6274 1111).

Your contact officer for this project, Ms Lisa Chan, can be contacted on (02) 9228 6226 or via email at lisa.chan@planning.nsw.gov.au. Please mark all correspondence regarding the project to the attention of the contact officer.

Yours sincerely

23.11.11

Chris Wilson
Executive Director
Major Projects Assessment
As delegate for the Director General

Environmental Assessment Requirements

Section 115Y of the *Environmental Planning and Assessment Act 1979*

Application number	SSI - 4963
Infrastructure (project)	**Pacific Highway Upgrade – Woolgoolga to Ballina** - the construction and operation of approximately 155 kilometres of four-lane divided carriageway, from approximately 5 kilometres north of Woolgoolga to approximately 6 kilometres south of Ballina. The project does not include the upgrades at Glenugie and Devils Pulpit, located between Woolgoolga and Ballina.
Location	Land generally located: (i) from Arrawarra Beach Road approximately 5 kilometres north of Woolgoolga to approximately 21 kilometres south of Grafton (the Franklins Road intersection with the Pacific Highway), and (ii) from approximately 13 kilometres south of Grafton (the Eight Mile Lane intersection with the Pacific Highway) to approximately 66 kilometres north of Grafton, and (iii) from approximately 72 kilometres north of Grafton to the Ballina Bypass approximately 6 kilometres south of Ballina, in the Ballina, Clarence Valley, Coffs Harbour and Richmond Valley local government areas.
Proponent	Roads and Maritime Services
Date issued	23 November 2011
General requirements	The Environmental Impact Statement (EIS) must be prepared in accordance with and meet the minimum requirements of Part 3 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (the Regulation) and include the following: 1. the information required under clause 6 of Schedule 2 of the Regulation; and 2. the content listed in clause 7 of Schedule 2 of the Regulation, including but not limited to: o a summary of the environmental impact statement, o a statement of the objectives of the project, including a description of the strategic need, justification, objectives and outcomes for the Pacific Highway Upgrade Program, the aims and objectives of relevant strategic planning and transport policies, including *NSW 2021*, the *Far North Coast Regional Strategy* and the *Mid North Coast Regional Strategy*, and the cumulative and synergistic impacts associated with the Pacific Highway Upgrade Program as a whole, and o an analysis of feasible alternatives to the carrying out of the project and project justification, including: ➢ an analysis of alternatives/ options considered, having regard to the project objectives (including an assessment of the environmental costs and benefits of the project relative to alternatives and the consequences of not carrying out the project), and the provision of a clear discussion of the route development and selection process, the suitability of the chosen alignment and whether or not the project is in the public interest, and ➢ justification for the preferred project taking into consideration the objects of the *Environmental Planning and Assessment Act 1979*.

	○ an analysis of the project, including an assessment, with a particular focus on the requirements of the listed key issues, in accordance with clause 7(1)(d) of Schedule 2 of the Regulation (where relevant), including an identification of how relevant planning, land use and development matters (including relevant strategic and statutory matters) have been considered in the impact assessment (direct, indirect and cumulative impacts) and/or in developing management/ mitigation measures, and ○ detail how the principles of ecologically sustainable development will be incorporated in the design, construction and ongoing operation phases of the project.
Key issues	The EIS must address the following specific matters: **Traffic and Transport** – including but not limited to: • demonstration of how the preferred route and road design meets the traffic and transport objectives of the project; • construction traffic impacts, including: ○ the identification of routes and the nature of existing traffic on these routes, ○ an assessment of construction traffic volumes (including spoil haulage/ delivery of materials and equipment to the road corridor and ancillary facilities), and ○ potential impacts to the regional and local road network (including safety and level of service) and potential disruption to existing public transport/ school bus services and access to properties and businesses; • operational traffic and transport impacts to the local and regional road network, including: ○ changes to access arrangements/ service roads to properties, businesses and State forest road network, ○ changes to local road connectivity and impacts on local traffic arrangements, road capacity/ safety, service roads and modified access to the upgraded highway (including potential impacts of changed traffic arrangements on public transport/ school bus services and access for emergency services), ○ traffic capacity of the project and its ability to cater for predicted future growth. Consideration should be given to what effect potential major land use changes in the locality may have on the traffic assessment outcomes, and ○ opportunities for the provision of pedestrian and cycle access and connections along the highway and to adjoining communities; and • impacts on maritime use of the Richmond and Clarence rivers and safety of navigation for water based traffic. **Biodiversity -** including but not limited to: • impacts on the biodiversity values of the site and adjoining areas, including flora and fauna and their habitat (terrestrial, riparian and aquatic); • impacts on Endangered Ecological Communities, critical habitat, threatened and protected species, populations and their habitats, listed under both State and Commonwealth legislation that have been recorded or considered likely to occur on the site and surrounding land based on the presence of suitable habitat, and whether the proposal or specific aspects of the proposal constitute Key Threatening Processes in terms of the *Threatened Species Conservation Act 1995*; • targeted surveys of threatened flora and fauna species and their habitat that are known or likely to occur within the project's study area based on the presence of suitable habitat. The targeted surveys must include but not limited to the following species:

	○ Oxleyan Pygmy Perch (*Nannoperca oxleyana*), Purple Spotted Gudgeon (Mogurnda adspersa), ○ Squirrel Glider, Yellow-bellied Glider, Brush-tailed Phascogale, Eastern Pygmy-possum, ○ Wallum Froglet, Olongburra Frog, Pouched Frog, Giant-barred Frog, Green-thighed Frog, Green and Golden Bell Frog, ○ White-crowned Snake, Pale Headed Snake, Stephen's Banded Snake, ○ Microbats – all threatened species, ○ Forest Owls – Masked, Sooty, Barking, Powerful, Grass Owl, ○ Brolga, Black-necked Stork, Comb-crested Jacana, Magpie Goose, Black Bittern, ○ Bush Stone – curlew, Albert's Lyrebird, Grey-crowned Babbler, ○ Koala, Long-nosed Potoroo, Common Planigale, Rufous Bettong, and ○ Emu (*Dromaius novaehollandiae*). Details of the survey methodology employed, including survey effort and timing and representativeness for the species targeted, should be identified; • impacts on wildlife and habitat corridors, and habitat fragmentation and details of mitigation measures, having regard to the range of fauna species and opportunities for connectivity (terrestrial, arboreal and aquatic) across the project; • impacts on/from vegetation loss, weed infestation (terrestrial and aquatic), edge effects, groundwater dependent ecosystems, wetlands including State Environmental Planning Policy No. 14 – Coastal Wetlands, and aquatic and riparian species and their habitats; • consideration of regional scale cumulative impacts and the significance of the biodiversity impacts of the project in the context of the Pacific Highway Upgrade Program; • details of how impacts would be managed during construction and operation for project components (including ancillary facilities), the suitability of measures and adaptive management and maintenance protocols and monitoring programs; • the details of available offset measures to compensate the biodiversity impacts of the proposal where offset measures are proposed to address residual impacts, consistent with the *Principles for the use of biodiversity offsets in NSW*; and • taking into account the *Draft Guidelines for Threatened Species Assessment* (Department of Environment and Conservation, 2005); *Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna - Amphibians* (DECCW, 2009); and *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft* (DEC, 2004). **Noise and Vibration –** including but not limited to: • construction noise and vibration impacts, including impacts from construction traffic, ancillary facilities, batch plants and blasting. The EIS must identify sensitive receivers and assess construction noise/ vibration generated by representative construction scenarios focusing on high noise generating works. Where work hours outside of standard construction hours are proposed, clear justification and detailed assessment of these work hours must be provided, including alternatives considered, mitigation measures proposed and details of construction practices, work methods, compound design, etc; • cumulative impacts during construction, having regard to other developments (both existing and approved) in the locality, the staged construction of the project and the construction of adjoining Pacific Highway Upgrade projects;

	• operational road traffic noise impacts of the project (including service roads and rest areas) on sensitive receivers, including reflective noise impacts from proposed noise mitigation barriers and bridges; and • taking into account the following guidelines, as relevant: *NSW Road Noise Policy* (Department of Environment, Climate Change and Water, 2011), *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009), *Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation, 2006), and *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration* (Australian and New Zealand Environment and Conservation Council, 1990). **Soils, Sediments and Water** – including but not limited to: • impacts on surface water flows, quality and quantity, with particular reference to any likely impacts on surrounding water bodies, wetlands and their habitats, including potential indirect impacts on the Solitary Island Marine Park by works in the Arrawarra Creek and Corindi River catchments; • groundwater impacts, taking into consideration local impacts at deep cuttings and fill locations, and cumulative impacts on regional hydrology. The assessment shall consider: the extent of drawdown, impacts to groundwater characteristics, quality, quantity, and connectivity, discharge and recharge rates, and implications for surface flows, groundwater users, groundwater dependent ecosystems and wetlands; • impacts to the Rous Water Regional Water Supply (Woodburn) bore fields drinking water source, taking into account discharge/ recharge rates and groundwater yield, and consideration of the relevant public health and environmental water quality criteria specified in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000* ((Australian and New Zealand Environment and Conservation Council) and the *Australian Drinking Water Guidelines 2004* (National Health and Medical Research Council and the Natural Resource Management Ministerial Council); • flooding impacts and characteristics, to and from the project, with an assessment of the potential changes to flooding behaviour (levels, velocities and direction) and impacts on bed and bank stability, through flood modelling, including: o hydraulic modelling for a range of flood events, o description, justification and assessment of design objectives (including bridge, culvert and embankment design), o an assessment of afflux and flood duration (inundation period) on land, infrastructure, property and business operations (including agricultural land and stock movement to flood refuges and evacuation routes), hazard and emergency service within the affected area, and future development potential of access affected land, and o consideration of the effects of sea level rise, changes to rainfall frequency and/or intensity as a result of climate change, including an assessment of the capacity of proposed (and existing) stormwater drainage structures; • waterways to be modified as a result of the project, including ecological, hydrological and geomorphic impacts (as relevant), including temporary crossings, and measures to rehabilitate the waterways to pre-construction conditions or better, including fish passage requirements consistent with *Policy and Guidelines for Fish Friendly Waterway Crossings* (Department of Primary Industries, 2004); • identification and assessment of soil characteristics and properties that may impact or be impacted by the proposal; and • identification and assessment of soft soils, soil contamination, acid

	sulfate soils, and details of erosion and sedimentation control measures. **Heritage –** including but not limited to: • 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. Where impacts are identified, the assessment shall: o outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the measures) generally consistent with the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (Department of Environment and Conservation, 2005), o be undertaken by a suitably qualified heritage consultant(s), o demonstrate effective consultation with Aboriginal communities in determining and assessing impacts and developing and selecting options and mitigation measures (including the final proposed measures), and o 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; and • impacts to *State and local historic heritage* (including archaeology, heritage items conservation areas and natural areas), in particular impacts to the New Italy Settlement and High Conservation Value Old Growth Forest should be assessed. Where impacts to State or locally significant historic heritage items are identified, the assessment shall: o outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the mitigation measures) generally consistent with the guidelines in the NSW Heritage Manual (1996), o be undertaken by a suitably qualified heritage consultant(s) (note: where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria), o include a statement of heritage impact for all heritage items (including significance assessment), o consider impacts from vibration, demolition, archaeological disturbance, altered historical arrangements and access, landscape and vistas, and architectural noise treatment, and o develop an appropriate archaeological assessment methodology, including research design, to guide physical archaeological test excavations and include the results of these excavations. **Visual Amenity, Urban Design and Landscaping** – including but not limited to: • a description of the visual significance of the affected landscape, particularly where the corridor traverses greenfield areas; • an assessment of the visual impact of the project on the landscape character of the area, including built form (materials and finishes) and the urban design (height, bulk and scale) of key components including bridge crossings, floodplain embankments, interchanges, and views to and from the project; and • details of landscaping treatment and design (including noise barriers, retaining walls and landscaping) consistent with the overall design of the Pacific Highway Upgrade Program and integration with the existing (and desired) character of affected localities;

	• taking into account the *Noise Wall Design Guideline* (Roads and Traffic Authority, 2006). **Land Use and Property -** including but not limited to: • impacts on directly affected properties and land uses, including impacts related to access, land use, property infrastructure, future development potential, property acquisition and land sterilisation and severance; • the agricultural sector taking into account fragmentation and potential loss of regionally significant farmland as identified in the *Northern Rivers Farmland Protection Project* (Department of Planning, 2005) and *Mid North Coast Farmland Mapping Project* (Department of Planning, 2008), food production, stock/ agricultural diseases and the impact on quarantined properties of a revised road network, and impacts on travelling stock routes/ reserves (as relevant); • the operation of State forest estate, including potential for fragmentation and sterilisation of resources, and access by forestry and other users; • impacts on Crown land, reserves and assets, and land reserved under the *National Parks and Wildlife Act 1974*; • impacts on natural resources, including mining, petroleum production and extractive resources utilisation; • impacts on commercial fishing access and aquaculture operations, including impacts on oyster priority areas in accordance with the *NSW Oyster Industry Sustainable Aquaculture Strategy 2006* (Department of Primary Industries); and • identification of services and utilities to be relocated. **Social and Economic -** including but not limited to: • social and economic impacts on local and regional communities (including towns and villages directly impacted by the project and those bypassed by the project); • impact on highway-based businesses and agribusinesses from traffic, access, property, public domain and amenity related changes; • impact of the project on tourist and recreational access and use of towns and villages, National Parks and nature reserves, State forests and waterways; and • connectivity (including pedestrian and cycleway opportunities) and contiguity of existing and planned settlement and activity clusters. **Environmental Risk Analysis –** notwithstanding the above key assessment requirements, the EIS must include an environmental risk analysis to identify potential environmental impacts associated with the project (construction and operation), proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. Where additional key environmental impacts are identified through this environmental risk analysis, an appropriately detailed impact assessment of this additional key environmental impact must be included in the EIS.

Consultation	You should undertake an appropriate and justified level of consultation with relevant parties during the preparation of the EIS, including but not limited to:
	• local, State and Commonwealth government authorities, including the:
	  ○ Department of Primary Industries (Agriculture, Forests, Fisheries, Minerals and Crown Land divisions),
	  ○ Heritage Council of NSW,
	  ○ Marine Parks Authority NSW,
	  ○ Maritime Services,
	  ○ NSW Office of Water,
	  ○ Office of Environment and Heritage,
	  ○ Transport for NSW, and
	  ○ Ballina, Clarence Valley, Coffs Harbour and Richmond Valley

	councils; • specialist interest groups, including Local Aboriginal Councils, Aboriginal stakeholders and industry/ growers associations, mining and petroleum title holders; • utilities and service providers, including Rous Water; and • the public, including community groups and adjoining and affected landowners. The EIS must describe the consultation process, document consultation undertaken and identify the issues raised (including where these have been addressed in the EIS).
Further Consultation after 2 years	If you do not lodge an EIS for the development within 2 years of the issue date of these DGRs, you must consult with the Director General in relation to the preparation of the EIS.

PUBLIC

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PCU027561

Mr Michael Young
Team Leader – Roads
Infrastructure Projects
Department of Planning & Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attention: Lisa Chan

Dear Mr Young

Subject: State Significant Infrastructure – Pacific Highway Upgrade – Woolgoolga to Ballina (SSI - 4951) – Review of Draft Director General's Environmental Assessment Requirements

Reference is made to a letter dated 17 October 2011 advising that the Roads and Traffic Authority (RTA) have lodged a State Significant Infrastructure application for the above project.

Your letter of 17 October 2011 included a copy of the Draft Director General's EARs and a copy of the RTA report 'Woolgoolga to Ballina Upgrading the Pacific Highway State Significant Infrastructure Application Report' dated October 2011.

The RTA report indicates that there are potentially 2 State Listed Items affected by the project:
New Italy Settlement SHR 1648
High Conservation Value Old Growth Forest SHR 1487

and that 12 locally Listed items are affected, plus a further 19 unlisted items which have been identified by the project research to date.

It is noted that the Draft EARs for the Project have identified Heritage as a key issue, and that the requirements listed for Heritage in the EARs indicate a reasonably comprehensive range of matters to be considered as part of the Environmental Assessment.

Nevertheless, it is recommended that the draft requirements should be strengthened by the addition of the following matters:

1. the requirements should include preparation of Archaeological Assessments and Archaeological Research Designs as well as Statements of Heritage Impact for built heritage items.

Archaeological Research Designs would be needed to guide any physical archaeological works which may be undertaken as part of the further assessments needed for the project.

2. The Research Design and methodology proposed for any physical archaeological works to be undertaken as part of the initial assessments for the project should be reviewed by both the Department and the Heritage Council prior to the commencement of physical works to ensure that the strategies being used are appropriate and in accordance with standard archaeological practice for State listed sites and areas.

The existing EA requirements under Consultation do not currently include the Heritage Council of NSW amonst those to be consulted, only the Office of Environment & Heritage. As 2 State Listed items are potentially affected by the project it is recommended that the Heritage Council of NSW be added to the list of bodies to be consulted as part of the Project.

I trust that the advice in this letter will be of assistance to you. Thank you for referring the draft Director General's EARs for comment.

If you have any questions regarding the above, please feel free to contact Siobhan Lavelle at the Heritage Branch using the details provided with this letter.

Yours sincerely

31/10/2011

Vincent Sicari
Manager
Conservation Team
Heritage Branch
Office of Environment and Heritage
Department of Premier & Cabinet
AS DELEGATE OF THE NSW HERITAGE COUNCIL

NSW GOVERNMENT | Department of Primary Industries
Catchments & Lands

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www.lands.nsw.gov.au

2 November 2011

Attention: Lisa Chan

Re: Pacific Highway Upgrade – Woolgoolga to Ballina, Environmental Assessment Requirements (EAR's)

I refer to information received by Department of Primary Industries – Catchment and Lands (CLD) from Planning and Infrastructure in regard to environmental assessment requirements for the redevelopment of the Pacific highway from Ballina to Woolgoolga.

CLD is the primary stakeholder in the administration of the Crown estate in the State of New South Wales.

The proposal will affect a significant amount Crown land reserved for a variety of purposes, which are under various management regimes and tenures. Crown land should be suitably addressed in all aspects of the environmental assessment (EA).

Environmental Assessment (EA) Requirements – CLD agree with the identified key issues in the report but request additional information and focus on the Crown estate.

Crown Reserves – The EA must acknowledge the impacts the proposal will have on Crown reserves and how these impacts will be mitigated. Information required includes;

- Accurate identification of all affected Crown lands including ancillary facilities and construction material requirements
- Loss of access
- Loss of practical use – i.e. Flood reserves being severed and impacting on the carrying capacity for grazing in times of flood.

Crown Waterways - The beds of most tidal waters and many of the beds of non-tidal waters (including rivers, streams and lakes) comprise Crown lands that are managed by CLD. Crown Waterways affected by the proposal need to be identified as such in the EA.

The proposed construction of bridges across navigable waterways in accordance with *Roads Act 1993 (Section 78)*, will require easements over footings in Crown waterways below MHWM, to be acquired under *Land Acquisition (Just Terms Compensation) Act 1991.*

Crown public roads – The EA must identify legal practical access of affected or alienated roads as required. The differentiation between Crown public roads and Council public roads should also be addressed in the final assessment.

- Crown roads affected and held under enclosure permits – Will require consultation with holders and may be subject to disposal under the CLD Roads Reform project. Landholders may have freehold title over disposed roads.
- Crown roads not held under enclosure permits - may also be subject to disposal under the CLD Roads Reform project.

The RTA is required to clarify proposed closure and acquisition of all Crown roads.

Process - If and when construction is approved, but prior to works commencing on the subject Crown estate, it will be necessary for the RTA to secure a suitable tenure from the Minister under the Crown Lands Act. The tenure will provide the RTA with required access and occupation of the subject lands until such time as the land has been acquired.

The ability of the Minister to consider tenure over the land is in part dependent on the resolution of any claims to the land under the Aboriginal Land Rights Act and the views of any controlling authority.

Lands Acquisition -It will be necessary for the RTA to acquire all affected Crown lands. The amount of compensation to be payed will need to be agreed upon prior to concurrence to acquisition.

CLD Consultation – early identification of land status by the RTA will address status issues in relation to the proposal. It is recommended that the RTA meet with CLD continually throughout each phase of the project to identify any issues that may require further consultation with various Crown land managers and other interested parties.

Aboriginal Land Claims

There are a number of Crown lands within the project area under current Aboriginal Land Claims. Early identification of the effected Crown lands will enable the RTA to identify and consult with the claimants as the project progresses.

If you have any further queries, feel free to contact me on 02 66403431 or daniel.cupitt@lands.nsw.gov.au

Yours sincerely

Daniel Cupitt
Acting - Group Leader Natural Resources and Property Services
Far North Coast
T: (02) 6640 3431

For and on behalf of the Minister for Primary Industries

NSW GOVERNMENT | Office of Environment & Heritage

Our reference: DOC 11/49632
Contact : Craig Harré
Date: 4rd November 2011

PCU027802

Mr Michael Young.
Infrastructure Projects
Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2000

Dear Mr Young,

Re: Pacific Highway Upgrade – Woolgoolga to Ballina *Draft Environmental Assessment Requirements Application number SSI – 4963.*

Thank you for the opportunity to review and comment on the key issues for the draft Environmental Assessment Requirements for the Woolgoolga to Ballina Pacific Highway Upgrade received by Office of Environment and Heritage (OEH) by email from Senior Planning Officer, Lisa Chan 17th October 2011.

OEH has considered the information provided by the Department of Planning and Infrastructure (DoPI) and has provided comments on the draft Director General Requirements in **Attachment A** whilst additional information required to assess the project is detailed in **Attachment B**. The proponent should ensure that the Environmental Impact Statement (EIS) is sufficiently comprehensive and contains sufficient information to allow OEH to determine the full extent of the impact(s) of the proposal.

The key information requirements for the project are summarised below:

1. the environmental impacts of the project. Sufficient information must be provided to ensure that OEH can take matters that are outlined in Section 45 of the *Protection of the Environment Operations Act 1997* into consideration, with respect to water, soils, air, noise and waste;
2. the impacts of the project on threatened species, populations and their habitat, endangered ecological communities, critical habitat and the maintenance of connectivity for fauna species. The nature and extent of impacts to biodiversity values resulting from the proposal will assist evaluation of proposed mitigation measures and define elements that may need to be addressed within a biodiversity offset package;
3. the impacts of the project on Aboriginal cultural heritage values. This information is required to enable completion of an adequate assessment of the impacts of the project on the Aboriginal cultural heritage values of the route, in particular impacts upon Aboriginal sites, potential archaeological deposits and the cultural values attached to waterways located along the preferred route;

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4. the actions that will be taken to avoid, minimise, mitigate impacts or compensate for unavoidable impacts identified in 1-3 above;

The proponent should also be aware that any commitments made in the EIS may be formalised as approval conditions. Consequently, pollution control or conservation measures should not be proposed if they are impractical, unrealistic or beyond the financial viability of the development. It is important that all conclusions are supported by adequate data.

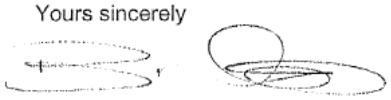
Based on information provided, the proponent will require an environment protection licence to carry out the scheduled activity of road construction. The proponent will need to make a separate application to OEH to obtain this licence if planning project approval is granted.

Due to the complexity of this proposal, it is also strongly recommended that the proponent consult with OEH during the assessment period with regard to the assessment of Aboriginal cultural heritage and biodiversity values potentially affected by the proposal.

OEH requests that three copies of the EIS are provided for assessment. These documents should be lodged at OEH's North Coast Regional Office, PO Box 498, Grafton 2460.

Should you have any questions in relation to air, noise or water quality matters please contact Bryce Gorham on (02) 6640 2509. If you have any queries regarding Aboriginal cultural heritage, please contact Nick Pulver on (02)6659 8225. Finally, if you have any questions regarding threatened species and biodiversity matters, please contact Craig Harré on (02) 6659 8223.

Yours sincerely



BRETT NUDD
Manager North Coast Region
Environment Protection and Regulation Group

Attachment C – Relevant Guidelines

Water quality

- National Water Quality Management Strategy: Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000)
- NWQMS Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC 2000)
- The relevant targets within the State Water Management Outcomes Plan

Wastewater

- National Water Quality Management Strategy: Guidelines for Sewerage Systems - Effluent Management (ARMCANZ/ANZECC 1997)
- National Water Quality Management Strategy: Guidelines for Sewerage Systems – Use of Reclaimed Water (ARMCANZ/ANZECC 2000)
- Environmental Guidelines for the Utilisation of Treated Effluent by Irrigation (NSW DEC 2004)
- Environment and Health Protection Guidelines: 'Onsite Sewage Management for Single Households', February 1998 (Silver Book).
- *NSW Guidelines for Urban & Residential Use of Reclaimed Water* (NSW Water Recycling Coordination Committee, 1993).

Stormwater

- Managing Urban Stormwater: Soils and Construction (NSW Landcom, 2004)
- Managing Urban Stormwater: Source Control (EPA 1998)
- Managing Urban Stormwater: Treatment Techniques (EPA 1998).
  (Note: some of these documents will be revised)

Groundwater

- State Groundwater Policy Framework Document (DLWC 1997)
- The NSW State Groundwater Quality Protection Policy (DLWC 1998)
- (Draft) NSW Groundwater Quantity Management Policy
- NSW Groundwater Dependent Ecosystems Policy (DLWC 2002)
- National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ & ANZECC 1995)

Contaminated Land

- Managing Land Contamination: Planning Guidelines - SEPP55 - Remediation of Land, Department of Urban Affairs and Planning and NSW EPA, 1998:
- Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites (Environment Protection Authority (EPA) 1997);
- Contaminated Sites – Guidelines on Significant Risk of Harm and Duty to Report (EPA, 1999).

Noise and vibration

- NSW Industrial Noise Policy (EPA, 1999)
- NSW Environmental Criteria for Road Traffic Noise (EPA, 1999)
- Interim Construction Noise Guideline (DECCW July 2009.)
- Technical Basis to Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration (ANZECC 1990)
- Assessing vibration: a technical guideline (DEC 2006)
- Environmental Noise Control Manual (RTA 2001)

Acid Sulfate Soils

- Acid Sulfate Soils Manual (Acid Sulfate Soils Management Advisory Committee 1998)

- National Strategy for the Management of Coastal Acid Sulfate Soils (Agricultural and Resource Management Council of Australia and New Zealand, ANZECC and Ministerial Council Forestry, Fisheries and Aquaculture 2000)

Assessing Threatened Species Impacts

- Draft Guidelines for Threatened Species Assessment - Available from Department of Planning.
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities, Working Draft November 2004. Available from the DECC website.
- *Guidelines for the Translocation of Threatened Plants in Australia* available from the Australian Network for Plant Conservation (ANPC), Australian Department of Environment and Heritage.

Assessing Aboriginal Cultural Heritage Impacts

- Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation - Available from Dept of Planning
- Interim Community Consultation Requirements for Applicants - www.nationalparks.nsw.gov.au/npws.nsf/Content/Protecting+Aboriginal+objects+and+places
- Aboriginal Cultural Heritage Standards and Guidelines Kit http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Protecting+Aboriginal+objects+and+place
- DECC section 87/section 90 application form http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Protecting+Aboriginal+objects+and+place