



# Appendix O

Historic heritage impact assessment



Narrabri Gas Project  
GHD Pty Ltd  
3-Nov-2016



# Historic Heritage Impact Assessment

Narrabri Gas Project

## Historic Heritage Impact Assessment

Narrabri Gas Project

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## Executive Summary

The Proponent is proposing to develop natural gas in the Gunnedah Basin in New South Wales (NSW), southwest of Narrabri. AECOM Australia Pty Ltd (AECOM) has been engaged by GHD Pty Ltd (GHD) to prepare an assessment of the potential impacts to the historic heritage significance of the project area.

Under the Narrabri Gas Project (the project), up to 850 production wells or up to 425 well pads would be progressively commissioned and decommissioned within the Project area over the estimated 25-year life span of the project. This would include chip or core holes, or pilot wells drilled as part of the exploration and appraisal program that may be converted to production wells. As such, the total number of well pads would be between 425 and 465 production wells, including both production and appraisal wells, depending on the number of pilot wells converted to production.

The project would also develop water gathering systems and supporting infrastructure. The natural gas produced would be treated at a central gas processing facility situated on a rural property known as Leewood. The gas would then be piped via a high-pressure gas transmission pipeline to market. The high-pressure gas transmission pipeline would be part of a separate approvals process and is therefore not part of this development proposal.

Historically, the project area was initially part of squatter's runs, which were then legitimately granted to various individuals, before largely being resumed for the purposes of state forests. There was no large scale clearing or intensive grazing on the eastern side of the Newell Highway. The forests were logged by individual contractors since the mid-19<sup>th</sup> century and are now managed and logged by Forestry NSW.

AECOM undertook a week of field surveying between April and May of 2014 to supplement the field survey carried out in November of 2011. These surveys identified 53 sites, which can be characterised into seven types: Timber Extraction Areas (TEAs), Sawmill sites, timber loading ramps, habitation sites, logging tracks, Sydney University Giant Air-shower Recorder pits and other sundry sites. The logging related sites have been identified as forming a landscape, herein referred to as the Pilliga East Logging Cultural Landscape. The sites were assessed against Heritage Division guidelines *Assessing Heritage Significance* (NSW Heritage Office, 2001). The majority of sites were found to be of local significance as part of a collection of TEAs, timber loading ramps and logging tracks that can demonstrate the pattern and course of the development of logging in the forests and can yield new and substantive information about such.

The impact assessment has determined that activities that do not result in surface disturbance at a site will not impact the heritage significance of that site. Monitoring and surveying (air, noise, water, ecology etc.) activities that do not result in disturbance to the surface of the site may be undertaken at sites without impacting the heritage significance. The impact assessment has taken into consideration the extent to which this project differs from standard projects that have a fixed footprint. The gas wells can be manoeuvred, within geological, environmental and social constraints, to reduce impacts to environmental and social items.

Project infrastructure is proposed for construction within the Pilliga East Cultural Landscape. Of the 53 sites identified within the project area, the following sites have been identified for protection, which will mitigate potential impacts to the Landscape and the TEAs, logging camps and timber loading ramps as collections with heritage significance:

- Cowallah Parish Plan Sawmill;
- Logging Camp 7;
- Cowallah Sites Complex;
- Hardy's Hut;
- Pilliga 1 Oil Well;
- SUGAR pits - located at the Leewood site and the intersection of Plumb Road and No Name Road;
- Timber extraction areas 1, 2, 3, 4, 6, 10, 12, 18, 19 and 21; and
- Timber loading ramp 1, 5, 6, 9 and ramp associated with TEA 19.

No direct impacts have been identified as arising from the location of the major facilities proposed at Leewood, Bibblewindi, the proposed infrastructure corridor, or Westport. The Leewood property contains a pair of SUGAR pits that are currently and will continue to be protected by barrier fencing.

To manage historic heritage within the project, a Historic Heritage Management Plan will also be developed and used in conjunction with the field development protocol. The field development protocol for the project provides a framework for the siting of gas wells and associated infrastructure. It seeks to systematically avoid, minimise and manage the environmental impacts of the project in accordance with, among other things, the findings of this Historic Heritage Assessment.

## 1.0 Introduction

### 1.1 Overview

The Proponent is proposing to develop natural gas in the Gunnedah Basin in New South Wales (NSW), southwest of Narrabri (refer Figure 1).

The Narrabri Gas Project (the project) seeks to develop and operate a gas production field, requiring the installation of gas wells, gas and water gathering systems, and supporting infrastructure. The natural gas produced would be treated at a central gas processing facility on a local rural property (Leewood), approximately 25 kilometres south-west of Narrabri. The gas would then be piped via a high-pressure gas transmission pipeline to market. This pipeline would be part of a separate approvals process and is therefore not part of this development proposal.

The primary objective of the project is to commercialise natural gas to be made available to the NSW gas market and to support the energy security needs of NSW. Production of natural gas under the project would deliver economic, environmental and social benefits to the Narrabri region and the broader NSW community. The key benefits of the project can be summarised as follows:

- Development of a new source of gas supply into NSW would lead to an improvement in energy security and independence to the State. This would give NSW gas markets greater choice when entering into gas purchase arrangements. Potential would also exist for improved competition on price. Improved competition on price would have flow on benefits for NSW's economic efficiency, productivity and prosperity.
- The provision of a reduced greenhouse gas emission fuel source for power generation in NSW as compared to traditional coal-fired power generation.
- Increased local production and regional economic development through employment and provision of services and infrastructure to the project.
- The establishment of a regional community benefit fund equivalent to five per cent of the royalty payment made to the NSW Government within the future production licence area. If matched by the NSW Government, the fund could reach \$120 million over the next two decades.

### 1.2 Description of the project

The project would involve the construction and operation of a range of exploration and production activities and infrastructure including the continued use of some existing infrastructure. The key components of the project are presented in Table 1, and are shown on Figure 1.

**Table 1 Key project components**

Component	Infrastructure or activity
<b>Major facilities</b>	
Leewood	<ul style="list-style-type: none"> <li>- a central gas processing facility for the compression, dehydration and treatment of gas</li> <li>- a central water management facility including storage and treatment of produced water and brine</li> <li>- optional power generation for the project</li> <li>- a safety flare</li> <li>- treated water management infrastructure to facilitate the transfer of treated water for irrigation, dust suppression, construction and drilling activities</li> <li>- other supporting infrastructure including storage and utility buildings, staff amenities, equipment shelters, car parking, and diesel and chemical storage</li> <li>- continued use of existing facilities such as the brine and produced water ponds</li> <li>- operation of the facility</li> </ul>
Biblewindi	<ul style="list-style-type: none"> <li>- in-field compression facility</li> <li>- a safety flare</li> </ul>

Component	Infrastructure or activity
	<ul style="list-style-type: none"> <li>- supporting infrastructure including storage and utility areas, treated water holding tank, and a communications tower</li> <li>- upgrades and expansion to the staff amenities and car parking</li> <li>- produced water, brine and construction water storage, including recommissioning of two existing ponds</li> <li>- continued use of existing facilities such as the 5ML water balance tank</li> <li>- operation of the expanded facility</li> </ul>
Biblewindi to Leewood infrastructure corridor	<ul style="list-style-type: none"> <li>- widening of the existing corridor to allow for construction and operation of an additional buried medium pressure gas pipeline, a water pipeline, underground (up to 132 kV) power, and buried communications transmission lines</li> </ul>
Leewood to Wilga Park underground power line	<ul style="list-style-type: none"> <li>- installation and operation of an underground power line (up to 132 kV) within the existing gas pipeline corridor</li> </ul>
<b>Gas field</b>	
Gas appraisal and production infrastructure	<ul style="list-style-type: none"> <li>- seismic geophysical survey</li> <li>- installation of up to 850 new wells on a maximum of 425 well pads <ul style="list-style-type: none"> <li>• new well types would include exploration, appraisal and production wells</li> <li>• includes well pad surface infrastructure</li> </ul> </li> <li>- installation of water and gas gathering lines and supporting infrastructure</li> <li>- construction of new access tracks where required</li> <li>- water balance tanks</li> <li>- communications towers</li> <li>- conversion of existing exploration and appraisal wells to production in addition to the 850 new wells</li> </ul>
Ancillary	<ul style="list-style-type: none"> <li>- upgrades to intersections on the Newell Highway</li> <li>- expansion of worker accommodation at Westport</li> <li>- a treated water pipeline and diffuser from Leewood to Bohena Creek</li> <li>- treated water irrigation infrastructure including: <ul style="list-style-type: none"> <li>• pipeline(s) from Leewood to the irrigation area(s)</li> <li>• treated water storage dam(s) offsite from Leewood</li> </ul> </li> <li>- operation of the irrigation scheme</li> </ul>

The project is expected to generate approximately 1,300 jobs during the construction phase and sustain around 200 jobs during the operational phase; the latter excluding an ongoing drilling workforce comprising approximately 100 jobs.

Subject to obtaining the required regulatory approvals, and a financial investment decision, construction of the project is expected to commence in early 2018, with first gas scheduled for 2019/2020. Progressive construction of the gas processing and water management facilities would take around three years and would be undertaken between approximately early/mid-2018 and early/mid-2021. The gas wells would be progressively drilled during the first 20 or so years of the project. For the purpose of impact assessment, a 25-year construction and operational period has been adopted.

### 1.3 Project Location

The project would be located in north-western NSW, approximately 20 kilometres south-west of Narrabri, within the Narrabri local government area (LGA) (see Figure 1).

The project area covers about 950 square kilometres (95,000 hectares), and the project footprint would directly impact about one per cent of that area.

The project area contains a portion of the region known as 'the Pilliga'; which is an agglomeration of forested area covering more than 500,000 hectares in north-western NSW around Coonabarabran, Baradine and Narrabri. Nearly half of the Pilliga is allocated to conservation, managed under the NSW National *Parks and Wildlife Act 1974*. The Pilliga has spiritual meaning and cultural significance for the Aboriginal people of the region.

Other parts of the Pilliga were dedicated as State forest, and set aside for the purpose of 'forestry, recreation and mineral extraction, with a strategic aim to "provide for exploration, mining, petroleum production and extractive industry" under the *Brigalow and Nandewar Community Conservation Area Act 2005*. The parts of the project area on state land are located within this section of the Pilliga.

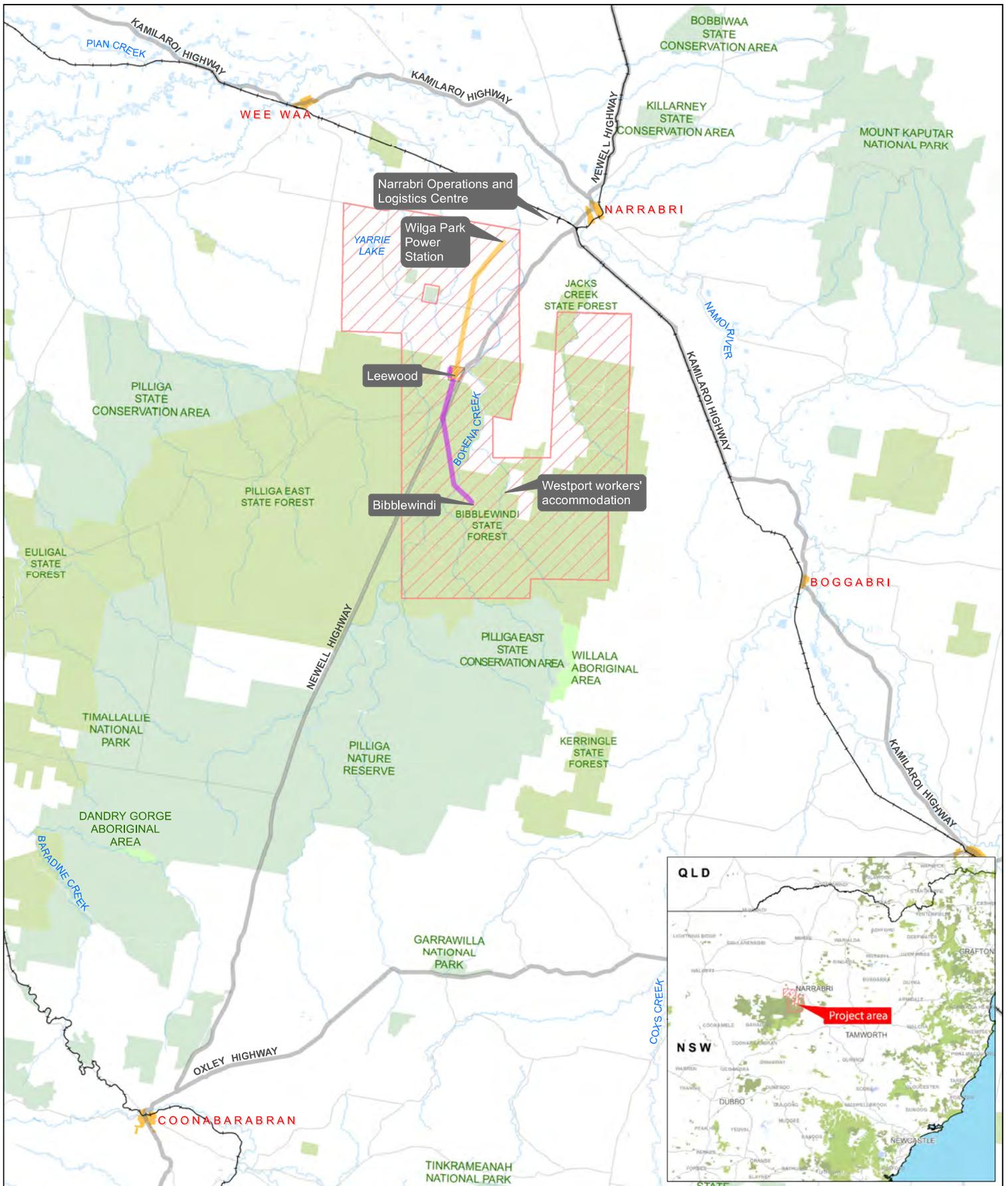
The semi-arid climate of the region and general unsuitability of the soils for agriculture have combined to protect the Pilliga from widespread clearing. Commercial timber harvesting activities in the Pilliga were preceded by unsuccessful attempts in the mid-1800s to establish a wool production industry. Resource exploration has been occurring in the area since the 1960s; initially for oil, but more recently for coal and gas.

The ecology of the Pilliga has been fragmented and otherwise impacted by commercial timber harvesting and related activities over the last century through:

- the establishment of more than 5,000 kilometres of roads, tracks and trails
- the introduction of pest species
- the occurrence of drought and wildfire.

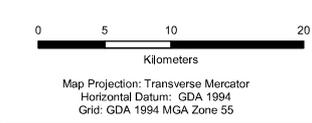
The project area avoids the Pilliga National Park, Pilliga State Conservation Area, Pilliga Nature Reserve and Brigalow Park Nature Reserve. Brigalow State Conservation Area is within the project area but would be protected by a 50 metre surface exclusion zone.

Agriculture is a major land use within the Narrabri LGA; about half of the LGA is used for agriculture, split between cropping and grazing. Although the majority of the project area would be within State forests, much of the remaining area is situated on agricultural land that supports dry-land cropping and livestock. No agricultural land in the project area is mapped by the NSW Government to be biophysical strategic agricultural land (BSAL) and detailed soil analysis has established the absence of BSAL. This has been confirmed by the issuance of a BSAL Certificate for the project area by the NSW Government.



**LEGEND**

Project area	Lakes and dams	Leewood to Wilga Park infrastructure corridor
Leewood	Watercourses	Bibblewindi to Leewood infrastructure corridor
Urban	Highways	
State forest	Major Roads	
Parks and reserves	Train line	
Aboriginal areas		



Narrabri Gas Project  
EIS Technical Appendix Historic Heritage

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**Regional context  
and location of key infrastructure**

**Figure 1-1**

C:\Users\Foddy\Desktop\21\_22463\_KBM29.mxd [KBM: 221]  
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Data source: NSW Department of Lands: DTDB and DCDB - 2012-13, Santos: Operational and Base Data - 2013, Created by: afoddy

## 1.4 Planning Framework

The project is permissible with development consent pursuant to the *State Environmental Planning Policy (Mining, Petroleum and Extractive Industries) 2007* and is identified as ‘State significant development’ pursuant to section 89C(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *State Environmental Planning Policy (State and Regional Development) 2011*.

The project is subject to the assessment and approval provisions of Division 4.1 of Part 4 of the EP&A Act. The Minister for Planning is the consent authority, who is able to delegate the consent authority function to the Planning Assessment Commission, the Secretary of the Department of Planning and Environment or to any other public authority (see Section 3.0).

The project is also a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. The project was declared to be a controlled action on 5 December 2014, to be assessed under the bilateral agreement between the Commonwealth and NSW Governments, and triggering the following controlling provisions:

- listed threatened species and ecological communities
- a water resource, in relation to coal seam gas development and large coal mining development
- Commonwealth land.

This historic heritage assessment identifies the potential environmental issues associated with construction and operation of the project and addresses the Secretary’s environmental assessment requirements for the project. The assessment will be used to support the EIS for the project. The Secretary for Planning and Infrastructure, with input from the NSW Heritage Division, Office of Environment and Heritage, issued the Secretary’s Environmental Assessment Requirements (SEARs) for the historical heritage assessment on 25 July 2014. Additional requirements were issued on 22 December 2014.

Table 2 lists each requirement relevant to the historic heritage impact assessment and where it is addressed in this report.

**Table 2 Secretary’s Environmental Assessment Requirements for the historic heritage impact assessment**

Secretary’s Environmental Assessment Requirement	Section Addressed in this Report
An assessment of the likely historic heritage (cultural and archaeological) impacts of the development, having regard to OEH’s requirements:	
Include a statement of heritage impact (including significance assessment) for any State significant or locally significant historic heritage items	Appendix B & Appendix C
Outline any proposed mitigation and management measures (including an evaluation of the effectiveness and reliability of the measures).	Section 8.0
The EIS must include information addressing all relevant impacts upon the environment of Commonwealth land in which the Siding Spring Observatory is situated. This includes potential impacts upon <ol style="list-style-type: none"> <li>i. The people/communities who utilise the facilities</li> <li>ii. The qualities, characteristics, and heritage values for which the observatory is recognised</li> <li>iii. The social, economic and cultural aspects of the Siding Spring Observatory</li> </ol>	Refer to EIS Appendix T1 and Q*  Section 3.2.1
To support the assessment of potential heritage values associated with the observatory, the EIS must include a statement of heritage impacts.	Refer to EIS Appendix T1 and Q* Appendix C this document

\* Refer to Appendix T1 - Social Impact Assessment and Appendix Q - Landscape and Visual Impact Assessment

Accordingly, this historic heritage assessment identifies the potential environmental issues associated with construction and operation of the Narrabri Gas Project and addresses the Secretary's environmental assessment requirements for the project. The assessment will be used to support the Environmental Impact Statement (EIS) for the project.

The following guidelines have been adopted for this assessment, as specified in the SEARs:

- *NSW Heritage Manual* (NSW Heritage Office & NSW Department of Urban Affairs and Planning, 1996b); and
- *The Burra Charter* (the Australia ICOMOS charter for places of Cultural Significance) (ICOMOS (Australia), 2013).

In addition to the guidelines identified in the SEARs, the following guidelines were considered in this assessment:

- *Assessing Heritage Significance* (NSW Heritage Office, 2001);
- *Assessing Significance for Historical Archaeological Sites and 'Relics'* (NSW Heritage Branch, 2009);
- *Heritage Curtilages* (NSW Heritage Office & NSW Department of Urban Affairs and Planning, 1996a); and
- *Levels of Heritage Significance* (NSW Heritage Office, 2008).

Additionally, the SEARs require that the EIS address the potential impacts of the project on the Sidings Springs Observatory at Coonabarabran. With reference to heritage, the impact assessment must address the potential cumulative impacts on the Observatory that may affect the qualities, characteristic and heritage values for which the Observatory is recognised. This requirement is addressed in Section 3.2.1 of this report.

## 1.5 Project Team

The project was managed by Dr Susan Lampard (AECOM Archaeologist). Dr Lampard coordinated project logistics, conducted heritage assessments and authored this report with the assistance of AECOM Senior Archaeologist Luke Kirkwood (AECOM Senior Archaeologist). Danielle Phillips (AECOM Associate Director - Environment) and Luke Kirkwood provided technical and Quality Assurance review. Figures have been created and provided by GHD.

## 1.6 Limitations

Predictions have been made within this report about the probability of subsurface archaeological materials occurring within the study area, based on surface indications and environmental contexts. However, it is possible that materials may occur in areas without surface indications and in any environmental context.

A summary of the statutory requirements regarding historical heritage is provided in Section 2.0. The summary is provided based on experience of the authors with the heritage system in NSW and does not purport to be legal advice. It should be noted that legislation, regulations and guidelines change over time and users of the report should satisfy themselves that the statutory requirements have not changed since the report was written.

## 1.7 Acknowledgments

AECOM would like to acknowledge the information provided by Associate Professor Lawrence Peak of Sydney University's Physics Department in relation to the Sydney University Giant Air-Shower Recorders.

## 1.8 Report Structure

The report is structured as follows:

- **Chapter 1 – Introduction.** This chapter introduces the project and the proponent, and describes the project area.
- **Chapter 2 – Methodology.** This chapter defines the study area assessed in this report and describes the steps undertaken in the assessment.
- **Chapter 3 – Legislative context.** The chapter outlines the relevant Commonwealth and State legislation relating to the assessment. Any guidelines and assessment criteria (where applicable) relevant to the gas field construction, operation and decommissioning are also identified.

- **Chapter 4 – Historical Context.** This chapter summarises the historical development of the study area in order to make predictions regarding the potential type and distribution of sites.
- **Chapter 5 – Parish Plans.** The chapter examines the existing historical plans available for the study area and identifies area of archaeological potential.
- **Chapter 6 - Existing environment.** This chapter describes the existing environmental values of the study area relevant to historic heritage and archaeology, including results of the field investigations.
- **Chapter 7 – Impact assessment.** The chapter examines the potential environmental impacts associated with the construction and operation of the project.
- **Chapter 8 – Mitigation measures.** This chapter outlines the proposed mitigation strategies to be implemented during the life of the project to manage the potential environmental impacts.
- **Chapter 9 – Conclusion.** This chapter presents a conclusion to the report and presents the next steps in the advancement of the project.

## 2.0 Methodology

This chapter describes the methodology used in preparing this Historic Heritage Impact Assessment, including heritage register searches, field survey of the project area and Significance Assessment criteria.

### 2.1 Heritage Register Search

A search was undertaken of the heritage schedules below through the Australian Heritage Database, the NSW State Heritage Inventory (maintained by the NSW Heritage Division) and the Narrabri LEP Heritage Schedule. The search included the project area and a two kilometre buffer.

- World Heritage List;
- National Heritage List;
- Commonwealth Heritage List;
- Register of the National Estate (non-statutory);
- State Heritage Register;
- Section 170 Registers of relevant Government Agencies, particularly the Forestry Corporation of NSW; and
- *Narrabri Local Environment Plan 2012*.

### 2.2 Field Survey Methodology

#### 2.2.1 Previous Assessment

AECOM was previously engaged by Eastern Star Gas to assess the historic heritage potential of a different project area, which was centred over the Pilliga East Forest. Over five days between 22 and 26 November 2011, AECOM Archaeologist Dr Susan Lampard and then AECOM graduate archaeologist Rochelle Coxon undertook a targeted field survey. The survey focused on:

- The potential site of the Terra Delbi School, located near the confluence of the Bibblewindi and Cowallah Creeks;
- Gaining an overall understanding of the nature of the region and the heritage and archaeological potential and significance of the project area.

Fifteen sites were identified during the survey. The fifteen sites have been incorporated into this assessment in Section 6.0, where appropriate. During the present assessment, a greater understanding of site characteristics within the Pilliga area has been developed. This has led to a reassessment of the heritage significance of these sites within this report. With the exception of the Stock Loading Facility and Hardy's Hut, sites identified during the 2011 survey were not revisited during the 2014 survey due to time constraints. The information collected in the 2011 survey was considered sufficient to allow for a reassessment.

#### 2.2.2 Current Assessment

A second field survey was undertaken from 28 April to 2 May 2014 and comprised a survey by vehicle along roads and access tracks in State Forests within the project area. This methodology was determined to be appropriate for the following reasons:

- For an assessment of this nature, access was not considered necessary for the privately owned lands in the north western portion of the study area. A desktop assessment, through the heritage register search (see Section 2.1), was undertaken;
- The amount of ground that could be covered by pedestrian survey within a reasonable timeframe was limited;
- The size of the study area, together with the density of vegetation, made pedestrian transects difficult to achieve; and
- It is likely that historical activities were located near or adjacent to access roads and tracks and water resources; and

- As well pads can be manoeuvred, within geological, social and environmental constraints, and there is no defined footprint, micro-siting of well pads can be undertaken based on a characterisation of sites grounded in an understanding of typical site types and locations. Complete coverage and identification of every site is not necessary in order to undertake site characterisation;
- Previous experience conducting survey within the Pilliga Forest (undertaken in 2011).

Key historical sites of interest for this survey were initially identified within the Project area from parish plans. The following areas were subsequently targeted as part of the survey described above:

- Sawmill on Bohena Creek;
- House on Bohena Creek;
- Johnston's 'Albion' Sawmill, near the junction of Bohena and Bibblewindi Creek;
- Hardy's Hut, cultivated paddock, horse paddock, log fence and four wire and netting fence; and
- Two huts, house, garden and yard on Bohena Creek.

Further details regarding the evaluation of parish maps relevant to the Project area are provided in Section 4.8.

The following assessment method was undertaken at each site identified either through location of the sites marked on parish plans or identified as part of the survey:

1. The structures and/or features identified at each site were recorded;
2. The structures/features were then assessed for historical significance;
3. Photographs were taken of the structures/features with details maintained in a photo log; and
4. The position of the site was recorded with a Global Positioning System (GPS).

No sub-surface testing was undertaken.

## 2.3 Analysis Method

The Global Positioning System (GPS) data regarding the identified sites was entered into a Geographic Information System (GIS) for mapping. The field notes were then typed into the description provided in Section 6.0 for each of the sites inspected during the field survey. During the process, the physical evidence was analysed in light of the site's historical context. The site's significance was also assessed. The process of determining significance is described in Section 2.4. The significance of each site and the information collected in the field are key components in determining what impact, if any, the project may have on the sites. Management recommendations were subsequently developed based on the significance of the site and the level of potential impact.

## 2.4 Significance Assessment Criteria

In order to understand how a development will impact on a heritage site it is essential to understand why a site is significant. An assessment of significance is undertaken to explain why a particular site is important and to enable the appropriate site management and curtilage to be determined. Cultural significance is defined in the Australia International Council on Monuments and Sites Charter for the conservation of places of Cultural Significance (the Burra Charter) as meaning "aesthetic, historic, scientific or social value for past, present or future generations" (Article 1.2). Cultural significance may be derived from a place's fabric, association with a person or event, or for its research potential. The significance of a place is not fixed for all time. What is of significance now may change as similar sites are located, more historical research is undertaken and community tastes change (ICOMOS (Australia), 2013).

The process of linking this assessment with a site's historical context has been developed through the NSW Heritage Management System and is outlined in the guideline *Assessing Heritage Significance* (NSW Heritage Office, 2001), part of the NSW *Heritage Manual* (NSW Heritage Office & NSW Department of Urban Affairs and Planning, 1996b). The *Assessing Heritage Significance* guidelines establish seven evaluation criteria (which reflect four categories of significance and whether a place is rare or representative) under which a place can be evaluated in the context of State or local historical themes. Similarly, a heritage site can be significant at a local

level (i.e. to the people living in the vicinity of the site), at a State level (i.e. to all people living within NSW) or be significant to the country as a whole and be of National or Commonwealth significance.

In accordance with the guideline *Assessing Heritage Significance* (NSW Heritage Office, 2001) and the *Heritage Act 1977*, a site will be considered to be of 'State significance' if it meets two or more of the assessment criteria at a State level. A site is assessed as being of 'local heritage significance' if it meets one or more of the following criteria:

**Criterion (a)** – *an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).*

The site must show evidence of significant human activity or maintain or show the continuity of historical process or activity. An item is excluded if it has been so altered that it can no longer provide evidence of association.

**Criterion (b)** – *an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local to area).*

The site must show evidence of significant human occupation. An item is excluded if it has been so altered that it can no longer provide evidence of association.

**Criterion (c)** – *an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area).*

An item can be excluded on the grounds that it has lost its design or technical integrity or its landmark qualities have been more than temporarily degraded.

**Criterion (d)** – *an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons.*

This criterion does not cover importance for reasons of amenity or retention in preference to proposed alternative.

**Criterion (e)** – *an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area). Significance under this criterion must have the potential to yield new or further substantial information.*

Under the guideline, an item can be excluded if the information would be irrelevant or only contains information available in other sources.

**Criterion (f)** – *an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area). The site must show evidence of the element/function etc. proposed to be rare.*

An item is excluded under this criterion if it is not rare or endangered.

**Criterion (g)** – *an item is important in demonstrating the principal characteristics of a class of NSW's (or local area's):*

- *Cultural or natural places; or*
- *Cultural or natural environments.*

An item is excluded under this criterion if it is a poor example or has lost the range of characteristics of a type.

The Heritage Council require the summation of the significance assessment into a succinct paragraph, known as a Statement of Significance. The Statement of Significance is the foundation for future management and impact assessment.

## 2.5 Statements of Heritage Impact

The objective of a Statement of Heritage Impact is to evaluate and explain how the proposed development, rehabilitation or land use change will affect the heritage value of the site and/or place. A Statement of Heritage Impact should also address how the heritage value of the site/place can be conserved or maintained, or preferably enhanced by the proposed works.

This report has been prepared in accordance with the NSW Heritage Office & Department of Urban Affairs and Planning's *NSW Heritage Manual* (1996) and the NSW Heritage Office *Statements of Heritage Impact* (NSW Heritage Office, 2002). The guidelines pose a series of questions as prompts to aid in the consideration of  
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impacts due to the Project. The questions vary in the guideline, depending on the nature of the impact to the heritage site. The Statement of Heritage Impact for direct impacts to identified heritage items is provided in Appendix B & Appendix C.

## 3.0 Legislative Context

### 3.1 Introduction

A number of planning and legislative documents govern how heritage is managed in NSW and Australia. The following section provides an overview of the requirements under each as they apply to the Project.

### 3.2 Federal Controls

#### 3.2.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) defines 'environment' as both natural and cultural environments and therefore includes Aboriginal and historic cultural heritage sites. Pursuant to the EPBC Act, protected heritage sites are listed on the National Heritage List (sites of significance to the nation) or the Commonwealth Heritage List (sites belonging to the Commonwealth or its agencies). The aforementioned two lists replaced the Register of the National Estate (RNE). The RNE is no longer a statutory register, but is retained as a reference archive. The NHL, CHL and RNE were consulted and there are no sites within or directly adjacent to the project area on those registers.

Under Part 9 of the EPBC Act, any action that is likely to have a 'significant impact' on a matter of National Environmental Significance (defined as a 'controlled action' under the Act), may only progress with approval of the Commonwealth Minister for the Department of the Environment (DoE). An action is defined as a project, development, undertaking, activity (or series of activities), or alteration. An action will also require approval if:

- It is undertaken on Commonwealth land and will have or is likely to have a significant impact on the environment on Commonwealth land; and
- It is undertaken by the Commonwealth and will have or is likely to have a significant impact.

Under Section 341ZB, Commonwealth Government agencies, such as the Australian National University (ANU), are required to identify and maintain a register of heritage assets under their control. Under Section 341ZC any Commonwealth agency is to ensure that impacts to the heritage values of items listed on their heritage registers are minimised or eliminated. The Siding Springs Observatory, Coonabarabran is listed on ANU's heritage register under Section 341ZC. ANU has not undertaken a formal assessment of the Observatory against the Commonwealth heritage criteria. A community heritage study undertaken on behalf of the Warrumbungle Shire Council (High Ground Consulting, 2006), in which the Observatory sits, identified the site held State historical, associative, aesthetic, technical/research significance, rarity and representative significance.

The Telescope is located approximately 78 km south west of the southernmost point of the Project area. The project will not be visible from the Observatory and therefore the associative, aesthetic significance will not be impacted. The operation of the Observatory will not be affected by the project through sky glow or other mechanisms (refer to the Visual Impact Assessment) and therefore the historic, rarity, representative and technical/research significance of the Observatory will not be impacted. As the heritage values of the site will not be impacted by the project, the EPBC Act is not of further relevance to the project in relation to heritage matters. The Secretary-Generals Environmental Assessment Requirements include a requirement to undertake a Statement of Heritage Impact. This can be found in Appendix B & Appendix C.

### 3.3 State Controls

#### 3.3.1 Environmental Planning and Assessment Act 1979

The EP&A Act provides for the preparation of planning instruments to direct development within NSW. This includes Local Environment Plans (LEP), which are administered by local governments. LEPs principally determine and regulate land use and the process for development applications. LEPs usually include clauses requiring that heritage be considered during the preparation and assessment of development applications. In addition, LEPs usually include a schedule of identified heritage sites. The Narrabri LEP 2012 applies to the project and is discussed further in Section 3.4.

Division 4.1 in Part 4 of the EP&A Act provides for planning assessment and a determination regime for State Significant Development (SSD). Section 89C of the EP&A Act stipulates that a development will be considered SSD if it is declared to be such by the *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD).

Under Clause 8(1) of SEPP SRD, a development is declared to be SSD if:

- The development on the land concerned is, by the operation of an environmental planning instrument, is permissible only with development consent under Part 4 of the EP&A Act, and
- The development is specified in Schedule 1 or 2 of the SEPP SRD.

The project was declared to be a SSD as it meets both of these criteria.

Section 89J of the EP&A Act provides that an approval under Part 4, or an excavation permit under Section 139, of the *Heritage Act 1977*, is not required for the project as it is an approved SSD.

### **3.3.2 The Heritage Act 1977**

The NSW *Heritage Act 1977* (as amended) was enacted to conserve the environmental heritage of NSW. Under Section 32, places, buildings, works, relics, moveable objects or precincts of heritage significance are protected by means of either Interim Heritage Orders (IHO) or by listing on the NSW State Heritage Register (SHR). Sites that are assessed as having State heritage significance can be listed on the SHR by the Minister on the recommendation of the Heritage Council of NSW.

Archaeological relics (i.e. relics that are buried) are protected by the provisions of Section 139. Pursuant to Section 139, it is illegal to disturb or excavate land knowing or suspecting that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed. In such cases, an excavation permit under Section 140 is required. It is to be noted that that no formal listing is required for archaeological relics. Archaeological relics are automatically protected if they are of local significance or higher.

Pursuant to Section 170 of the *Heritage Act 1977*, NSW Government agencies are required to maintain a register of heritage assets. The Register places obligations on the agencies (but not on non-government proponents) beyond their responsibility to assess the impact on surrounding heritage sites.

AECOM searched Section 170 registers to determine whether there are listed sites within the Project area. No items listed on the SHR were identified within or adjacent to the project area. The Forestry Corporation of NSW S170 register was not publicly available and therefore could not be consulted.

## **3.4 Local Controls**

### **3.4.1 Narrabri Local Environmental Plan 2012**

The *Narrabri Local Environmental Plan 2012* (Narrabri LEP) controls development in relation to heritage items. Part 5, Clause 5.10 includes actions that require prior Council approval. Such actions include demolition, damage to archaeological sites, damaging a place or tree, erecting a building adjacent to or subdividing land on which a heritage item is sited. The proponent must consider the extent to which the proposed development would affect the heritage significance of the item and whether development on an adjacent property will impact on the heritage values of an item.

While the requirements of the Narrabri LEP are not strictly binding on this Project by virtue of the operation of Part 4 of the EP&A Act, the heritage-related provisions of the Narrabri LEP have been considered as part of this assessment, where relevant.

Schedule 5 contains a list of identified heritage items within the LGA. An examination of Schedule 5 indicated that no listed items are located in or within a two kilometre buffer of the Project area.

## **3.5 Summary**

The relevant historic heritage registers have been consulted. No listed heritage items were identified within or adjacent to the project area.

## 4.0 Historical Context

### 4.1 Introduction

The historical information provided below was prepared by historian Pauline Curby for the previous Eastern Star Gas project in 2011. It has been updated where relevant.

### 4.2 Oxley – a naval man explores

NSW surveyor-general John Oxley led his party to the edge of the Pilliga forests in August 1818. He had left Bathurst the previous May on a second journey of exploration into the unknown ‘wilds’ of north western NSW and had followed the Macquarie River until it disappeared into marshes. Proceeding north-east, his party ‘discovered’ the Castlereagh River before turning east.

A man whose naval experience fitted him better for coastal survey work than for inland exploration, Oxley was despondent. He saw little evidence of life and on 17 August noted:

*In our track we saw no signs of natives, and the country seemed abandoned of every living thing. Silence and desolation reigned around.* (Oxley, 1820: 269)

Although there was evidence of human activity, Oxley does not seem to have recognised this as such. On 18 August the party entered “a very thick forest of small iron barks which had been lately burnt; and their black stems and branches, with the dull bluish colour of their foliage, gave the whole a singularly dismal and gloomy appearance. So thick was the forest that we could hardly turn our horses, nor could the sun’s rays penetrate to the sandy desert on which these trees grew.” (Oxley, 1820: 269)

As the party struggled through sandy country – Oxley repeatedly described it as ‘desert’ – they skirted the southern margins of the forests and were probably in what is now Pilliga East State Forest when they turned back. As it was too difficult to proceed, Oxley ordered a ‘retreat’ and they retraced their steps before proceeding east to more favourable country. After leaving the unfavourable ‘desert’ they came upon the rich Liverpool Plains, ‘discovered’ the Peel River, crossed the southern part of the New England Range near Walcha, found the Hastings River, following it to its estuary at Port Macquarie.

Oxley’s *Journals of Two Expeditions Into the Interior of New South Wales*, published in 1820, give the first detailed description of the Australian inland and his ‘discoveries’ paved the way for the later work of Charles Sturt and Sir Thomas Mitchell. As a result the rich pastoral lands of the Liverpool Plains were taken up by pastoralists (Dunlop, 1967). It wasn’t long before land hungry colonists were attracted to the less favourable land further west.

### 4.3 Pastoralists and selectors

According to Eric Rolls’ research, the Pilliga area was first occupied by Europeans in the late 1830s, when Andrew Brown set up a pastoral outstation on the banks of Baradine Creek next to a long water hole, near the present town of Baradine (Rolls, 1981: 117). Rolls described the pastoralists who squatted illegally in the district, their ever-changing fortunes and station names, some of which are now remembered by the names of state forests (Rolls, 1981: 166).

Although in some cases wealthy and powerful, pastoralists lacked security of tenure over the land they appropriated from Aboriginal people. The payment of a licence fee was considered an ‘imposition’ as it conferred no right of ownership or security of tenure (Baker, 1958). Pastoral holdings relevant to the present study are Thurradulha/Thurradulba and Arrarownie Runs.

Located between Bohena and Bibblewindi Creeks in the Parish of White, Thurradulba Run was large by contemporary standards, as it also appears in the Parishes of Goona and Crowie. Arrarownie Run was located in the Parish of Cowallah between Cowallah and Bohena Creeks. Rolls related details of their different ‘owners’ with some ambiguity: this land was not private property (Rolls, 1981: 134, 171, 195 & 303 for Thurradulba Run & 127, 158, 177 & 195 for Arrarownie Run). More intensive research using, for example surveyors’ notebooks and crown land commissioners’ reports, would enhance this picture, but is beyond the scope of the present research. Run boundaries, notoriously difficult to specify in the early pastoral period, have not been investigated.

After the gold discoveries of the 1850s, there was a good deal of popular agitation and middle class politicking in NSW, resulting in the ‘free selection acts’ of 1861. The ‘free selection acts’ allowed ‘selection before survey’ and

meant that only a small deposit was needed for land to be selected. The balance was paid off in instalments and tenure was secure if residential and 'improvement' conditions were fulfilled.

This move to put working people on the land backfired in many parts of the colony when squatters used 'every legal loophole and administrative opportunity' to retain their leaseholds. They succeeded in converting the very insecure tenure of their prime land to freehold and used political influence to have reserves created that could not be selected: they could continue to use what was in effect public land. The strategic position of water reserves, for example, could block selection of waterfront blocks used by pastoralists (Davison, Hirst, & Macintyre, 1998: 579; Gammage, 1986: 62-73). The first district water reserve on Bundock (Middle) Creek, slightly west of the project area, marked on the 1878 County of White map, was gazetted in May 1878.

A few years earlier another vital reserve also assisted the pastoralists and stockowners generally when a travelling stock route (TSR No 941); 10 chains either side of the road from Coonabarabran to Narrabri, was notified on 12 October 1875. The resultant 'long paddock' prevented any blocking of the route to market and ensured stock could graze while progressing to market.

#### 4.4 Forests and timber reserves

With the western Pilliga the target of selectors, the village of Baradine grew. By the second half of the 1870s a thriving timber industry was developing. So intense and uncontrolled was the exploitation that soon the first timber reserves were gazetted in the district (Rolls, 1981: 183). In addition, regulations were tightened when the payment of royalties on timber from reserves was introduced in 1878. Licences were issued by forest rangers rather than crown lands commissioners and land agents, as had previously been the case (Grant, 1989).

Timber Reserve No 1104, marked on the 1878 County of White map, was gazetted in September 1878. The Reserve occupied a large area, being the whole of the parish of Bohena and the area immediately to the north, the parish of Boral (to the west of Brigalow (Bohena) Creek) and part of the Police District of Narrabri. The system of forest reserves, developing in NSW at that time, was part of a strategy to reserve forests for the future. The strategy was also partly motivated by the need for a more efficient method of managing timber getting. As with the water reserves however, this also assisted pastoralists to sterilise (or 'lock up') land from free selection. While a reserve could not be sold, an inexpensive grazing licence could be held over it. As a result, pastoralists with political connections usually had no trouble securing these.

The pastoralists were beset with other problems, however. There had been a series of 'wet years' that created the conditions for the 'marvellous' growth of cypress pine that Rolls considered was the foundation of the present forests (Rolls, 1981). Many pastoralists regarded this as 'useless' rather than 'marvellous'. At the end of 1879, a group of over thirty pastoralists petitioned the Minister for Mines to allow them to clear pine scrub from 'their' land. They claimed the spreading pine threatened to 'destroy the grazing capability' of their runs. They wished to be assured of security of tenure before they undertook the costly task of clearing scrub. The map accompanying this petition shows a great swathe of central New South Wales including the project area had this problem. Although there was general agreement that this phenomenal pine growth was caused by a change in burning regime, a number of different solutions was suggested. Charles Lockley, the Darling District commissioner for Crown Lands, who believed that runs were now 'of but little value as pastoral properties', observed 'that where by some accident the scrub has been thinned, those spared rush up into fine trees which in twenty years would be most valuable' and based on this he recommended that the lessees should not be allowed to destroy the scrub, but rather (anticipating later practice) to thin it.

It was at this time that the timber/scrub of the eastern Pilliga began to be systematically exploited. The earliest parish maps of the project area demonstrate this development, showing how forests were subdivided into blocks for which licences were allocated by auction for one to three years. Parish of Goona (1883) was divided into Blocks 152 to 154; Parish of Cowallah (1883) was divided into Blocks 147, 166 and 168; Parish of White (1883) was divided into Block 146. The southern part of the Parish of Crowie (1883) became Block 152, west of Bohena Creek, in the NW part of the project area. East of this the Parish of Brigalow (1883) was divided into Blocks 144 and 145, while Block 149 was in the Parish of Gorman (1882).

#### 4.5 Grazing leases

Licences for timber getting were held in tandem with grazing licences, created as a result of the *Crown Lands Act* of 1884, which aimed to regulate the use of public land for grazing. Up until that time, pastoralists had little security of tenure over 'their runs', except for the fairly small areas of land they were allowed to select. The *Crown*

*Lands Act* was designed to strike a balance by giving pastoralists some security of tenure and encouraging orderly selection. In the wake of the aforementioned legislation, pastoral holdings were assessed and runs were divided into leasehold areas, to be leased for a fixed term and resumed areas, to be held under annual license. Inevitably, the pastoralists described the poorer part of the run that they did not think would attract selection as 'resumed area'. In New South Wales much of that land remains in public ownership as state forests or national parks.

In the project area, a leasehold area denoted as Willylaw 697 and land to the north of it (a resumed area with the same name), are marked on the Parish of Parkes map (1882). There were also leasehold and resumed areas, Norfolk 717C, in the Parish of Gorman (1882) and a leasehold area Arrarownie 523 in the Parish of Cowallah (1883).

The paperwork created as a result of the 1884 legislation, the pastoral holding files and the pastoral occupation licence files provide useful information. Dividing runs into resumed areas and leasehold areas necessitated an assessment of its grazing capacity and notes were also made on improvements, timber and grasses. Normally few improvements were made on the resumed areas, over which there was little security. Therefore, in the project area, only land designated as 'leasehold areas' is likely to have any 'improvement' prior to the 1890s. Money was not spent on land under insecure tenure.

Despite this, infrastructure such as bores, roads and bridges were constructed. Such infrastructure was more likely in the western Pilliga on well-watered, fertile land, rather than the dry and less than hospitable eastern Pilliga. As a result, there were boom years and the railway reached Narrabri in 1882, at a time of significant development throughout the north-west of the colony (Rolls, 1981: 11 & 187).

Much of the Project area was under grazing licence while systematic logging was undertaken in the thick forest. Vegetation notes on parish maps from this time indicate that this was not a homogenous forest. In the western part of the Parish of Parkes (1882), there were stands of ironbark, bloodwood and pine and in the Parish of Crowie (1883), an 'open scrub of wattle'. The northern section of the Parish of Bohena (1884) was 'Brigalow Scrub'. Closer settlement

The boom times did not last. On 20 March 1891, the leasehold and resumed areas previously mentioned above were forfeited. This was likely a result of the depression that impacted severely on the colony at that time. In the aftermath of the economic crisis the banks – those that had not crashed in 1893 – foreclosed on mortgagees. As a result, extensive farming and pastoral areas came under the control of financial institutions. While this did not affect the Project area directly, as there does not seem to have been any freehold land there at this stage, land legislation passed in response to the crisis did have an impact.

Although land reform had been attempted, there was deep frustration with the operation of New South Wales land laws in the late 19<sup>th</sup> century. In the wake of the 1890s depression, new legislation that sought to encourage 'closer settlement' was introduced to extend and improve the earlier selection acts (Davison et al., 1998: 133). The first piece of such legislation, being the *Homestead Selection Act of 1895*, introduced the notion of a 'living area' or 'home maintenance' area. It created a lease in perpetuity, subject to the payment of rent and five years residence, allowing a man – usually, but not always – to have a farm sufficiently large for a family to make a 'decent' living (King, 1957: 209).

Improvement and scrub leases, also introduced at this time, were 28-year leases of 'scrub or inferior' land that was to be cleared for agriculture. During the final year of the lease, an application could be made for a homestead grant of 640 acres. Therefore, if this type of lease were allowed over a forested area, it would certainly be cleared and there was a chance it would be alienated. In the Parish of Cowallah (1883), THB McGee took out Scrub Leases on land between Cowallah and Bohena Creeks in 1895 and 1897. In addition, TAS Garland had one of 1000 acres further south on Bohena Creek. That area is now state forest, as is George White's improvement lease in the Parish of White (1883).

Efforts to improve the land laws continued, especially after the devastating drought of 1895-1903. The Closer Settlement Act 1904 allowed 'compulsory resumption' of private estates, much of it from the old inferior 'resumed areas', for redistribution as small farms. The *Crown Lands (Amendment) Act* of 1905 created the Conditional Purchase Lease, a fifty-year tenure which later could be converted to a perpetual lease, requiring the lessee to carry out conditions such as cultivation and the preservation of timber. The large Conditional Purchase Lease Area No 208 created in 1909, in the Parish of Bohena (1906) between Bohena and Bundock Creeks, is now freehold land. Records of these leases, held at State Records NSW, have not been accessed for this report.

When the first Labor Government was elected in New South Wales in 1910 it had a mandate for change. Despite closer settlement legislation, large holdings had not been broken up. Pastoral leaseholders had a proprietary attitude that often obscured the fact that they were using public land. The Labor Government's introduction of Crown Lease tenure in 1912 sought to prevent the alienation of public land as well as giving working people access to grazing land. A Crown Lease area was created in the centre of the previously mentioned Conditional Purchase Lease area in the Parish of Bohena. It was under that legislation, or amendments to it, that extensive areas of forest were placed under more tightly controlled leaseholds. 'Improvements', such as fencing and ringbarking, were required and leases were regularly inspected. If the conditions were not met leaseholds were forfeited.

In 1912, the *Homestead Selection Act* was also modified by the introduction of Homestead Farm tenure, a lease in perpetuity which aimed to bring Crown land into 'productive' use. In the Project area, the tenure was introduced on 28 June 1912 when Homestead Farm areas 177 and 178 were created in the Parish of Brigalow (1883, later annotations to the plan). In 1912 and in the following year, people such as Stanley Manning, PM McGirr, Louisa Murray, WW McCann and Harry Kuhner acquired homestead farms of between 700 and 900 acres, east of Bohena Creek. Some of that large area remains freehold land, while some is now part of Jacks Creek and Bibblewindi State Forests. Further research (including oral history) would be required to investigate the stories of those homestead farmers. Rolls has detailed how 'selectors' arrived in the area in the early years of the century and how a government report in 1905 praised the potential of the area around Baradine for wheat growing (Rolls, 1981: 197-205).

In the early 1920s, another area of Homestead Farms, mostly around 1000 acres each, was taken up east of Bibblewindi Creek in the Parish of White (1899, later annotations to the plan). While some of that area is now freehold land, the block taken up by JF Kuhner, probably a relation of Harry's, is now part of Bibblewindi State Forest. In the Parish of Gorman (1913,) people such as JEA Jones, RG Boyle and Mary Brown had Homestead Farms. Boyle seemed to have been particularly lucky as he had seven blocks. However, it appears that the land was not good farming land as some of the blocks had already changed hands in the first few years of tenure. It is noted that much of that land is now located within state forests.

It appears that the impact of the well-intentioned legislation between 1895 and 1912 was significant. However, it did not yield the expected result. As lease conditions specified that 'improvements' (such as land clearing and ring barking) should be undertaken so the land could be effectively used for grazing and/or cropping, it could be anticipated that evidence of such activities would be visible 'on the ground'. It appears from Forests NSW files that few of the lessees were genuine farmers and instead voraciously cut out all the merchantable timber with little thought for its regeneration. Later it was asserted by Forests NSW that settlers obtained loans from the Rural Bank, exploited the timber and then 'walked out'. It was also claimed that one man 'with several dummies obtained a large block of country ... and did a royal trade in timber' (Forests NSW, 1946: File 39419).

## 4.6 Business-like management

The New South Wales Commissioner for Forests from 1935 to 1948, one E.H.F. Swain, who as a young forester had worked in various locations around the state, described saw millers and timber getters as 'natural log thieves'. There seemed to be 'no idea amongst the settlers' of preserving timber for anything. Attempts at regulation of the timber industry had been ineffective and by the late 19<sup>th</sup> and early 20<sup>th</sup> century, there was considerable dissatisfaction with its management which in many cases clashed with a widespread belief in the intrinsic virtues of closer settlement (Forest Conservancy Branch, 1898: 5). Against this background, a Royal Commission into the timber industry was conducted in 1907-8 (Grant, 1989: 60).

By that time, many people realised that a resource, once considered inexhaustible, was finite and were dismayed at the government's lack of control over the timber industry. It is clear from the commission hearings records that if land were considered suitable for agriculture it was made available for closer settlement. Revocations of timber reserves were not unusual. This procedure reflected the lowly status of the Department of Forestry, a poor relation that had been shunted around under a variety of government departments since the 1870s.

As a result of the Royal Commission, the *Forestry Act* of 1909 made provision for the dedication of state forests that could not be revoked except by an Act of Parliament. In contrast, a reserve could be revoked by a notice in the Government Gazette. Independence from the tutelage of other government departments was not achieved until 1916. A second Forestry Act was passed in 1916, which in turn created the Forestry Commission.

Meanwhile, E.H.F. Swain had been busy. In early 1915, he conducted an extensive survey of the Pilliga Scrub, including the western part of the project area, west of Bohena Creek. The Pilliga Forest, 'the finest Cypress Pine and Ironbark forest in Australia', he declared, 'is the last stronghold of the timber industry in the North West'. Swain believed ironbark growing there 'represents one of the few remaining sources of supply of this essential timber'.

Swain perceived the clash between forestry and settlement interests as a war with the Pilliga as the frontline. He considered that while 'forest values and claims are indisputable; the settlement value and claims are problematical' and that much of the Pilliga had been selected by what he termed 'timber traffickers'. Homestead Farm tenure came in for particular criticism as, he argued, this 'disposes of the timber value on payment of a small rent – analogous to the tenant of a furnished house having the right to sell the furniture of the landlord during his tenancy' (Swain, 1915). His recommendation that the Pilliga Scrub should be a state forest became a reality when the oldest part of Pilliga East State Forest, west of Bohena Creek, was gazetted in December 1916 (although the date is usually cited as 1917). At the same time Bibblewindi State Forest, in the project area, and Jacks Creek State Forest, just north of it, were also gazetted.

As forests were gazetted, surveys and assessments were conducted to determine, in the first two decades, whether land should be used for farming or timber getting. The surveys and assessments also determined areas suitable for dedication as state forests and established the quantity of merchantable timber on crown land. Forests were divided into administrative units called compartments and forest management was guided by working plans for the business-like management and exploitation of the forest. The approach marked a change in forest administration in New South Wales. Until the 1920s, forest management had been fairly haphazard with logging generally allowed until there were no more merchantable trees available.

One of the oldest Forestry Commission working plans was devised in March 1918 for Pilliga East State Forest. As well as dealing with the timber and its potential use, the 1918 plan also noted that two grazing licences were held in parts of the forest. Whilst it was a feature of NSW forests until recent years, dual use was only acceptable if it was under 'forestry tenure'. The Forestry Commission was beginning to sense it could exert its new found authority. However, research has not been conducted into grazing under Forestry Commission supervision in the project area.

One of the main causes for concern, in relation to grazing and the use of the forest by 'outsiders', was fire control. This is understandable in a forest that experienced uncontrollable wildfire every few years. Prickly pear, which was widespread, was another problem to be dealt with. There seems to have been no local men available to work at eradicating this, possibly because of the numbers serving in the Great War in Europe. This unpleasant task was 'usually done by Chinamen' (Swain, 1915).

In the 1920s, the Forestry Commission took a proactive approach to the organisation of the forest estate. Resident foremen lived in the forests in newly erected cottages so that logging and silviculture could be closely supervised. However, by the 1960s, due to improved transport and communications, the foremen lived in town, rather than cottages in the forest. The old cottages were either sold off or demolished. Little bush schools that had served the needs of forest workers' children also closed at this time. While it is uncertain if this general pattern applied to the forests of the Project area, a reserve for Terra Delbi Public School was gazetted on 8 September 1913. The location was on Bohena Creek, in the Parish of Goona (1902) on land reserved the previous year (W & CR 47647). No evidence has been found so far that such a school operated there.

Forest historian Les Carron has asserted that the establishment of the Forestry Commission meant that for the first time, control could be exercised over 'the use of the forest which clashed with traditional industry attitudes'. The old laissez-faire days of almost unrestricted cutting were over, he argued, and trees had to be marked by foresters and their manner of felling approved (Carron, 1985: 11). Oral accounts suggest, however, that changes in the administration of the timber industry were very gradual and that unrestricted cutting did not disappear overnight.

In the western Pilliga, sleeper cutting reached a peak in 1917. Sleepers were taken by bullock wagon to the rail head at Narrabri. As accessible areas were cut out, production declined until the railway line to Gwabegar, opened in 1923. Sleeper cutting reached another peak in 1930 as the forest estate became more intensively managed (van Kempen, 1997: 97).

The Pilliga was regarded as such an important source of timber that in 1937, the Pilliga National Forest was created. The Pilliga National Forest incorporates 13 forests, including the western part of the Project area. Designed to forestall the closer settlement lobby, it created a more secure reservation that also catered for public

recreation and wildlife preservation. The concept of multiple-use forests was a compromise made to retain forests primarily for wood production. As 'nature conservation' groups such as the National Parks and Primitive Areas Council (established in Sydney in 1932) gained traction, it was feared forests would be 'lost' by the creation of national parks (Carron, 1985: 55). Consequently, for some years the Forestry Commission had two enemies 'at the door'.

In the inter-war years, the Forestry Commission devised a fire fighting strategy that included the construction of wooden fire towers in elevated positions. After 1934, the fire towers were built with the assistance of unemployment relief funds. It is not known if there are ruins of the fire towers in the fire-prone Project area. Certainly firebreaks, fire roads and trails would have been constructed (Grant, 1989: 193-200). Probably the largest wildfires the project area has experienced were those of 1951 and 1982. Extensive fires, but not as widespread, also occurred in 1957 and 1974.

## 4.7 Intense timber production

Timber production across the state intensified in the years that Swain was commissioner (being 1935 to 1948). In particular, the introduction of new price structures meant that a greater diversity of timber could be logged and areas further from centres of population utilised for timber getting. Those developments, combined with technological changes, were slowly transforming timber getting from dependence on human and animal power to a highly mechanised industry. Unlogged areas and new species were now within the ambit of saw millers. They were assisted in this extension of their operations by an extensive road building program undertaken by the Forestry Commission in order to ensure supplies (Carron, 1985: 18).

While the housing boom of the 1950s was a bonus for the timber industry, it brought with it rising costs and increased royalties. This in turn led to the Forestry Commission restructuring the royalty system in 1954. When assessments of public lands in New South Wales were undertaken to estimate the State's timber resources, it was found that timber from state forests would not meet future demands (Carron, 1985: 22-23). Classification surveys aimed to categorise land according to its timber potential, rather than its actual usage and locate areas of interest to the Forestry Commission. This was the background for changes in land classification that resulted in a large part of the Project area becoming part of the forest estate.

Sometimes district foresters scouted out potential purchases that would be useful for timber production and on other occasions landholders approached the Commission offering to sell their properties. Local opinion, expressed in Forests NSW File 39419 seems to have been generally in favour of resuming the central freehold land of the project area, with the Narrabri Chamber of Commerce supporting such a move. Enclosed by forests, the central freehold area was especially targeted for resumption as it was a 'complete failure' in terms of agriculture and grazing (Forests NSW File 39419). The area remains freehold however.

At that time, the northern section of Jacks Creek State Forest only had been dedicated as state forest, with the two southern sections 'Homestead Farms'. In 1946, James Eric Boyle had offered his nine portions in the Parish of Gorman to the Forestry Commission. In the following year when those 'Homestead Farms' were purchased, they formed part of the eastern section of Jacks Creek State Forest. Even though the land was fenced, 250 acres of trees had been ring-barked and a sub-artesian bore, hut and yards were located there. It is unclear whether that land was ever farmed. It had certainly been used for timber production as at the time of purchase, sleeper cutters were cutting undersized timber there. Swain noted this was part of a belt of land that had 'failed for settlement, whose true destiny is timber production' (Forests NSW File 41007). There were many similar properties in a district where the 'first settlers existed solely from timber sales which resulted in a prosperous livelihood'. With the timber mostly cut out, many were anxious to rid themselves of their 'homestead farms' (Forests NSW File 43251).

Land immediately north of Boyle's was added to Jacks Creek State Forest in 1947. AAB Taylor offered his three portions, also 'Homestead Farms', for sale in 1947. It appears from the evidence that it had a similar history to Boyle's land. The district forester reported at the time that the 'bulk of the millable timber ...Cypress Pine and Ironbark has been heavily exploited in the past, and practically all that now remains are remnants of the original millable stand.' It was decided to buy the land, however as it had the potential to regenerate, especially if 'rigid' fire protection was implemented (Forests NSW File 52619).

Also mooted in that year was the addition of 8,000 acres (located immediately south of Boyle's land) to Pilliga East State Forest. The 8,000 acres comprised of two abandoned 'heavily cut over' portions and neighbouring vacant crown land, became Extension 5 of Pilliga East State Forest in 1955 (Forests NSW File 50478).

Another section of Jacks Creek State Forest, located to the south-west of the original forest, was augmented in 1948. At that time, the Forestry Commission purchased 6,897 acres from Stan Power, a young returned serviceman. His family had bought the land while he was on overseas service in 1944 but on his return, local 'men of good experience' advised him to sell to the Forestry Commission. Investigation of Power's land revealed a familiar picture: heavy past exploitation of Cypress Pine and Ironbark, most recently in the mid-1930s, but 'excellent pine regeneration'. As this was considered some of the best forestry land south of Jacks Creek State Forest, the district forester was anxious it be acquired without delay as it would be 'a calamity' to see 'young ironbark slaughtered, wasted and cut for the purpose for which it was not intended' ( Forests NSW File43251).

In 1951, another 1,468 acres in the Parish of White, including Stanley Manning's abandoned rabbit infested Portion 7 on Cowallah Creek, was dedicated as Extension 2 of Bibblewindi State Forest. The district forester at Baradine had recommended the acquisition as part of the campaign to 'build up the forest estate from more or less abandoned settlement propositions in this area' (Forests NSW File 39419).

Another cut over block of 1,660 acres, a 'promising forest redemption proposition', became part of Bibblewindi State Forest (Extension 3) in 1963. The block was resumed from Lionel James and Matthew Pannowitz who had bought the land from L.W. Guest. A small compensation was paid. Years elapsed while difficulty over land title and the payment of outstanding Crown dues was resolved. In addition to extensive ringbarking – one of the 'improvement' conditions – rabbit infestation and kangaroos were reputed to be damaging Cypress pine regeneration on the block. In 1945 evidence of charcoal burning, a feature of the north western forests at this time when petrol was rationed was noted (Forests NSW File 52141).

It was a little different when 3,670 acres were added to Bibblewindi State Forest in 1949, (Extension 1) as land was purchased from the Bank of NSW, rather than an individual. The land was known as Belford's area, after the former owner Emma Alice May Belford. While the section of the property east of what is now Westport Road was floristically varied with pine, Bloodwood, Pilliga Box and a Broom plain, west of the road a large section of Portion 20 was cleared and 120 acres cultivated, indicating Emma Belford had attempted to operate a farm. There was also a four-roomed hut with a verandah and four huts in varying states of repair on the fenced block, in addition to a well, a windmill and a 2000-gallon tank (Forests NSW File 39388).

Portion 20 (from where the farm had operated) was part of the forest estate for 15 years and still known locally as 'Belford's'. In 1957, John Joyce-Brandon, who had recently bought Portion 6 (adjoining to Bibblewindi State Forest) from Stanley Manning, suggested to the Forestry Commission that his well forested block be swapped with 'Belford's'. Prior to the finalisation of the agreement in 1964, Brandon agreed that he would allow the Forestry Commission access to the well and windmill on 'Belford's' in times of bushfire (Forests NSW file 63818).

The first enlargement of Pilliga East State Forest in the post-war years took place in 1949. In that year, 204 000 acres of land, some of which was in the County of White in the project area, became Extension 4 of the Pilliga East State Forest. Known as the 'Badlands', the southern section of the aforementioned vacant crown land is now part of Pilliga East State Conservation Area. To the north of it is the most easterly section of Pilliga East State Forest (Forests NSW file 33017). East of Bohena Bore another area of 850 acres (Extension 6) was added to the forest in 1956. When that land was assessed two years earlier the district forester argued that the 'economic destiny of this land is for Forestry'. He believed this was 'due to the obvious fact that even if highly improved the land would be only inferior for grazing or agriculture' (Forests NSW file 78961).

While little agriculture seems to have been attempted in that part of the Pilliga Scrub, signs of it were evident on Portion 2, Parish of Cowallah (being T.A.S. Garland's former scrub lease on Bohena Creek, part of the old Arrarownie Run). Aerial photographs taken in 1961 revealed that parts of the block, through which the travelling stock route ran, had been cleared 'a long time ago and have regenerated to varying degrees' (File 69970, Forests NSW). The clearing, it was noted, included 'the stock route also, as though it had been part of the portion'. In addition, there were signs of 'old cultivation which extended, unbroken, across the border of the stock route'. Attempts at 'settlement' made in the past had 'obviously failed as also did several other attempts further south along the same creek'. In light of the fact that a sawmill is marked on an earlier Parish of Cowallah (1898) map on the north west boundary of the portion, perhaps the main aim of the lessee was timber exploitation rather than farming, as in the rest of the Pilliga. In 1963, when Coonabarabran resident J.L. Flood applied for a special lease for residence, grazing and agriculture there was consternation within the Forestry Commission that anyone would try again where so many had failed – some recently in the country immediately south. The application was refused and subsequently that portion and land south of it, popular with apiarists, were incorporated into Pilliga East State Forest.

The Forestry Commission (State Forests NSW for some years and Forests NSW, now Forestry Corporation) has always been primarily driven by economic imperatives, as its charter made clear. While policies such as the establishment of flora reserves in 1935 benefitted the environment, the Forestry Commission had become increasingly out of step with changing community attitudes. When the National Parks and Wildlife Service was established in 1967, the Commission's conservationists transferred to the new government agency. By that time, the push for closer settlement from politicians and the Department of Lands was in the past. However, wrangling over whether land was to remain forest or become national park was about to begin. Thousands of hectares of Crown land in less accessible areas of the state were 'acquired by the Forestry Commission to forestall NPWS's program of land acquisition.

Debates over logging of environmentally sensitive forests that had raged in rainforest and coastal areas since the 1970s gathered momentum in the north-west of the state in the late 1990s and early 2000s. As a result of studies conducted by Forests NSW and negotiations with a range of 'stakeholders', significant areas were transferred from one government agency to another. The southern part of the project area became part of Pilliga East State Conservation Area, as did Rutledge State Forest further to the south.

In 2009, thinning of the Pilliga East State forest was undertaken in wide areas across the Project area. In particular, thinning was undertaken west of the Newell Highway and in the northern portion of the forest around boundary Road. At present, the forest is categorised for 'General Management', with some localised areas specified as 'Harvesting Exclusion Zones' and those areas around the existing gas infrastructure, as 'Special Protection Zones' (Forestry NSW, 2008).

#### 4.8 Sydney University Giant Air-shower Recorder

Between 10 January 1968 and 5 February 1979, the Sydney University Physics Department constructed and operated the Sydney University Giant Air-shower Recorder (SUGAR) in the Pilliga Forest. The objective of the array was to locate the sources of high-energy cosmic rays in the Southern Hemisphere (Haynes, Haynes, Malin, & McGee, 1996).

The installation covered an area of 100 km<sup>2</sup>, of which a maximum of 70 km<sup>2</sup> was ever operational at any one time. Within the installation area were nested grids with spacings of 1600m, 800m and 400m. Each local station consisted of two six metre deep tanks buried in the ground and spaced 50 metres from each other. The tanks contained liquid scintillator - a liquid that becomes luminescent when a charged particle traverses it. The SUGAR converted the flash of light emitted by cosmic rays into an electrical pulse, which was then compared with the other tank at the local station. If there was a 'coincidence', the event was recorded on a tape recorder at the location. The tapes were collected every seven to 10 days and taken back to the base station, where master tapes were created and forwarded to Sydney for further analysis. The base station was located on the Newell Highway and included four 'A frame' houses for staff and visitors, a barn for vehicles, laboratory and transmitter tower (Associate Professor Lawrence Peak, Sydney University Physics Department, pers. comm. 15 June 2014).

Associate Professor Peak provided the following statement regarding the innovative nature of the SUGAR array:

*To view the whole array, it was necessary to co-ordinate the timing of every station. This was carried out using an ingenious system perfected by A/Professor Murray Winn. A constantly updating timing signal was beamed from the base station via a transmitter tower. Each station could then record the current time at the time of a coincidence. This allowed the whole array to be analysed for giant air showers which could spread over many stations (sometimes 10 or more), and for the incoming direction of this shower to be ascertained. The huge advantage of this system was that no cables were necessary to link the stations together.*

*At that time, the main (friendly) competitor was an air shower array called Haverah Park at Leeds UK. Although of similar area, this of course was looking at the Northern sky, of possible significance when searching for sources of these ultra-high energy cosmic rays.*

*The results from this experiment were very important in gathering size and direction information for these giant air showers initiated by incoming primary particles the energy of which can be greater than 10<sup>20</sup> electron volts. At this energy, a proton would appear 10<sup>11</sup> times more massive than at rest. Unfortunately these events are so rare (~1 per square km per year above 10<sup>19</sup> electron volts), that further experiments are proceeding to gather a large statistical sample. Some arrays use the technique pioneered by SUGAR, others use the fluorescence of the atmosphere when a charged particle passes through. Some have also tried to use the radio signals emitted.*

*After SUGAR and Haverah Park, the AKENO array in Japan operated for over 14 years and the Pierre Auger array which is being constructed in Argentina, is an exciting development using both ground based and fluorescence detectors.*

*The origin and direction of these high energy particles hurtling into our earth's atmosphere have profound bearing on theories of astrophysics, cosmology as well as ultra-high energy particle interactions. These energies are far in excess even of the Large Hadron Collider currently operating at CERN [European Organisation for Nuclear Research] (up to a maximum of  $10^{17}$  electron volts).*

## 4.9 Previous Heritage Assessments

Several previous historic heritage assessments have been undertaken within the project area. The outcomes of each of these are discussed below.

### **RPS, 2012, *Aboriginal & Historic Heritage Due Diligence Report: Leewood – Produced Water & Brine Management Project*, Prepared for Santos.**

RPS (2012) was engaged by Santos to undertake an Aboriginal and historic due diligence assessment for the proposed construction of a produced water and brine facility on the Leewood property. A survey of the property identified a pair of SUGAR pits. The report recommended that the SUGAR pits should remain intact and should not be disturbed. This report was considered during the impact assessment provided in Section 7.2.1.

### **RPS, 2012, *Westport Campsite Statement of Environmental Effects*, Prepared for Santos.**

RPS (2012b) was engaged by Santos to prepare a Statement of Environmental Effects (SEE) in relation to a proposed drillers' camp at Westport. The SEE considered historic heritage. A search of the relevant heritage registers did not identify items within the study area. A subsequent site inspection did not identify historic material.

### **Curby and Humphries, 2002, *Brigalow Belt Stage 2 Non-Indigenous Cultural Heritage Study*, Prepared for the Resource and Conservation Assessment Council**

Curby and Humphries (2002) prepared a non-indigenous heritage study focused on the forested areas of Brigalow Belt South Bioregion within NSW. Due to the size of the study area, the report focused on specific State Forests. The State Forests selected for the study did not incorporate any in the vicinity of the present study area. However, the report has been used to gain an understanding of the types of sites in the broader region and whether those identified in the present study area can be ascribed representative or rarity heritage significance. The historical context has also been incorporated by Curby into the historical context provided in Section 4.0.

## 5.0 Parish Maps

### 5.1 Introduction

Early parish maps sometimes contain information on the development within the area. While their purpose was to denote the sub-division of land within a parish, they occasionally record the location of a hut, well, stockyard or other improvement. Parish maps can therefore be a good source of information regarding early development in areas that do not have a detailed written history. In this way, parish maps are useful tools for identifying the location of former structures that may now be archaeological sites.

The land within the Project area comprises of the Parishes of Blake, Bohena, Boral, Brigalow, Cowallah, Crowie, Dampier, Dewhurst, Galloway, Goona, Gorman, Milner, Parkes, Quinn, White and Yaraman within the County of White. The maps for the aforementioned parishes were examined for potential areas of historical use. The review revealed that the parish maps for Brigalow, Crowie, Cowallah and Gorman indeed recorded a range of potential sites. These parish maps are addressed in turn in the following sections.

### 5.2 Brigalow

Parish maps were created for Brigalow in 1883, 1913 and 1933. The map for 1883 indicates two areas of interest, being Johnston's 'Albion' Sawmill (near the intersection of Bohena and Bibblewindi Creeks [refer to Figure 2]) and a house and hut on Bohena Creek (refer to Figure 3). Despite being denoted on the Brigalow map, neither of the aforementioned features are located in the parish, but are on the opposite, western bank of Bohena Creek. The Sawpit is in the parish of Goona and the house in Bohena, although the boundary changed, making the house in the parish of Crowie. The map for Goona does not reference the sawpit. Furthermore, the house and hut are likewise not denoted on the maps for either Crowie or Bohena. The Brigalow parish maps issued in 1913 and 1933 indicate the location of the sawmill. However, there is no further reference to the house and hut. This does not necessarily mean that they were no longer in existence but rather, they may have not held interest in relation to the mapping and land-use.

Both the sawmill and house and hut areas have the potential to retain archaeological relics or artefacts associated with the sites. Section 6.4.1 discusses the finds in the vicinity of Johnston's 'Albion' Sawmill. The area of the house was not investigated due to time constraints and there is unlikely to be impacts in the area arising from the project due to its proximity to the Newell Highway (i.e. less than 100 metres from the highway).



Figure 2 Excerpt from the 1883 Brigalow parish map, showing location of Johnston's Albion Sawmill. From NSW Government <http://images.maps.nsw.gov.au/pixel.htm>

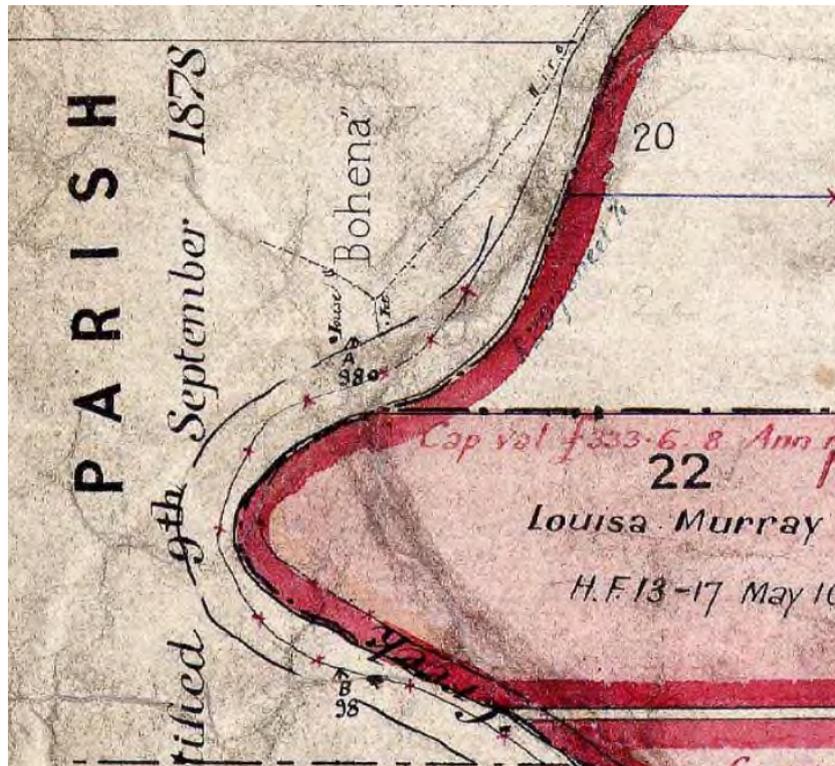


Figure 3 Excerpt from the 1883 Brigalow parish map, showing location of house and hut. Sourced from NSW Government <http://images.maps.nsw.gov.au/pixel.htm>

### 5.3 Crowie

The 1883 parish map for Crowie indicates the location of Robert Hardy's hut and other improvements. The other improvements include a cultivated paddock, horse paddock, a log fence and a four-wire and net fence (refer to Figure 4). The improvements are however, not indicated on later editions of the parish plan. A site was identified in the vicinity of the area indicated on the parish map, which is tentatively identified as Hardy's Hut and is discussed in Section 6.5.2. It is also possible the stock loading facility identified in Section 6.8.3 is associated with Hardy's improvements.



Figure 4 Excerpt from the 1883 Crowie parish map, showing Hardy's Hut and associated improvements. Sourced from NSW Government <http://images.maps.nsw.gov.au/pixel.htm>

### 5.4 Cowallah

The Cowallah parish plans were issued in 1883 and 1898. The 1883 edition indicates the location of two huts, a garden and house and yard to the north-east of the intersection of Bohena and Sandy Creeks (refer to Figure 5). The improvements are not indicated on the 1898 parish map, however a sawmill is indicated in the same position (refer to Figure 6). The features identified above are discussed in Sections 6.4.2 and 6.5.1.



Figure 5 Excerpt from the 1883 Cowallah parish map, showing two huts, house, yard and garden. Sourced from NSW Government <http://images.maps.nsw.gov.au/pixel.htm>



Figure 6 Excerpt from the 1898 Cowallah parish map, showing a sawmill. Sourced from NSW Government <http://images.maps.nsw.gov.au/pixel.htm>

### 5.5 Gorman

The parish map of 1882 for Gorman denotes that the parish is sprinkled with fences, tanks and a well (refer to Figure 7). The aforementioned were not individually investigated due to time constraints.

The 1897 edition of the map indicates that an area to the east of the parish had been set aside for a public school. That land is outside of the Project area.

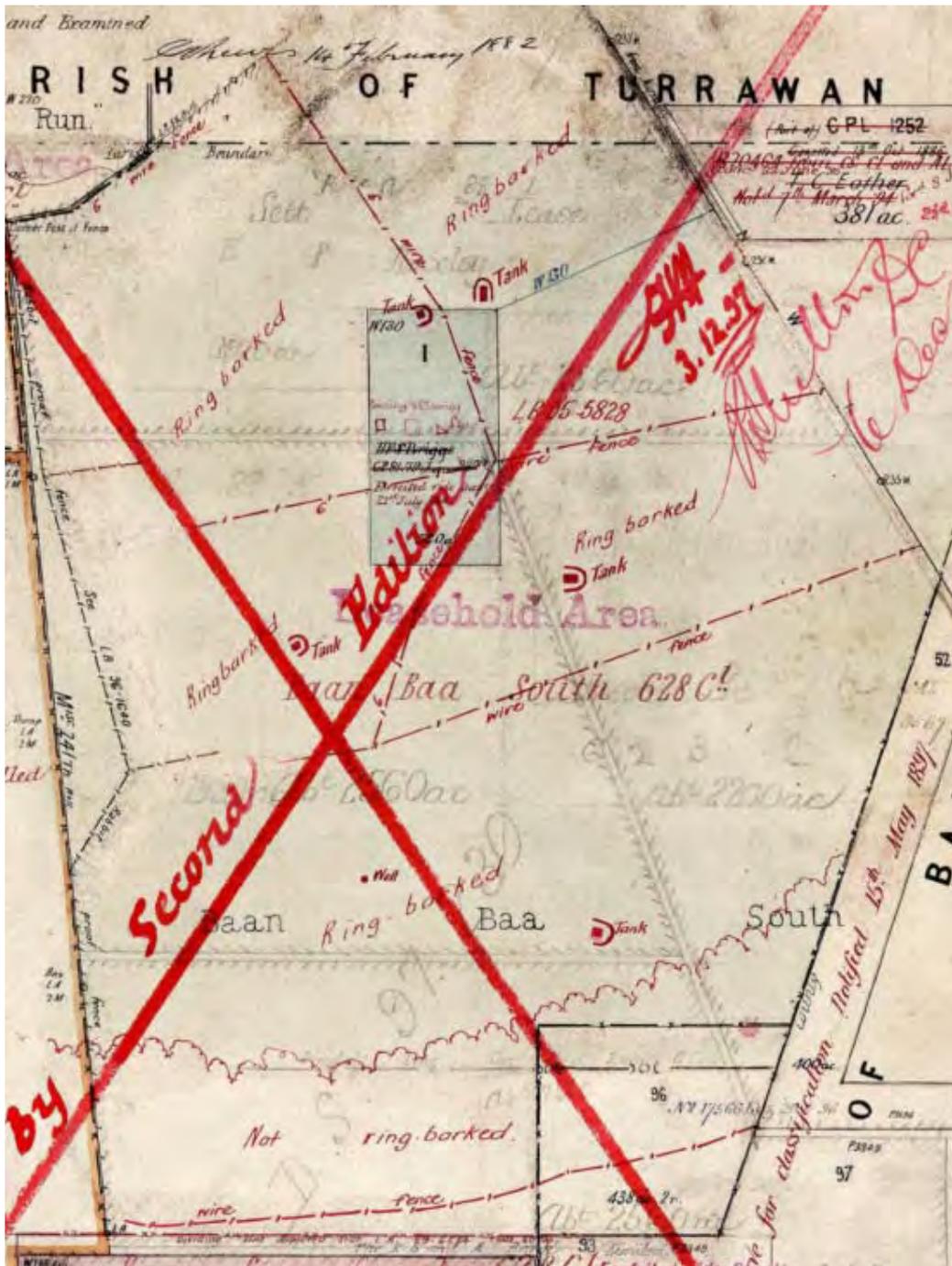


Figure 7 Excerpt from the 1882 Gorman parish map, showing fences, tanks and well. Sourced from NSW Government <http://images.maps.nsw.gov.au/pixel.htm>

## 6.0 Existing Environment

### 6.1 Introduction

The field survey was undertaken between 28 April and 3 May 2014, using the methodology outlined in Section 2.0. A total of 53 sites were identified as part of both this survey and the previous 2011 survey undertaken for Eastern Star Gas. A discussion of different site types is provided in Section 6.2 and a breakdown of site types is presented below in Table 3. It is noted that for an assessment of this nature, access was not considered necessary for the privately owned lands in the north western portion of the study area. Therefore, no sites are identified in this area. The location of the items is indicated in Figure 8.

**Table 3 Summary of identified sites**

Site Name	Assessed Significance
Timber Extraction Area 1	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 2	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 3	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 4	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 5	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 6	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 7	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 8	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 9	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 10	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 11	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 12	Local – historical, research, representative
Timber Extraction Area 13	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 14	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 15	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 16	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 17	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 18	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 19	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 20	Local – historical, research, as part of collection of TEAs
Timber Extraction Area 21	Local – historical, research, as part of collection of TEAs
Johnston's 'Albion' Sawmill	Not of heritage significance
Cowallah Parish Plan Sawmill	Local – historical, research,
Cowallah Sites Complex	Local – historical, research,
Hardy's Hut	Local – historical, research
1960s Camp	Not of heritage significance
Logging Camp 1	Local – historical, research, as part of collection of logging camps
Logging Camp 2	Local – historical, research, as part of collection of logging camps

Site Name	Assessed Significance
Logging Camp 3	Local – historical, research, as part of collection of logging camps
Logging Camp 4	Local – historical, research, as part of collection of logging camps
Logging Camp 5	Local – historical, research, as part of collection of logging camps
Logging Camp 6	Local – historical, research, as part of collection of logging camps
Logging Camp 7	Local – historical, research and representative
Timber Loading Ramp 1	Local – historical, research, as part of collection of loading ramps
Timber Loading Ramp 2	Local – historical, research, as part of collection of loading ramps
Timber Loading Ramp 3	Local – historical, research, as part of collection of loading ramps
Timber Loading Ramp 4	Local – historical, research, as part of collection of loading ramps
Timber Loading Ramp 5	Local – historical, research, as part of collection of loading ramps
Timber Loading Ramp 6	Local – historical, research, as part of collection of loading ramps
Timber Loading Ramp 7	Local – historical, research, as part of collection of loading ramps
Timber Loading Ramp 8	Local – historical, research, as part of collection of loading ramps
Timber Loading Ramp 9	Local – historical, research, as part of collection of loading ramps
Logging Track 1	Local – research, in conjunction with other sites
Logging Track 2	Local – research, in conjunction with other sites
Logging Track 3	Local – research, in conjunction with other sites
Logging Track 4	Local – research, in conjunction with other sites
Sydney University Giant Air-shower Recorders	State – social; Local – aesthetic, rare
Stock Loading Facility	Not of heritage significance
Blazed tree 1	Not of heritage significance
Blazed tree 2	Not of heritage significance
Oil Well	Local – historical
Pilliga East Cultural Landscape	Local – historical, research, representative

## 6.2 Site Characterisation

During the fieldwork, it became evident that the type of sites encountered could be characterised into seven types:

1. Timber Extraction Areas (TEA) – a cleared area next to a road or track that contains timber off-cuts and possibly also other artefacts. Typically, the ‘other artefacts’ are predominately kerosene or petrol tins or food tins but can also include glass and ceramic. Timber off-cuts are generally slices that have been sawn off four sides of a log in order to make a square or rectangular piece of timber. The resulting off-cut therefore has a flat side and a convex side. It is to be noted that there may also be a separate cleared area on the opposite side of the road or track that contains no or little wood off-cuts or material culture. As a result, it would appear that the timber processing occurred on one side, with the processed timber being stored on the other side prior to being transported.
2. Sawmill Site – a site with all the characteristics of a TEA but also exhibiting an additional characteristic such as a concrete and/or stone foundation pad or other substantial earthworks. The additional characteristics are considered to be evidence of a more permanent timber processing centre.

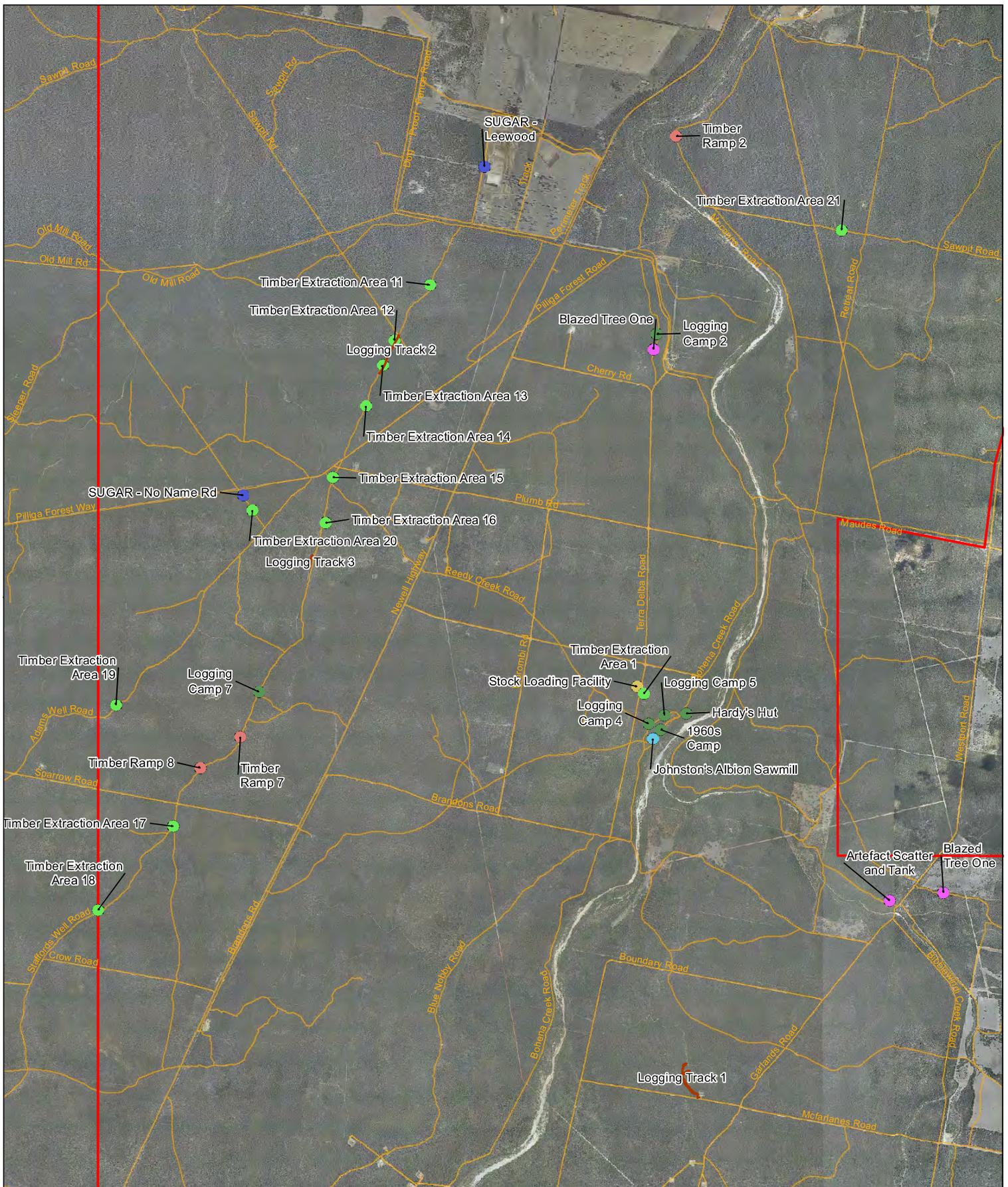
3. Timber Loading Ramps – usually consisting of two standing, living trees that are at least two metres apart behind which two to four large logs have been placed and an earthen ramp created. Such sites are often located at the intersection of two roads.
4. Habitation Site/Logging Camp – an area scattered with artefacts including glass, ceramic, metal and tins. The artefacts indicate that the site has been intensively used for the purposes of preparing and consuming food. There may be other indications of habitation such as introduced plant species or piles of rocks or concrete.
5. Logging Tracks – ephemeral tracks through the forest, often in a straight line. Logging tracks can be of a width suitable for a car or truck or may be narrower, indicative of use by a single horse. It should be noted that the tracks are plentiful. Time constraints did not allow for the mapping of all tracks. Those recorded are of particular note for the particular reason noted in the individual descriptions in Section 6.7.
6. Sydney University Giant Air-shower Recorder pits (SUGAR) – These appear as a cylindrical metal container of a similar diameter to a 44 gallon drum half buried in the ground. The shaft extends approximately 1.5 metres into the ground, before opening out into a reservoir of a larger diameter.
7. Other sites – there are a number of other sites that do not fall into the above categories, including an artefact scatter and tank, stock loading facility, two blazed trees and an oil well.

The following sections describe the sites identified during the field survey. The TEAs and Timber Loading Ramps have been numbered sequentially in the order in which they were identified. The Sawmill Sites and Habitation Sites are identified by the name of the individual thought to have established the site. Logging tracks are identified by the area in which they are located. The sites are indicated in Figure 8a-c.

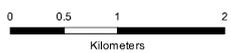
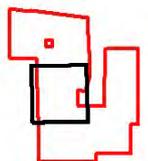
It is evident that the majority of the sites are related to logging activities. As such, their distribution across the State Forest forms a cultural landscape. Following on from the individual discussion of the items, the cultural landscape is described and assessed.

**Table 4 Identified site types**

Site Type	Number
Timber Extraction Areas (TEA)	21
Sawmill Site	2
Timber Loading Ramps	9
Habitation Site	10
Logging Tracks	4
Sydney University Giant Air-shower Recorder pits (SUGAR)	2
Other Sites	5
Cultural Landscape	1



- LEGEND**
- Project area
  - Roads/tracks
  - Historic Heritage Sites
  - Habitation Site
  - Other Site
  - Other Sites
  - Sawmill Site
  - Sydney University Giant Air-Shower Recorder
  - Timber Extraction Area
  - Timber Loading Ramps
  - Logging tracks



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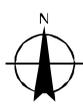
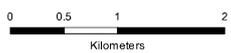
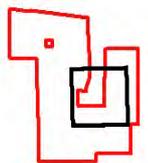
Job Number 21-22463  
Revision A  
Date 12 Mar 2015

Location of Identified Sites (1 of 3)

Figure 8a



- LEGEND**
- Project area
  - Roads/tracks
  - Historic Heritage Sites
  - Habitation Site
  - Other Site
  - Other Sites
  - Sawmill Site
  - Sydney University Giant Air-Shower Recorder
  - Timber Extraction Area
  - Timber Loading Ramps
  - Logging tracks



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Revision | A  
Date | 12 Mar 2015

Location of Identified Sites (2 of 3)

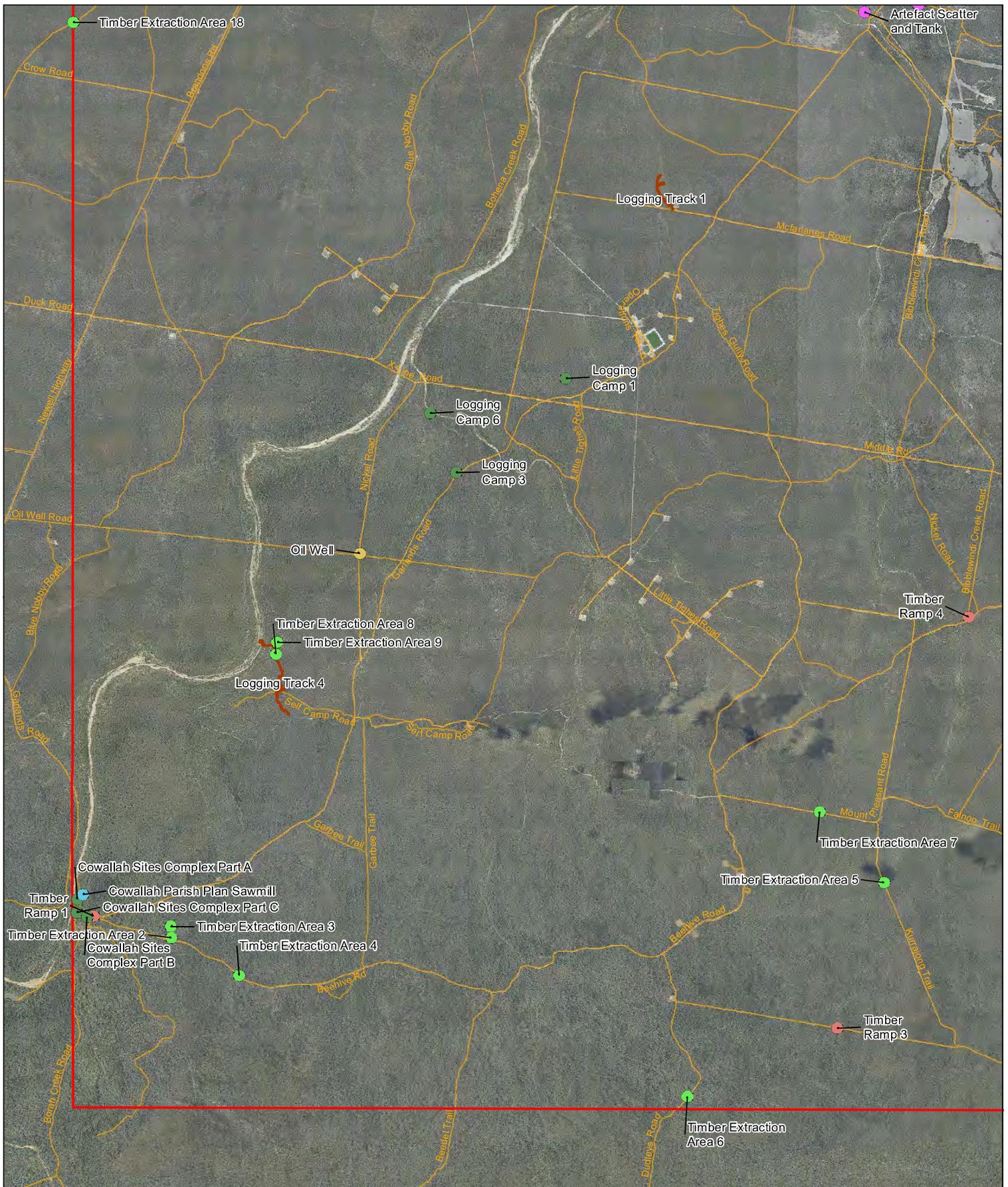
Figure 8b

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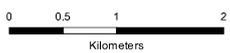
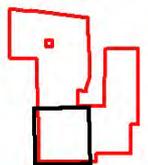
Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

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Data source: NSW Department of Lands: DTDB and DCOB - 2012-13; Santos: Operational and Base Data - 2013. Created by: afody



- LEGEND**
- Project area
  - Roads/tracks
  - Historic Heritage Sites
  - Habitation Site
  - Other Site
  - Other Sites
  - Sawmill Site
  - Sydney University Giant Air-Shower Recorder
  - Timber Extraction Area
  - Timber Loading Ramps
  - Logging tracks



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Revision A  
Date 12 Mar 2015

Location of Identified Sites (3 of 3)

Figure 8c

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Data source: NSW Department of Lands: DTDB and DCOB - 2012-13; Santos: Operational and Base Data - 2013. Created by: afdoy

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## 6.3 Timber Extraction Areas

A total of 20 TEAs were identified during the survey. Each TEA is described below, together with an assessment of significance against NSW heritage criteria (NSW Heritage Office, 2001). The majority of the TEAs are not of local or State significance in their own right. However, as part of a group of such sites, they have the ability to demonstrate the continuity of logging in the eastern Pilliga from the 19<sup>th</sup> century to the present. The TEAs are of historical and technical significance as part of such a group. Several of the more complex TEAs have been singled out as being of individual significance.

### 6.3.1 Timber Extraction Area 1

TEA 1 is located off Terra Delba Road. It consists of a cleared area adjacent to the road, with a scatter of timber off-cuts and tree stumps (refer to Plate 1). No material culture was identified.



Plate 1 Timber Extraction Area 1. View east

### 6.3.2 Timber Extraction Area 2

TEA 2 is located adjacent to the northern side of Beehive Road. While there is a small scatter of timber off-cuts, the main feature of the site is the evidence of the manner in which the timber was processed. Logs of approximately 100 to 150 millimetres in diameter have been quartered and laid in two parallel rows approximately four metres apart (refer to Plate 2). A sawn log with a length of approximately 13 metres is preserved in the northern most row. It would appear that larger logs have been laid across the quartered logs and have been squared off. Irregularly spaced saw marks are evident in the resultant quartered logs (refer to Plate 3). One off-cut and a larger log are still laid across the parallel rows (Plate 2).

Associated with the site is the lid of a 44 gallon drum (Plate 2), a petrol tin (refer to Plate 4) and some heat affected glass, which may have been a bottle.



**Plate 2** Timber Extraction Area 2. View north



**Plate 3** Detail of quartered logs in Timber Extraction Area 2. View west.



**Plate 4** Large felled tree and petrol can within Timber Extraction Area 2. View north east.

### 6.3.3 Timber Extraction Area 3

An area of timber off-cuts associated with TEA 2 (refer to Plate 5).



**Plate 5** Timber Extraction Area 3 - pile of timber off-cuts. View west.

### 6.3.4 Timber Extraction Area 4

TEA 4 is located on the southern side of Beehive Road and consists of a small number of off-cut pieces. Refer to Table 6 for an assessment of significance.

### 6.3.5 Timber Extraction Area 5

TEA 5 is located on both sides of Kurrajong Road. On the western side is a scatter of timber off-cuts, together with three significant piles of off-cuts (refer to Plate 6). The first pile, referred to as Pile 1, is approximately 1.5 metres high and about three metres in length (refer to Plate 7). The two remaining piles, being Piles 2 and 3, are not as high, but spread over a larger area. The cut marks evident on the off-cuts are un-weathered, indicating the site is not that old (refer to Plate 8). Artefacts associated with the site include a petrol can with a plastic handle, an oil or lubricant can and a tuna ring pull can of approximately 70 millimetres in diameter (of the type commonly used to contained tinned fish). On the opposite side of Kurrajong Road is a cleared area. It is considered that the

cleared area was probably used for the storage of processed logs prior to them being transported out of the forest.



**Plate 6** Timber Extraction Area 5 - Overview. View north.



**Plate 7** Timber Extraction Area 5 - detail of Pile 1 of timber off-cuts. View north west



**Plate 8** Timber Extraction Area 5 - detail of saw marks showing fresh timber.

### 6.3.6 Timber Extraction Area 6

TEA 6 is principally expressed as a large clearing on the western side of Dudleys (Baileys) Road (refer to Plate 9). There is also a smaller clearing located on the eastern side of Dudleys Road. There was limited evidence of timber processing, being two timber off-cuts. Both of the offcuts contained reasonably modern nails at either end (refer to Plate 10). There were also two clusters of coarse-grained sandstone stones. The sandstone stones do not occur naturally in the immediate vicinity. It is considered that they may have been brought to the site from Cowallah Creek, the nearest readily available source of such stones. All the stones were of a similar size, ranging from 100 x 100 millimetres to 100 x 200 millimetres. One of the clusters also included a quartz cobble of similar dimensions.

Refer to Table 6 and the associated Statement of Significance for the significance assessment.



**Plate 9** Timber Extraction Area 6 - site overview, note stone clusters. View south east.



**Plate 10** Timber Extraction Area 6 - nails in timber off-cuts.

### **6.3.7 Timber Extraction Area 7**

TEA 7 is located on Mount Pleasant Road (refer to Plate 11). TEA 7 consists of a cleared area that is rectangular in shape. The cleared area is interspersed with a number of timber off-cuts, as well as two petrol cans. Refer to Table 6 and the associated Statement of Significance for the significance assessment.



**Plate 11** Timber Extraction Area 7 - overview. View west.

### **6.3.8 Timber Extraction Area 8**

TEA 8 occurs on an unmarked extension of Self Camp Road that runs from its western mapped extent in a northerly direction and terminates at Bohena Creek. The site extends across both sides of the track. On the western side is evidence of timber processing, with a light scatter of timber off-cuts. There has been re-growth of pines that have subsequently died and collapsed across the site, limiting the legibility of the site. The cleared area on the eastern side does not contain off-cuts. It is considered that it was probably used as a storage area for the processed timber. Material culture was not evident at either site.

TEA 8 is likely associated with the TEA 9 complex described in Section 6.3.9.



Plate 12 Timber Extraction Area 8 - overview of western processing area. View west.

### 6.3.9 Timber Extraction Area 9

The beginning of TEA 9 is located approximately 130 metres north of TEA 8, across an erosion gully. The erosion gully is an unusual feature within the project area. It is submitted that the erosion gully may have resulted from increased traffic through the area due to the logging activities (refer to Plate 13). There is a scatter of timber off-cuts and finished squared timbers between TEA 8 and TEA 9.

TEA 9 consists of three separate, cleared areas. The cleared area closest to TEA 8 contains a small pile of timber off-cuts (in the north-western corner), with a very light scatter of off-cuts surrounding the clearing (refer to Plate 14). Secondary cleared areas are located to the north north-east and south south-east. No off-cuts were identified in either of those areas. The three areas were linked by narrow tracks that are not considered to be wide enough for a vehicle (refer to Plate 15). Other evidence of human activity is indicated by the presence of prickly pear (*Opuntia sp.*) in or adjacent to the clearings. The forest surrounding the area has been visibly cleared, being notably thinner than the broader surrounding area.



Plate 13 Erosion gully between Timber Extraction Area 8 and 9. View south-east.



**Plate 14** Timber Extraction Area 9 - overview of clearing 1. View north.



**Plate 15** Timber Extraction Area 9 - example of tracks between clearings. View north.

### 6.3.10 Timber Extraction Area 10

TEA 10 is a small clearing located on the western side of Jacks Creek Road. The cleared area is scattered with numerous off-cuts and felled, discarded logs. There is also evidence of bark stripping at the site. It is suggested that the activities undertaken at the site are reasonably recent in nature given that the bark has not decomposed.



**Plate 16** Timber Extraction Area 10 - detail of discarded off-cuts and stripped bark. View north-east.

### **6.3.11 Timber Extraction Area 11**

TEA 11 straddles Stafford Well Road. There is minimal evidence that timber processing occurred on the eastern side, with some off-cuts and quartered logs with intermittent saw marks like those described at TEA 2 (refer to Section 6.3.2, Plate 3).

On the western side of Stafford Well Road are the remains of a timber loading ramp (refer to Plate 17). This is one of only two TEAs (the other being TEA 19) that have an associated timber loading ramp. It appears as though the timber loading ramp has been slightly modified and reused as a cycle or motorcycle ramp. There is also evidence of other more recent use of the site, being the selective cutting of trees to create narrow paths. There is a distinct difference between the more recent activity and the diameter of trees selected and saw marks evident on the stumps of trees associated with the logging. While the stumps associated with logging are usually greater than 400 millimetres in diameter and exhibit a rough and highly weathered sawn surface, those associated with the recent activity are less than 200 millimetres in diameter and have a very smooth surface. No material culture was identified in association with the site.



**Plate 17** Timber Extraction Area 11 - Overview of western section of site and ramp. View west.

### 6.3.12 Timber Extraction Area 12

TEA 12 is located approximately 100 metres south of TEA 11 on Stafford Well Road. The concentration of activity was on the western side of the road (as discussed below). However, there is also a small, crescent shaped clearing on the eastern side of the road.

On the western side of Stafford Well Road is a larger, rectangular clearing. There has been some re-growth. Various items were found scattered across the clearing, although there is also a concentration of items in the north-eastern corner, adjacent to the road (refer to Plate 18). Table 5 provides some details and images of items found at the site. An analysis of the artefacts indicates that the site dates to the late 1910s or early 1920s.



**Plate 18** Timber Extraction Area 12 – north-eastern corner of clearing showing scatter of artefacts.

**Table 5 Description of a selection of artefacts from Timber Extraction Area 12.**

Item	Description	Approximate Date Range	Image
Bottle	Green wine-style bottle with the following words embossed in an oval shield 'THIS [BOTTLE REMAINS THE PROPERTY OF/ NSW BOTTLE COMPANY/ ___D/[AUSTRALIA]'.	Post 1916 (Noel Bultin Archives Centre, 2011)	
Lamp Glass	Scalloped rim fragment from a liquid fuel lamp glass	Not applicable	
Solarised amethyst glass bottle	Cylindrical flat-bottomed bottle of approximately 50 millimetres in diameter. Two part mould with separate base plate. Triangle mark on base. Embossed vertical lettering "LIGHT___"	c.1880-c.1920, based on solarisation of glass (Lockhart, 2006).	

Item	Description	Approximate Date Range	Image
Aerated Water Bottle	Early Codd-style aerated drink bottle, with four dimples. Body and base and shoulder in separate, conjoining fragments. Body has vertical embossed lettering "S. FAULKNER/NARRABRI". Two piece mould with separate base plate.	Post 1885, bottle type phased out 1920-1935 (Boow, 1992). S Faulkner established his factory in 1891.	
Ceramic	Green under-glaze transfer printed foliage design on an earthenware plate marley <sup>1</sup> fragment.	Not applicable.	
Kerosene tins	At least two rectangular kerosene tins. One has been cut in half horizontally.	Kerosene was sold in tins from 1865 (Busch, 1981).	

<sup>1</sup> Marley – the flat section of a plate between the rim and where it dips towards the base of the plate.

Item	Description	Approximate Date Range	Image
Food tins	More than 16 cans of various sizes.	Folded seams indicate an approximate date of 1920s (Busch, 1981)	

**6.3.13 Timber Extraction Area 13**

TEA 13 is located on the east side of Stafford Well Road, with an associated small clearing on the western side. The site consists of a small pile of timber off-cuts and two food tins (Plate 19). There is also a track running parallel with Stafford Well Road (refer Plate 20). The metal track marks made by the machine (presumably a bulldozer) are still evident. The track impacts on the eastern edge of the site, suggesting the site pre-dates the 2009 thinning (which the metal track marks are associated with). The date of the thinning is established by Forests NSW signs in the area that state “2009 Thinning”.



**Plate 19 Timber Extraction Area 13 - overview. View west.**



**Plate 20** Bulldozer track parallel to Stafford Well Road. View south.

#### **6.3.14 Timber Extraction Area 14**

A small number of timber off-cuts located on the eastern side of Stafford Well Road (refer to Plate 21). No other material culture is evident. As with TEA 13, the site has been impacted by later logging activities.



**Plate 21** Timber Extraction Area 14 - overview. View east.

#### **6.3.15 Timber Extraction Area 15**

Similar to TEA 13 and TEA 14, TEA 15 is located on the eastern side of Stafford Well Road. TEA 15 consists of a small number of timber off-cuts in a clearing. TEA 15 has been heavily impacted by activities associated with the 2009 thinning. A bulldozer has pushed over a tree, which has fallen across the site (refer to Plate 22).



Plate 22 Timber Extraction Area 15 - overview. View south west.

### 6.3.16 Timber Extraction Area 16

Located at the southern end of Stafford Well Road, TEA 16 is a modern site, probably associated with the 2009 thinning. There are large piles of timber-offcuts with bark still attached (refer to Plate 23). This is not evident in the earlier sites (i.e. presumably the bark from the earlier logging activities has decomposed or was used as fuel for cooking and heating fires). The site is scattered with modern oil and petrol cans and machine tracks (presumably a bulldozer) are evident across the site.



Plate 23 Timber Extraction Area 16 - overview. View north-west.

### 6.3.17 Timber Extraction Area 17

Following the pattern of TEA 13 to 15, TEA 17 is located on the eastern side of Stafford Well Road. The site contains a few scattered timber off-cuts and food tins.

However, the main feature of the site is a metal wood fuelled stove with embossed lettering “METTERS NEW ROYAL No. 3” (refer to Plate 24). Metters was a popular Australian brand of wood fuelled stove. It is noted that the Metters Company began operation in 1891 and were bought by Email Ltd in 1974 (Gibberd, 2005). A precise date for the production of the ‘New Royal No. 3’ has not been found. However, research has revealed that

second-hand examples were being advertised in newspapers from 1916. The No. 3 does not appear to have been as popular as the No. 1 and No. 2 – this may have been a price difference as the No. 3 appears to have a more ornate face, probably attracting a higher price tag.

A second item appears to be a fuel tank, probably from a kerosene fridge (refer to Plate 25). Kerosene refrigeration did not enter commercial production until the mid-1920s. It is postulated that these items were left by a persons engaged in logging activities in the area on leaving the forest or when the stove and fridge had ceased to function. The site provides an interesting insight into the material culture brought to the forest and cautions against archaeological assumptions around limited availability and paucity of artefactual material that may be present at such sites.

The site has evidently been visited in the more recent times, as evidence by the scattering of modern 'Four X' beer cans.



**Plate 24** Timber Extraction Area 17 - Metters New Royal No. 3 Stove. Detail



**Plate 25** Timber Extraction Area 17 - Kerosene fridge fuel tank. Detail

### 6.3.18 Timber Extraction Area 18

TEA 18 is a small site, consists of a limited number of timber off-cuts and a completed, formed timber beam (refer to Plate 26).



Plate 26 Timber Extraction Area 18 - formed timber beam. View south east.

### 6.3.19 Timber Extraction Area 19

TEA 19 is most likely associated with the 2009 thinning works and associated logging. The area has been identified by signposts erected by Forests NSW as having been thinned in that year. The site is of a scale not seen at other sites. An area of approximately 30 by 10 metres is covered in stripped bark (refer to Plate 27). A nearby clearing of 20 by 80 metres is ringed with piles of timber off-cuts (refer to Plate 28). A scatter of artefacts, including plastic engine oil containers, plastic drink bottles, safety boots and fabric scraps, is consistent with the recent past, confirming the site is most likely associated with the 2009 thinning. Associated with the site is a timber loading ramp (refer to Plate 29). The timber loading ramp appears to have been deliberately damaged, probably when the site was abandoned. The incorporation of a timber loading ramp within a TEA site is reasonably unique. The survey identified only one another TEA (being TEA 11) with an associated loading ramp.



Plate 27 Timber Extraction Area 19 - Stripped bark pile. View south-west.



Plate 28 Timber Extraction Area 19 - Timber off-cuts pile. View south-west.



Plate 29 Timber Extraction Area 19 - Timber loading ramp. View south-west.

### 6.3.20 Timber Extraction Area 20

The artefacts associated with TEA 20 indicate it was probably created in the 1980s. The body of a chainsaw (refer to Plate 30) and a clear 375 ml glass soft-drink bottle are indicative of that decade. The site is scattered with timber off-cuts and stripped bark (refer to Plate 31).



Plate 30 Timber Extraction Area 20 - Chainsaw body.



Plate 31 Timber Extraction Area 20 - Site overview. View south.

### 6.3.21 Timber Extraction Area 21

TEA 21 is located near the intersection of Saw Pit Road and Sawpit Creek. TEA 21 contains timber off-cuts of approximately 1.5 metres in length and up to 50 millimetres thick. The offcut material is jumbled and may have been impacted by flooding events from Sawpit Creek.



Plate 32 Timber Extraction Area 21 - Site overview. View west.

### 6.3.22 Significance assessment

With the exception of TEA 12, none of the TEAs described above is of State or local significance. However, as a group of similar sites, they meet the criteria for historical and research significance, as assessed in Table 6. TEA 12 is of heritage significance in its own right and is assessed separately in Table 7, although it also contributes to the group of TEAs as well. Each of the tables assessing the significance of the TEAs against NSW significance criteria is followed by a Statement of Significance, as required by the heritage guidelines (NSW Heritage Office, 2001).

**Table 6 Timber Extraction Areas – application of heritage significance criteria.**

APPLICATION OF CRITERIA	
Historical significance NSW criteria (a)	The collection of TEAs is of local historical significance. The collection demonstrates the continuity of logging in the Pilliga from the late 19 <sup>th</sup> century to the present. It shows the change in the methods and scale of logging across the timeframe. Additionally, it can demonstrate the differential targeting of particular areas of the Pilliga during different time periods.
Historical association significance NSW criteria (b)	The collection of TEAs is not of historical associative significance on a state or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance NSW criteria (c)	The collection of TEAs is not of aesthetic significance on a state or local level as it does not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance NSW criteria (d)	The collection of TEAs is not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance NSW criteria (e)	In association with the other TEAs, the location of the TEA has the potential to provide information regarding the manner in which logging of the forest was undertaken from the late 19 <sup>th</sup> to the present and how the industry has progressed over this period, which is significant at a local level. Spatial mapping of these sites, with an approximate date, may provide insight into whether particular areas were targeted during particular periods and how this varied over time with the introduction of new technology and improved transportation from the Pilliga.
Rarity NSW criteria (f)	The collection of TEAs does not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion.
Representativeness NSW criteria (g)	The collection of TEAs is not of representativeness significance as it does not demonstrate the principal characteristics of a class of state or local places or environments.

**Statement of Significance:** In isolation, no single timber extraction area is of State or local significance. However, as part of a collection of similar sites, they are of local historical and technical significance. The collection of TEAs demonstrates the pattern of logging in the eastern Pilliga from the late 19<sup>th</sup> century to the present and also shows the continuity of logging processes. The spatial mapping of the sites has the potential to provide insight into what areas were targeted during particular periods and how this varied over time, such as due to the introduction of new technology and improved transportation from the Pilliga.

Table 7 Timber Extraction Area 12 – application of heritage significance criteria.

APPLICATION OF CRITERIA	
Historical significance NSW criteria (a)	TEA 12 is of local historical significance. It demonstrates the continuity of logging in the Pilliga from the late 19 <sup>th</sup> century to the present. As one of a number of sites, it can show the change in the methods and scale of logging across the timeframe. Additionally, it can demonstrate the differential targeting of particular areas of the Pilliga during different time periods. As part of a collection of sites that spans the period of European exploitation, the TEA 12 can demonstrate the course of logging history. TEA 12 is in contrast to the larger-scale operation evident at the Cowallah Sites Complex and comparable to the c.1960s Loggers Camp.
Historical association significance NSW criteria (b)	This item is not of historical association significance on a state or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance NSW criteria (c)	This item is not of aesthetic significance on a state or local level as it does not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance NSW criteria (d)	This item is not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance NSW criteria (e)	The material culture associated with the site has the ability to elucidate questions relating to life in the logging camps of Pilliga forest during the 1910-1920s period. In association with other TEAs, the location of the TEA has the potential to provide information regarding the manner in which logging of the forest was undertaken from the late 19 <sup>th</sup> to the present and how the industry has progressed over this period, which is significant at a local level. Spatial mapping of the sites, with an approximate date, may provide insight into whether particular areas were targeted during particular periods and how the process varied over time with the introduction of new technology and improved transportation from the Pilliga.
Rarity NSW criteria (f)	This item does not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion.
Representativeness NSW criteria (g)	This item is local representative significance as it demonstrates the principal characteristics of a transient logging camp in the Pilliga forest. The collection of kerosene tins, food cans, glass and ceramics in association with the timber off-cuts are indicative of the material culture used at the site and the types of activities undertaken at this and numerous similar sites throughout the region.

**Statement of Significance:** TEA 12 is of local significance as it meets the threshold for the historical, research and representative criteria. It is representative of a transient logging camp in the Pilliga forest as it demonstrates the principal characteristics. That is, it provides evidence of logging activities together with material culture relating to daily life. With regard to its research significance, the artefacts associated with the site have the ability to provide an insight into daily life in a logging camp and access to goods.

The historical significance of TEA 12 is as part of a larger collection of TEAs that can demonstrate the pattern of logging in the eastern Pilliga from the late 19<sup>th</sup> century to the present. The collection of TEAs also shows the continuity of this process. The spatial mapping of the sites has the potential to provide insight into what areas were targeted during particular periods and how this varied over time with the introduction of new technology and improved transportation from the Pilliga. TEA 12 is of particular importance in this regard as the associated material culture enables a decade to be associated with the logging activities.

As part of a collection of sites that spans the period of European exploitation of the region for timber, the TEA 12 can demonstrate the course of domestic occupation of the Pilliga in association with the logging industry. TEA 12 is in contrast to the larger-scale operation evident at the Cowallah Sites Complex (c.1898) and is comparable to the Loggers Camp (c.1960s).

## 6.4 Sawmill Sites

Two sawmill sites were identified within the study area. Both of the sawmill sites were identified on parish plans (refer to Section 5.0). The first is identified as 'Johnston's Albion Sawmill' and the second as simply 'Sawmill'. The remaining physical evidence of each is discussed below.

### 6.4.1 Johnston's Albion Sawmill

Johnston's Albion Sawmill is depicted on the Brigalow parish map as being located on the western side of Bohena Creek, just to the north of its intersection with Bibblewindi Creek. The location of the former sawmill has been heavily impacted by later use and modification. There has been the removal of a substantial amount of material from the area, possibly for use in road building activities. The resultant embankments have been used by trail-bike riders and as protection by campers (refer to Section 6.5.10). The aforementioned activities have severely impacted the visibility and preservation of the Johnston's Albion Sawmill site.

An intensive survey of the area identified a partial concrete foundation (refer Plate 33). The remains were out of context, appearing to have been moved by a grader or bulldozer and are currently located within a depression. The concrete foundation has been damaged, making its original size and shape difficult to determine. However, it may have been U-shaped. As the edges are roughly formed, it appears that the concrete was originally poured into a foundation pit dug into the ground. The extant foundation has been broken into two sections, the larger being approximately 2.5 x 1 metres and having numerous inclusions of local rock. The depth of the foundation was not able to be determined as it was partially buried. A metal bar protrudes from the concrete and was probably used to mount a piece of machinery.

The smaller section is a roughly rectangular block of approximately 300 x 500 x 100 millimetres. The edges of that section appear to have been more carefully formed than that of the larger section (refer to Plate 34). There are two depressions in the visible surface that appear to have formerly held an attachment of some sort, probably similar to the metal mounting bar evident in the larger section.

The surrounding area is scattered with material from the 1960s to the present. However, no material culture of the Johnston's Albion Sawmill period (1890s) was found. Table 8 assesses the heritage significance of the site.



Plate 33 Johnston's Albion Sawmill - Site overview. View east.



**Plate 34** Johnston's Albion Sawmill - Detail of second foundation section.

**Table 8** Johnston's Albion Sawmill – application of heritage significance criteria.

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	This item is not of historical significance at a local or state level as it does not demonstrate the pattern or course of NSW or local history.
Historical association significance SHR criteria (b)	This item is not of historical association significance on a state or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	This item is not of aesthetic significance on a state or local level as it does not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	This item is not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance SHR criteria (e)	This item is not of local research significance. The site has been disturbed to the extent that it is considered unlikely to yield further archaeological information.
Rarity SHR criteria (f)	This item does not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion.
Representativeness SHR criteria (g)	This item is not of representativeness significance as it does not demonstrate the principal characteristics of a class of state or local places or environments.

**Statement of Significance:** The Johnston's Albion Sawmill site is of not of State or local significance. The disturbance of the site by later activities has removed its ability to contribute to an understanding of forestry activities in the Pilliga.

#### 6.4.2 Cowallah Parish Map Sawmill

The Sawmill identified on the Cowallah parish map of 1898. The recording of the Sawmill followed on from the depiction of two huts, garden and yard in a similar location on the 1883 version of the map. It seems logical that the larger sawmill enterprise grew out of the earlier recorded smaller settlement. The survey of the area identified areas of habitation and areas with a greater industrial focus, based on the associated material culture. While it is evident the habitation and industrial areas are linked, the habitation areas are discussed in Section 6.5.1.

The sawmilling area is located to the east of Bohena Creek and to the north of Garlands Road. The sawmilling area presents as a rectangular cleared area, which is approximately 20 metres wide and approximately 140 metres in length. The cleared area is oriented roughly north-south along Garlands Road. The survey discovered a scattering of material culture throughout the clearing, being more concentrated in the south and becoming lesser towards the northern portion. The northern extent of the site is devoid of material. This, together with the compacted nature of the ground, suggests the area was used either as a yard for livestock or as a storage area for processed timber.

A stone foundation was located in an approximately central alignment along the length of the site. The foundation was similar to that identified at Johnston's Albion Sawmill. Unlike the latter example, the stone foundation has been subject to fewer disturbances, although there has been some degradation along the western edge. Dressed local stone has been arranged in an 'L' shape and the void filled with smaller, undressed stones and compacted earth. The entire foundation is approximately 1.2 metres square. Associated with the foundation are a metal box and a broken concrete object that resembles a drain. A second similar object was located to the east, in association with a depression (refer 'Concrete Drain' in Table 9).

A scatter of concrete fragments occurs along a 15 metre section of Garlands Road, between the sawmill and Part A of the Cowallah habitation site. The concrete appears to have been poured into an *in situ* mould. It has been made with a coarse-grained sand with a high quartz component, which has similar characteristics to the sands of Bohena Creek. The location of the concrete within the road and associated grader mounds suggests part of the site may have been damaged by the construction of Garlands Road. As well as the concrete, there is a scatter of artefacts along Garlands Road between Part A and a point opposite the sandstone foundation.

The artefacts associated with the site are outlined in Table 9. None of the items provide a specific date for the occupation of the Sawmill site. However, the material culture appears to indicate the site may still have been in use during the 1920s.

**Table 9 Description of a selection of artefacts from the Sawmill.**

Item	Description	Approximate Date Range	Image
Vehicle part	Part of a vehicle chassis.	Extent of remains do not allow for an approximate date.	
Fry pan	Corroded fry pan	Item not diagnostic for dating purposes.	
Billy can	Corroded billy can	Item not diagnostic for dating purposes.	
Earthenware fragments	Fragments, probably from the same item, of unrefined earthenware (possibly from straight sided mixing/storage-style vessel). No decorative elements evident.	Item not diagnostic for dating purposes.	

Item	Description	Approximate Date Range	Image
Kerosene Can	Kerosene tin with an embossed 'spider web' design on base.	Research has not been able to determine a date for this item.	
Enamel Cup	An enamel cup with wire around the rim to create a handle.	Item not diagnostic for dating purposes.	
Concrete drain	Concrete formed item, possibly used for water management.	Item not diagnostic for dating purposes.	
Bottle	Brown glass bottle with applied finish with blown off top	Post 1860s (Boow, 1992).	

Item	Description	Approximate Date Range	Image
Bottle	Base, heel and body of brown glass bottle with embossed lettering around heel: "THE PROPERTY OF FEDERAL DISTILLARIES PTY LTD MELBOURNE"	1888-1924	
Tins	Three metal tins with plug top lids.	Item not diagnostic for dating purposes.	
Tin Can	Fragment of tin can with rolled/folded seams.	Folded seams indicate an approximate date of 1920s (Busch, 1981).	
Kerosene Can	Kerosene tin with embossed lettering "___ UNION/OIL/CO. LTD." The tin has been cut in half.	No specific date could be identified.	

**Table 10** Sawmill – application of heritage significance criteria.

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	This item is local of historical significance as it demonstrates the exploitation of the Pilliga forest for logging purposes. The site is indicative of the larger scale operators who working in the forest, in contrast to the smaller teams evident at sites such as TEA 12.
Historical association significance SHR criteria (b)	This item is not of historical association significance on a state or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	This item is not of aesthetic significance on a state or local level as it does not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	This item is not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance SHR criteria (e)	This item is of local research significance. Closer examination of the site may provide an indication of the extent of the sawmill operation and the infrastructure associated with it. In association with the Cowallah Sites Complex, it has the potential to yield significant new information regarding sawmilling in the Pilliga forest.
Rarity SHR criteria (f)	This item is potentially rare within the Eastern Pilliga. The survey did not identify a similar site that was as well preserved. Sawmilling sites were identified in the <i>Brigalow Belt Stage 2 Non-Indigenous Cultural Heritage Study</i> (Curby and Humphries, 2002), however the details included are insufficient to make a comparison and identify the rarity of the Sawmill site within the broader region.
Representativeness SHR criteria (g)	This item is not of representativeness significance as it does not demonstrate the principal characteristics of a class of state or local places or environments.

**Statement of Significance:** The Sawmill site is of local historical and technical significance. Historically, it demonstrates the utilisation of the Pilliga forest for logging purposes. The site is indicative of the larger scale operators who worked in the forest, in contrast to the smaller logging teams evident at sites such as TEA 12. The site has the potential to yield significant new information not available from other sources regarding the extent of the operations at the site.

## 6.5 Habitation and camping sites

The following section describes the habitation and camping sites identified during the 2011 and 2014 fieldwork. The significance assessments for Logging Camp 1 to 6 are provided following the description of Logging Camp 6 in Section 6.5.9. All other sites are assessed separately, with the significance assessment following the description of the site.

### 6.5.1 Cowallah Habitation Complex

Associated with the Sawmill (refer to Section 6.4.2) are three distinct areas that are indicative of habitation. However, those sites could not be directly correlated with the items marked on the 1883 Cowallah parish map ('hut and garden', 'hut' and 'house and yard') with any level of confidence. The areas are discussed below as Part A, B and C. However, Part A is likely to have been the 'hut and garden' and Part B the 'house and yard'. No archaeological evidence was found in the area marked as 'hut'. Part C contains two rubbish pits with no evidence of an associated structure. The parish map did not indicate a feature in the vicinity of Part C.

#### 6.5.1.1 Part A

Part A is a cleared area on the bank of Bohena Creek, being located to the north of Garlands Road (refer to Plate 35). The cleared area measures approximately 25 metres east-west and 55 metres north-south. The site has been used in more recent years by campers – as evidenced by camp fire sites, modern bottles and cans imposed on top of the site.

The historic elements of the site are a depression of approximately three by two metres, with a mound of sandstone stones, some of which have been dressed (refer to Plate 36). There is sufficient material to have formed a small fireplace. Associated with the depression and sandstone mound are some flat metal panels with attached flanges (refer to Plate 37). The flat metal panels may have been from an oven similar to that found at TEA 17 (refer to Plate 24). Fragments of heat affected blue and clear glass were also identified adjacent to the mound.

There are a limited number of artefacts visible on the surface, approximately 10 metres north of the mound. Artefacts included a small fragment of fine-grained refined earthenware from a tea cup or saucer, an unrefined earthenware fragment with two underglaze blue rim bands, a tea cup fragment of unrefined earthenware with no decoration and fragments of amethyst glass.



**Plate 35** Cowallah Habitation Site Part A - overview of site. View west.



**Plate 36** Cowallah Habitation Site Part A - sandstone mound.



Plate 37 Cowallah Habitation Site Part A - possible oven pieces.

#### 6.5.1.2 Part B

Part B of the site has a number of components, being two stone mounds with associated artefact scatter, non-indigenous plantings and a depression that has been interpreted as a well (refer to Plate 38). Each of the components is discussed separately below.

##### Stone Mounds

The first stone mound is located to the east of the largest oleander trees (see further below and Plate 44). The stone mound is approximately one metre wide and 2.5 metres long. There is no apparent order to the stones but they may have once formed a fireplace (refer to Plate 39). The second mound is a smaller scatter and located approximately 10 metres north of the first mound. It is considered insufficient to have been a fireplace. The purpose of the stones is unclear. The artefacts associated with that area indicate that it may have been a workshop, as the items are mechanical and industrial in nature (refer to Plate 40, Plate 41).

Scattered between the two areas are numerous glass, ceramic and metal artefacts. The glass fragments contained a range of colours and shapes; indicative of the period prior to 1930s (refer to Plate 42). The ceramic is largely unrefined earthenware with no decoration, the exception being one fragment with a blue underglaze transfer pattern and a second with a blue underglaze transfer with gilt hand-painted edge band (refer to Plate 43).

Notwithstanding this, there is only one fragment that is diagnostic for dating purposes – a base of a cobalt blue glass bottle with an embossed mark of one triangle inside another. The mark (logo) was used by Vick Chemical Company, makers of Vicks VapoRub, originally Vicks Magic Salve and Vicks Croup and Pneumonia Salve. The products were produced in Greensboro, America, from 1898. However, the Vick Chemical Company was not formed until 1911. It is probable the bottle dates to the 1920s, when Vicks VapoRub, as it had become known, was aggressively marketed overseas (Louis Round Wilson Special Collections Library, 2006). By the 1930s or 1940s the words 'Vicks VapoRub' were embossed on the base of bottles.

##### Non-Indigenous Plantings

The non-indigenous (or introduced) plants encountered at the site include two large oleander (*Nerium oleander*), one being over five metres in height (refer to Plate 44). In close proximity are two smaller oleanders, which may not have been original but spread from the larger plants. Oleanders are popular garden plants, but are highly poisonous and have no culinary or medicinal applications. The flowers were all of the same colour, being a dark pink (refer to Plate 45). A single hawthorn bush (*Crataegus sp.*) was located near the oleander but was not in flower or fruit during the survey (refer to Plate 46). Hawthorn does have medicinal applications as a digestive aid and the fruit can be used in preserves. They are common in colonial gardens. The final identified introduced plant was a peppercorn tree (*Schinus sp.*, possibly *areira*). Peppercorn trees too, are very commonly associated with colonial and early Federation Australian sites. It was believed they acted as a deterrent to flies. The specimen was in very poor condition (refer to Plate 47).



**Plate 38** Cowallah Habitation Site Part B - Overview. View north-west.



**Plate 39** Cowallah Habitation Site Part B – overview of first sandstone mound. View south-east.

<p><b>Plate 40</b> Cowallah Habitation Site Part B – batteries from workshop area.</p>	<p><b>Plate 41</b> Cowallah Habitation Site Part B – sample of metal from workshop area.</p>
<p><b>Plate 42</b> Cowallah Habitation Site Part B – sample of glass.</p>	<p><b>Plate 43</b> Cowallah Habitation Site Part B – sample of ceramic.</p>
<p><b>Plate 44</b> Cowallah Habitation Site Part B – large oleander. View north-west.</p>	<p><b>Plate 45</b> Cowallah Habitation Site Part B – detail of oleander flowers.</p>

	
<p><b>Plate 46</b> Cowallah Habitation Site Part B – hawthorn. View north-west.</p>	<p><b>Plate 47</b> Cowallah Habitation Site Part B – peppercorn tree. View west.</p>

**Depression (Well)**

The depression, interpreted as a well, is approximately two metres square and 1.5 metres deep (refer to Plate 48). The original shape appears to have been a formed square, although parts of the walls have collapsed. A log in the southern wall appears to have been part of a support structure. Associated with the depression were pieces from a corrugated iron tank. This, together with the log wall supports, has led to the interpretation of the feature as a well. The feature is located sufficiently close (within 100 m) of Bohena Creek that it is likely that the well would not have had to be too deep to reach water. However, the depression is sufficiently removed from the creek such that a person would not have wanted to cart water. Other artefacts identified in the vicinity of the feature are the lid of a cast iron cooking pot, metal fixture from a kerosene lamp and a section of metal pipe with a decorative joiner.



**Plate 48** Cowallah Habitation Site Part B - well depression. View south-east.

**6.5.1.3 Part C**

Part C sits within the triangle of roads formed by Garlands, Beehive and Creighs Roads. It presents as two depressions with a dense artefact scatter in and between the depressions. The holes have been interpreted as the rubbish dump for the Cowallah Habitation Complex. The range and extent of the artefacts visible on the surface is indicative of a well-preserved and extensive archaeological rubbish dump. The volume of material indicates the Cowallah Habitation Complex and Cowallah Parish Map sawmill may have been occupied by a large number of people or over an extended period of time. Whilst Table 11 includes a selection of some of the artefacts, the site also included fragments of large stoneware storage vessels and ginger beer-style bottles and brown glass tonic bottles. Interestingly, the majority of the ceramic was undecorated or moulded, which is unusual in the Australian context (Brooks, 1999). The material is generally indicative of the decades between 1890s and the 1920s.

**Table 11 Description of a selection of artefacts from Cowallah Habitation Complex Part C.**

Item	Description	Approximate Date Range	Image
Earthenware	Unrefined earthenware plate fragments with moulded lily-of-the-valley floral motif on rim. Makers mark: "ROYAL STONE CHINA/JOHN H DAVIS/HANLEY"	Davis was in operation between 1875 and 1891 (thepotteries.org, 2014).	
Cast Iron Pots	Fragments of cast iron pots and lid.	Not diagnostic for dating purposes.	
Case gin style bottle	Base from a case gin style bottle featuring an embossed star.	Not diagnostic for dating purposes.	

Item	Description	Approximate Date Range	Image
Earthenware	Selection of unrefined earthenware. Left to right: blue hand-painted rim band fragment; red and blue cut-sponge decorated fragment; green under-glaze transfer printed fragment.	Period of greatest popularity between 1840 and 1870. In mass production into the 1930s (Miller, 1991).	
Amethyst Glass	Two fragments from different decorative pressed glass vessels. Left to Right: hexagonal hobnail and waffle pattern; simple hobnail pattern.	c.1880-c.1920, based on solarisation of glass (Lockhart, 2006).	

Table 12 assesses the heritage significance of the Cowallah Habitation Complex as a whole.

**Table 12 Cowallah Habitation Complex – application of heritage significance criteria.**

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	In association with the other logger's camps in the Pilliga forest, the Cowallah Habitation Complex is of local historical significance. As part of a collection of sites that spans the period of European logging activities, the Cowallah Habitation Complex can demonstrate the course of domestic occupation of the forest in association with its logging history. The Loggers Camp is in contrast to the small-scale operation evident at the c.1920s TEA 12 site and the 1960s Loggers Camp.
Historical association significance SHR criteria (b)	This item is not of historical association significance on a state or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	This item is not of aesthetic significance on a state or local level as it does not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	This item is not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance SHR criteria (e)	This item is of local research significance. Detailed mapping and archaeological investigation of the complex has the potential to yield significant new information, that is not available from other sources, regarding sawmill life in the Pilliga from the 1890s through to approximately the 1920s. The Part C dump in particular has the potential to yield information regarding domestic life, camp arrangements and access to goods and services.

APPLICATION OF CRITERIA	
Rarity SHR criteria (f)	This complex is potentially rare within the Eastern Pilliga. The survey did not identify a similar site that was as well preserved. Sawmilling sites were identified in the <i>Brigalow Belt Stage 2 Non-Indigenous Cultural Heritage Study</i> (Curby and Humphries, 2002), however the details included are insufficient to make a comparison and identify the rarity of the Sawmill site within the broader region.
Representativeness SHR criteria (g)	This item is of local representative significance, demonstrating the principal characteristics of habitation sites associated with a sawmilling operation.

**Statement of Significance:** The Cowallah Habitation Complex is of local historical, research and representative significance. In association with the other logger’s camps in the Pilliga forest, the Cowallah Habitation Complex is of local historical significance. As part of a collection of sites that spans part of the period of European settlement, the Cowallah Habitation Complex can demonstrate the course of domestic occupation of the forest in association with its logging history. The Loggers Camp is in contrast to the small-scale operation evident at the c.1920s TEA 12 site and the 1960s Loggers Camp.

Detailed mapping and archaeological investigation of the complex has the potential to yield significant new information, that is not available from other sources, regarding sawmill life in the Pilliga from the 1890s through to approximately the 1920s. The Part C dump in particular has the potential to yield information regarding domestic life, camp arrangements and access to goods and services. The Complex is representative of large habitation sites in the Pilliga forest occupied between the 1890s and the 1920s.

**6.5.2 Hardy’s Hut**

A large stand of *Aloe sp.* plants was identified in the area between Bohena Creek Road and Bohena Creek. A large permanent billabong is present immediately to the west of the stand of Aloe plants. The Aloe plants are located in the vicinity of where the Crowie parish plan of 1883 places Hardy’s Hut (refer to Figure 4). A number of glass and metal artefacts were identified near the vicinity of the stand of Aloe plants during the 2011 survey. However, the previously identified artefacts could not be located during the 2014 survey. No indication of the fences indicated on the Crowie parish plan could be located.



**Plate 49 Hardy’s Hut - Overview of Aloes. View north-east.**

Table 13 Hardy's Hut – application of heritage significance criteria.

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	The item is not of historical significance at a local or state level as it does not demonstrate the pattern or course of NSW or local history.
Historical association significance SHR criteria (b)	The item is not of historical associative significance on a state or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	The item is not of aesthetic significance on a state or local level as it does not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	The item is not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance SHR criteria (e)	Archaeological investigation of the area thought to have been the location of Hardy's Hut may provide insight in to some of the earliest European occupiers of the Pilliga Forest. Hardy's occupation was different from that of the loggers, as the parish plan suggests Hardy was attempting to farm the land. Evidence of attempts to farm the Pilliga is not available from other sources and is of significance to the historical understanding of the local area.
Rarity SHR criteria (f)	The item does not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion.
Representativeness SHR criteria (g)	The item is not of representativeness significance as it does not demonstrate the principal characteristics of a class of state or local places or environments.

**Statement of Significance:** The site of Hardy's Hut is of research significance at a local level. Archaeological investigation of the area thought to have been the location of Hardy's Hut may provide insight in to some of the earliest European occupiers of the Pilliga Forest. Hardy's occupation was different from that of the loggers. As the Crowie parish map suggests, Hardy was attempting to farm the land. Evidence of attempts to farm the Pilliga is not available from other sources and is of significance to the historical understanding of the local area.

### 6.5.3 1960s Camp

The 1960s camp is located in the embankment adjacent to Johnston's Albion Sawmill. Based on the stratigraphic evidence visible during the site inspection, it appears as though a car has been dumped during the use of the camp and this has later been impacted by the removal of earth from the area discussed in Section 6.4.1. Evidence of a small campfire is located beside the remains of the car, together with a ladies vinyl purse, brown glass beer bottles, metal cans and tins and glass soft-drink bottles (refer to Plate 50). The soft drink bottles represent local companies, being Septimus Faulkner of Narrabri (refer to Plate 51) and E. Thomas Pty Ltd of Inverell (refer to Plate 52). Faulkner established his factory in 1891 and it was closed in 1980. The style of the printing is indicative of the 1960s.



Plate 50 1960s Camp. Overview. View north.

A photograph of a rusted glass bottle lying on the ground. The bottle has a label with the word 'FAULKNER'S' in large blue letters, 'QUALITY' below it, and 'SERVE IT YOUR WAY' at the bottom. A checkered scale bar is placed to the right of the bottle for size reference.	A photograph of a rusted metal bottle lying on the ground. The bottle has a label with the word 'SNOW' in a stylized font and 'E. THOMAS PTY LTD' below it. A checkered scale bar is placed to the right of the bottle for size reference.
<p>Plate 51 1960s camp site – Faulkners Bottle.</p>	<p>Plate 52 1960s camp site – E. Thomas Pty Ltd Bottle.</p>

Table 14 1960s camp – application of heritage significance criteria.

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	This item is not of historical significance at a local or state level as it does not demonstrate the pattern or course of NSW or local history.
Historical association significance SHR criteria (b)	This item is not of historical association significance on a state or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	This item is not of aesthetic significance on a state or local level as it does not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	This item is not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance SHR criteria (e)	This item is not of technical significance as it does not have the ability to yield information that is significant to an understanding of NSW or local history.
Rarity SHR criteria (f)	This item does not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion.
Representativeness SHR criteria (g)	This item is not of representativeness significance as it does not demonstrate the principal characteristics of a class of state or local places or environments.

**Statement of Significance:** The 1960s camp is not of State or local significance under any of the seven criteria.

#### 6.5.4 Logging Camp 1

Logging Camp 1 comprises a semi-cleared area scattered with worked timber and some tins. The Camp is located on the western side of Garlands Road, between Tighes Gully and Boundary Roads. The material covers an area of approximately 20 metres by 20 metres. The material includes nine off-cut sections of timber and seven rectangular slabs that are representative of house cladding. Two tins were identified within the vicinity, being a kerosene tin (20x18x16 cm in size) and a cylindrical tin of 11x7cm (of the type commonly used to contain Tuna).

#### 6.5.5 Logging Camp 2

Logging Camp 2 is located on the western side of Tera Delba Road, to the north of Cherry Road. The Camp comprises of a small clearing with a small scatter of kerosene tins. No other evidence of activity was noted.

#### 6.5.6 Logging Camp 3

Logging Camp 3 is located 10 metres from Cowallah Creek, near Garlands Road. . No cut timbers were evident. The site contained a small collection of artefacts, potentially related to logging activities. Artefacts identified at the site include two kerosene tins (with no imprints) and the base of a glass tumbler of amethyst glass. The tumbler is decorated with 15 arch panels. The base is very thick (3 cm) and over all the remaining portion is 8 cm. The diameter at the base is 6.5 cm and at the top it is 7.2 cm The solarisation of the glass is indicative of a date prior to the 1920s (Lockhart, 2006).



Plate 53 Logging Camp 3 - Glass tumbler.

#### 6.5.7 Logging Camp 4

Logging Camp 4 is located on an unnamed track that runs towards Bohena Creek. The site is located approximately 100 metres from Bohena Creek. A formed sleeper is evident in the road mound edge, with two more sleepers scattered across the site. The sleeper is roughly 40 centimetres in width. The following artefacts were found in association with the sleeper on the road edge mound:

- Fragment of undecorated dinner or side plate of refined earthenware, approximately 5 by 2 cm;
- Fragment of clear glass from heel of bottle. Air bubbles and a heel seam evident;
- Handle fragment from jug or other large hollowware vessel. The fragment exhibits an over splash of brown transfer; and
- Tin with no defining features.

The broader area was scattered with tins of various dimensions, including kerosene and food style tins. No other artefactual material was observed.



**Plate 54** Logging Camp 4 - glass and ceramic fragments.

### 6.5.8 Logging Camp 5

Logging Camp 5 is located 70 metres south-east of Camp 4, across an unnamed track and approximately 80 metres from Bohena Creek. The material associated with Logging Camp 5 is later in date than the other camps, as evidenced by brown beer bottles and an Ovaltine tin. Ovaltine was introduced into Australia in 1943 (AB Food and Beverages, 2011), dating the site to the latter half of the 20<sup>th</sup> century. Other artefact material located includes:

- Metal bucket;
- Metal laundry-style tub;
- At least five metal food-style tins;
- Kerosene tin from "VACCUM OIL Co";
- Sardine-style tins;
- Clear glass soft drink bottle with screw top lid and lettering on heel "NOT TO BE REFILLED RECYCLABLE GLASS 15420.E11";
- Tobacco tin; and
- Clear wine-style bottle.



Plate 55 Logging Camp 5 - Overview. View north-east.

### 6.5.9 Logging Camp 6

Logging Camp 6 is located approximately 20 metres from Cowallah Creek, near Garlands Road and roughly opposite Logging Camp 3. No cut timbers were evident. Material located during the survey included two kerosene tins, one of which was imprinted with “MADE IN AUSTRALIA” on the top. The imprint on the base was illegible except for the word “...COMPANY...” and the numerals “\_ \_ 62”

When considered in isolation, Logging Camps 1 to 6 are not of State or local significance. However, when considered as a group of similar sites, they meet the criteria for historical and research significance, as assessed in Table 15.

Table 15 Logging Camps 1 to 6 – application of heritage significance criteria.

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	The collection of Logging Camps 1 to 6 are of local historical significance. They demonstrate the continuity of logging in the Pilliga from the late 19 <sup>th</sup> century to the present continuation of logging activities. They can contribute to an understanding of the differential targeting of particular areas of the Pilliga during various time periods.
Historical association significance SHR criteria (b)	The logging camps are not of historical associative significance on a state or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	The logging camps are not of aesthetic significance on a state or local level as it does not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	The logging camps are not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance SHR criteria (e)	As a group of logging camps, the sites have the potential to provide information regarding the manner in which logging of the forest was undertaken from the late 19 <sup>th</sup> and how the industry has progressed over this period, which is significant at a local level. Spatial mapping of these sites, with an approximate date, may provide insight into whether particular areas were targeted during particular periods and how this

APPLICATION OF CRITERIA	
	varied over time with the introduction of new technology and improved transportation from the Pilliga.
Rarity SHR criteria (f)	The logging camps do not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion.
Representativeness SHR criteria (g)	The logging camps are not of representativeness significance as it does not demonstrate the principal characteristics of a class of state or local places or environments.

**Statement of Significance:** In isolation, no one logging camp is of State or local significance. However, as part of a collection of similar sites, they are of local historical and technical significance. The group of logging camps demonstrates the pattern of logging in the eastern Pilliga from the late 19<sup>th</sup> century to the present on-going logging activities and also shows the continuity of this process. The spatial mapping of these sites has the potential to provide insight into what areas were targeted during particular periods and how this varied over time with the introduction of new technology and improved transportation from the Pilliga.

#### 6.5.10 Logging Camp 7

Logging Camp 7 is located on the eastern side of Staffords Well Road, presenting as an irregularly shaped cleared area of approximately 15 by 20 metres. A feature associated with the camp is a rectangle of boards that have been laid on the ground. The rectangle covers an area of approximately 3 x 1.5 metres. Both ends of the boards are held in place with a metal bracket, which has been nailed to the ground (refer to Plate 56). This has been interpreted as a sort of outdoor patio area.

Table 16 contains images and information regarding a selection of the artefacts located at the site. Other material culture included the springs from a sofa, the metal mesh base of a bed, a metal laundry tub, food tins and cylindrical petrol/kerosene tins. There was a scatter of unrefined and refined earthenware, some of which had a yellow or green body. There was also some gilt edge-banded ware and plate marleys with moulded designs and scalloped rims. There were very few transfer-printed pieces. Transfer-printed pieces are indicative of the period after the 1910s. The forms covered the range of domestic necessities – plates, bowls, cups and saucers. However, the largest proportion of fragments appeared to come from tea cups. The artefacts at the site indicate this was a family group – the presence of a pram frame and a cats-eye marble are indicative of children, while the make-up bottle suggests a woman also lived there (refer to Table 16). The diagnostic artefacts seem to indicate the site was occupied during the 1960s.



Plate 56 Loggers Camp - wooden platform.

Table 16 Description of a selection of artefacts from the Loggers Camp.

Item	Description	Approximate Date Range	Image
Pram	Metal frame of a pram leaning up against a tree.	Not diagnostic for dating purposes.	
Bottle	Clear glass, oval bottle with swirl pattern on neck. Embossed printing around heel: "THIS BOTTLE ALWAYS REMAINS THE PROPERTY OF WC DOUGLAS LTD SYDNEY". Australian Glass Manufacturing logo on base with codes "B/IS60/4"	WC Douglas began producing Fountain tomato sauce in 1906. This style of bottle was introduced in 1960 (Cerebos Australia Limited, 2011)	Image unavailable

Item	Description	Approximate Date Range	Image
Tea Pot	Brown bodied earthenware tea pot with a blue and cream wash around rim. Black transfer printed makers mark in square: "PATENTS/477013/355746/STAFFORD SHIRE/ENGLAND/HANLEY/B"	Alcock, Lindley & Bloore Ltd., produced mainly teapots. Mark used 1919 onwards (Godden, 1991:28)	
Glass bottle	Fragments of a glass bottle with an embossed sun-burst pattern.	c.1950-60s	
Ceramic	Earthenware base of dinner plate with a green transfer makers mark "YAMASHO IRONSTONE CHINA/MADE IN JAPAN"	unknown	
Glass make up bottle	Glass foundation make-up bottle with text: "SHAKE BEFORE USING/ FOR A SATIN SMOOTH SMOOTH/GLAMOROUS COMPLEXION/ Exquisite/ON ALL SKINS/APPLY SPARINGLY WITH/FINGERTIPS BLENDING/EVERY OVER FACE & THROAT"	c.1950-60s	

Table 17 Loggers camp – application of heritage significance criteria.

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	In association with the other logger's camps in the Pilliga forest, Logging Camp 7 is of local historical significance. As part of a collection of sites that spans the period of European logging activities, the Loggers Camp can demonstrate the course of logging history. The Loggers Camp is in contrast to the larger-scale operation evident at the Cowallah Sites Complex and comparable to the c.1920s site evident at TEA 12.
Historical association significance SHR criteria (b)	This item is not of historical association significance on a state or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	This item is not of aesthetic significance on a state or local level as it does not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	This item is not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance SHR criteria (e)	This item is of local technical significance as it has the ability to yield information that is significant to an understanding of the local logging industry. Investigation of the artefacts associated with the site may provide an insight into life in the forest during the 1960s that is not available from other resources.
Rarity SHR criteria (f)	This item does not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion.
Representativeness SHR criteria (g)	This item is of local representative significance as it demonstrates the principal characteristics of a 1960s logger's camp occupied by a family unit, as demonstrated by the cat's eye marble and foundation bottle.

**Statement of Significance:** Logging Camp 7 is of local historical, technical and representative significance. As part of a collection of logger's habitation sites (the Cowallah Habitation Complex and TEA 12, for example) they are able to demonstrate the course of historical domestic occupation in the Pilliga Forest from the 1890s through to the 1960s. The archaeological investigation of the site may contribute to an understanding of domestic life in the Pilliga during the 1960s. It is also representative of a 1960s logger's camp occupied by a family unit, as demonstrated by the cat's eye marble and foundation bottle.

## 6.6 Timber Loading Ramps

Due to the similarity in the construction of timber loading ramps across the study area, it is unnecessary to describe each one. The loading ramps follow a standard pattern. They are usually located at the intersection of two roads or tracks. Two suitably spaced trees are selected and horizontal logs stacked behind the trees to hold the earthen ramp that is then built behind it. Across the study area, the number of horizontal logs showed minimal variation – between two and four logs. The loading ramps were not usually associated with TEAs – only two being found in conjunction with a TEA, TEA 11 and TEA 19 being the exception. The loading ramps associated with those sites are described in Sections 6.3.11 and 6.3.19 and are therefore not repeated here.

**Table 18 Timber loading ramps within the study area**

Timber loading ramp No.	Location/Comment	Image
1	Near intersection of Garlands, Beehive and Creigh's Roads.	
2	McCains Road, north of intersection with Sawpit Road	No image available
3	Whirley Brook Trail. Appears to have been used in the last several years as one of the logs has been replaced and the saw marks are fresh. Piles of unprocessed logs adjacent to ramp.	
4	Intersection of Beehive and Bibblewindi Creek Roads.	

Timber loading ramp No.	Location/Comment	Image
5	Intersection of Monument Road and Duschke Link	
6	Intersection Duskie Road and Duschke Link	
7	On Stafford Well Road. Only one standing tree was used in the construction and the earthen ramp has collapsed.	
8	On Stafford Well Road.	

Timber loading ramp No.	Location/Comment	Image
9	On Chromite Road. Top log appears to have been recently replaced – the un-weathered cut edge is evident in the adjacent image.	

The significance of the timber loading ramps is assessed as a group, as no one individual ramp meets the significance threshold.

**Table 19 Timber loading ramps – application of heritage significance criteria.**

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	The group of nine timber loading ramps identified in the study area are of local historical significance. The group demonstrates the continuity of logging in the Pilliga from the late 19 <sup>th</sup> century to the present.
Historical association significance SHR criteria (b)	These items are not of historical associative significance on a state or local level as they do not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	These items are not of aesthetic significance on a state or local level as they do not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	These items are not of social significance on a state or local level as they do not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance SHR criteria (e)	In association with the TEAs, the group of timber loading ramps has the potential to provide information regarding the manner in which logging of the forest was undertaken from the late 19 <sup>th</sup> to the present. The grouping also provides information regarding how the industry has progressed over this period, which is significant at a local level. Spatial mapping of these sites, with an approximate date, may provide insight into whether particular areas were targeted during particular periods and how this varied over time with the introduction of new technology and improved transportation from the Pilliga.
Rarity SHR criteria (f)	These items do not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion.
Representativeness SHR criteria (g)	These items are of representative significance as they demonstrate the principal characteristics of timber loading ramps. The similarity between the nine indicates they are representative

**Statement of Significance:** The group of nine timber loading ramps are of local historical and technical significance. In association with the Timber Extraction Areas, the timber loading ramps demonstrate the pattern of logging in the eastern Pilliga from the late 19<sup>th</sup> century to the present and also shows the continuity of this process. The spatial mapping of these sites has the potential to provide insight into what areas were targeted

during particular periods and how this varied over time with the introduction of new technology and improved transportation from the Pilliga.

## 6.7 Logging Tracks

The study area within the State Forest is criss-crossed with unmapped logging tracks. The number and complexity of these features made it impracticable to identify and map all the tracks encountered during the survey. The following is a description of several that were of particular note:

- Track 1 - On the northern side of McFarlanes Road is a track that runs roughly north-south. The forest to the east of the track has been cleared but there was no material culture evident;
- Track 2 - On the eastern side of Staffords Well Road is a bulldozer track, probably associated with the 2009 thinning works (refer to Plate 20 and Plate 22);
- Track 3 - On the western side of Staffords Well Road is a track that is too narrow to have been created by a vehicle. It has been interpreted as being created by a horse pulling logs continuously along the same line. The track has resulted in the formation of a depression that has subsequently been subject to water erosion. The track follows a linear alignment, indicating it is of human origin, rather than being a natural phenomenon; and
- Track 4 - Track running parallel to Bohena Creek, at the end of Self Camp Road. The track provides access for TEAs 8 and 9.

**Table 20 Logging Tracks – application of heritage significance criteria.**

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	These items are not of historical significance at a local or state level as they do not demonstrate the pattern or course of NSW or local history.
Historical association significance SHR criteria (b)	These items are not of historical association significance on a state or local level as they do not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	These items are not of aesthetic significance on a state or local level as they do not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	These items are not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance SHR criteria (e)	In association with the TEAs, Logging Camps and Timber Ramps, the logging tracks have the potential to provide insight into the way in which loggers moved through the forest. Mapping of the tracks would capture this research potential.
Rarity SHR criteria (f)	These items do not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion.
Representativeness SHR criteria (g)	These items are of representativeness significance as they do not demonstrate the principal characteristics of a class of state or local places or environments.

**Statement of Significance:** The logging tracks throughout the study area are of local research significance. In association with the TEAs, Logging Camps and Timber Ramps, the logging tracks have the potential to provide insight into the way in which loggers moved through the forest. Mapping of the tracks would capture this research potential.

## 6.8 Other Sites

### 6.8.1 Sydney University Giant Air-shower Recorder (SUGAR)

As noted in section 4.9, the SUGAR array consisted of 54 stations and operated from 1968 until 1979. Each station consisted of pairs of liquid scintillation detectors (i.e. for detecting air showers) separated by 50 metres. The entire SUGAR array covered an area of 100 km<sup>2</sup> (Sydney University Physics Department, 2008), although the

precise locations of the stations throughout the Pilliga are not available. The installation also originally included a base station and transmission tower; however, these are understood to have been demolished. Two of the liquid scintillation detectors were located during the survey. The first was adjacent to the existing produced water ponds on Leewood, while the second was located off No Name Road, near the intersection with Plumb Road. The liquid scintillation detectors consist of what presents as a 44 gallon drum half buried in the ground. The shaft of the liquid scintillation detector reaches approximately 1.5 metres below the ground, before opening into a wider chamber underneath. Table 21 assesses the significance of the identified SUGAR components (pits).

**Table 21 Sydney University Giant Air-shower Recorder – application of heritage significance criteria.**

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	This item is of historical significance as it contributes to an understanding of research into air showers in NSW. The loss of fabric, especially the base station and transmission tower, has lessened the ability of the SUGAR array to demonstrate the course and pattern of research at a State level. .
Historical association significance SHR criteria (b)	This item is not of historical association significance on a State or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	The SUGAR array is of local significance as it demonstrates a high degree of technical achievement. The array was a pioneer in the field of recording giant air showers. In addition, in order for the array to work at maximum efficiency, Associate Professor Murray Winn of Sydney University perfected a system to transmit a timing signal to each of the local stations. This innovation allowed the whole array to be analysed for giant air showers and the direction of the shower determined. The results of the experiments conducted using the array was of great import to the physics community. The loss of fabric, especially the base station and transmission tower, has lessened the integrity of the array.
Social significance SHR criteria (d)	The SUGAR array is of State social significance, being held in high regard by the physics community. The research undertaken using the array provided important information regarding the size and direction of incoming giant air showers.
Technical/Research significance SHR criteria (e)	This item is not of technical or research significance at a State or local level as it does not have the potential to yield information that will contribute to an understanding NSW's cultural or natural history. The SUGAR array is technically obsolete and is of no further technical significance.
Rarity SHR criteria (f)	The SUGAR array is of local significance, being the only example in the State and Australia. During its operation, the array was one of only two operating Giant Air-shower Recorders in the world, the other being in Leeds, UK. The significance of the array has been degraded by the loss of the base station and the location of some of the local stations.
Representativeness SHR criteria (g)	This item is not of representative significance as it does not demonstrate the principal characteristics of a class of State or local places or environments.

**Statement of Significance:** The SUGAR is of State social significance, is of technical significance and is also rare at a local level. The SUGAR array is of State social significance, being held in high regard by the physics community. The research undertaken using the array provided important information regarding the size and direction of incoming giant air showers. The array demonstrates a high degree of technical achievement, being both pioneering in the field of giant air shower recording and also for the timing signal system developed to allow larger portions of the array to be interrogated at any one time. However, the loss of integrity has degraded the technical and rarity significance to local, rather than State.

### 6.8.2 Artefact Scatter and Tank

This site is located on the northern side of Bibblewindi Creek, approximately 100 metres north-west of the intersection of Garlands and Bibblewindi Creek Roads. Spread over an area of over 100 m<sup>2</sup> is an assortment of rusted metal items, including car bodies and 44 gallon drums. A concrete tank and a small but deep dam (refer to Plate 57) are located in the north-western corner of the scatter. There is evidence (in the form of vertical supports)

of a structure around the tank. Adjacent to the tank was a stack of cut sleepers. A gum tree has fallen over the sleepers, thereby making their removal too difficult to effect (refer to Plate 58). Several of the sleepers had dog spikes attached, indicating they are potentially stacked for reuse. Associated with the site was a large stand of unidentified introduced vegetation.

Table 22 provides an assessment of heritage significance.



**Plate 57** Tank Site - Overview of tank. View north-east.



**Plate 58** Tank Site - Sleeper stack. View north-east.

**Table 22 Artefact Scatter and Tank – application of heritage significance criteria.**

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	This item is not of historical significance at a local or state level as it does not demonstrate the pattern or course of NSW or local history.
Historical association significance SHR criteria (b)	This item is not of historical association significance on a state or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	This item is not of aesthetic significance on a state or local level as it does not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	This item is not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance SHR criteria (e)	This item is not of technical significance as it does not have the ability to yield information that is significant to an understanding of NSW or local history.
Rarity SHR criteria (f)	This item does not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion.
Representativeness SHR criteria (g)	This item is not of representativeness significance as it does not demonstrate the principal characteristics of a class of state or local places or environments.

### 6.8.3 Stock Loading Facility

The stock loading facility consists of pine timbers cut from the area. The stock loading facility is located adjacent to an unnamed track which runs parallel to Bohena Creek and Bohena Creek Road. The central section of the stock loading facility is roughly rectangular, with a chute to herd animals through running towards the road. The south-western corner of the stock loading facility is open. There was no other cultural evidence in the surrounding area.

Table 23 assesses the significance of the stock loading facility.



Plate 59 Stock Loading Facility. View east.

Table 23 Stock Loading Facility – application of heritage significance criteria.

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	This item is not of historical significance at a local or state level as it does not demonstrate the pattern or course of NSW or local history.
Historical association significance SHR criteria (b)	This item is not of historical association significance on a state or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	This item is not of aesthetic significance on a state or local level as it does not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	This item is not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance SHR criteria (e)	This item is not of technical significance as it does not have the ability to yield information that is significant to an understanding of NSW or local history.
Rarity SHR criteria (f)	This item does not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion.
Representativeness SHR criteria (g)	This item is not of representativeness significance as it does not demonstrate the principal characteristics of a class of state or local places or environments.

#### 6.8.4 Blazed Trees

Two blazed trees were encountered during the site survey.

Tree One: The blazed tree is located adjacent to a logging track that runs parallel to and west of, Terra Delba Road. The blazed tree (an iron bark tree) had had an area of bark (approximately 800 millimetres by 300 millimetres) removed. The letters “F” & “I” had then been blazed into the exposed hardwood (refer to Plate 60). It is assumed that the initials probably stand for Forestry Industry.

Tree Two: The blazed tree is located on the southern side of Monument Road. An oval area of bark 300 by 120 millimetres has been removed with a steel axe – the axe marks are evident in the exposed hardwood. No letters or symbols were blazed in the hardwood (refer to Plate 61). It is not possible to determine whether the blaze was created by a Caucasian or an Indigenous person within the period since European settlement. Table 24 assesses the significance of the two blazed trees.

**Table 24 Blazed trees – application of heritage significance criteria.**

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	These items do not of historical significance at a local or state level as they does not demonstrate the pattern or course of NSW or local history.
Historical association significance SHR criteria (b)	These items are not of historical association significance on a state or local level as they do not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	These items are not of aesthetic significance on a state or local level as they do not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	These items are not of social significance on a state or local level as they do not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance SHR criteria (e)	These items are not of technical significance as they do not have the ability to yield information that is significant to an understanding of NSW or local history.
Rarity SHR criteria (f)	These items do not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion.
Representativeness SHR criteria (g)	These items are not of representativeness significance as it does not demonstrate the principal characteristics of a class of state or local places or environments.

**Statement of Significance:** The blazed trees are not of State or local significance under any of the seven criteria.



Plate 60 Blazed Tree One.

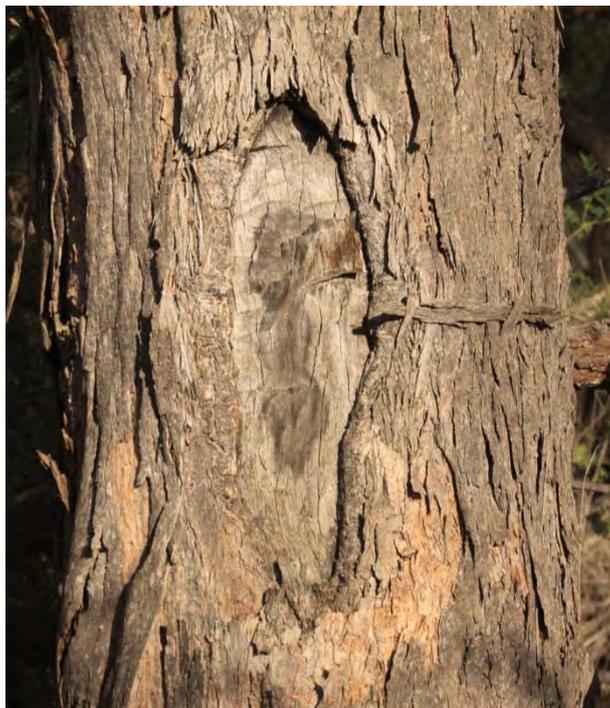


Plate 61 Blazed Tree Two.

### 6.8.5 Oil Well

The oil well is located on the north-eastern corner of the intersection of Oil Well and Nickel Roads. It is the site of an oil exploration pit and an associated windmill base. All that remains of the windmill is four legs. The legs have been sawn off approximately 10 cm from ground level. In addition, some other artefact material including brown beer bottle glass, metal bolts and other metal fragments was located.

The oil well pit is a concrete lined pit, approximately 2 m<sup>2</sup> and 70 cm deep, with a sign erected within the pit. The sign reads:

MID-EASTERN OIL

PILLIGA = 1

4973 – 17 – 9 - 64

The area surrounding the windmill and oil well pit is scattered with brown beer bottles, kerosene tins and other metallic objects, such as nuts, bolts and various unidentified metal off-cuts.



Plate 62 Oil Well - Detail of identification plate.

**Table 25 Oil Well – application of heritage significance criteria.**

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	The oil well is of local historical significance. It demonstrates the course and pattern of resource exploration in the local area.
Historical association significance SHR criteria (b)	This item is not of historical association significance on a state or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	This item is not of aesthetic significance on a state or local level as it does not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	This item is not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons.
Technical/Research significance SHR criteria (e)	This item is not of technical significance as it does not have the ability to yield information that is significant to an understanding of NSW or local history.
Rarity SHR criteria (f)	This item does not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion.
Representativeness SHR criteria (g)	This item is not of representativeness significance as it does not demonstrate the principal characteristics of a class of state or local places or environments.

**Statement of Significance:**

The oil well is of local historical significance. It demonstrates the course and pattern of resource exploration in the local area.

**6.9 Pilliga East Logging Cultural Landscape**

A cultural landscape can be defined as an area where the patterns of settlement or use are visible in that landscape, together with a cultural awareness of the contribution of the settlement or use to cultural values, norms or attitudes towards the land (NSW Department of Environment Climate Change and Water, 2010: 4). An often cited diagrammatical representation of a cultural landscape is provided in Figure 9. A landscape is a continually changing unit, being the product of evolving relationships between nature, people, the past and present and the values that people place on these.



Source: Diagram after Guilfoyle 2006:2, based on Phillips 2002:5

**Figure 9 Representation of elements contributing to a cultural landscape** (NSW Department of Environment Climate Change and Water, 2010: 4)

As discussed in Sections 6.3.22, 6.5, 6.6 and 6.7, individually the majority of the TEAs, logging camps, timber loading ramps and logging tracks are not of heritage significance. It is only when they are considered collectively that a sense of the scale and intensity of logging activities in the Pilliga can be appreciated. The TEAs, sawmill sites, habitation sites, timber loading ramps and logging tracks clearly demonstrate a pattern of use within the east Pilliga for logging purposes. Further research regarding the spatial arrangement of the sites, together with the material culture contained within them, has the potential to yield information regarding the evolution of attitudes towards the Pilliga and the logging activities undertaken within it.

For the purposes of this assessment, the cultural landscape boundary will be defined as the State Forests within and surrounding the project area (refer to Figure 14 in Appendix B, with the items identified in Sections 6.3 to 6.7 comprising elements that contribute to the cultural landscape).

**Table 26 Pilliga East logging cultural landscape – application of heritage significance criteria.**

APPLICATION OF CRITERIA	
Historical significance SHR criteria (a)	The Pilliga East logging cultural landscape is of local historical significance. The landscape demonstrates the patterns of utilisation of the Pilliga East forest, the different intensities and methods of logging from the 1890s to the present. The timber extraction areas, sawmill sites, logging camps, timber loading ramps, logging tracks and other sites associated with logging activities that are scattered across the landscape, can tell the story of logging in the Pilliga East. Further research may indicate the variations in methods and areas of concentration between the early operations and the later State operated activities.
Historical association significance SHR criteria (b)	The landscape is not of historical association significance on a state or local level as it does not have a strong or special association with the life or works of a person, or group of persons, of importance in state or local cultural history.
Aesthetic significance SHR criteria (c)	The landscape is not of aesthetic significance on a state or local level as it does not demonstrate aesthetic characteristics and/or a high degree of technical achievement in the state or the local area.
Social significance SHR criteria (d)	The landscape is not of social significance on a state or local level as it does not have a strong or special association with a particular community or cultural group in the state or local area for social, cultural or spiritual reasons. There seems to be a lack of recognition of historical logging activities in the Pilliga East, despite the extent of the activities. Further research within the local community may provide some indication as to why.
Technical/Research significance SHR criteria (e)	The Pilliga East cultural landscape is of local research significance. The creation of a cultural landscape map of the TEAs, sawmill sites, logging camps, timber loading ramps and logging tracks could provide insights into the pattern of logging in the forest.
Rarity SHR criteria (f)	The landscape does not possess uncommon, rare, or endangered aspects of state or local cultural history and so does not qualify as significant under this criterion. All State Forests are likely to contain similar groups of sites that would combine to create a cultural landscape with similar significance.
Representativeness SHR criteria (g)	The Pilliga East cultural landscape is of local representative significance, it contains all the sites characteristic of logging activities (TEAs, sawmill sites, logging camps, timber loading ramps and logging tracks).

#### Statement of Significance:

The Pilliga East cultural landscape is of historical, research and representative significance. The landscape demonstrates the patterns of logging activities in the Pilliga East forest and the different intensities and methods of logging from the 1890s to the present. The TEAs, sawmill sites, logging camps, timber loading ramps, logging tracks and other sites associated with logging activities that are scattered across the landscape can tell the story of logging in the Pilliga East. Further research may indicate the variations in methods and areas of extraction between the early operations and the later State operated activities.

The Pilliga East cultural landscape is of local research significance. The creation of a cultural landscape map of the TEAs, sawmill sites, logging camps, timber loading ramps and logging tracks could provide insights into the pattern of logging in the forest.

The Pilliga East cultural landscape is of local representative significance as it contains all the sites characteristic of logging activities (TEAs, sawmill sites, logging camps, timber loading ramps and logging tracks).

## 7.0 Impact Assessment

### 7.1 Introduction

The heritage significance of each item has been assessed in Section 6.0. The following sections will assess the impacts of the proposed development, the scope of which was outlined in Section 1.2 and reiterated below. The impact assessment has taken into consideration the extent to which this project differs from standard projects that have a fixed footprint. The gas wells can be manoeuvred, within geological, environmental and social constraints, to reduce impacts to environmental and social items.

### 7.2 Infrastructure

As noted in Section 1.2, the major facilities will be located in four distinct locations:

- Bibblewindi;
- Leewood;
- within the Bibblewindi to Wilga Park infrastructure corridors; and
- the Westport workers' accommodation.

The aforementioned four locations are discussed in the following sections.

#### 7.2.1 Leewood

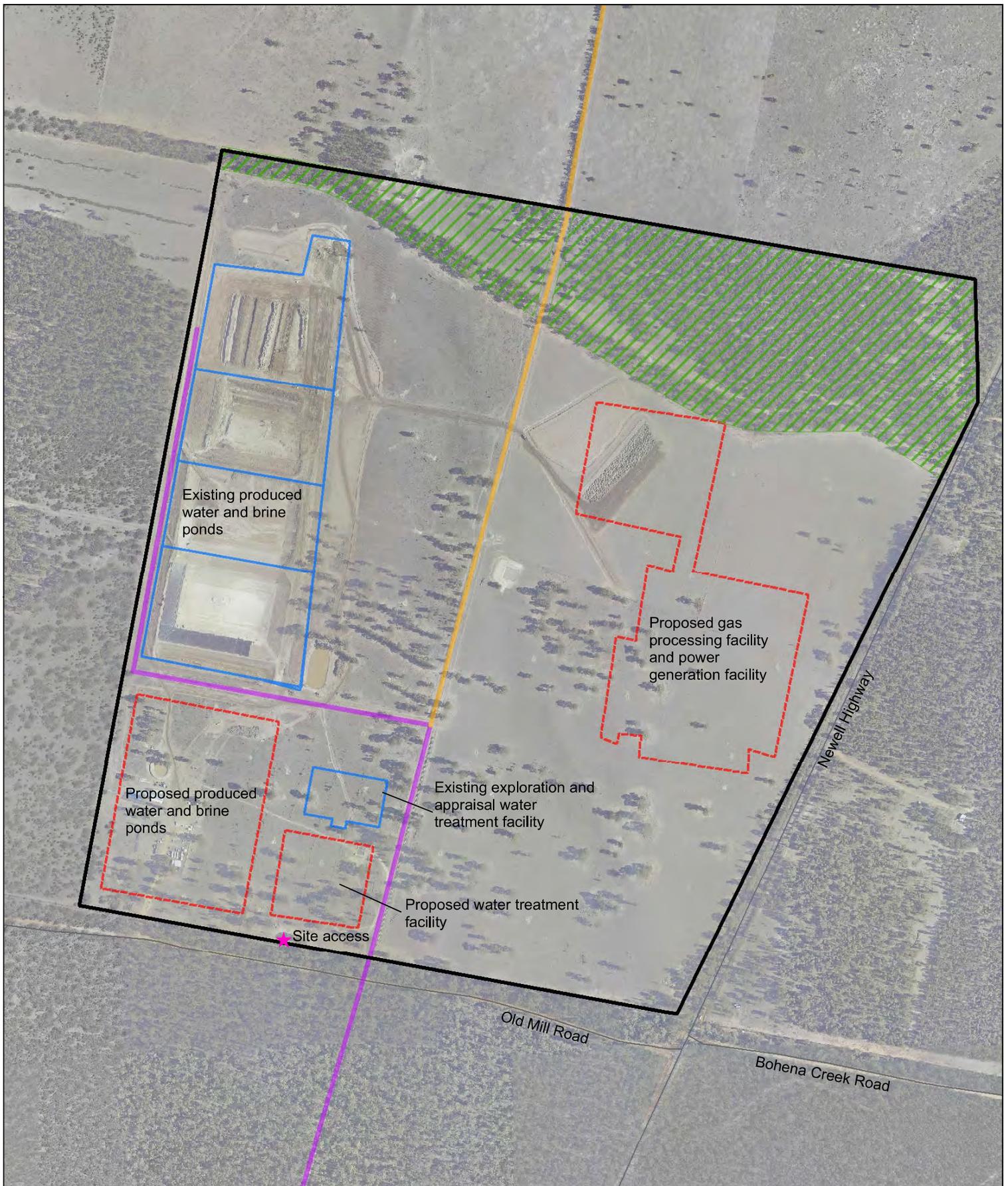
The Leewood Property (Leewood) is centrally located within the project area. Leewood adjoins the Newell Highway and is situated approximately 25 kilometres south-west of Narrabri. It is approximately 246 hectares in size and is accessed from Old Mill Road (refer to Figure 1). There are two produced water and brine ponds and supporting infrastructure, constructed as part of the exploration and appraisal activities. In addition, there is an existing gas pipeline that runs in a north-south direction through the property as well as a produced water pipeline within the corridor. The site is generally cleared and has been subject to grazing prior to Santos' acquisition.

The location of the proposed major facilities is provided on Figure 10 and the following components are proposed:

- a central gas processing facility for the compression, dehydration and treatment of gas
- a central water management facility including storage and treatment of produced water and brine
- optional power generation for the project
- a safety flare
- treated water management infrastructure to facilitate the transfer of treated water for irrigation, dust suppression, construction and drilling activities
- other supporting infrastructure including storage and utility buildings, staff amenities, equipment shelters, car parking, and diesel and chemical storage
- continued use of existing facilities such as the brine and produced water ponds operation of the facility.

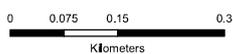
One pair of liquid scintillation detectors from the SUGAR array has been previously identified on the Leewood property. The liquid scintillation detectors are located directly adjacent to the two produced water ponds at the site and were fenced off and left undisturbed during the construction works. It is not anticipated that the SUGAR pits will be impacted by the proposed works and they will continue to be protected by fencing.

No other items of historic heritage significance were identified on the Leewood property. It is therefore considered that the proposed works at the Leewood site are unlikely to impact items of heritage significance.



Aerial Imagery: Dec 2013

- LEGEND**
- Leewood
  - Leewood to Wilga Park infrastructure corridor
  - Bibblewindi to Leewood infrastructure corridor
  - Roads
  - Existing facilities
  - Proposed infrastructure
  - Vegetation to remain



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### Existing and proposed infrastructure at Leewood

Figure 10

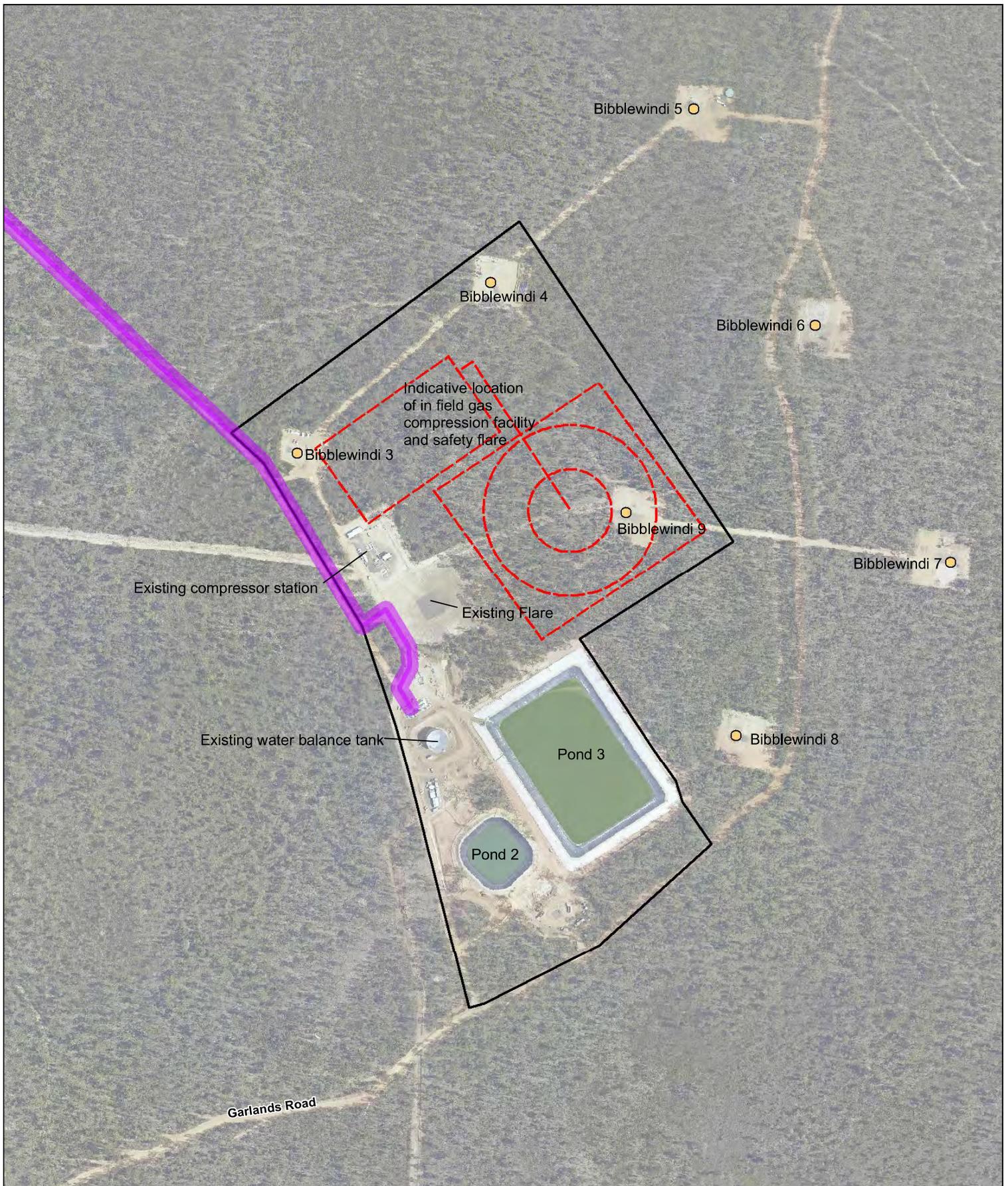
### 7.2.2 Bibblewindi

The Bibblewindi facility is partially operational as part of previously approved exploration activities in the Pilliga. The facility is located within the Bibblewindi State Forest (in the south of the project area); approximately seven kilometres east of the Newell Highway (refer to Figure 12). The current facility is about 12 hectares in size, and is accessed via X-Line Road and Garlands Road (Figure 11). There are no known heritage items at the facility.

The project would result in an additional footprint of approximately 16 hectares at Bibblewindi for the infield compression and flare infrastructure, as outlined in Figure 11. The infrastructure includes:

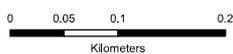
- in-field compression facility
- a safety flare
- supporting infrastructure including storage and utility areas, treated water holding tank, and a communications tower
- upgrades and expansion to the staff amenities and car parking
- produced water, brine and construction water storage, including recommissioning of two existing ponds
- continued use of existing facilities such as the 5ML water balance tank
- operation of the expanded facility.

No historic sites were identified in the vicinity of the Bibblewindi facility. However, due to the densely vegetated nature of the environment, it is possible that sites exist within the proposed area of additional disturbance. Should additional sites be identified during construction, they can be mitigated under the Historic Heritage Management Plan (refer to Section 8.2).



Aerial Imagery: Dec 2013

- LEGEND**
- Indicative Bibblewindi site boundary
  - Bibblewindi to Leewood infrastructure corridor
  - Indicative infrastructure location
  - Existing wells



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### Existing and proposed infrastructure at Bibblewindi

**Figure 11**

### 7.2.3 Infrastructure Corridors

An existing water pipeline between Bibblewindi and Leewood was constructed as part of previous approvals. A gas pipeline between Bibblewindi and Wilga Park Power Station, via Leewood, currently connects the facilities at Bibblewindi to the Leewood property (refer to Figure 12).

The following additional infrastructure would be located along the existing corridor under this project:

- a new intermediate gas pipeline to transfer gas from the infield compression station at the Bibblewindi site to the Leewood site. The gas would be processed in the proposed central gas processing facility;
- two new water flow lines;
- a new underground transmission line up to 132 kV to reticulate power from the Leewood site to the Bibblewindi site; and
- communications cabling.

The construction and installation of the abovementioned infrastructure would require an expansion of the existing corridor from approximately 12 metres to 30 metres. The location of the corridor is depicted on Figure 12.

No historic sites have been identified in the vicinity of the infrastructure corridor. However, the entire length of the corridor was not surveyed and there remains potential for sites to be located within the proposed 30 metre corridor. Measures to mitigate the risk of impact to unidentified sites being located within the expanded corridor are provided in Section 8.2.

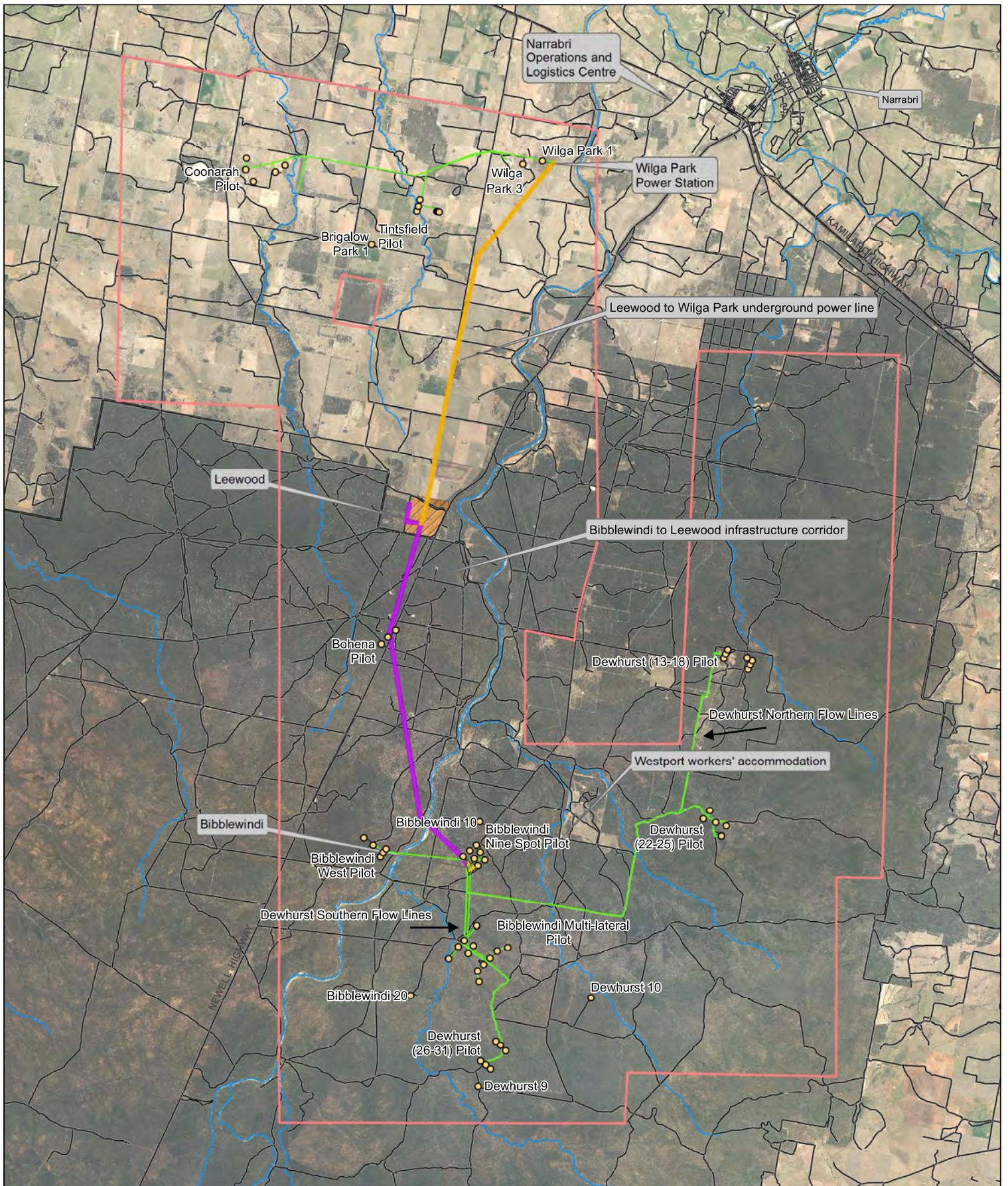
Additionally, a new underground transmission line up to 132kV to reticulate power from Wilga Park to Leewood is proposed within the existing gas pipeline corridor. No historic sites were identified in the vicinity of the infrastructure corridor during a search of relevant heritage registers (refer to Section 3.0). However, the entire length of the corridor was not surveyed and there remains potential for sites to be located within the corridor. Measures to mitigate the risk of impact to previously unidentified sites being located within the corridor are provided in Section 8.2.

### 7.2.4 Westport workers' accommodation

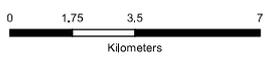
Santos currently has approval from Narrabri Shire Council for the construction of a 64-person camp on Westport Road, being within Lot 4 on Deposited Plan 757126. Santos seeks to extend the current approval to allow for a capacity of approximately 200 people.

RPS (2012b) completed a heritage assessment for the initial approval. No historic heritage sites or material was identified within the camp boundary.

The extended camp boundary was not surveyed at the time. The survey of the area will be managed under the Historic Heritage Management Plan discussed in Section 8.2.



- LEGEND**
- Project area
  - Watercourses
  - Leewood to Wilga Park infrastructure corridor
  - Existing wells
  - Leewood
  - Train line
  - Bibblewindi to Leewood infrastructure corridor
  - Bibblewindi
  - Existing flowlines
  - Roads/tracks



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Existing infrastructure

Figure 12

## 7.3 Gas Fields

The development of the gas field will result in the exploration and appraisal activities including approximately 30 coreholes, approximately ten chip holes and approximately ten sets of four-well pilots up to 850 individual production wells from a maximum of 425 well sets within the project area. It is probable that not all well pads will be located within the curtilage of the Pilliga East logging cultural landscape. The well pads will result in the clearing of areas of 100x100 metres. Up to 20 communication towers will be located within the cleared areas associated with well pads. The gas wells will be connected by gas and water gathering lines, as well as access tracks. Existing roads would be used wherever possible, but where this is not possible a 12 metre right of way will be required during construction, rehabilitated to a seven metre track.

The planning and development of gas field infrastructure is an iterative and staged process, where the location of infrastructure is determined by the resource, proximity to existing infrastructure, landholder agreements and environmental and other constraints. Consequently, the assessment of the impacts of the project on the heritage significance is undertaken without the proposed location of the infrastructure being known. The gas field would be located in part of a timber harvesting forest that has been operating since the 1890s and continues to be logged today. Because of this extensive and ongoing use, a large number of sites associated with the timber extraction process were identified during the heritage survey.

Many of the sites identified across the project area are of the same type, such as cleared timber extraction areas and timber loading ramps. In addition, a number of specific sites were identified and assessed as providing local historic heritage significance on the basis of their value in showing how people lived and worked in the area during the logging activities. These sites include a sawmill site, logging camp and several habitation sites.

There are also two sites identified for their heritage significance that are unrelated to the logging activities; the SUGAR pits (State social significance and local significance on the basis of aesthetic and rarity significance) and the Pilliga 1 Oil well (local historical significance).

### 7.3.1 Assessment of potential to impact identified heritage sites

Activities that do not result in surface disturbance at a site will not impact the heritage significance of the site. Monitoring and surveying (air, noise, water, ecology etc.) activities that do not result in disturbance to the surface of the site may be undertaken at sites without impacting the heritage significance.

Gas field infrastructure will be sited to avoid surface development at the following sites. There would be NO impact to the assessed heritage significance of these sites from the project:

- Cowallah Parish Plan Sawmill
- Logging Camp 7
- Cowallah Sites Complex
- Hardys Hut
- Pilliga 1 Oil Well
- SUGAR pits - located at the Leewood site and the intersection of Plumb Road and No Name Road.

### Timber extraction areas

As outlined in 6.3.22, the majority of the timber extraction areas are not of heritage significance in their own right. The timber extraction areas as a collection have local historical and research significance. Based on the sites being similar in nature across the area, the preservation of a selection of the collection of sites would ensure that the impact to heritage significance of the collection would be limited to acceptable levels.

Consequently, surface development activities will be avoided at the following sites to protect and mitigate the potential impacts to the heritage significance of the collection of timber extraction areas:

- Timber extraction areas 1, 2, 3, 4, 6, 10, 12, 18, 19 and 21.

The above sites are nominally listed as suggested sites to avoid surface disturbance. However, due to the similarity of the sites across the project area, if impacts are unavoidable at a timber extraction site listed, another timber extraction site may be substituted without impacting the heritage significance of the collection of sites. The sites would be mitigated following the measures outlined in Section 8.0 and Table 27 prior to ground disturbance works.

### Timber loading ramps

Similarly, the timber loading ramp sites follow a standard pattern across the area. No individual ramp meets the threshold, however, as a collection they are of local historical heritage significance as they demonstrate the continuity of logging in the Pilliga. If surface development activities are avoided at a selection of the collection of the ramps then the impact to the heritage significance of the collection of timber loading ramps can be mitigated. The following ramps have been selected:

- Timber loading ramp 1, 5, 6, 9 and ramp associated with TEA 19.

The above sites are nominally listed as suggested sites to avoid surface disturbance. However, due to the similarity of the sites across the project area, if impacts are unavoidable at a loading ramp site listed, another loading ramp site may be substituted without impacting the heritage significance of the collection of the sites. The sites would be mitigated following the measures outlined in Section 8.0 prior to ground disturbance works.

### Logging tracks

In relation to the logging tracks, it is considered that the mapping of these sites would capture the research potential of these sites and as such, no further impact assessment is required.

### Pilliga East Cultural Landscape

By preserving the sites that have been suggested above as surface development exclusion areas, the project will also preserve the Pilliga East Cultural Landscape by continuing to provide a representative collection of sites that are able to demonstrate a pattern of use within the east Pilliga for logging purposes. The impacts to the Landscape will be mitigated further through the establishment and maintenance of a GIS layer to record the surface development exclusion areas, as discussed in Section 8.0.

### Implementation of impact assessment findings

Santos has developed a Field Development Protocol that provides a framework for the siting of gas wells and associated infrastructure to be installed within the Project area. The Protocol aims to ensure that the development of the project, particularly the siting of infrastructure, minimises the impact of the project on the environment. It has been designed to ensure that the project avoids areas with specific attributes, including identified sites that have been assessed as being of heritage significance.

#### 7.3.2 Indirect Impacts

The sites identified in Section 6.0 have not been assessed as holding aesthetic heritage significance and, as such, views of a gas well pad will not impact on their significance.

For an assessment of this nature, access was not considered necessary for the privately owned lands in the north western portion of the study area. It is possible that some of the homesteads in that area are of aesthetic significance that would be impacted by the siting of a gas well pad within the visual catchment of the item. Further consideration of the potential aesthetic significance should be undertaken during micro-siting.

The project will not result in the generation of vibrations that are likely to impact on the identified sites. Consideration should be given as to whether vibrational impacts may be relevant should sites with standing structures of heritage significance be identified in the northern portion of the study area.

## 7.4 Summary

Activities that do not result in surface disturbance at a site will not impact the heritage significance of the site. Monitoring and surveying (air, noise, water, ecology etc.) activities that do not result in disturbance to the surface of the site may be undertaken at sites without impacting the heritage significance.

The gas field is proposed for construction within the Pilliga East Cultural Landscape. Of the 53 sites identified within the project area, the following sites have been identified for protection, which will mitigate potential impacts to the Landscape and the TEAs, logging camps and timber loading ramps as collections with heritage significance:

- Cowallah Parish Plan Sawmill;
- Logging Camp 7;
- Cowallah Sites Complex;

- Hardys Hut;
- Pilliga 1 Oil Well;
- SUGAR pits - located at the Leewood site and the intersection of Plumb Road and No Name Road;
- Timber extraction areas 1, 2, 3, 4, 6, 10, 12, 18, 19 and 21; and
- Timber loading ramp 1, 5, 6, 9 and ramp associated with TEA 19

Management measures are provided in Section 8.0 and a Statement of Heritage Impact for the Landscape, as required by the Secretary's Environmental Assessment Requirements, is provided in Appendix B.

No direct impacts have been identified as arising from the location of major facilities at Leewood, Bibblewindi, the proposed infrastructure corridor, or Westport. The Leewood property contains a pair of SUGAR pits. The SUGAR pits are currently protected by barrier fencing.

## 8.0 Mitigation Measures

### 8.1 Introduction

Management measures are required to protect the sites identified within this report and additional sites identified during the construction and operation of the project. The following sections provide management and mitigation measures, should identified sites be impacted by the proposed development of the gas field. This is followed by an evaluation of the effectiveness and reliability of these measures, as required by the Secretary's Environmental Assessment Requirements.

### 8.2 General Measures

The heritage sites are located on land that will remain in the control of the Forestry Corporation of NSW. The long-term protection of the sites is therefore best managed by that agency. It is suggested that Santos advises the Forestry Corporation of NSW of the location of the sites identified in this report. The Forestry Corporation of NSW may choose to include the sites on their Section 170 register (refer to Section 3.3.2).

The following measures will be implemented by Santos to manage the historic heritage significance of sites within the Project area:

- Develop an Historic Heritage Management Plan (HHMP) to guide the management and protection of items within the project area. As a minimum, the Plan will include the following elements:
  - A list, plan and GIS layer showing the location of identified heritage items and include a 15 m buffer. Where a site is located in proximity to an existing road, the buffer will terminate at the road edge and will not impact on the use of the road. A larger buffer may be required in the cleared farm land in the northern portion of the Project area to reduce visual impacts;
  - A significance assessment and Statement of Significance for each site (refer to the relevant sections in Section 6.0);
  - Induction protocols for staff and project personnel to undertake a cultural heritage induction, to assist them in understanding and complying with their legal obligations under the *Heritage Act*;
  - An unexpected finds procedure in the event that further sites are identified during surveying or micro-siting, which is likely to include:
    - Adding the location of the site to the GIS layer, the site should be coded as 'disturbed' or similar if necessary, but the location should be retained within the layer in order to preserve the information for future historical research purposes;
    - Creation of an inventory sheet detailing the features and components of the site, including images, maps, plans as relevant;
    - Protocols and criteria for determining the mitigation measures for sites (refer to Table 27 for proposed mitigation measures for identified sites); and
  - A separate procedure for the discovery of skeletal remains.

### 8.3 Effectiveness of Mitigation Measures

The Secretary's Environmental Assessment Requirements for the historical impact assessment require the effectiveness and reliability of the proposed management and mitigation measures be evaluated (Section 1.4).

The management of the heritage assets within the Project area during construction and operation will be undertaken through a Historic Heritage Management Plan. Such management documents are commonly used as heritage management tools and their effectiveness and reliability is supported by Heritage Council of NSW advocacy. In addition, the micro-siting of gas well pads will be guided by the Field Development Protocol. The Field Development Protocol is a formal document and will contain protocols that will endeavour to site infrastructure away from identified heritage sites that are nominated for preservation. Should impacts be unavoidable, the HHMP will contain management and mitigation measures relevant to the type and significance of the site.

Table 27 Proposed mitigation measures for identified sites

Site Name	Assessed Significance	Proposed Mitigation Measure
Timber Extraction Area 1	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 2	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 3	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 4	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 5	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 6	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 7	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 8	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 9	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 10	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 11	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 12	Local – historical, research, representative	Detailed mapping of site, collect artefacts, archaeological testing and salvage, if warranted.
Timber Extraction Area 13	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 14	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 15	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 16	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 17	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 18	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 19	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 20	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.
Timber Extraction Area 21	Local – historical, research, as part of collection of TEAs	Map extent of site, photographic archival recording.

Site Name	Assessed Significance	Proposed Mitigation Measure
Johnston's 'Albion' Sawmill	Not of heritage significance	None warranted
Cowallah Parish Plan Sawmill	Local – historical, research	Detailed mapping of site, collect artefacts, archaeological testing and salvage, if warranted.
Cowallah Habitation Complex	Local – historical, research representative	Detailed mapping of site, collect artefacts, archaeological testing and salvage, if warranted.
Hardy's Hut	Local – historical, research	Avoid impacts where possible. If impacts are unavoidable, undertake detailed mapping of site, collect artefacts, archaeological testing and salvage, if warranted.
1960s Camp	Not of heritage significance	None warranted.
Logging Camp 1	Local – historical, research, as part of collection of logging camps	Map site extent, collect and record artefacts in site, archaeological testing and salvage, if warranted.
Logging Camp 2	Local – historical, research, as part of collection of logging camps	Map site extent, collect and record artefacts in site, archaeological testing and salvage, if warranted.
Logging Camp 3	Local – historical, research, as part of collection of logging camps	Map site extent, collect and record artefacts in site, archaeological testing and salvage, if warranted.
Logging Camp 4	Local – historical, research, as part of collection of logging camps	Map site extent, collect and record artefacts in site, archaeological testing and salvage, if warranted.
Logging Camp 5	Local – historical, research, as part of collection of logging camps	Map site extent, collect and record artefacts in site, archaeological testing and salvage, if warranted.
Logging Camp 6	Local – historical, research, as part of collection of logging camps	Map site extent, collect and record artefacts in site, archaeological testing and salvage, if warranted.
Logging Camp 7	Local – historical, research and representative	Avoid impacts where possible. If impacts are unavoidable, undertake detailed mapping of site, collect artefacts, archaeological testing and salvage, if warranted.
Timber Loading Ramp 1	Local – historical, research, as part of collection of loading ramps	Map extent of site, photographic archival recording.
Timber Loading Ramp 2	Local – historical, research, as part of collection of loading ramps	Map extent of site, photographic archival recording.
Timber Loading Ramp 3	Local – historical, research, as part of collection of loading ramps	Map extent of site, photographic archival recording.
Timber Loading Ramp 4	Local – historical, research, as part of collection of loading ramps	Map extent of site, photographic archival recording.
Timber Loading Ramp 5	Local – historical, research, as part of collection of loading ramps	Map extent of site, photographic archival recording.

Site Name	Assessed Significance	Proposed Mitigation Measure
Timber Loading Ramp 6	Local – historical, research, as part of collection of loading ramps	Map extent of site, photographic archival recording.
Timber Loading Ramp 7	Local – historical, research, as part of collection of loading ramps	Map extent of site, photographic archival recording.
Timber Loading Ramp 8	Local – historical, research, as part of collection of loading ramps	Map extent of site, photographic archival recording.
Timber Loading Ramp 9	Local – historical, research, as part of collection of loading ramps	Map extent of site, photographic archival recording.
Logging Track 1	Local – research, in conjunction with other sites	Map extent of Logging Track, photographic archival recording.
Logging Track 2	Local – research, in conjunction with other sites	Map extent of Logging Track, photographic archival recording.
Logging Track 3	Local – research, in conjunction with other sites	Map extent of Logging Track, photographic archival recording.
Logging Track 4	Local – research, in conjunction with other sites	Map extent of Logging Track, photographic archival recording.
SUGAR components (pits)	State – social; Local – aesthetic, rare	Consult with Sydney University, photographic archival recording.
Stock Loading Facility	Not of heritage significance	None warranted
Blazed tree 1	Not of heritage significance	None warranted
Blazed tree 2	Not of heritage significance	None warranted
Oil Well	Local - historical	Avoid impacts where possible. If impacts are unavoidable, undertake detailed mapping of site, collect artefacts, archaeological testing and salvage, if warranted.
Pilliga East Cultural Landscape	Local – historical, research, representative	Map extent of individual sites, record in a GIS system to build a picture of the landscape

## 8.4 Summary

The mitigation and management measures proposed for the project in relation to historic heritage are summarised in Table 28.

**Table 28 Summary of mitigation and management measures for historic heritage**

Historic heritage	
EIS Number	Measure
11.1	A Historic Heritage Management Plan would be implemented.
11.2	<p>To preserve the Pilliga East Logging Cultural Landscape the following sites are surface development exclusion areas:</p> <ul style="list-style-type: none"> <li>- Cowallah Parish Plan Sawmill;</li> <li>- Logging Camp 7;</li> <li>- Cowallah Sites Complex; and</li> <li>- Hardy's Hut.</li> </ul> <p>Due to the similarities of the timber extraction areas and logging ramps across the project area, if impacts are unavoidable at a site listed below, another site of the same type may be substituted as a surface development exclusion area without impacting the heritage significance:</p> <ul style="list-style-type: none"> <li>- Timber extraction areas 1, 2, 3, 4, 6, 10, 12, 18, 19 and 21; and</li> <li>- Timber loading ramp 1, 5, 6, 9 and ramp associated with timber extraction area 19.</li> </ul> <p>The following sites are would be surface development exclusion areas based on their heritage significance:</p> <ul style="list-style-type: none"> <li>- Pilliga 1 Oil Well; and</li> <li>- SUGAR pits - located at the Leewood site and the intersection of Plumb Road and No Name Road.</li> </ul>
11.3	Impacts to other identified historic heritage sites would be mitigated through implementation of the measures outlined in the Historic Heritage Management Plan (HHMP).
11.4	Potential historic heritage sites that are identified during site surveying or micro-siting would be managed in accordance with an unexpected finds procedure provided in the HHMP.

## 9.0 Conclusion

The Proponent is proposing to develop natural gas from coal seams in the Gunnedah Basin in NSW, south-west of Narrabri. AECOM has been engaged by GHD to prepare an assessment of the potential impacts to the historic heritage significance of the project area.

The Project area was initially part of squatter's runs, then was legitimately granted to various individuals, before largely being resumed for the purposes of state forests. There was no large scale clearing or intensive grazing on the eastern side of the Newell Highway. The forests were logged by individual contractors since the mid-19<sup>th</sup> century and are now managed and logged by Forestry NSW.

AECOM undertook a week of field survey between April and May of 2014 to supplement the field survey carried out in November of 2011. These surveys identified 53 sites, which can be characterised into seven types: Timber Extraction Areas, Sawmill sites, Timber Loading Ramps, Habitation sites, Logging tracks, Sydney University Giant Air-shower Recorder and other sundry sites. The logging related sites have been identified as forming a landscape, herein referred to as the Pilliga East Logging Cultural Landscape. The sites were assessed against Heritage Division guidelines *Assessing Heritage Significance* (NSW Heritage Office, 2001). The majority of sites were found to be of local significance as part of a collection of TEAs, timber loading ramps and logging tracks that can demonstrate the pattern and course of the development of logging in the forests and could yield new and substantive information about such.

Activities that do not result in surface disturbance at a site will not impact the heritage significance of the site. Monitoring and surveying (air, noise, water, ecology etc.) activities that do not result in disturbance to the surface of the site may be undertaken at sites without impacting the heritage significance.

Project infrastructure is proposed for construction within the Pilliga East Cultural Landscape. Of the 53 sites identified within the project area, the following sites have been identified for protection, which will mitigate potential impacts to the Landscape and the TEAs, logging camps and timber loading ramps as collections with heritage significance:

- Cowallah Parish Plan Sawmill;
- Logging Camp 7;
- Cowallah Sites Complex;
- Hardys Hut;
- Pilliga 1 Oil Well;
- SUGAR pits - located at the Leewood site and the intersection of Plumb Road and No Name Road;
- Timber extraction areas 1, 2, 3, 4, 6, 10, 12, 18, 19 and 21; and
- Timber loading ramp 1, 5, 6, 9 and ramp associated with TEA 19

No direct impacts have been identified as arising from the location of the major facilities proposed at Leewood, Bibblewindi, the proposed infrastructure corridor, or Westport. The Leewood property contains a pair of SUGAR pits. The SUGAR pits are currently and will continue to be protected by barrier fencing.

To manage historic heritage within the project, a Historic Heritage Management Plan will also be developed and used in conjunction with the Field Development Protocol. The Field Development Protocol for the project provides a framework for the siting of gas wells and associated infrastructure. It seeks to systematically avoid, minimise and manage the environmental impacts of the project in accordance with, among other things, the findings of this Historic Heritage Assessment.

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## Appendix A

Co-ordinates of identified heritage sites recommended as 'surface development exclusion areas'

## Appendix A Co-ordinates of identified heritage sites recommended as 'surface development exclusion areas'

**Table 29 Co-ordinates of identified heritage sites recommended as 'surface development exclusion areas'**

Site Name	Easting	Northing
Logging Camp 7	748110.3517	6615708.777
Logging Camp 7	748170.057	6615700.665
Logging Camp 7	748152.3654	6615659.924
Logging Camp 7	748092.6359	6615666.972
Logging Camp 7	748110.3517	6615708.777
Cowallah Sawmill	745953.1294	6600049.088
Cowallah Sawmill	745936.1813	6600055.143
Cowallah Sawmill	745912.9729	6600086.279
Cowallah Sawmill	745945.3308	6600305.434
Cowallah Sawmill	745994.6775	6600321.306
Cowallah Sawmill	746067.3546	6600559.945
Cowallah Sawmill	746102.261	6600542.143
Cowallah Sawmill	745953.1294	6600049.088
Cowallah Complex A	745935.6552	6600246.662
Cowallah Complex A	745927.67	6600177.773
Cowallah Complex A	745891.4441	6600181.437
Cowallah Complex A	745899.4372	6600250.68
Cowallah Complex A	745935.6552	6600246.662
Cowallah Complex C	745903.8031	6600064.352
Cowallah Complex C	745906.698	6600066.411
Cowallah Complex C	745920.5728	6600050.508
Cowallah Complex C	745948.4358	6600023.659
Cowallah Complex C	745986.0032	6600016.423
Cowallah Complex C	745887.5126	6599974.757
Cowallah Complex C	745890.1661	6599997.365
Cowallah Complex C	745896.1181	6600008.563
Cowallah Complex C	745903.8031	6600064.352
Hardy's Hut	754069.3903	6615402.945
Hardy's Hut	754119.9867	6615401.754
Hardy's Hut	754119.2333	6615354.592
Hardy's Hut	754068.2724	6615355.436
Hardy's Hut	754069.3903	6615402.945

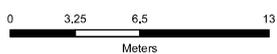
Site Name	Easting	Northing
Sugar - No Name	747872.3196	6618480.049
Sugar - No Name	747925.4071	6618478.122
Sugar - No Name	747925.4759	6618434.478
Sugar - No Name	747871.9916	6618434.641
Sugar - No Name	747872.3196	6618480.049
Sugar - Leewood	751483.2953	6622873.923
Sugar - Leewood	751542.3514	6622866.871
Sugar - Leewood	751538.9098	6622810.866
Sugar - Leewood	751479.854	6622817.917
Sugar - Leewood	751483.2953	6622873.923
Oil Well	749863.4133	6605137.834
Oil Well	749918.1495	6605133.019
Oil Well	749914.0018	6605077.122
Oil Well	749858.5868	6605083.371
Oil Well	749863.4133	6605137.834
Cowallah Complex B	746007.2259	6599981.755
Cowallah Complex B	746041.1413	6600017.107
Cowallah Complex B	746098.0891	6599985.695
Cowallah Complex B	746100.7938	6599932.856
Cowallah Complex B	746004.3034	6599931.879
Cowallah Complex B	746007.2259	6599981.755
Timber Extraction Area 1	753512.1724	6615647.366
Timber Extraction Area 1	753500.6817	6615642.008
Timber Extraction Area 1	753491.0399	6615645.517
Timber Extraction Area 1	753485.6817	6615657.008
Timber Extraction Area 1	753491.0399	6615668.499
Timber Extraction Area 1	753500.6817	6615672.008
Timber Extraction Area 1	753510.3235	6615668.499
Timber Extraction Area 1	753515.6817	6615657.008
Timber Extraction Area 2	747188.1242	6599677.151
Timber Extraction Area 2	747185.8309	6599675.717
Timber Extraction Area 2	747187.2904	6599672.078
Timber Extraction Area 2	747188.3617	6599676.978
Timber Extraction Area 2	747196.2174	6599682.211
Timber Extraction Area 2	747241.6675	6599701.665
Timber Extraction Area 2	747259.4492	6599686.734
Timber Extraction Area 2	747277.4988	6599683.856
Timber Extraction Area 2	747272.7596	6599666.194
Timber Extraction Area 2	747274.338	6599649.828
Timber Extraction Area 2	747264.7013	6599639.678
Timber Extraction Area 2	747233.8855	6599645.102
Timber Extraction Area 2	747232.5303	6599651.601

Site Name	Easting	Northing
Timber Extraction Area 2	747206.3488	6599658.061
Timber Extraction Area 2	747169.6558	6599674.247
Timber Extraction Area 2	747173.5519	6599677.774
Timber Extraction Area 2	747185.1845	6599679.281
Timber Extraction Area 3	747256.8733	6599819.625
Timber Extraction Area 3	747250.3788	6599812.32
Timber Extraction Area 3	747254.7315	6599806.118
Timber Extraction Area 3	747253.1235	6599802.472
Timber Extraction Area 3	747237.2141	6599796.737
Timber Extraction Area 3	747231.9751	6599790.258
Timber Extraction Area 3	747220.7963	6599789.317
Timber Extraction Area 3	747215.9834	6599791.768
Timber Extraction Area 3	747212.4656	6599806.337
Timber Extraction Area 3	747204.8358	6599813.834
Timber Extraction Area 3	747199.1712	6599816.76
Timber Extraction Area 3	747187.483	6599815.765
Timber Extraction Area 3	747180.1995	6599824.563
Timber Extraction Area 3	747188.6423	6599837.392
Timber Extraction Area 3	747199.2252	6599843.672
Timber Extraction Area 3	747227.6581	6599875.443
Timber Extraction Area 3	747236.4651	6599879.522
Timber Extraction Area 3	747248.2127	6599879.351
Timber Extraction Area 3	747257.6838	6599868.561
Timber Extraction Area 3	747258.1331	6599853.941
Timber Extraction Area 3	747255.0397	6599845.315
Timber Extraction Area 4	748198.8551	6599125.552
Timber Extraction Area 4	748187.3645	6599120.194
Timber Extraction Area 4	748175.8738	6599125.552
Timber Extraction Area 4	748172.3645	6599135.194
Timber Extraction Area 4	748177.7226	6599146.685
Timber Extraction Area 4	748187.3645	6599150.194
Timber Extraction Area 4	748197.0063	6599146.685
Timber Extraction Area 4	748202.3645	6599135.194
Timber Extraction Area 6	754481.5815	6597419.008
Timber Extraction Area 6	754470.0908	6597413.65
Timber Extraction Area 6	754460.449	6597417.159
Timber Extraction Area 6	754455.0908	6597428.65
Timber Extraction Area 6	754460.449	6597440.14
Timber Extraction Area 6	754470.0908	6597443.65
Timber Extraction Area 6	754481.5815	6597438.291
Timber Extraction Area 6	754485.0908	6597428.65
Timber Extraction Area 10	764895.0425	6621470.987
Timber Extraction Area 10	764894.4735	6621468.106
Timber Extraction Area 10	764884.7981	6621469.618
Timber Extraction Area 10	764893.1061	6621454.647
Timber Extraction Area 10	764877.1134	6621445.708
Timber Extraction Area 10	764858.1681	6621460.54
Timber Extraction Area 10	764852.88	6621478.787

Site Name	Easting	Northing
Timber Extraction Area 10	764866.3186	6621486.623
Timber Extraction Area 10	764873.1405	6621496.485
Timber Extraction Area 10	764884.733	6621497.955
Timber Extraction Area 12	750018.4907	6620635.358
Timber Extraction Area 12	750007	6620630
Timber Extraction Area 12	749995.5093	6620635.358
Timber Extraction Area 12	749992	6620645
Timber Extraction Area 12	749997.3582	6620656.491
Timber Extraction Area 12	750007	6620660
Timber Extraction Area 12	750018.4907	6620654.642
Timber Extraction Area 12	750022	6620645
Timber Extraction Area 18	745866.4907	6612590.358
Timber Extraction Area 18	745855	6612585
Timber Extraction Area 18	745843.5093	6612590.358
Timber Extraction Area 18	745840	6612600
Timber Extraction Area 18	745845.3582	6612611.491
Timber Extraction Area 18	745855	6612615
Timber Extraction Area 18	745864.6418	6612611.491
Timber Extraction Area 18	745870	6612600
Timber Extraction Area 19	746113.4907	6615491.358
Timber Extraction Area 19	746102	6615486
Timber Extraction Area 19	746090.5093	6615491.358
Timber Extraction Area 19	746087	6615501
Timber Extraction Area 19	746092.3582	6615512.491
Timber Extraction Area 19	746102	6615516
Timber Extraction Area 19	746111.6418	6615512.491
Timber Extraction Area 19	746117	6615501
Timber Extraction Area 21	756285.3025	6622190.587
Timber Extraction Area 21	756273.8118	6622185.229
Timber Extraction Area 21	756262.3212	6622190.587
Timber Extraction Area 21	756258.8118	6622200.229
Timber Extraction Area 21	756262.3212	6622209.871
Timber Extraction Area 21	756273.8118	6622215.229
Timber Extraction Area 21	756283.4537	6622211.719
Timber Extraction Area 21	756288.8118	6622200.229



**LEGEND**  
 Project area  
 Heritage area



Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 55

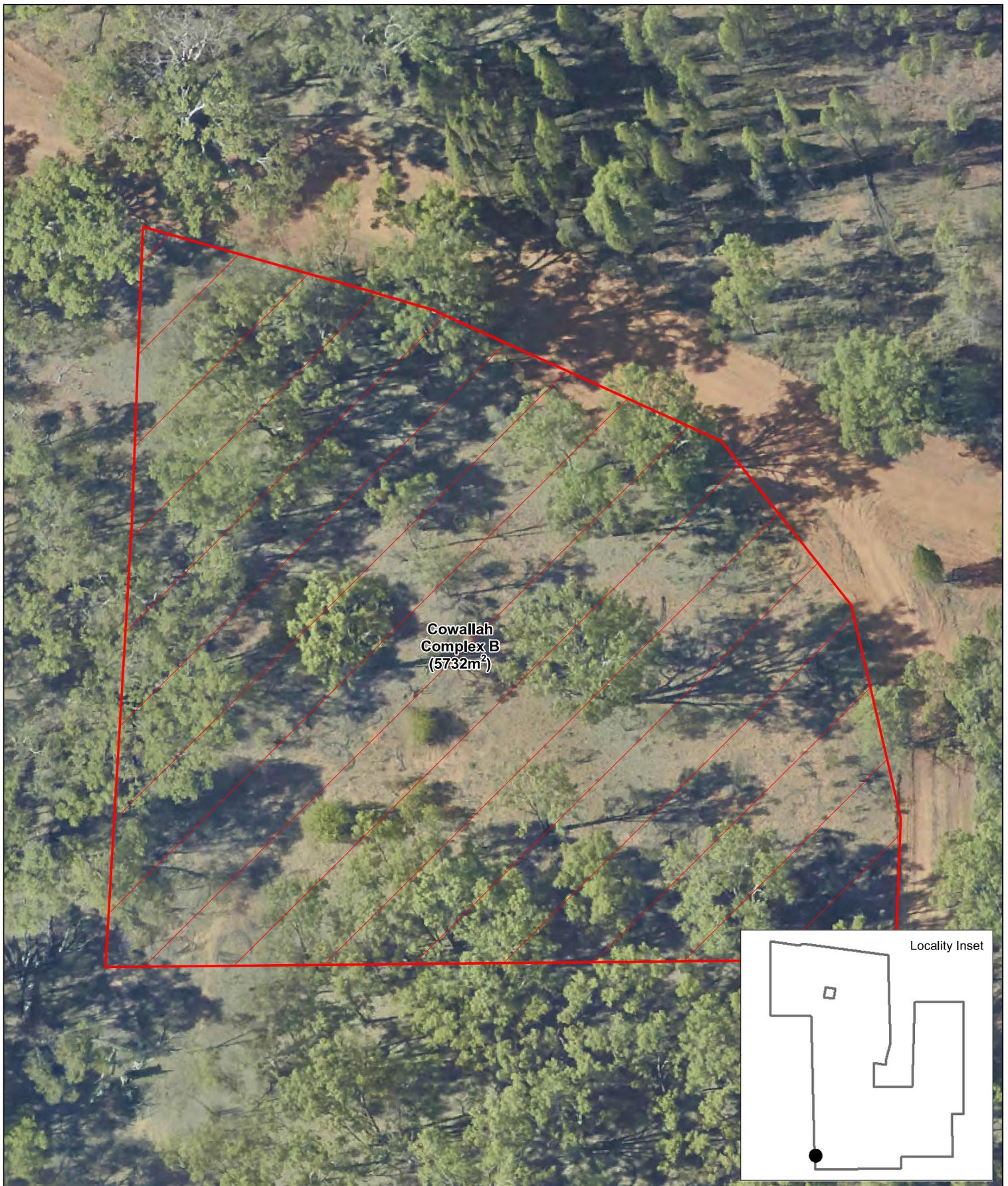


Narrabri Gas Project  
 EIS Technical Appendix Historic Heritage

Job Number | 21-22463  
 Revision | A  
 Date | 25 Jul 2016

**Heritage Area  
 Cowallah Complex A**

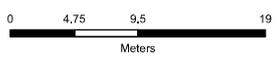
**Figure 13a**



**Cowallah  
Complex B  
(5732m<sup>2</sup>)**

Locality Inset

- LEGEND**
-  Project area
  -  Heritage area

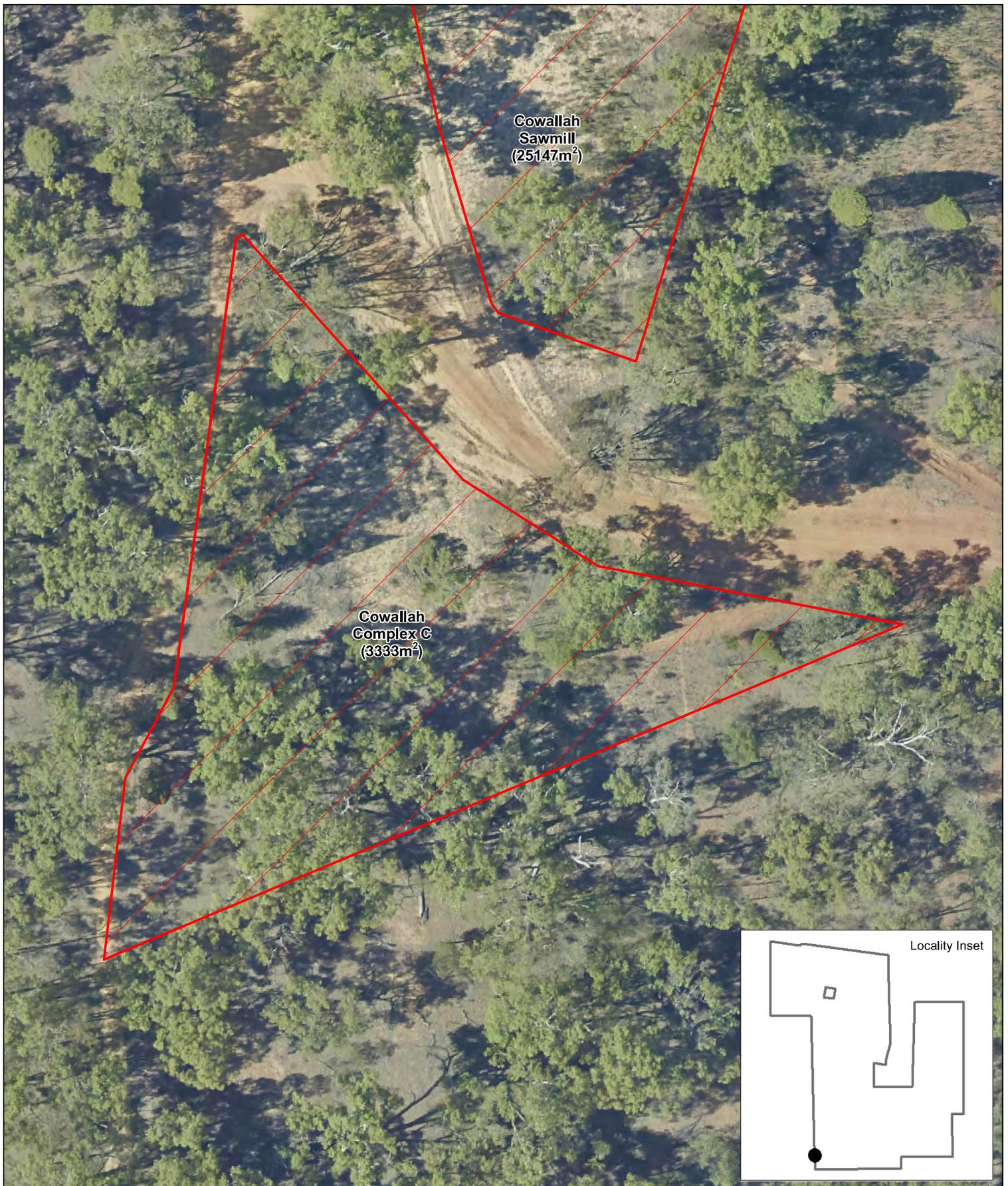


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EIS Technical Appendix Historic Heritage

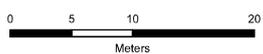
Job Number | 21-22463  
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**Heritage Area  
Cowallah Complex B**

**Figure 13b**



- LEGEND**
- Project area
  - Heritage area

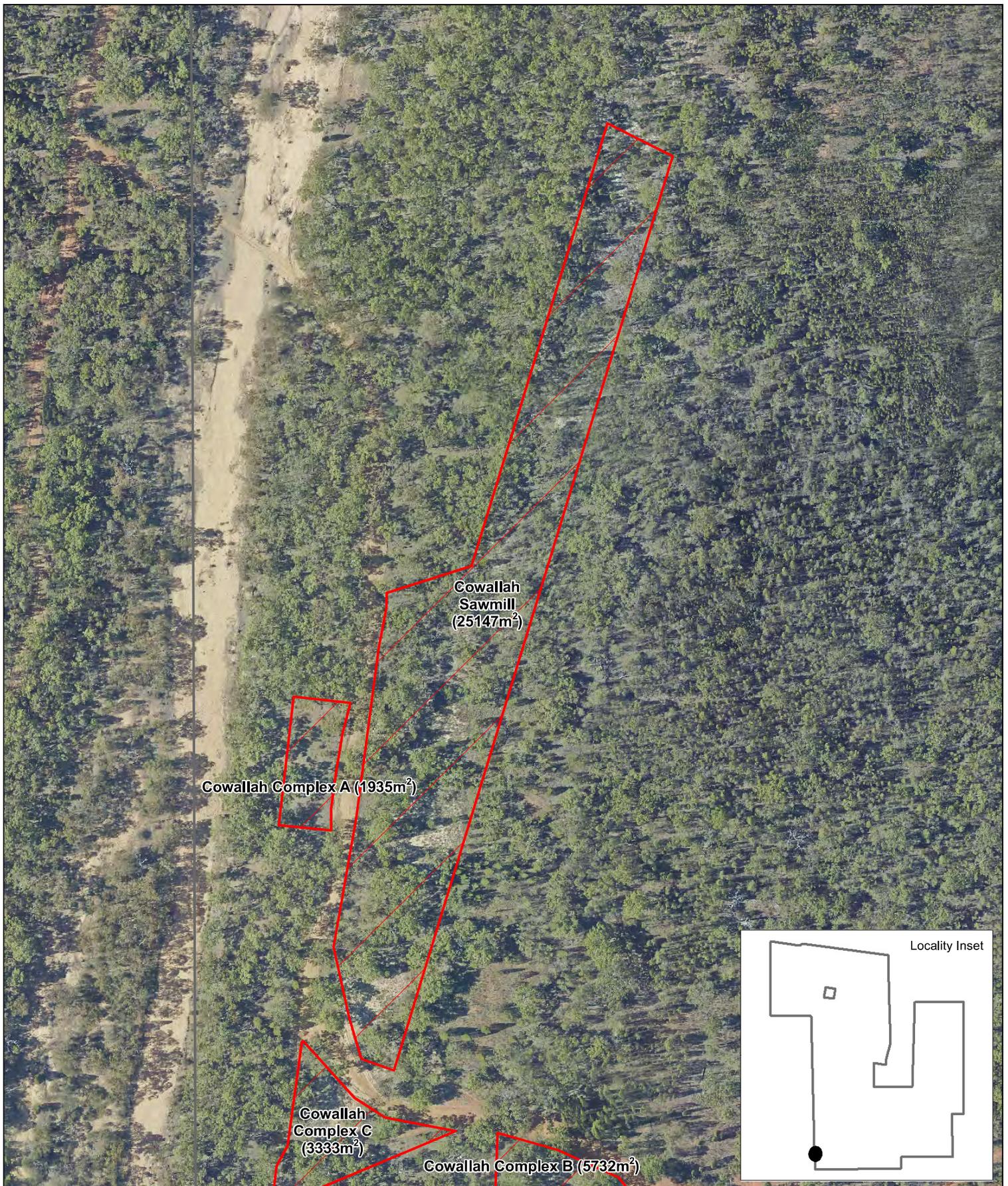


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EIS Technical Appendix Historic Heritage

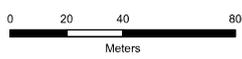
Job Number 21-22463  
Revision A  
Date 25 Jul 2016

**Heritage Area  
Cowallah Complex C**

**Figure 13c**



**LEGEND**  
 [White box] Project area  
 [Red outline box] Heritage area



Narrabri Gas Project  
 EIS Technical Appendix Historic Heritage

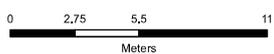
Job Number 21-22463  
 Revision A  
 Date 25 Jul 2016

**Heritage Area  
 Cowallah Sawmill**

**Figure 13d**



**LEGEND**  
 Project area  
 Heritage area



Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 55



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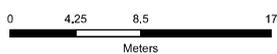
Job Number | 21-22463  
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**Heritage Area  
 Hardy's Hut**

**Figure 13e**



- LEGEND**
- Project area
  - Heritage area



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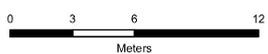
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**Heritage Area  
Logging Camp 7**

**Figure 13f**



**LEGEND**  
 [Grey box] Project area  
 [Red box] Heritage area



Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 55



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 EIS Technical Appendix Historic Heritage

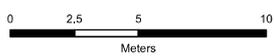
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Heritage Area  
 Oil Well

Figure 13g



- LEGEND**
- Project area
  - Heritage area



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**Heritage Area**  
**Sugar - Leewood**

**Figure 13h**

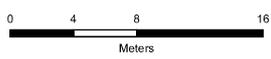
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Sugar -  
No Name  
(2964m<sup>2</sup>)

Locality Inset

- LEGEND**
-  Project area
  -  Heritage area



Narrabri Gas Project  
EIS Technical Appendix Historic Heritage

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Date 25 Jul 2016

**Heritage Area**  
**Sugar - No Name**

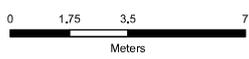
**Figure 13i**



**Timber  
Extraction Area 1  
(829m<sup>2</sup>)**

Locality Inset

- LEGEND**
-  Project area
  -  Heritage area



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**Heritage Area  
Timber Extraction Area 1**

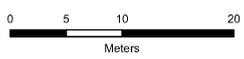
**Figure 13j**



Timber  
Extraction Area 2  
(3564m<sup>2</sup>)

Locality Inset

- LEGEND**
-  Project area
  -  Heritage area



Narrabri Gas Project  
EIS Technical Appendix Historic Heritage

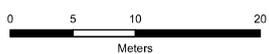
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**Heritage Area  
Timber Extraction Area 2**

**Figure 13k**



- LEGEND**
- Project area
  - Heritage area



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Heritage Area  
Timber Extraction Area 3

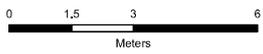
Figure 13I



**Timber Extraction  
Area 4  
(634m<sup>2</sup>)**

Locality Inset

- LEGEND**
-  Project area
  -  Heritage area



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**Heritage Area  
Timber Extraction Area 4**

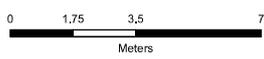
**Figure 13m**



Timber Extraction  
Area 6  
(519m<sup>2</sup>)

Locality Inset

- LEGEND
-  Project area
  -  Heritage area

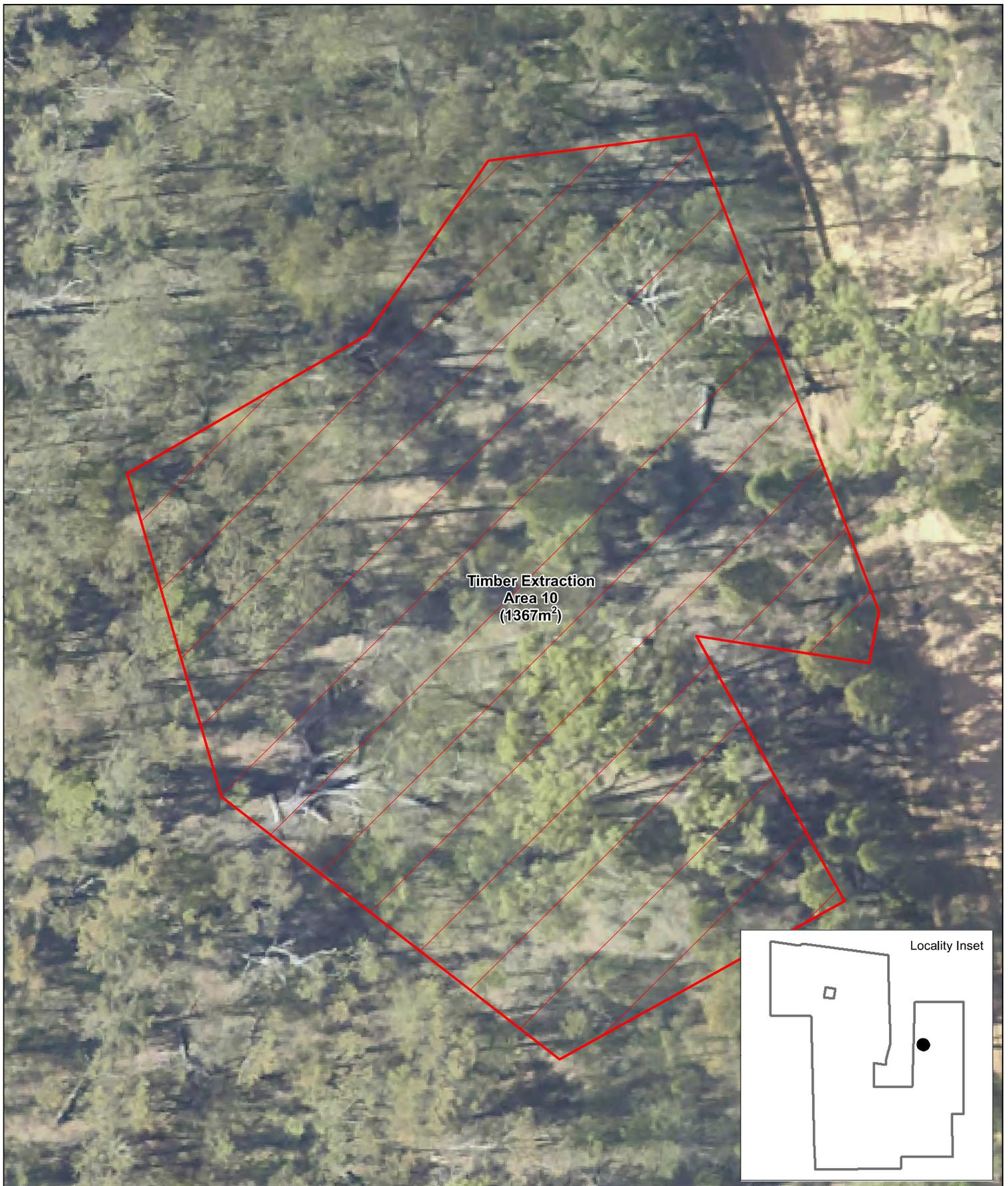


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EIS Technical Appendix Historic Heritage

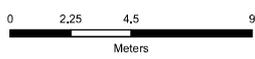
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Heritage Area  
Timber Extraction Area 6

Figure 13n



- LEGEND
- Project area
  - Heritage area



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**Heritage Area**  
**Timber Extraction Area 10**

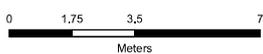
**Figure 13o**



Timber Extraction  
Area 12  
(570m<sup>2</sup>)

Locality Inset

- LEGEND
-  Project area
  -  Heritage area

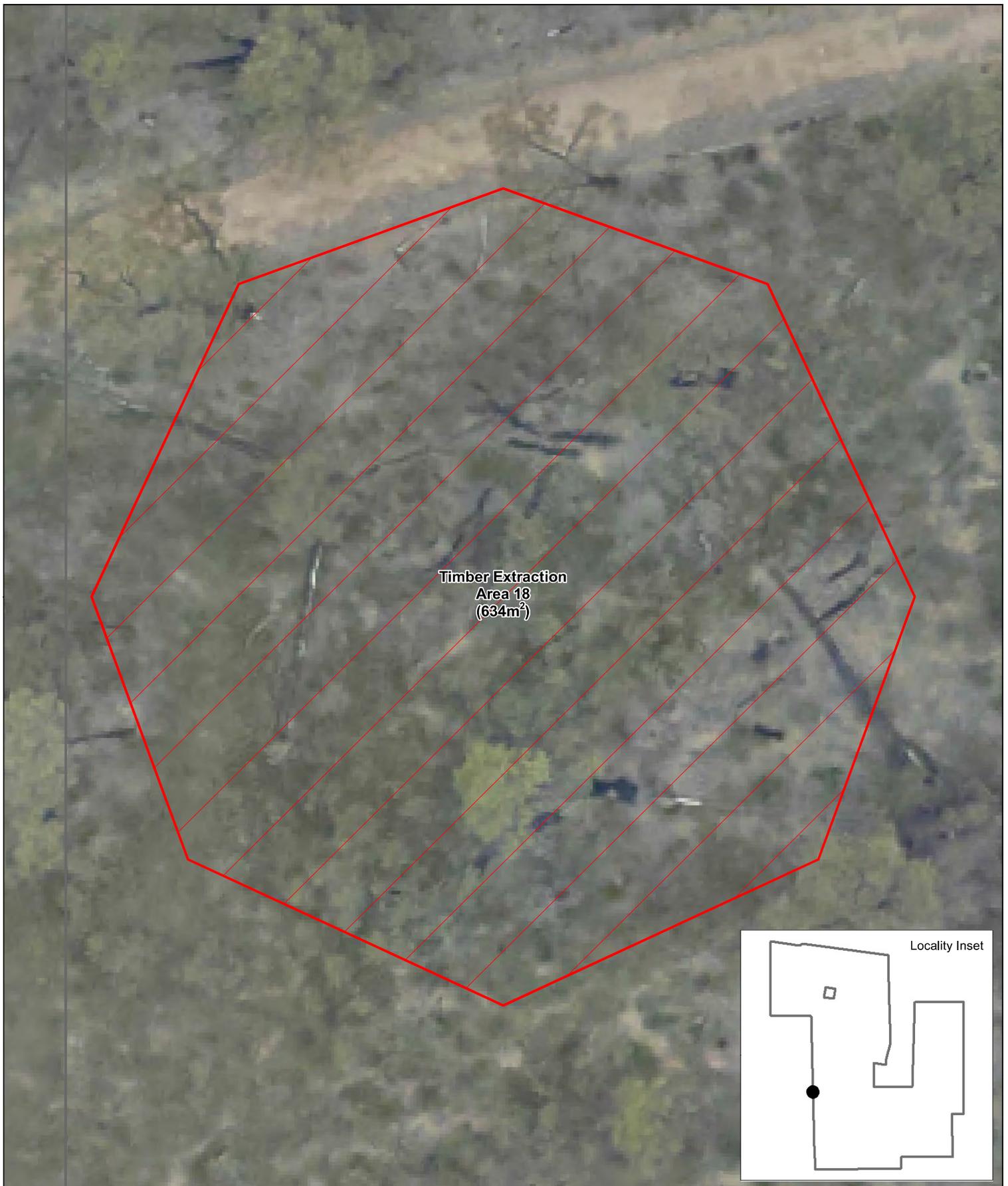


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Heritage Area  
Timber Extraction Area 12

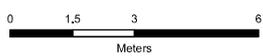
Figure 13p



Timber Extraction  
Area 18  
(634m<sup>2</sup>)

Locality Inset

- LEGEND
-  Project area
  -  Heritage area



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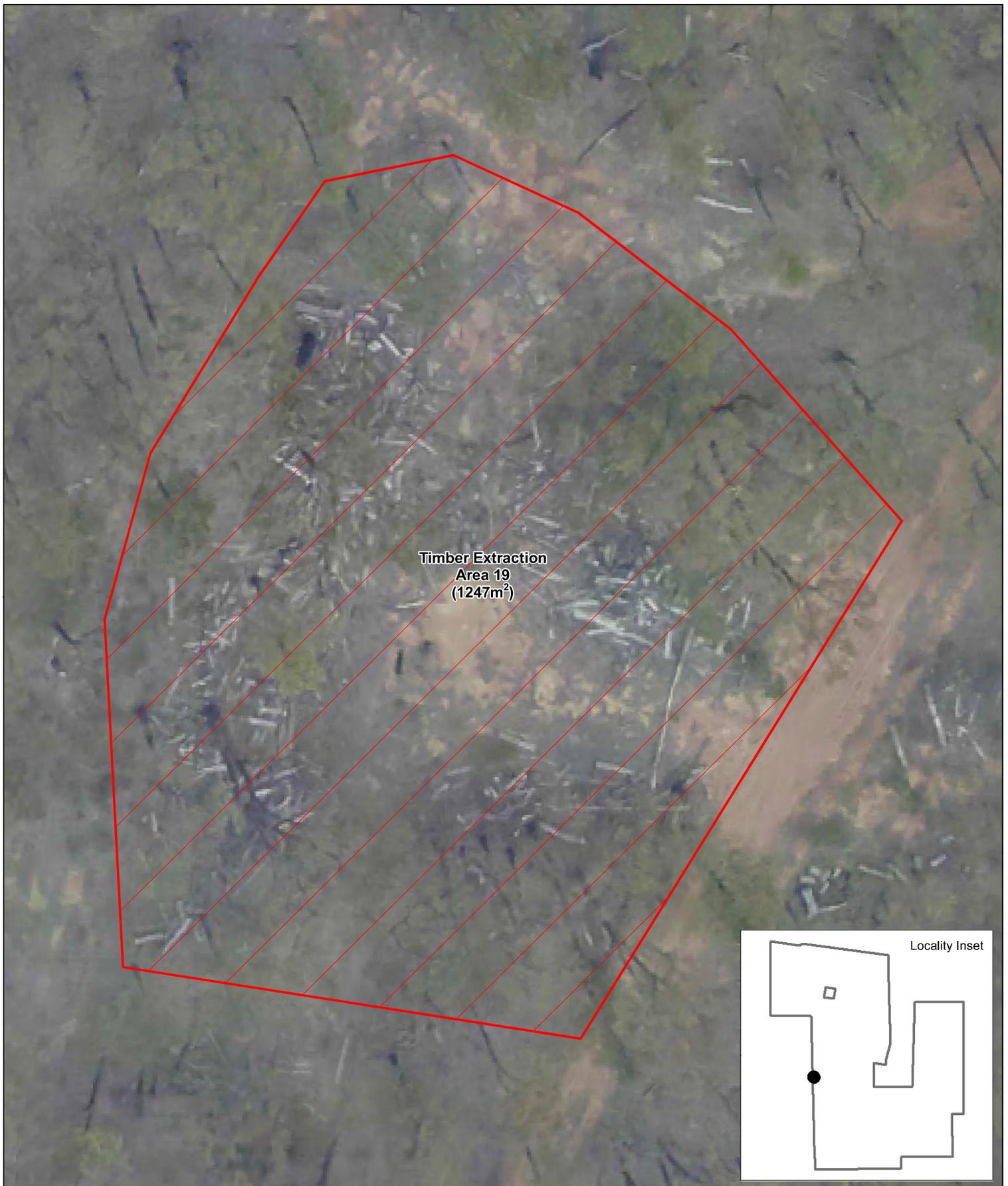
Heritage Area  
Timber Extraction Area 18

Figure 13q

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Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

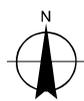
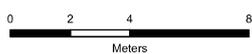
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Timber Extraction  
Area 19  
(1247m<sup>2</sup>)

Locality Inset

- LEGEND
-  Project area
  -  Heritage area



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Heritage Area  
Timber Extraction Area 19

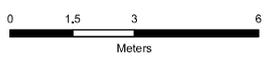
Figure 13r



Timber Extraction  
Area 21  
(476m<sup>2</sup>)

Locality Inset

- LEGEND**
-  Project area
  -  Heritage area



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**Heritage Area  
Timber Extraction Area 21**

**Figure 13s**

Appendix B

# Statement of Heritage Impact - Pilliga East logging cultural landscape

## Appendix B Statement of Heritage Impact - Pilliga East logging cultural landscape

### Introduction

The objective of a Statement of Heritage Impact is to evaluate and explain how the proposed development, rehabilitation or land use change will affect the heritage value of the site and/or place. A Statement of Heritage Impact should also address how the heritage value of the site/place can be conserved or maintained, or preferably enhanced by the proposed works.

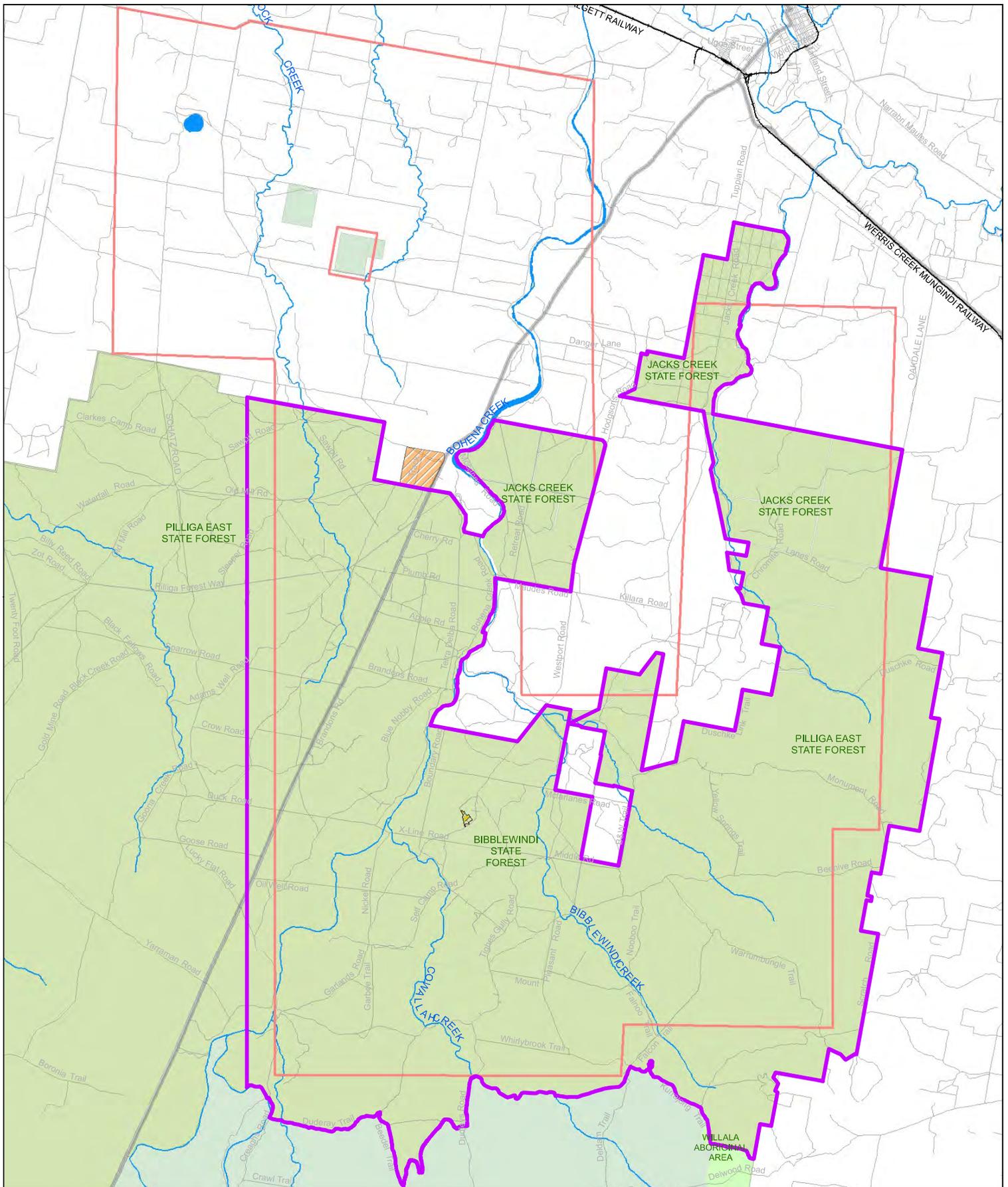
This report has been prepared in accordance with the NSW Heritage Office & Department of Urban Affairs and Planning *NSW Heritage Manual* (1996) and NSW Heritage Office *Statements of Heritage Impact* (NSW Heritage Office, 2002). The guidelines pose a series of questions as prompts to aid in the consideration of impacts arising from the project based on the proposed change. The questions vary in the guideline, depending on the nature of the impact to the heritage site, for example demolition of a structure, change of use, additions etc. or questions can be tailored to the specific project and its impacts.

The project will result in impacts to one identified item of heritage significance: the Pilliga East logging cultural landscape. Due to the nature of the landscape and the impacts, the guideline does not provide relevant questions under any one impact type. The questions outlined below have been taken from the various impact types to examine the impacts to the cultural landscape:

1. How has the impact of the new development on the heritage significance of the existing landscape been minimised?
2. Has evidence (archival and physical) of the previous landscape been investigated?
3. Are any known or potential archaeological deposits affected by the landscape works?
4. How does the work impact on views to, and from, adjacent heritage items?

### Nature of the Proposed Impacts

The development of the gas field will result in the exploration and appraisal activities including approximately 30 coreholes, approximately ten chip holes and approximately ten sets of four-well pilots up to 850 individual production wells from a maximum of 425 well sets within the project area. It is probable that not all well pads will be located within the curtilage of the Pilliga East logging cultural landscape. The well pads will result in the clearing of areas of 100x100 metres. Up to 20 communication towers will be located within the cleared areas associated with well pads. The gas wells will be connected by gas and water gathering lines, as well as access tracks. Existing roads would be used wherever possible, but where this is not possible a 12 metre right of way will be required during construction, rehabilitated to a seven metre track. The Bibblewindi major facilities area will comprise 16 hectares. The Bibblewindi to Leewood infrastructure corridor is proposed as a 30 metre wide corridor of 16 kilometres in length.



- LEGEND**
- Project area
  - Lakes and dams
  - Pilliga East Cultural Landscape Curtilage
  - Leewood
  - Watercourses
  - Bibblewindi
  - Roads
  - Parks and reserves
  - Train line
  - State forest
  - Aboriginal areas



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Environmental Impact Statement

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### Pilliga East Cultural Landscape Curtilage

Figure 14



## Impacts of Proposal on Heritage Significance

Section 6.9 provided an assessment of heritage significance, determining that the Pilliga East cultural landscape was of local historical, research and representative value. The significance of the landscape was summarised thus:

*The Pilliga East cultural landscape is of historical, research and representative significance. The landscape demonstrates the patterns of logging activities in the Pilliga East forest, the different intensities and methods of logging from the 1890s to the present. The timber extraction areas, sawmill sites, logging camps, timber loading ramps, logging tracks and other sites associated with logging activities that are scattered across the landscape, can tell the story of logging in the Pilliga East. Further research may indicate the variations in methods and areas of extraction between the early operations and the later State operated activities.*

*The Pilliga East cultural landscape is of local research significance. The creation of a cultural landscape map of the TEAs, sawmill sites, logging camps, timber loading ramps and logging tracks could provide insights into the pattern of logging in the forest.*

*The Pilliga East cultural landscape is of local representative significance, it contains all the sites characteristic of logging activities (TEAs, sawmill sites, logging camps, timber loading ramps and logging tracks).*

It is anticipated that the timber extraction areas, sawmill sites, logging camps, timber loading ramps and logging tracks can be avoided during the placement of gas wells, access tracks, gas and water gathering lines. There is some flexibility in the placement of well pads, within the parameters imposed by local geology and in conjunction with other social and environmental constraints, which differentiates it from other projects. Where possible, direct impacts will be avoided during the construction by relocating well pads. As such, the components of the landscape are likely to remain in place, with the project infrastructure forming another layer on the landscape. This process will be managed through the historic heritage management plan (the plan). The role of the plan is to identify the historic heritage items within the project area, together with measures to mitigate unavoidable impacts and a procedure to be enacted if additional sites are identified. The plan will sit underneath and inform the field development protocol. The plan is to be referred to when works are proposed in proximity to identified heritage items, when micro-siting of well pads is being undertaken or access roads or pipelines routes being determined in order to:

- Understand the location of identified sites, with a view to avoidance, if possible;
- Understand the mitigation measures required if avoidance is not possible; and
- Understand the procedure should additional sites be identified.

## Assessment of Heritage Impacts

### 1. How has the impact of the new development on the heritage significance of the existing landscape been minimised?

Santos will endeavour to avoid impacts to identified sites wherever possible, given the hierarchy of social and environmental constraints. The following sites have been identified for protection, which will mitigate any potential impacts to the Landscape and the TEAs, logging camps and timber loading ramps as collections with heritage significance:

- Cowallah Parish Plan Sawmill;
- Logging Camp 7;
- Cowallah Sites Complex;
- Hardys Hut;
- Pilliga 1 Oil Well;
- SUGAR pits - located at the Leewood site and the intersection of Plumb Road and No Name Road;
- Timber extraction areas 1, 2, 3, 4, 6, 10, 12, 18, 19 and 21; and

- Timber loading ramp 1, 5, 6, 9 and ramp associated with TEA 19.

**2. Has evidence (archival and physical) of the previous landscape been investigated?**

Section 4.0 constitutes an archival investigation of the previous landscape. Section 6.0 outlines the sites that have been identified to date and constitutes a physical investigation.

**3. Are any known or potential archaeological deposits affected by the proposal?**

Some of the 53 identified sites have archaeological potential. It is also probable that as yet unidentified sites with archaeological deposits are contained within the cultural landscape. Wherever possible, these sites will be avoided. Should impacts be unavoidable for operational reasons or due to competing considerations, the archaeological deposits will be mitigated under the Archaeological Research Design and Methodology contained within the proposed Historic Heritage Management Plan.

**4. How does the work impact on views to, and from, adjacent heritage items?**

Due to the dense nature of the vegetation within the Pilliga East forest, there are not currently expansive views to or from the identified sites. Even those sites that are located adjacent to current access tracks are usually only visible within 20 metres of the site due to the screening effect of the vegetation on either side.

## Statement of Heritage Impact

The impacts to the heritage significance identified above are summarised in Table 30.

**Table 30 Summary of impacts to the Pilliga East logging cultural landscape**

Impact Type	Impact
Major negative impacts (substantially affects fabric or values of state significance)	None.
Moderate negative impacts (irreversible loss of fabric or values of local significance; minor impacts on State significance)	None.
Minor negative impacts (reversible loss of local significance fabric or where mitigation retrieves some value of significance; loss of fabric not of significance but which supports or buffers local significance values)	None.
Negligible or no impacts (does not affect heritage values either negatively or positively)	<p>The project will make every attempt to avoid directly impacting identified sites that comprise the cultural landscape. On this basis, the project will result in an additional layer of human intervention that will sit beside the logging cultural landscape and previous historic oil &amp; gas exploration.</p> <p>Additionally, by preserving the sites nominated as surface development exclusion areas the project will mitigate impacts to the Pilliga East Cultural Landscape by continuing to provide a representative collection of sites that are able to demonstrate a pattern of use within the east Pilliga for logging purposes.</p> <p>Likewise, due to the dense nature of the vegetation in the Pilliga East, it is considered unlikely that there will be visual impacts. The nominated buffers will provide a forest setting from which the logging sites can be viewed and appreciated in context.</p>
Minor positive impacts (enhances access to, understanding or conservation of fabric or values of local significance)	None
Major positive impacts (enhances access to, understanding or conservation of fabric or values of state significance)	None

In summary, it is not anticipated that the project will adversely impact the identified heritage significance of the Pilliga East cultural landscape.

Appendix C

# Statement of Heritage Impact - Siding Springs Observatory

## Appendix C Statement of Heritage Impact - Siding Springs Observatory

### Introduction

The Secretary-General's Environmental Assessment Requirements included a requirement to undertake a Statement of Heritage Impact addressing the Siding Springs Observatory. The Observatory is listed under Section 341ZC, which requires Commonwealth Government agencies to maintain a register of heritage assets. The Siding Springs has been identified by the Australian National University as holding heritage value. A heritage assessment prepared by High Ground Consulting (2006) concluded that the Observatory was of State significance, holding historical, associative, aesthetic, technical/research significance, rarity and representative values.

As the object and method for completing a Statement of Heritage Impact has been outlined in Appendix B and Section 2.5 it is not repeated here. As no impacts were identified, there are no questions in the guidelines of relevance. The questions regarding new development adjacent to a heritage item have been used as a matter of process. The guidelines pose the following questions:

1. How is the impact of the new development on the heritage significance of the item or area to be minimised?
2. Why is the new development required to be adjacent to a heritage item?
3. How does the curtilage allowed around the heritage item contribute to the retention of its heritage significance?
4. How does the new development affect views to, and from, the heritage item? What has been done to minimise negative effects?
5. Is the new development sympathetic to the heritage item? In what way (e.g. form, siting, proportions, design)?
6. Will the additions visually dominate the heritage item?
7. Will the public and users of the item still be able to view and appreciate its significance?

### Nature of the Potential Impacts

The Telescope is located approximately 78 km south west of the southernmost point of the Project area. The project will not be visible and there will be no other visual effects through sky glow and the like.

### Impacts of Proposal on Heritage Significance

The project will not be visible from the Observatory and therefore the associative, aesthetic significance will not be impacted. The operation of the Observatory will not be affected by the project through sky glow or other mechanisms (refer EIS Appendix Q - Visual Impact Assessment) and therefore the historic, rarity, representative and technical/research significance of the Observatory will not be impacted.

### Assessment of Heritage Impacts

1. **How is the impact of the new development on the heritage significance of the item or area to be minimised?**

Due the nature of the project's activities and the distance from the Observatory (80kms), there will be no impact on the Observatory's operations or heritage significance.

2. **Why is the new development required to be adjacent to a heritage item?**

The project is not located adjacent to the Observatory, but rather more than 80kms to the north-east. The project is located in an area designated for the purposes of 'forestry, recreation and mineral extraction' under the *Brigalow and Nandewar Community Conservation Area Act 2005*.

**3. How does the curtilage allowed around the heritage item contribute to the retention of its heritage significance?**

The project will not affect the heritage significance of the Observatory or the surrounding grounds and buildings due to its distance from the observatory (80kms) and the project will not be visible from the observatory

**4. How does the new development affect views to, and from, the heritage item? What has been done to minimise negative effects?**

The project will not affect views of or from the observatory due to its distance from the observatory (80kms) and the project will not be visible from the observatory.

**5. Is the new development sympathetic to the heritage item? In what way (e.g. form, siting, proportions, design)?**

Due to the projects significant distance from the observatory, there are no form, siting or design considerations required.

**6. Will the additions visually dominate the heritage item?**

The project will not be visible from the observatory and its activities will not impact the Observatory's observations.

**7. Will the public and users of the item still be able to view and appreciate its significance?**

There will be no impact on the public or users of the Observatory or their ability to view the Observatory and appreciate its significance as a result of the project.

## Statement of Heritage Impact

The impacts to the heritage significance identified above are summarised in Table 31.

**Table 31 Summary of impacts to the Siding Springs Observatory**

Impact Type	Impact
Major negative impacts (substantially affects fabric or values of state significance)	None.
Moderate negative impacts (irreversible loss of fabric or values of local significance; minor impacts on State significance)	None.
Minor negative impacts (reversible loss of local significance fabric or where mitigation retrieves some value of significance; loss of fabric not of significance but which supports or buffers local significance values)	None.
Negligible or no impacts (does not affect heritage values either negatively or positively)	The project will not impact on the heritage significance of the Sidings Springs Observatory as the project is located 80 km from the Observatory and there will be no visual or other impacts.
Minor positive impacts (enhances access to, understanding or conservation of fabric or values of local significance)	None
Major positive impacts (enhances access to, understanding or conservation of fabric or values of state significance)	None

In summary, the project will not adversely impact the identified heritage significance of the Siding Springs Observatory.

