

CHAPTER 15

Cultural heritage

ILLABO TO STOCKINBINGAL ENVIRONMENTAL IMPACT STATEMENT

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INLAND
RAIL

An Australian Government Initiative

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15. Cultural heritage

This chapter provides an assessment of non-Aboriginal cultural heritage, and a summary of the assessment of Aboriginal cultural heritage for the Inland Rail Illabo to Stockinbingal (I2S) project (the proposal). It describes the existing environment, assesses the impacts of construction and operation of the proposal, and provides recommended mitigation and management measures. The full Aboriginal Cultural Heritage Assessment Report (ACHAR) is in Technical Paper 7: Aboriginal Cultural Heritage Assessment Report.

15.1 Overview

The potential for heritage impacts has been avoided and/or minimised during design development by avoiding known heritage items, such as scar trees, and including bridges to protect riparian areas with potential Aboriginal heritage sensitivity, as far as practicable.

15.1.1 Aboriginal heritage

The proposal falls within the traditional lands of the Wiradjuri people. Aboriginal consultation has been undertaken for the proposal in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (Department of Environment, Climate Change and Water (DECCW), 2010b). This included participation by Registered Aboriginal Parties (RAPs) in the site survey and the review of draft Aboriginal cultural heritage assessment report. Consultation with other Indigenous stakeholders has included Wagga Wagga and Young Local Aboriginal Land Councils (LALCs) and Mawang Galway Elders Group.

Results of desktop assessments, field surveys and test excavations identified 22 separate locations with Aboriginal heritage sensitivity, including four scar trees, in the study area.

During construction, activities would result in direct impacts to 7 of the 22 Aboriginal sites from the disturbance of part, or all, of a heritage item or place, or changes to its setting.

Proposed measures to address these impacts include:

- ▶ Additional archaeological survey and test excavation (if required) would be performed prior to the commencement of impact works at Zone 5 and 6, which were unable to be surveyed, to confirm the precise nature and extent of the archaeological resource and appropriate mitigations. Parts of these zones were considered to have archaeological potential; should work occur in these parts, further survey would be required.
- ▶ An Aboriginal cultural heritage management plan would be prepared in consultation with RAPs and implemented as part of the Construction Environmental Management Plan (CEMP). This plan would include:
 - ▶ A salvage methodology would be prepared by a suitably qualified archaeologist in consultation with relevant RAPs.
 - ▶ An unexpected finds procedure would be created to provide a consistent method for managing any unexpected heritage or archaeological items.

During operation, no impacts to Aboriginal heritage are anticipated.

The proposal's development would continue to be informed by the Aboriginal consultation that has been undertaken for the proposal.

15.1.2 Non-Aboriginal heritage

Two non-Aboriginal heritage-listed items were identified within the proposal site: the Stockinbingal Railway Station and Stockinbingal Heritage Conservation Area. A significance assessment was not conducted as these identified non-Aboriginal heritage items were deemed unlikely to be directly impacted by the proposal during construction or operation.

During construction, activities at these locations would be minimal and no direct impacts would occur to non-Aboriginal heritage-listed items. Detailed design and construction planning would avoid direct impacts on these items/sites of non-Aboriginal heritage significance, as far as reasonably practicable.

During operation, the key potential impacts and proposed measures to address them are as follows:

The proposal could have indirect vibration impacts on non-Aboriginal heritage structures, including Cohen's Trade Palace (CWA Rooms), Billabong Creek rail underbridge and the Stockinbingal Railway Station. Measures as considered in Chapter 16: Noise and vibration would minimise the potential for indirect impacts to non-Aboriginal heritage as a result of the proposal.

15.2 Approach

A summary of the approach to the assessments is provided in this section, including the legislation, guidelines and/or policies driving the approach and the methodology used to undertake the assessments. A more detailed description of the approach and methodology is provided in Technical Paper 7.

15.2.1 Legislative and policy context to the assessment

15.2.1.1 Aboriginal heritage

The Aboriginal heritage assessment was undertaken in accordance with Secretary's Environmental Assessment Requirements (SEARs) and with reference to the requirements of relevant legislation, policies and assessment guidelines including:

- ▶ *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Cth) (ATSHIP Act)
- ▶ *Native Title Act 1993* (Cth) (NT Act)
- ▶ *National Parks and Wildlife Act 1974* (NSW) (NPW Act)
- ▶ *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act)
- ▶ *Aboriginal Land Rights Act 1983* (NSW)
- ▶ *Aboriginal cultural heritage consultation requirements for proponents* (Department of Environment, Climate Change and Water (DECC) (now Heritage NSW), 2010c)
- ▶ *Guide to investigating assessing and reporting on Aboriginal Cultural Heritage in NSW* (NSW OEH, 2011a)
- ▶ *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (NSW DECCW, 2010a).

The main piece of legislation relevant to Aboriginal heritage in NSW is the NPW Act and supporting regulation. The NPW Act defines an Aboriginal object as 'any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales'.

Under section 84 of the NPW Act, the minister may declare an Aboriginal place that, in the opinion of the minister, is or was of special significance with respect to Aboriginal culture. Section 86(4) of the NPW Act states that a person must not harm or desecrate an Aboriginal place. Under section 86(4) of the NPW Act, it is also an offence to harm or desecrate an Aboriginal object or Aboriginal place, unless a defence applies.

Under section 87(1) of the Act, it is a defence to a prosecution offence if the harm or desecration of an Aboriginal object was authorised by an Aboriginal Heritage Impact Permit (AHIP) and the activities were carried out in accordance with that AHIP. As described in Chapter 3: Statutory context, the provisions of the EP&A Act provide an exemption from the requirement for an AHIP for activities approved as state significant infrastructure (SSI).

The NPW Act requires due diligence to be exercised to check if Aboriginal sites would be harmed by works. Aboriginal sites recorded by the AHIMS include:

- ▶ Aboriginal objects (as defined under the NPW Act) or groups of objects
- ▶ an area of land containing Aboriginal objects
- ▶ a 'potential archaeological deposit' (or PAD), which is an area where, based on previous investigation, Aboriginal objects are likely to be present.

The EPBC Act also provides provisions that list and protect Aboriginal sites or places considered to be of national significance. No Aboriginal sites or places listed under the EPBC Act were identified in the study area, and therefore there are no requirements under the EPBC Act relevant to the assessment.

15.2.1.2 Non-Aboriginal heritage

The *Heritage Act 1977* (NSW) (Heritage Act) includes provisions to conserve the state's environmental heritage, and provides for the identification, registration, and protection of items of state heritage significance, constitutes the Heritage Council of NSW, and confers on it functions relating to the state's heritage.

Some approvals under the Heritage Act (that is, approvals under Part 4 and Division 8 of Part 6, and excavation permits under section 139) are not required for SSI projects.

The EP&A Act establishes the framework for heritage values to be formally assessed in land use planning and local development consent processes. Under the EP&A Act, the definition of 'environment' includes cultural heritage. The Heritage Act defines 'environmental heritage' as places, buildings, works, relics, movable objects or precincts considered significant based on historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values.

Items and places of national heritage significance, as well as heritage places owned by the Australian Government, are managed under the EPBC Act. The EPBC Act provides for the identification, registration, and protection of items of national heritage significance. National heritage is one of the nine matters of national environmental significance protected by the EPBC Act.

This non-Aboriginal heritage assessment has been undertaken with consideration of SEARs and with reference to the requirements of relevant legislation, policies and/or assessment guidelines including:

- ▶ *Criteria for the assessment of excavation directors* (NSW Heritage Council, 2011)
- ▶ *NSW Heritage Manual* (Heritage Office and Department of Urban Affairs and Planning, 1996)
- ▶ *Assessing Heritage Significance* (NSW Heritage Office, 2001)
- ▶ *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Australia ICOMOS, 2013) ('the Burra Charter').

15.2.2 Secretary's Environmental Assessment Requirements

The SEARs relevant to heritage, together with a reference to where they are addressed in the EIS, are provided in Appendix A.

15.2.3 Methodology

15.2.3.1 Study area

The study area for the field investigations and associated assessments was based on a 'Focus Area of Investigation' (FAI), a corridor generally 250 metres (m) in width (with some variations) within which the proposal is generally located. The concept of the 250 m FAI was established early in the design development process to establish an extent for field surveys, which subsequently informed the development of a preferred alignment and associated proposal site as described in Chapter 6: Alternatives and proposal options.

The database searches undertaken for Aboriginal and non-Aboriginal cultural heritage were based on a search area of 500 m from the FAI to identify heritage items surrounding the proposal site.

15.2.3.2 Key tasks—Aboriginal cultural heritage

The Aboriginal cultural heritage assessment was undertaken in accordance with the guidelines detailed in section 15.2.1.1 and involved:

- ▶ a desktop review of archaeological literature and data to determine if Aboriginal sites have been previously identified within the study area, including a search or review of:
 - ▶ the Aboriginal Heritage Information Management System (AHIMS) in July 2018, September 2018, October 2018 and February 2021
 - ▶ the EPBC Act Protected Matters Search Tool to identify any Commonwealth-listed Aboriginal heritage sites or places near the proposal site
 - ▶ *Cootamundra Local Environmental Plan 2013* (Cootamundra LEP) and *Junee Local Environmental Plan 2012* (Junee LEP)
 - ▶ previous archaeological investigations, including the *Inland Rail—Illabo to Stockinbingal. Aboriginal Objects Due Diligence Desktop Assessment* (Niche Environment and Heritage, 2016)
- ▶ consultation with registered Aboriginal parties (described in the following section)
- ▶ a field survey undertaken between 26 and 30 November 2019 to identify any visible surface evidence of cultural heritage sites and landforms. An additional limited survey was also undertaken in January 2019
- ▶ assessing the significance of sites/areas of potential archaeological sensitivity within the proposal site requiring further investigation
- ▶ developing a predictive model to assist in determining archaeological potential and preparing an Aboriginal Archaeological Research Design (AARD report)

- ▶ completing archaeological test excavations between 6 and 22 May 2019, and 24 September and 2 October 2019, and 7 to 10 December 2020 by suitably qualified archaeologists (refer to Technical Paper 7)
- ▶ preparation of an Aboriginal Cultural Heritage Assessment Report (Technical Paper 7), including:
 - ▶ a description of the Aboriginal heritage investigations undertaken
 - ▶ a description of the consultation processes
 - ▶ an overview of the legislative and statutory requirements
 - ▶ an assessment of the impact to recorded Aboriginal sites and areas of archaeological potential
 - ▶ recommended management and mitigation measures.

Aboriginal consultation

Aboriginal consultation has been undertaken for the proposal in accordance with the requirements of *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW, 2010b). This included:

- ▶ notification of the proposal, assessment, and registration of interest of Aboriginal stakeholders, including:
 - ▶ letters requesting contact details for Aboriginal people or organisations who may hold cultural knowledge and may identify heritage issues relevant to the study area, which were sent via email on 17 September 2018 sending letters to Aboriginal parties identified by agencies on 9 October 2018 providing notification of the assessment and an opportunity to register their interest for the proposal
 - ▶ placing an advertisement in The Riverina Leader on 26 September 2018
 - ▶ a total of 11 Aboriginal parties registered an interest for the proposal and became Registered Aboriginal Parties (RAPs)
- ▶ facilitating a process whereby RAPs could contribute to culturally appropriate information gathering and the research methodology, provide information that will enable the cultural significance of Aboriginal objects and/or places on the proposal site to be determined and have input into the development of any cultural heritage management options. RAP contributions included:
 - ▶ participation in a survey of the study area and discussion of the proposal
 - ▶ registration of interest, and participation in the archaeological test excavation program to identify Aboriginal objects, recording sites and determine the potential archaeological extent of deposits. Test excavations took place between 6 and 22 May 2019, 24 September and 2 October 2019 and 7 and 10 December 2020
 - ▶ attending a site inspection on 30 January 2019 to inspect the suspected men's business site.

An AARD project methodology report for survey and test excavation fieldwork was provided to RAPs for comment on the 26 October 2018 for a 28-day review period. After conducting field surveys of the study area, the AARD project methodology report was revised to include additional test excavation locations and was sent to the RAPs on 25 February 2019.

Due to revisions in the design of the proposal as discussed in Chapter 6: Alternatives and proposal options, further test excavation was identified as being necessary at the north end of the study area. A revised project methodology was issued on 4 November 2020 to outline an approach to additional test excavations in a new part of the study area—Zone 11 East.

A draft copy of the ACHAR that assessed the original proposal design was sent to the RAPs in October 2019 for a 28-day review period. The RAPs were provided with a copy of the updated draft ACHAR for review and comment on 11 June 2021. In accordance with the Heritage NSW consultation guidelines, the RAPs were given 28 days to provide comment on the draft report. Only one response was received from RAPs. All community comments were appended to the final ACHAR.

Site survey

Based on the results of the desktop review of archaeological literature and data, and consultation with the Aboriginal community, 11 zones (Zone 1–Zone 11) were identified to contain potential archaeological sensitivity and targeted for site survey. Zone 11 was separated into two sub-zones for investigation: Zone 11, which was initially investigated in 2018 and Zone 11 East, which was established in December 2020 to account for changes to the proposal alignment following design development (refer to Chapter 6: Alternatives and proposal options). Due to private property access restrictions, two zones (Zone 5 and Zone 6) were not able to be surveyed physically. The location of the zones is identified in Figure 15-1.

Archaeological test excavations

Based on the results of the site survey, four zones—Zone 1, 2, 4 and 11 (comprising Zones 11 and 11 East)—were considered to have archaeological potential and were selected for archaeological testing. Testing of two areas considered to have low sensitivity (Zone 7 and 8) was also undertaken to validate the assumptions on landform and site features used to determine the potential sensitivity. The methodology for archaeological test excavation is detailed in Appendix F of Technical Paper 7.

Further details on the methodology for the assessment is in Chapter 3 of Technical Paper 7.

TABLE 15-1: SURVEY ZONES WITH NEW SITE AND SITE TYPE DATA WITHIN THE STUDY AREA

Zone	New site recording	AHIMS ID ¹	Site type
1	ARTC1	50-5-0266	Low-density artefact scatter/isolated artefacts
	ARTC2	50-5-0267	
	ARTC3	50-5-0274	
	ARTC4	50-5-0276	
	ARTC5	50-5-0275	Grindstone and zone of archaeological potential
	Site Zone 1	50-5-0280	Zone of archaeological potential
2	ARTC6	50-5-0277	Scarred tree
	Site Zone 2	50-5-0287	Zone of archaeological potential
3	— ²	50-5-0117 ²	Scarred tree
	—	50-5-0120 ²	Scarred tree
	—	50-5-0121 ²	Scarred tree
	ARTC18	50-5-0286	Scarred tree
	ARTC 20	AHIMS pending	Scarred tree
4	ARTC7	50-5-0285	Isolated artefact
	ARTC8	50-5-0284	Artefact scatter and zone of archaeological potential
	ARTC9	50-5-0283	Isolated artefact
7	ARTC12	50-5-0268	Isolated artefacts
	ARTC13	50-5-0269	
	ARTC14	50-5-0270	
	ARTC15	50-5-0271	
	ARTC16	50-5-0272	
	ARTC17	50-5-0273	
8	—	—	—
11	ARTC10	50-2-0054	Isolated artefacts and zone of archaeological potential
	ARTC11	50-2-0055	
11 East ³	ARTC19	50-2-0058	Scarred tree

1. New site recordings identified during survey were subsequently registered as AHIMS sites.

2. Three scarred trees were previously recorded in the AHIMS search.

3. Zone 11 East was not included in the original survey, but subsequent investigation revealed a scarred tree within a new zone of the proposed alignment.

The previously recorded scarred trees (AHIMS 50-5-0117, 50-5-0120 and 50-5-0121) were found to have scars that were natural, rather than cultural, in origin.

Potential archaeological deposits

Four key areas of PAD were identified during the archaeological surveys as requiring archaeological test excavation. These were located at Zones 1, 2, 4, 11 and 11 East (11 and 11 East shared one area of PAD). Three of the four PADs are directly related to water courses (PADs in Zones 1, 2, 11 and 11 East), while one of the PADs is associated with the site ARTC8 (in Zone 4).

The results of the archaeological survey were refined to produce a test excavation methodology targeted to newly identified sites, areas of PADs and areas of specific landforms as necessary to formulate a valid sampling strategy.



15.1 Areas of predicted sensitivity and zones

Data Sources: #####

Coordinate System: GDA 1994 MGA Zone 55
Paper size: A3
Scale: 1:60,000
Date: 5/20/2021

220_0110_EIS_15_1_SurveyAreas_F12.mxd

15.2.3.3 Key tasks—non-Aboriginal cultural heritage

The assessment of non-Aboriginal cultural heritage assessment included the following key tasks:

- ▶ reviewing the following heritage databases to identify whether any listed heritage items are located in the vicinity of the proposal site:
 - ▶ NSW Section 170 heritage registers for ARTC, Transport for NSW (TfNSW) and Department of Education
 - ▶ State Heritage Inventory (including the State Heritage Register)
 - ▶ Australian Heritage Database
 - ▶ Australian Heritage Places Inventory
 - ▶ relevant Local Environment Plans (LEPs), including Cootamundra LEP and Junee LEP
 - ▶ National heritage list
- ▶ review of available literature to determine the historical context of the proposal site
- ▶ a site survey (undertaken as part of the field survey completed for the Aboriginal heritage assessment) to identify potential heritage items, and areas of archaeological potential.

A significance assessment was not conducted as the locally identified non-Aboriginal heritage items were deemed unlikely to be directly impacted by the proposal during construction or operation (refer to section 15.4.2 and 15.5). The potential for historical archaeology along the proposal site was assessed during the site survey work. No areas of potential archaeological sensitivity were identified, and no further assessment of impacts was made.

15.2.4 Risks identified

The environmental risk assessment for the proposal is included in Appendix G: Environmental risk assessment. Due to the absence of listed non-Aboriginal heritage items within the proposal site, no significant risks for non-Aboriginal heritage were identified.

Risks to Aboriginal heritage with an assessed risk of medium or higher included:

- ▶ direct impacts on known Aboriginal heritage items (e.g. scar trees)
- ▶ direct impacts to archaeologically sensitive landscapes and potential unidentified Aboriginal heritage items
- ▶ indirect impacts to Aboriginal heritage items from construction of the project such as visual setting or settlement
- ▶ direct impact to non-Aboriginal heritage items, including disturbance to known or unidentified items of heritage significance
- ▶ indirect impact to non-Aboriginal heritage items, including changes to the visual landscape, noise and vibration.

15.2.5 How potential impacts have been minimised or avoided

The option development and assessment process for the Inland Rail location and route options is summarised in Chapter 6: Alternatives and proposal options. As noted in Chapter 6, the shortlist of route options was subject to a detailed assessment, and the proposed alignment was refined based on evaluation of key considerations, including environmental impacts.

Potential environmental impacts, including heritage, were included in the list of selection criteria used for the analysis of options. This included non-Aboriginal heritage items and areas of potential Aboriginal heritage sensitivity.

As a result of the route selection process, the potential for heritage impacts has been avoided and/or minimised by avoiding known heritage items and areas of potential Aboriginal heritage sensitivity. The alignment was shifted 50 m to avoid an Aboriginal scar tree and a bridge included in design to avoid areas of potential Aboriginal heritage sensitivity.

15.3 Existing environment

This section provides the environmental context of the study area and describes the existing Aboriginal and non-Aboriginal heritage.

15.3.1 Environmental context

15.3.1.1 Land use history

The study area traverses multiple working farms, as well as the township of Stockinbingal, roads and rail. The land has undergone significant changes over time including vegetation clearance, construction of roads, tracks, dams, fences, and ploughing for crops. The natural landscape within lengthy tracts of the study area has been impacted by these activities. Some sections of the study area are also currently being used for stock grazing, which has a less obvious impact to zones of potential archaeological sensitivity, although still creates impacts through erosion. These impacts create other disturbances which reduce the potential for Aboriginal archaeological sites across the study area, and therefore have an important bearing on the assessment of the archaeological resource.

15.3.1.2 Soil landscape

The study area passes through 12 soil landscapes and crosses six watercourses. These soil landscapes fall into three soil groups: Erosional, Transferral and Alluvial. Erosional soil landscapes are generally found to be shallow on upper slopes and deep on mid to lower slopes and along creek lines. Transferral soil landscapes can vary between shallow and deep on upper slopes and are generally deep across all other areas. Alluvial soil landscapes vary between moderately deep and deep across all landforms. The soil landscapes in the study area is discussed in detail in Technical Paper 7.

15.3.1.3 Hydrology

The study area spans the catchment of both the Murrumbidgee River and Lachlan River (Lower and Upper). The proposal crosses six ephemeral creeks—Billabong Creek, Ulandra Creek, Run Boundary Creek, Isobel Creek, Powder Horn Creek and Dudauman Creek. All of these creeks drain the Bethungra ranges, located to the east of the study area, and flow towards the south. Technical Paper 7 provides further information on the hydrology in the study area.

15.3.1.4 Land use context

The nature and availability of resources, including water, flora and fauna, and suitable raw materials for the manufacture of stone tools and other items, had (and continues to have) a significant influence on the way in which people use the landscape. Alterations to the natural environment also impact on the preservation and integrity of any cultural materials, whether Aboriginal or non-Aboriginal, while current vegetation and erosional regimes affect the visibility and detectability of sites and objects. For these reasons, it is essential to consider the land use context as a component of any heritage assessment.

Prior to European occupation, the study area would have been covered in open eucalypt woodlands, which would have minimised erosion and artefact movement. Modified trees may be found in any soil landscape, in areas with mature vegetation. During and post land clearing, modified trees may have been destroyed and stone artefacts in erosional landscapes may have been displaced from their original discard point. However, soil landscapes with deep soil profiles are generally more stable and artefacts in these areas often undergo less displacement.

Therefore, despite recent agricultural activity, it can be predicted that artefacts may be found in the majority of the Transferral and Alluvial landscapes and in the mid to lower slopes of Erosional landscapes within the study area.

15.3.2 Aboriginal heritage

15.3.2.1 Historical Aboriginal land use

The proposal is located within the land of the Wiradjuri people. The Wiradjuri people occupied the largest geographic areas of all Aboriginal groups within New South Wales. Their range includes the Macquarie, Lachlan and Murrumbidgee Rivers, with Wiradjuri translating to mean ‘people of the three rivers’. These rivers would have provided a variety of resources and food. It is estimated that between 2,000 and 3,000 Wiradjuri people lived near the current township of Wagga Wagga prior to the arrival of Europeans.

The study area is located about 30 kilometres (km) north of the Murrumbidgee River. The Wiradjuri people generally moved around in small groups, using the river flats, open land and waterways with some regularity through the seasons. The study area contains a number of smaller permanent and ephemeral creeks, and aquatic food such as fish were likely supplemented with kangaroos and emus, as well as fresh fruit, nuts, yam daisies, wattle seeds and orchid tubers.

15.3.2.2 Aboriginal sites

Listed Aboriginal sites

A desktop review of archaeological literature and data was conducted to determine if Aboriginal sites have been previously identified within the study area.

The results of the AHIMS search identified three listed Aboriginal sites within Zone 3:

- ▶ Bethunga Crown Land Road deakin/eulomo tree fire scar 2 (50-5-0120), a Modified Tree (Carved or Scarred) located within the proposal site
- ▶ Bethunga Crown Land Road deakin/eulomo tree fire scar 1 (50-5-0121), a Modified Tree (Carved or Scarred) located within the proposal site
- ▶ Bethunga Crown Land Road deakin/eulomo tree fire scar 1 (50-5-0117), a Modified Tree (Carved or Scarred) located within the proposal site.

The location of these sites is shown in Figure 15-2.

Aboriginal places

The desktop review did not identify any Aboriginal places declared under section 84 of the NPW Act, nor Aboriginal places of heritage significance defined by the Cootamundra LEP and Junee LEP, within the study area.

Predictive model for archaeological potential

The results of the desktop review were used to produce a predictive model for the study area, including the following criteria:

- ▶ Aboriginal occupation sites will mainly be present in association with water sources—primarily lower order streams—although sites may also occur in close proximity to Ulandra Creek, Run Boundary Creek and Isobel Creek
- ▶ Aboriginal occupation sites are most likely to occur on low-gradient, well-drained landforms in close proximity to those water sources, indicating that the area of alignment with the highest potential for sites to occur is a 15-km stretch starting 10 km north of Illabo
- ▶ artefact sites, including scatters and isolated finds, are the predominant sites identified. The majority of artefacts are made from quartz, with lesser reliance on silcrete and volcanics, although none of the previous studies note the presence of key raw material outcrops in the local area
- ▶ scarred trees are unlikely due to the widespread clearing of the vegetation, and most of the flat or low-gradient landforms have been subject to ploughing and agricultural disturbances.

This desktop review and predictive model were used to identify areas of archaeological potential.

Archaeological survey of sensitive sites identified by predictive modelling

Archaeological surveys of the study area, in the form of a pedestrian survey, were undertaken in conjunction with members of the local Aboriginal community, as represented by the RAPs. These RAP participants included representatives from Young Local Aboriginal Land Council (LALC), Brungle/Tumut LALC, Cootamundra Aboriginal Working Party and Bidya Marra Consultancy. The survey targeted zones of potential sensitivity based on the results of the desktop review and consultation with the Aboriginal community. Due to access restrictions, four of the 11 zones were not available for physical survey, including Zone 5, 6, 9 and 10. A total of 7.54 kilometres was surveyed within the seven zones where access was available. The length of each zone and landform characteristics are outlined in Table 15-2.

TABLE 15-2: ZONES AND LANDFORM

Zone	Landform	Zone length (m)
1	River flats and undulating plains	820
2	River flats and undulating plains	650
3	Undulating plains and includes sites AHIMS 50-5-0117, AHIMS 50-5-0120, AHIMS 50-5-0121	50
4	Lower slopes—mainly of the Bethungra Ranges	2,100
5	Lower slopes—mainly of the Bethungra Ranges	4,200
6	Lower slopes—mainly of the Bethungra Ranges	2,450
7	River flats and undulating plains	2,330
8	Undulating plains, with some lower slopes of isolated local relief	1,240
9	Undulating plains	1,200
10	Undulating plains	500
11 and 11 East*	River flats and undulating plains, with some lower slopes of isolated local relief	400

* The area of Zone 11 East had already been covered by the survey in Zone 11; however, it has been included in the survey discussion as it still comprised an area of sensitivity and was subsequently subject to test excavation.

The survey identified a number of artefact scatters and isolated artefacts. A total of 22 separate recorded locations were noted, four of which were scarred trees, the remainder being artefact sites. The survey also inspected the three previously recorded AHIMS sites. Aboriginal sites identified by the surveys are summarised in Table 15-1 and shown in Figure 15-2.

TABLE 15-3: SURVEY ZONES WITH NEW SITE AND SITE TYPE DATA WITHIN THE STUDY AREA

Zone	New site recording	AHIMS ID1	Site type
1	ARTC1	50-5-0266	Low-density artefact scatter/isolated artefacts
	ARTC2	50-5-0267	
	ARTC3	50-5-0274	
	ARTC4	50-5-0276	
	ARTC5	50-5-0275	Grindstone and zone of archaeological potential
	Site Zone 1	50-5-0280	Zone of archaeological potential
2	ARTC6	50-5-0277	Scarred tree
	Site Zone 2	50-5-0287	Zone of archaeological potential
3	-2	50-5-01172	Scarred tree
	—	50-5-01202	Scarred tree
	—	50-5-01212	Scarred tree
	ARTC18	50-5-0286	Scarred tree
	ARTC 20	AHIMS pending	Scarred tree
4	ARTC7	50-5-0285	Isolated artefact
	ARTC8	50-5-0284	Artefact scatter and zone of archaeological potential
	ARTC9	50-5-0283	Isolated artefact
7	ARTC12	50-5-0268	Isolated artefacts
	ARTC13	50-5-0269	
	ARTC14	50-5-0270	
	ARTC15	50-5-0271	
	ARTC16	50-5-0272	
	ARTC17	50-5-0273	
8	—	—	—
11	ARTC10	50-2-0054	Isolated artefacts and zone of archaeological potential
	ARTC11	50-2-0055	
11 East ³	ARTC19	50-2-0058	Scarred tree

1. New site recordings identified during survey were subsequently registered as AHIMS sites.

2. Three scarred trees were previously recorded in the AHIMS search.

3. Zone 11 East was not included in the original survey, but subsequent investigation revealed a scarred tree within a new zone of the proposed alignment.

The previously recorded scarred trees (AHIMS 50-5-0117, 50-5-0120 and 50-5-0121) were found to have scars that were natural, rather than cultural, in origin.

Potential archaeological deposits

Four key areas of PAD were identified during the archaeological surveys as requiring archaeological test excavation. These were located at Zones 1, 2, 4, 11 and 11 East (11 and 11 East shared one area of PAD). Three of the four PADs are directly related to water courses (PADs in Zones 1, 2, 11 and 11 East), while one of the PADs is associated with the site ARTC8 (in Zone 4).

The results of the archaeological survey were refined to produce a test excavation methodology targeted to newly identified sites, areas of PADs and areas of specific landforms as necessary to formulate a valid sampling strategy.

The PADs at Zones 1, 2, 11 and 11 East were predicted as having archaeological sensitivity based on their proximity to Billabong Creek, Ulandra Creek and Dudauman Creek respectively. Each of these zones comprised level creek bank terraces, and two of the three zones had artefacts present. The PAD at Zone 11 also included the slopes and crests of the hill to the north of Dudauman Creek, which was an area considered to have archaeological potential based on the criteria of the predictive modelling.

Two zones of low sensitivity were nominated for further investigation, including Zones 7 and 8. Based on the landform type, this zone was considered to have limited archaeological potential. The landform in Zone 7 is low-lying and poorly drained, which is not considered suitable for occupation sites; however, the zone contained six identified isolated artefacts. Zone 8 includes lower slopes and a well-drained landform; however, there is a poor correlation with reliable water sources and no artefacts were identified in this zone. Zone 8 was not considered to have archaeological potential; however, this zone was included in test excavations to test aspects of the predictive modelling relating to the importance of landform in archaeological site location.

Access to Zone 5 and Zone 6 was not possible for either the test excavation program or the pedestrian surveys due to private property access restrictions. These zones were considered to have archaeological potential as they cross Run Boundary Creek and Isobel Creek, with the study corridor passing halfway between Ironbong Creek to the west and the Bethungra Range to the east.

Zone 9 and Zone 10 were also unable to be physically surveyed due to access restrictions; however, the level, unremarkable nature of the landforms in these zones along with the inconsistent nature of the watercourses suggested that neither of these zones have any archaeological potential.

Test excavation of areas of archaeological potential

Based on the predictive model for the study area, Zone 9 and Zone 10 were determined to not be consistent with these criteria and were discounted from further testing. Zone 8 was also discounted from containing archaeological potential, although further testing within this zone was undertaken to validate the criteria adopted in the model. The predictive model was then applied to areas not able to be accessed, including Zones 5 and 6, to determine archaeological potential within these zones.

A total of 231 test units (TUs) were excavated across the seven zones. A total of 133 stone artefacts were identified during the test excavation. A summary of the results of the test excavations is presented in Table 15-4.

TABLE 15-4: SUMMARY OF TEST EXCAVATION RESULTS

Zone	Number of test units	Artefact count	Site description
1	60	64	<ul style="list-style-type: none"> ▶ Grass covered paddock currently used for grazing ▶ TUs located either side of Billabong Creek ▶ Alluvial soil landscape—Ironbong Creek across the majority of the zone ▶ Excavations stopped at 900 mm due to limit of reach.
2	22	35	<ul style="list-style-type: none"> ▶ Grass/weed covered paddock, regularly ploughed for crops ▶ TUs located either side of Ulandra Creek ▶ Alluvial soil landscape—Ironbong Creek across the zone ▶ Average excavation depth 500 mm.
4	18	12	<ul style="list-style-type: none"> ▶ Cropped paddock, recently ploughed ▶ Erosional soil landscape—Bethungra across the zone ▶ Average excavation depth 500 mm.
7	26	0	<ul style="list-style-type: none"> ▶ Cropped paddock, recently ploughed ▶ Erosional soil landscape—Twins Range across the zone.

Zone	Number of test units	Artefact count	Site description
8	35	0	<ul style="list-style-type: none"> ▶ Grass covered paddock currently used for grazing ▶ Transferral soil landscape—Frampton across the zone ▶ Site in close proximity to the erosional Twins Range soil landscape.
11	41	9	<ul style="list-style-type: none"> ▶ Grass covered paddock currently used for grazing ▶ Transferral soil landscape—Oakville across the southern portion of the zone.
11 East	29	13	<ul style="list-style-type: none"> ▶ Grass covered paddock currently used for grazing ▶ Erosional soil landscape—Comerford across the majority of the zone ▶ Transferral soil landscape—Oakville across the north-eastern corner of the zone.

Test excavations found evidence of Aboriginal use of the area within PAD Zone 1 (Site Zone 1) and Zone 2 (Site Zone 2), including the presence of cultural scarred trees and artefacts buried at depths of 400 mm below the surface, which suggests Aboriginal occupation activity.

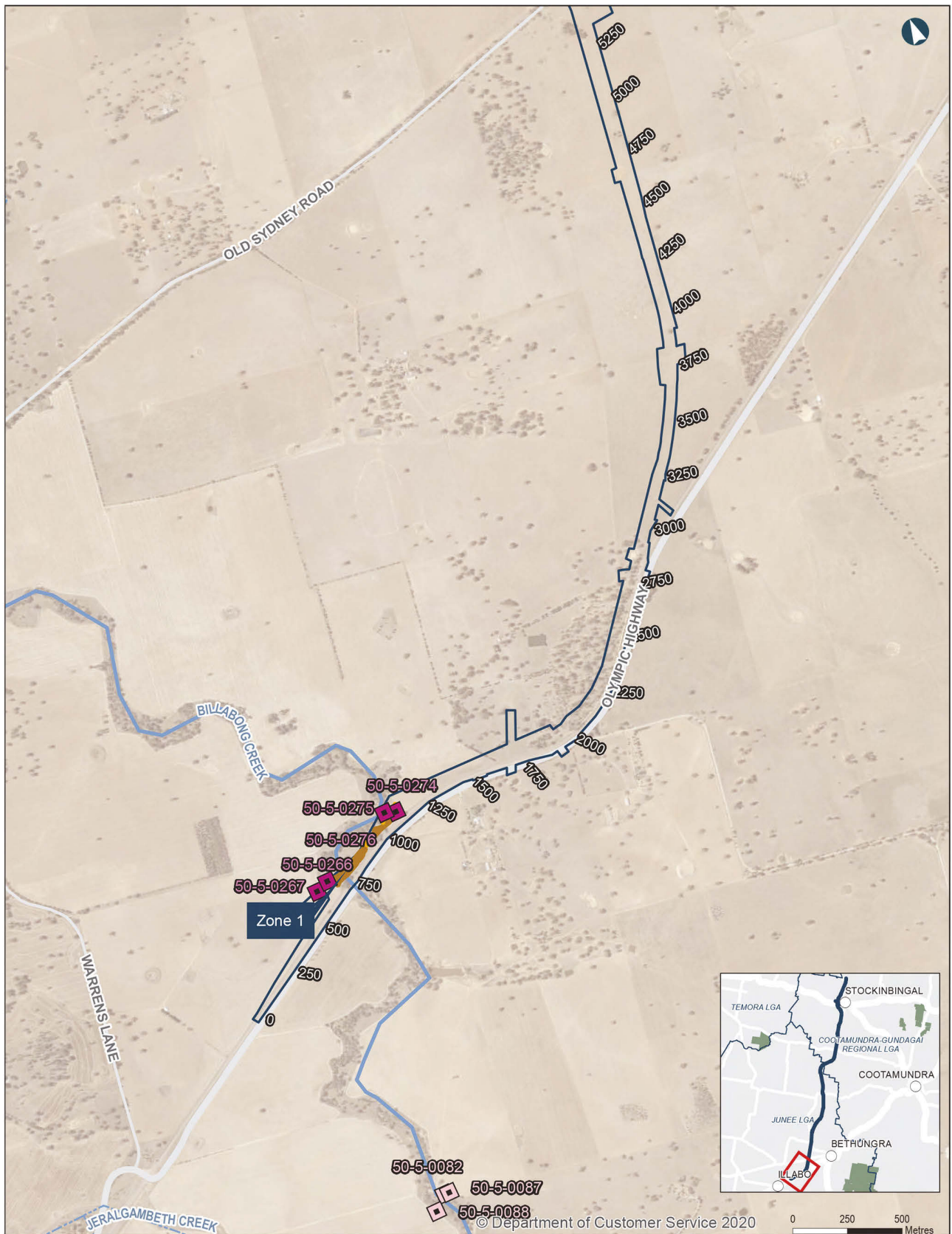
Test excavations determined that PAD Zone 4, 7, 11 and 11 East were not Aboriginal sites due to surface disturbances from erosional processes and agricultural activities.

During the final session of test excavations (between 7 and 10 December), all of the RAP groups inspected a recently identified scarred tree (ARTC19) in Zone 11 East, which was close to the proposal site. It was generally agreed that this tree was of cultural significance and that avoidance of it should be the first approach to its management.

The results of the test excavations were used to refine the identified areas of potential archaeological sensitivity identified during the desktop review and survey. A summary of the conclusions for each zone is provided in Table 15-5. Based on this assessment, refined areas of potential sensitivity were identified for Zone 5 and Zone 6, which are shown in Figure 15-2.

TABLE 15-5: AREAS OF ARCHAEOLOGICAL POTENTIAL BASED ON THE REVISED PREDICTIVE MODELLING

Zone	Site description
1	Zones 1 and 2, comprising levelled terraces adjacent to creeks, have both demonstrated the presence of archaeological sites, and therefore fit the predictive modelling that sites will be present in close proximity to water courses on level or gently sloping, well-drained ground. Zone 1 also appears to be located along the southern side of a widespread archaeological zone along Billabong Creek.
2	
4	Although subject to heavy disturbance, this zone also supports the predictive model in relation to proximity to water. The artefacts present are likely to have derived from the banks of a water course that has since been infilled and levelled.
5	This zone was initially considered to have archaeological potential along most of the zone because the study corridor crosses Run Boundary Creek and another small tributary to Ironbong Creek, a number of minor drainage lines, and skirts along the low slopes of the Bethungra Range. However, based on the revised predictive modelling, the sections of the zone that cross the Run Boundary Creek and Isobel Creek would cover areas of archaeological potential, while all other sections of the zone would unlikely have much archaeological potential. The southern end of this zone includes the area across Run Boundary Creek and one of its minor tributaries. Further to the north within Zone 5 is a short section of the study area that crosses Isobel Creek and also crosses one of the toe-slopes of the Bethungra Range. The zones of archaeological sensitivity would cover an area of 100 m either side of the creeks.
6	This zone was considered to have archaeological potential for the same reasons as Zone 5—it has areas of low slope from the Bethungra Range and crosses Isobel Creek, a tributary of Ironbong Creek. However, like Zone 5, there is only a small area within this zone where there is a direct correlation of both the presence of a water course and low-gradient, well-drained landforms.
7	The absence of any defined archaeological sites in this area suggests that this land was purely used for casual resource procurement and was not a favoured occupation zone. This leads to the possibility that the correlation with well-drained land is as important for Aboriginal occupation zones as the proximity to water. On that basis, the predictive modelling could be refined to note that proximity to water in its own right is of less likelihood than the correlation of both water sources and well-drained landforms.
8	Results from this zone confirmed the prediction that regardless of the landform being semi-elevated and on the lower slopes of a ridge, the correlation with proximity to water is the crucial element in predicting the location of previous Aboriginal occupation activity.
11 and 11 East	Results from Zone 11 and 11 East run against the predictive statement correlating elevated land and proximity to water. These results tend to suggest that there may have been less Aboriginal occupation of the zones at the northern end of the study area, or perhaps that the area around Dudauman Creek was occupied in a location somewhere nearby but outside of the study area. Both zones were determined not to comprise archaeological sensitivity.



Key features of proposal

Proposal site
 Chainage (distance in metres from southern limit of the

- AHIMS site
- AHIMS site (confirmed as not an Aboriginal site).
- Aboriginal sites identified during survey - Artefact
- Aboriginal sites identified during survey - Modified tree

- Potential archaeological deposit (low density)
- Potential archaeological deposit (high density)

Existing features

- Sub-arterial road
- Arterial road
- Major Watercourse
- Minor Watercourse

15.2 Identified Aboriginal sites and areas of archaeological potential

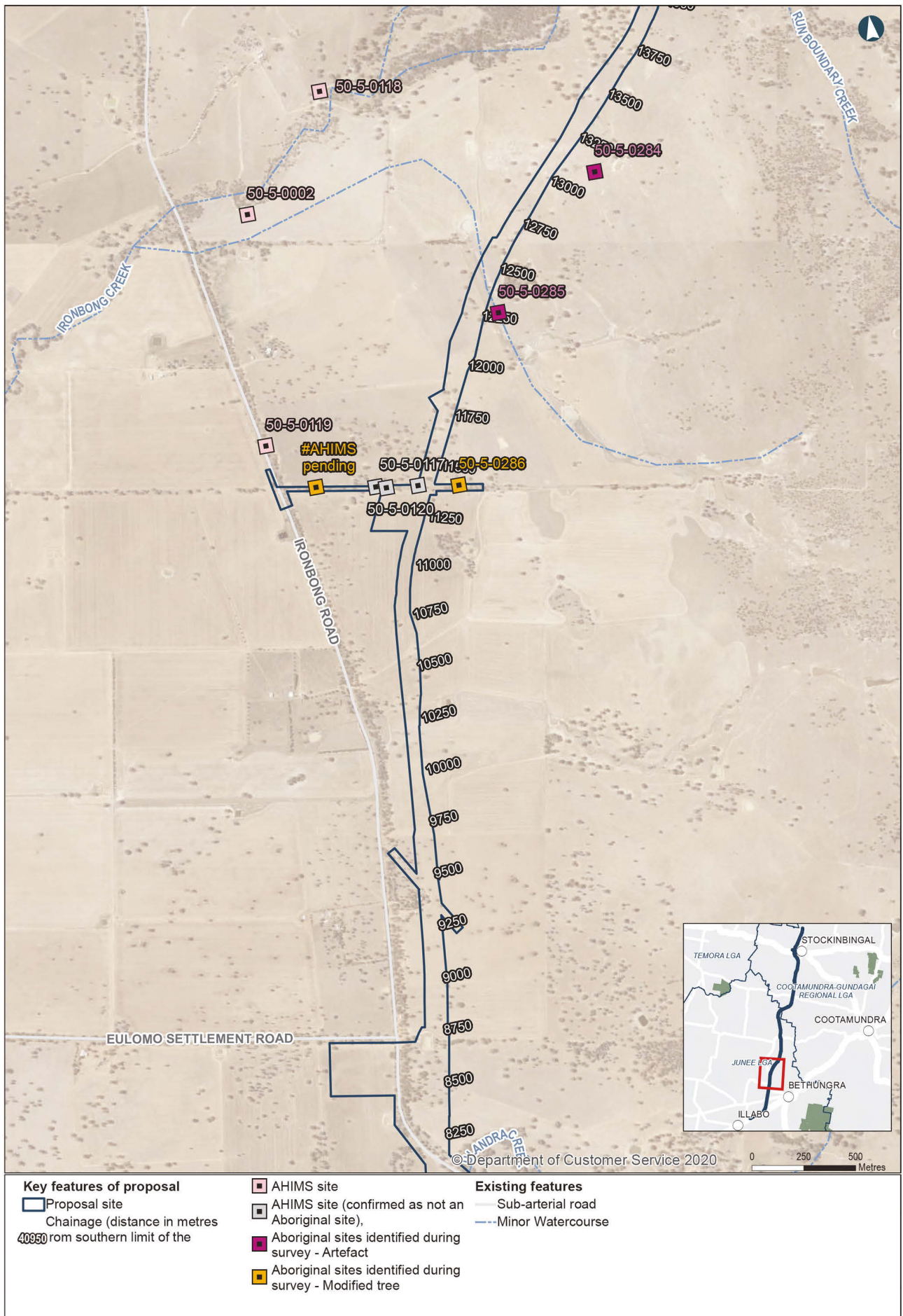
Coordinate System: GDA 1994 MGA Zone 55
 Date: 12/21/2021 Paper size: A4 Scale: 1:25,000
 MAP 1 of 9



Key features of proposal		Existing features	
Proposal site		Sub-arterial road	
Chainage (distance in metres from southern limit of the 40950)		Arterial road	
AHIMS site		Minor Watercourse	
AHIMS site (confirmed as not an Aboriginal site).			
Aboriginal sites identified during survey - Artefact			
Aboriginal sites identified during survey - Modified tree			
Potential archaeological deposit (high density)			

15.2 Identified Aboriginal sites and areas of archaeological potential

Coordinate System: GDA 1994 MGA Zone 55
 Date: 12/21/2021 Paper size: A4 Scale: 1:25,000
MAP 2 of 9



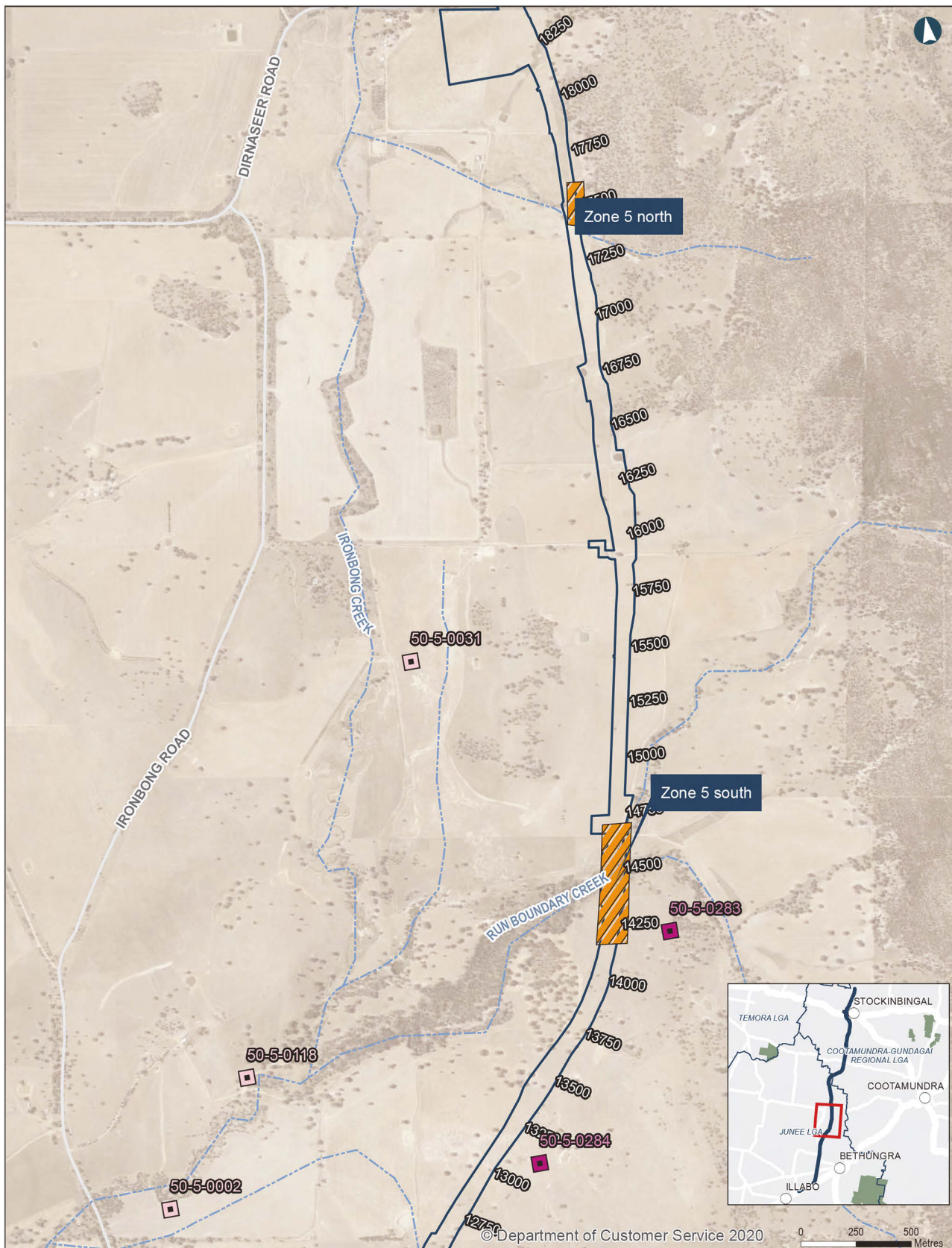
15.2 Identified Aboriginal sites and areas of archaeological potential

Coordinate System: GDA 1994 MGA Zone 55
Date: 12/21/2021 Paper size: A4 Scale: 1:25,000

MAP 3 of 9

Illabo to Stockinbingal Data Sources: LPI, IRDJV, ARTC

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Key features of proposal	Existing features
<ul style="list-style-type: none"> Proposal site Chainage (distance in metres from southern limit of the 	<ul style="list-style-type: none"> Sub-arterial road Minor Watercourse
<ul style="list-style-type: none"> AHIMS site AHIMS site (confirmed as not an Aboriginal site) Aboriginal sites identified during survey - Artefact Aboriginal sites identified during survey - Modified tree Archaeological sensitivity 	

15.2 Identified Aboriginal sites and areas of archaeological potential

Coordinate System: GDA 1994 MGA Zone 55
Date: 12/21/2021 Paper size: A4 Scale: 1:25,000
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Key features of proposal

- Proposal site
- Chainage (distance in metres from southern limit of the proposal)

- AHIMS site
- AHIMS site (confirmed as not an Aboriginal site)
- Aboriginal sites identified during survey - Artefact
- Aboriginal sites identified during survey - Modified tree
- Archaeological sensitivity

Existing features

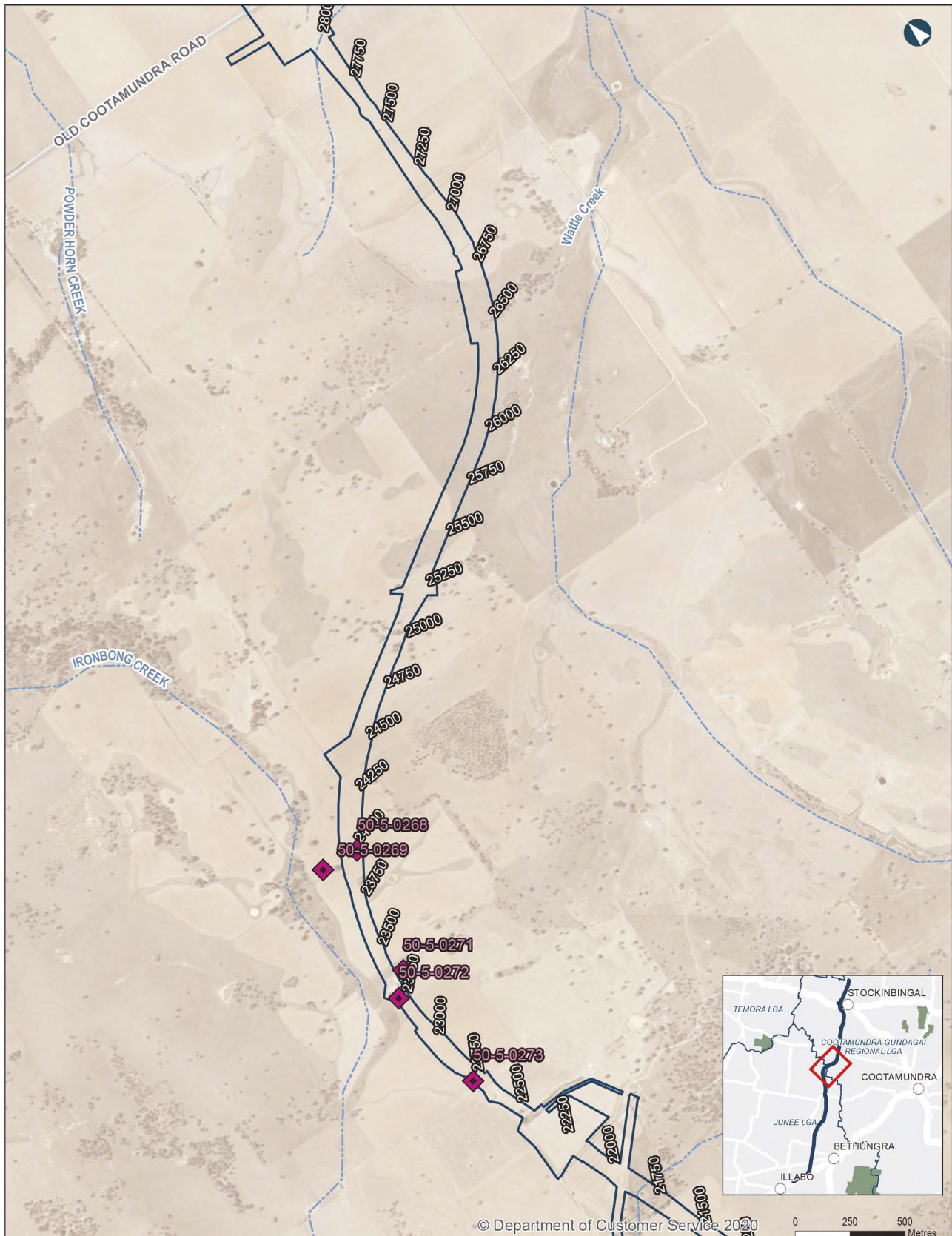
- Sub-arterial road
- Minor Watercourse

15.2 Identified Aboriginal sites and areas of archaeological potential

Coordinate System: GDA 1994 MGA Zone 55
Date: 12/21/2021 Paper size: A4 Scale: 1:25,000
MAP 5 of 9

Illabo to Stockinbingal Data Sources: LPI, IRDJV, ARTC

220_0115_EIS_15_2_IdentifiedAbSitesandAreasArchPol_r1v2.mxd



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Key features of proposal

- Proposal site
- Chainage (distance in metres from southern limit of the proposal)

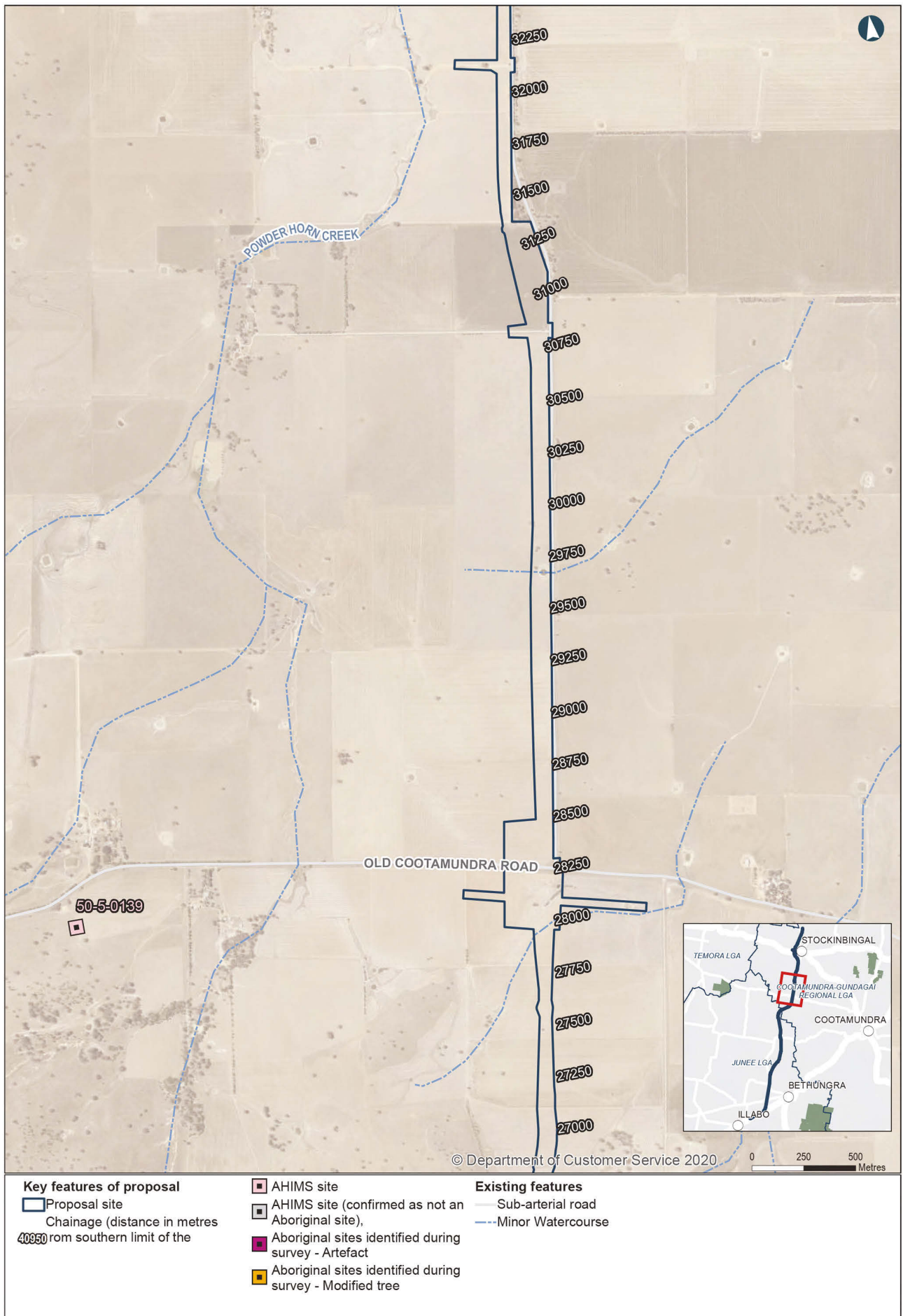
- AHIMS site
- AHIMS site (confirmed as not an Aboriginal site),
- Aboriginal sites identified during survey - Artefact
- Aboriginal sites identified during survey - Modified tree

Existing features

- Sub-arterial road
- Minor Watercourse

15.2 Identified Aboriginal sites and areas of archaeological potential

Coordinate System: GDA 1994 MGA Zone 55
Date: 12/21/2021 Paper size: A4 Scale: 1:25,000
MAP 6 of 9

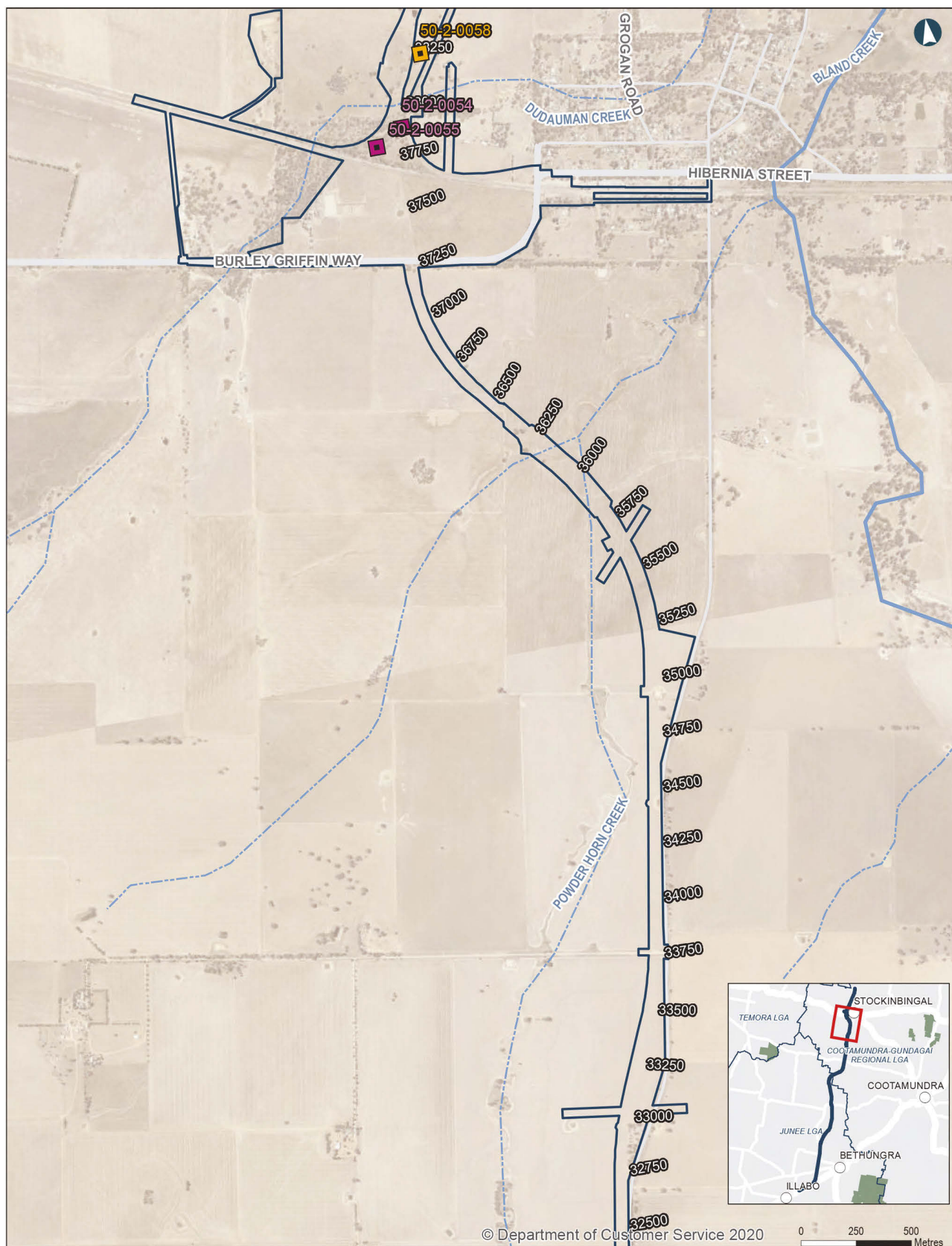


15.2 Identified Aboriginal sites and areas of archaeological potential

Coordinate System: GDA 1994 MGA Zone 55
Date: 12/21/2021 Paper size: A4 Scale: 1:25,000
MAP 7 of 9

Illabo to Stockinbingal Data Sources: LPI, IRDJV, ARTC

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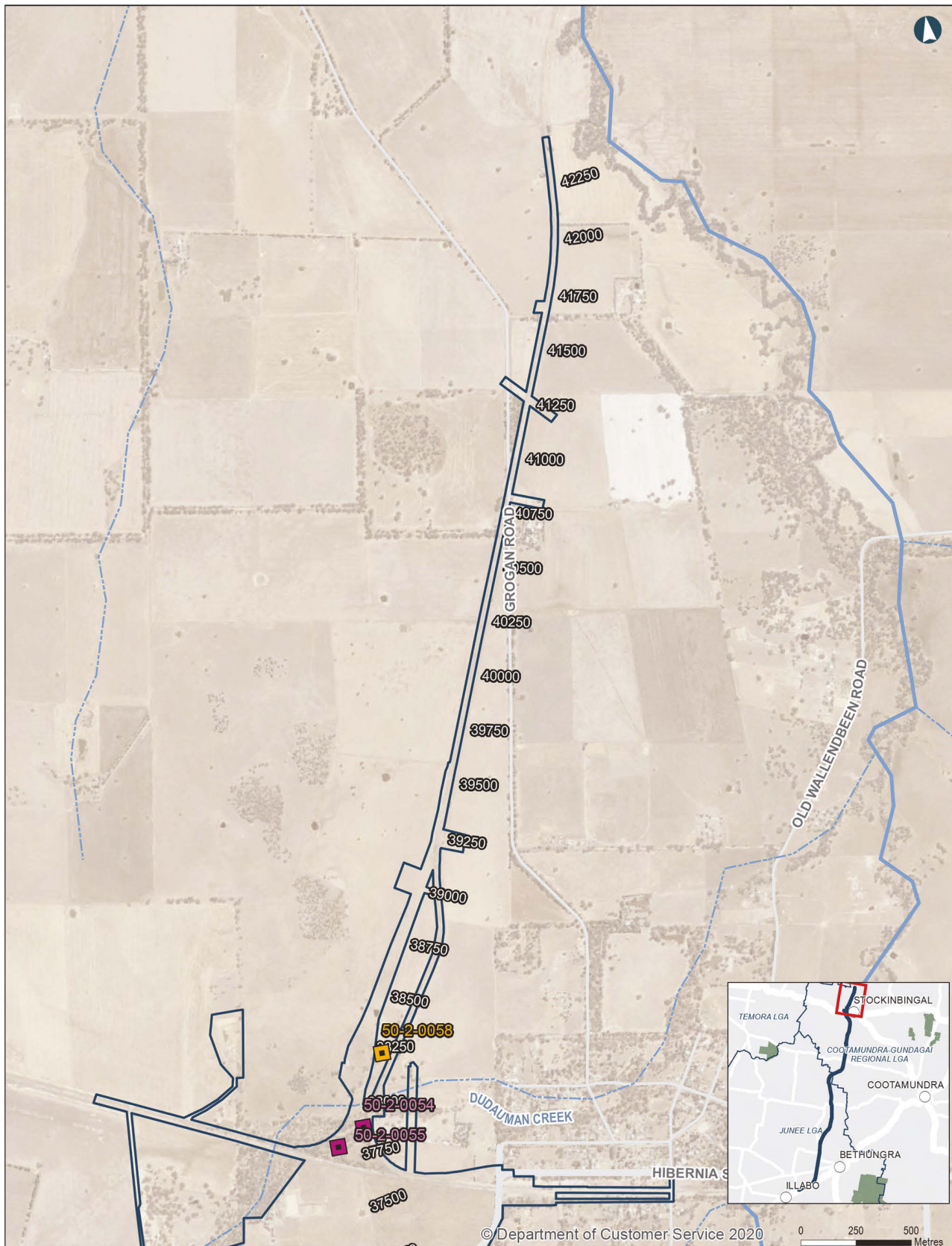
Key features of proposal
 [] Proposal site
 Chainage (distance in metres from southern limit of the

- [] AHIMS site
- [] AHIMS site (confirmed as not an Aboriginal site),
- [] Aboriginal sites identified during survey - Artefact
- [] Aboriginal sites identified during survey - Modified tree

Existing features
 [] Sub-arterial road
 [] Arterial road
 [] Major Watercourse
 [] Minor Watercourse

15.2 Identified Aboriginal sites and areas of archaeological potential

Coordinate System: GDA 1994 MGA Zone 55
 Date: 12/21/2021 Paper size: A4 Scale: 1:25,000
 MAP 8 of 9



Key features of proposal

Proposal site
 Chainage (distance in metres
 40950 from southern limit of the

- AHIMS site
- AHIMS site (confirmed as not an Aboriginal site),
- Aboriginal sites identified during survey - Artefact
- Aboriginal sites identified during survey - Modified tree

Existing features

- Sub-arterial road
- Arterial road
- Major Watercourse
- Minor Watercourse

15.2 Identified Aboriginal sites and areas of archaeological potential

Coordinate System: GDA 1994 MGA Zone 55
 Date: 12/21/2021 Paper size: A4 Scale: 1:25,000
MAP 9 of 9

Revised predictive model for archaeological potential

Based on the test excavation results, the predictive modelling was reviewed and several areas of potential archaeological sensitivity along the study corridor were revised.

The key observations made from the test excavation results and changes to the predictive modelling are outlined in Table 15-6.

TABLE 15-6: REVISION TO PREDICTIVE MODELLING FOR ARCHAEOLOGICAL POTENTIAL

Zone	Test excavation observations	Changes to predictive modelling
1 2	These areas, comprised of levelled terraces adjacent to creeks, have both demonstrated the presence of archaeological sites, and Zone 1 also appears to be located along the southern side of a widespread archaeological zone along Billabong Creek. The presence of archaeological sites fits the predictive modelling that determined sites will be present in close proximity to water courses on level or gently sloping, well-drained ground.	No change.
4	The key observation in this zone was that the artefacts present are likely to have been derived from the banks of a water course that has since been infilled and levelled. Artefact distribution was largely a result of post-depositional taphonomic process and not the original archaeological site formation processes, thereby obscuring the original correlation between the site location and the water course. Zone 4 supports the predictive model in relation to proximity to water, although it has little bearing on the prediction of sites being located on low-gradient, well-drained landforms close to those water sources, primarily due to the extent of landform remodelling in that area.	No change.
7	This area was largely devoid of elevated, well-drained ground, and the channel of the water course had become ill-defined at this point, being more of a wetland than a clear fresh water source. The absence of any defined archaeological sites in this area suggests that this land was purely used for casual resource procurement and was not a favoured occupation zone. This leads to the possibility that the correlation with well-drained landforms is as important for Aboriginal occupation zones as the proximity to water.	The predictive modelling could be refined to note that proximity to water is less likely than the correlation of both water sources and well-drained landforms.
8	The null-hypothesis testing in Zone 8 confirmed the prediction that even though the landform is semi-elevated and on the lower slopes of a ridge, correlation with proximity to water is the crucial element in predicting the location of previous Aboriginal occupation activity.	No change.
11 and 11 East	The results for these areas suggest that there may have been less Aboriginal occupation of the zones at the northern end of the study area, or perhaps that the area around Dudauman Creek was occupied in a location somewhere nearby but outside of the study area.	Results from Zones 11 and 11 East run against the predictive model correlating elevated land and proximity to water.

This review of the predictive model assisted with refining the predictive modelling statements for Zones 5, 6, 9 and 10 where surveys and testing could not be undertaken due to access issues. The key changes are outlined in Table 15-7.

TABLE 15-7: REFINED PREDICTIVE MODELLING STATEMENTS FOR INACCESSIBLE AREAS

Zone	Original predictive modelling statement	Revised predictive modelling statement
5	This zone was considered to have archaeological potential along most of the study area because it crosses over Run Boundary Creek and another small tributary to Ironbong Creek, a number of minor drainage lines, and also skirts along the low slopes of the Bethungra Range.	Zone 5 is approximately 4.2 km in length; however, along that distance, there are only two areas of land where there is a correlation between water course and low-gradient well-drained landforms. At the southern end of this zone, a length of 1.13 km from site ARTC9, across Run Boundary Creek and one of its minor tributaries, would cover an area of archaeological potential based on the predictive modelling. Further to the north within Zone 5 is a short section of the study area that crosses Isobel Creek and also crosses one of the toe-slopes of the Bethungra Range. This area would also be a zone of archaeological sensitivity and would cover an area of 100 m either side of the creek. Based on the refined predictive modelling, the rest of the area along Zone 5 is unlikely to have any substantial archaeological potential.

Zone	Original predictive modelling statement	Revised predictive modelling statement
6	This zone was also considered to have archaeological potential for the same reasons as Zone 5—it has areas of low slope from the Bethungra Range and also crossed Isobel Creek, a tributary of Ironbong Creek.	Similar to Zone 5, there is only a small area within this zone where there is a direct correlation of both the presence of a water course and low-gradient well-drained landforms. This correlation occurs over a distance of 0.88 km either side of Isobel Creek. The southern end of this part of the study area is located 1.38 km north of Dirnaseer Road. Based on the refined predictive modelling, the rest of the area along Zone 6 is unlikely to have any substantial archaeological potential.
9 10	Zones 9 and 10 were considered in the Due Diligence assessment (Niche Environment and Heritage, 2016) to have archaeological sensitivity due to their proximity to water courses.	A comparison of these watercourses with others along the proposal indicate that they are ephemeral drainage lines that cross largely flat plains with little topographic relief. Test excavation results from other zones along the proposal suggest that neither Zones 9 or 10 maintain a substantial enough water source, nor have the characteristic low-gradient well-drained landforms that would warrant maintaining their definition as having archaeological sensitivity.

Assessment of significance

An assessment of significance was undertaken for the identified Aboriginal sites and archaeological potential of the study area. This assessment would inform the basis of management if the site were impacted by the proposal.

Overall, the study area is considered to have a relatively low level of significance, mainly through its cultural value to the local Aboriginal community and based on some of its low-key indicators of scientific significance.

The study area crosses the plains to the west of the Bethungra Ranges, which are a significant area for the Wiradjuri people. Caves within these ranges are associated with a cultural story relating to the creation of the Murrumbidgee River and the transformation of Wiradjuri culture from patriarchal to matriarchal (Section 4.2.2.1)). The river systems across these plains provided resources in support of the cultural activity in nearby areas such as the ranges.

The archaeological sites themselves are considered to be of some contemporary cultural significance to the local Aboriginal community because they are a tangible demonstration and connection that this landscape was used by Aboriginal people in the past. This evidence concretises the relationship between the known cultural sites in the surrounding areas and the day-to-day way of life of the people who valued those places in the past.

The archaeology of the study area also has low to moderate scientific significance based on its residual archaeological potential in Zones 1 and 2, which have the capacity to provide further detailed information on the nature of past Aboriginal occupation in the area along the margins of key watercourses. On that basis, it has low to moderate ongoing research potential. A detailed assessment of significance for sites identified within the study area is included in section 6.2 of Technical Paper 7.

Summary of Aboriginal objects and values within the proposal site

Based on AHIMS results, the archaeological survey and test excavation, the potential Aboriginal objects and values known to be present within or near the current proposal site are identified in Table 15-8. This includes the 22 Aboriginal sites identified during survey and PADs that were either found to be Aboriginal sites or sites with archaeological potential that have not been physically surveyed.

Two of the previously recorded AHIMS sites (AHIMS 50-5-0120 and 50-5-0121) are located outside the study area and were excluded from Table 15-8. These sites were scarred trees found to have scars that were natural, rather than cultural, in origin. AHIMS 50-5-0117 is located within the study area and was therefore included in Table 15-8, although it is noted that this site was also found to be a scarred tree resulting from natural processes, rather than cultural.

15.3.2.3 Native title

Consultation with the National Native Title Tribunal for this proposal established that there were no native title determination applications, determinations of native title or land use agreements over the study area.

TABLE 15-8: ABORIGINAL OBJECTS AND VALUES WITHIN THE PROPOSAL SITE

Zone	Site ID	AHIMS ID	Values	Summary of significance
Zone 1	Artefact sites ARTC1–4	50-5-0266 50-5-0267 50-5-0274 50-5-0276	Within the earlier study area, but now outside of the proposal site.	Cultural site
	Artefact site ARTC5	50-5-0275	Collected as part of test excavation work.	Cultural site
	Site Zone 1	50-5-0280	Three areas within Zone 1 with higher artefact densities are on the northern edge of the proposal site.	Cultural site
	Zone 1—low-density scatter	50-5-0280	Two zones of lower artefact density are within the proposal site.	Cultural site
Zone 2	Scarred Tree ARTC6	50-5-0277	Currently within the study area, but located outside of the proposal site to the west.	Cultural site
	Site Zone 2	50-5-0287	Two areas within Zone 2 with higher artefact densities are within the construction footprint, and partially impacted by the proposal.	Cultural site
Zone 3	Scarred tree 50-5-0117	50-5-0117	This recorded site was found to not be a culturally modified tree. While the tree itself will be removed for the project work to be undertaken, its AHIMS record should be modified to show that it is not a cultural object.	No cultural significance
	Scarred tree ARTC18	50-5-0286	This newly recorded culturally modified tree is outside of the eastern edge of the proposal site.	Cultural site
	Scarred tree ARTC 20	AHIMS # pending	This newly recorded culturally modified tree is within the proposal site.	Cultural site
Zone 4	Artefact site ARTC7	50-5-0285	Isolated artefact currently within the study area, but located outside of the proposal site to the west.	Cultural site
	ARTC8	50-5-0284	Currently within the study area, but located outside of the proposal site to the west.	Cultural site
	ARTC9	50-5-0283	Isolated artefact currently within the study area, but located outside of the proposal site to the east.	Cultural site
	PAD Zone 4	–	Area of PAD within the proposal site has been investigated and is not a cultural site.	Not a cultural site
Zone 5	PAD Zone 5	–	Zone of archaeological potential currently within the proposal site. The significance of this zone is predicted to be moderate–high adopting a precautionary approach.	Cultural site
Zone 6	PAD Zone 6	–	Zone of archaeological potential currently within the proposal site. The significance of this zone is predicted to be moderate–high, adopting a precautionary approach.	Cultural site
Zone 7	PAD Zone 7 North	–	Area of PAD within the proposal site has been investigated and is not a cultural site.	Not a cultural site
	PAD Zone 7 South	–	Area of PAD within the proposal site has been investigated and is not a cultural site.	Not a cultural site
	Artefact sites ARTC12 and ARTC16	50-5-0268 50-5-0272	ARTC12 and ARTC16 are within the proposal site. Area of PAD within the proposal site has been investigated and is not a cultural site.	Cultural artefacts, PAD is not a cultural site

Zone	Site ID	AHIMS ID	Values	Summary of significance
	Artefact sites ARTC13–15, ARTC17	50-5-0269 50-5-0270 50-5-0271 50-5-0273	ARTC13–15 and ARTC17 are outside of the proposal site. Area of PAD within the proposal site has been investigated and is not a cultural site.	Cultural artefacts, PAD is not a cultural site
Zone 11	Artefact site ARTC10 and ARTC11	50-2-0054 50-2-0055	ARTC10 and ARTC11 are within the proposal site.	Cultural site
	PAD Zone 11	–	Area of PAD within the proposal site has been investigated and is not a cultural site.	Not a cultural site
Zone 11 East	PAD Zone 11 East	–	Area of PAD within the proposal site has been investigated and is not a cultural site.	Not a cultural site
	Scar Tree ARTC19	50-2-0058	This newly recorded culturally modified tree is located outside of the proposal cultural site.	Cultural site

15.3.3 Non-Aboriginal heritage

15.3.3.1 Heritage context

This section provides an overview of the heritage context of the proposal site and its surrounds. Information detailed in this section was primarily sourced from the *Cootamundra Shire Community-Based Heritage Study* (Black Mountain Projects, 2010), as well as other sources including available information on heritage-listed items identified within the study area, which is discussed further in the following section.

Early exploration and pastoral stations

The proposal site is located within the Riverina region. The first European exploration of the region occurred in 1817, when an expedition led by John Oxley, who followed the Lachlan River downstream of Booligal. Subsequent explorations were completed by Thomas Mitchell, who arrived at the junction of the Lachlan River and the Murrumbidgee River in 1836, and by Charles Sturt, who explored the Murrumbidgee and lower Murray in the years between 1828 and 1831. Exploration of Cootamundra and surrounds first occurred during an expedition of Hume and Hovel in 1824.

Pastoralists settled in the area soon after, following the river plains. Settlement in the area increased, and an overland mail service to the area commenced in 1838 following 'Mitchell's Track' from Melbourne to Sydney. Battling harsh conditions, and supported by convict labour until 1840, pastoralists relied on sheep for wool and in fewer numbers, cattle.

However, land use remained sparse in the area and livestock grazed over large tracts of land. It was not until the late 19th century and early 20th century that greater numbers of people settled in the region and purchased land. The building of railways (discussed further below) was key to the development of area, including the expansion of cropping for wheat.

Stockinbingal

While the area around Stockinbingal was first settled by Europeans much earlier, the township of Stockinbingal was not designed until 1881. Stockinbingal was first proclaimed a village on 20 March 1886. The origins of the word Stockinbingal are based in Aboriginal language, and thought to have used the word 'Tockinbingie' as a name of the district in their dialect Bingie, which combined 'Tocum', meaning a deep water hole, 'Bingara' meaning a creek and 'Bimbal', meaning a white flowering box tree. The earliest reference to the name 'Stockanbingel' is found in the Government Gazette dated 27 June 1848, as part of James Matheson's Wallendbeen Run of 9 miles long by 5 miles wide.

In 1893, the railway between Cootamundra and Temora (in part of the Lake Cargelligo Line) was opened through the township of Stockinbingal (discussed further below). With its connection to rail, by the 20th century Stockinbingal had become a rural centre servicing the surrounding agricultural area producing wheat and wool. In the period up to 1940, the township saw significant growth, and a number of businesses were established within the township, including banks, a pub, a blacksmith, a doctor and dentist, and a number of others. Public services, including a post office, hospital, police station, courthouse and school also opened to service the town. The local hotel also serviced travellers, including Cobb & Co coaches that used Stockinbingal as a stopover on their journeys from Harden to Temora (NSW OEH, 2019b).

During the mid-late 20th century, the population of Stockinbingal declined significantly. Decline of the township continued after 1960, when the sealing of roads between Cootamundra and Temora, greater availability of consumer goods, and improvements to motor vehicles that vastly improved travel time and reduced the dependence of the surrounding agricultural properties on the township. The decline of Stockinbingal can also be attributed to the loss of employment opportunities due to the mechanisation of agriculture reducing employment opportunities on farms surrounding the township, causing a progressive decline the prices of agricultural products. Today, many of the businesses within Stockinbingal are now closed.

Railway

The proposal connects to three existing railway lines, comprising the Lake Cargelligo Line and Stockinbingal-Parkes Line (at Stockinbingal), and the Main South Line (at the southern extent of the study area).

The first railway to commence operation in New South Wales was a section between Sydney and Parramatta, which opened in 1855. Expansion of the rail line towards the study area began in the 1870s, and Cootamundra became a junction for the Main South Line and Lake Cargelligo Line. The Cootamundra railway station was opened in 1877.

The Lake Cargelligo Line extends from Cootamundra, through the townships of Stockinbingal, Temora and West Wyalong to its terminus at Lake Cargelligo. The line was constructed to service the main wheat area of the state's central west and provide connection to the Main South Line at Cootamundra. The rail line first commenced operation in 1893, with the completion of the section between Cootamundra and Temora, including construction of the Stockinbingal Railway Station. Remaining sections of the line were completed until the opening of the line to the terminus at Lake Cargelligo in 1917. The station at Stockinbingal is of timber construction and originally operated by manual signals. The station was also used for passenger and mail services between Cootamundra and Temora until these services ceased operation in 1974. The station is a heritage listed item of local significance and is one of over 400 such stations built throughout country NSW. Less than twelve survive. Stockinbingal station is shown in Photo 15-1.



PHOTO 15-1: STOCKINBINGAL RAILWAY STATION

Source: (NSW OEH, 2019b)

In 1916, the Stockinbingal–Parkes Line was opened at Stockinbingal. The Stockinbingal–Parkes Line provides connection to the Lake Cargelligo Line and extends to the Main Western Line at Parkes. This Illabo to Stockinbingal section of railway was constructed to provide connection between the Main South Line and the Main Western Line to facilitate the east–west movement of freight trains from Sydney. Other than the rail line itself, and culverts over Dudauman Creek, there are no bridges or significant pieces of infrastructure associated with the Stockinbingal to Parkes Line within the study area.

At the southern extent of the study area, the proposal connects to the Main South Line. This rail line extends from Central Station in Sydney, to Albury, where it connects to rail line at the border to Victoria. The Main South Line acts as the main freight and passenger line between the cities of Sydney and Melbourne. Within the study area, the Main South Line includes an underbridge over Billabong Creek. The section between Cootamundra and Illabo commenced operation in 1878.

Notably, the Main South Line includes the Bethungra Spiral, a heritage listed item of state significance, which is located about 10 km north-east of the study area. In its original form, Main South Line was constructed to traverse a significant mountain range at steep grade. To rectify this issue, the Bethungra Spiral was constructed in the 1940s to alleviate the grade of the railway line and improve operations. The Bethungra Spiral was opened in 1944. The heritage listing for the Bethungra Spiral notes it exhibits a significant engineering solution using the technology available at the time of construction.

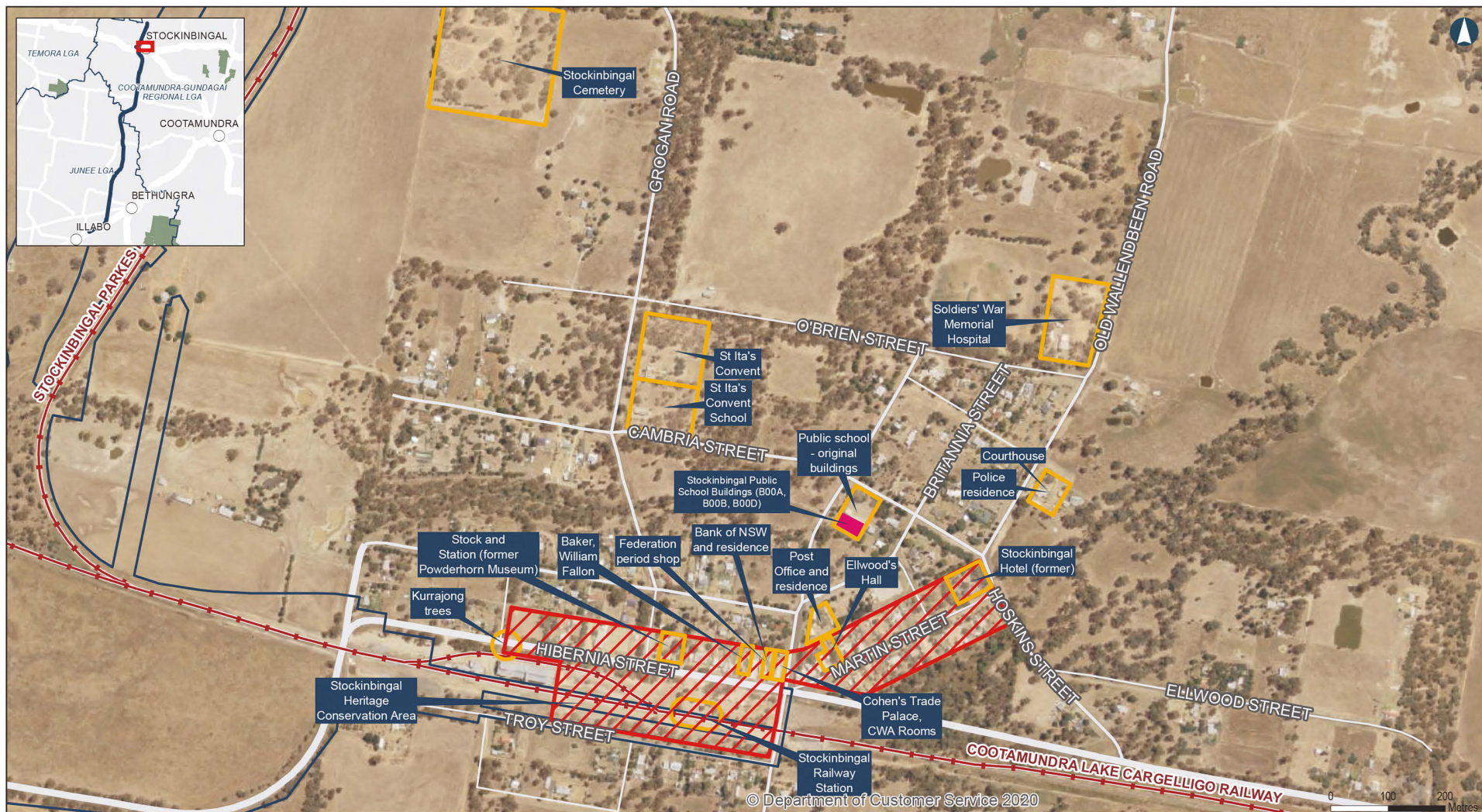
15.3.3.2 Heritage-listed items

A number of heritage-listed items were identified within the study area. All listed items identified were located within the township of Stockinbingal. There are two heritage-listed items within the proposal site, including the Stockinbingal Railway Station and Stockinbingal Heritage Conservation Area. The Cootamundra LEP and Junee LEP do not identify any heritage conservation management plans associated with these heritage-listed items.

Heritage-listed items within 2 km of the proposal site are outlined in Table 15-9 and shown on Figure 15-3. These were all listed as having 'local' significance under the Cootamundra LEP.

TABLE 15-9: HERITAGE-LISTED ITEMS IDENTIFIED WITHIN 2 KM OF THE PROPOSAL SITE

Item	Listing (item number)	Location relevant to the proposal site
Baker, William Fallon	Cootamundra LEP (i75)	Within 500 m of the proposal site
Bank of NSW and residence	Cootamundra LEP (i73)	Within 500 m of the proposal site
Cohen's Trade Palace, CWA Rooms	Cootamundra LEP (i71)	Within 500 m of the proposal site
Ellwood's Hall	Cootamundra LEP (i82)	Within 500 m of the proposal site
Federation period shop	Cootamundra LEP (i24)	Within 500 m of the proposal site
Public school—original buildings	Cootamundra LEP (i65)	Within 500 m of the proposal site
Soldiers' War Memorial Hospital	Cootamundra LEP (i83)	Greater than 1 km from the proposal site
St. Ita's Convent	Cootamundra LEP (i68)	Greater than 1 km from the proposal site
St. Ita's Convent School	Cootamundra LEP (i69)	Greater than 1 km from the proposal site
Stock and station (former Powderhorn Museum)	Cootamundra LEP (i76)	Within 500 m of the proposal site
Stockinbingal Cemetery	Cootamundra LEP (i70)	Greater than 1 km from the proposal site
Stockinbingal Heritage Conservation Area	Cootamundra LEP (C3)	Within the proposal site
Courthouse	Cootamundra LEP (i80)	Greater than 1 km from the proposal site
Stockinbingal Hotel (former)	Cootamundra LEP (i81)	Within 500 m of the proposal site
Police residence	Cootamundra LEP (i79)	Greater than 1 km from the proposal site
Post office and residence	Cootamundra LEP (i66)	Within 500 m of the proposal site
Stockinbingal Railway Station	Cootamundra LEP (i78)	Within the proposal site
Kurrajong trees	Cootamundra LEP (i77)	Within 500 m of the proposal site
Stockinbingal Public School—Buildings B00A, B00B and B00D	NSW Department of Education S.170 listing (5064338)	Within 500 m of the proposal site



15.3 Heritage listed items within the study area

Data Sources: LPI, IRDJV, ARTC

220_0115_EIS_15_3_HeritageListedItemswithin2km_r1v1.mxd

15.3.3.3 Potential heritage items

Land within the study area has been predominantly cleared for agricultural land used for grazing and cropping. A summary of potential heritage items identified within the study area is discussed below.

Rail related items with potential heritage significance

Within the study area, the rail line (including underbridges and associated rail infrastructure) has historical association with the expansion of the NSW rail network through the region, and its role in encouraging agricultural and pastoral development.

Original construction of the rail lines within the study area date to the late 19th century. Subsequent works for the maintenance and upgrade of the rail lines have been undertaken and is considered to have relatively low heritage value.

One structure is present at the southern extent of the study area, identified as the Billabong Creek rail underbridge (Chainage 750), which is shown in Photo 15-2 and on Figure 7-1, in Chapter 7: Proposal description—operation. This bridge is constructed on brick piers with concrete abutments. The rail track is supported by steel girders. The date of construction of this bridge is unknown, however its general style and construction type indicates it may be of potential heritage significance.



PHOTO 15-2: BILLABONG CREEK RAIL UNDERBRIDGE

The only structures associated with the Lake Cargelligo Line and the Stockinbingal–Parkes Line within the study area include culverts at crossing points of Dudauman Creek. These structures are constructed of concrete, and date more recently, indicating they are an upgrade of previous culverts at this location. These structures are not considered to be of potential heritage significance.

Non-rail related items with potential heritage significance

No non-rail related potential heritage items were identified within the study area. A number of residential dwellings, farm buildings and infrastructure are located within the study area; however, no items were identified to have potential heritage significance.

Some anecdotal evidence was collected relating to a potential former saw mill site located between chainage 11,600 and 11,700. The sawmill was reported to date from the 1960s although the actual history of this site was unable to be confirmed. A site of this type is unlikely to have any historical archaeological potential (discussed further below); however, the historical significance of the equipment is unknown. The location of the former sawmill is shown in Figure 15-2.

15.3.3.4 Areas of archaeological potential

No areas of significant archaeological potential relevant to non-Aboriginal heritage have been identified within the study area including through the site survey. However, due to the historical land uses identified, the potential presence of archaeological remains could not be discounted.



Key features of proposal

- Proposal site
- 40850 Chainage (distance in metres from southern limit of the proposal)

Existing features

- Sub-arterial road
- Arterial road
- Minor Watercourse
- Historic sawmill site

15.4 Items of potential heritage significance (former sawmill site)

Coordinate System: GDA 1994 MGA Zone 55
Date: 2/22/2022 Paper size: A4 Scale: 1:10,808

15.4 Impact assessment—construction

Construction of the proposal will include activities that could result in direct impacts from the disturbance of part or all of a heritage item or place, and/or changes to its setting. Direct impacts may include:

- ▶ intentional impact to a heritage item that could not feasibly be avoided
- ▶ potential for vibration impacts close the proposal site as a result of construction works and the movement of plant, vehicles and machinery
- ▶ accidental damage as a result of the movement of machinery and equipment.

Where direct impacts do not occur, the proposal may still result in indirect impacts to surrounding items, including:

- ▶ altered historical arrangements and access
- ▶ impacts to the visual amenity, landscape and vistas
- ▶ impacts to the curtilage of an item.

A summary of the potential direct and indirect impacts to Aboriginal and non-Aboriginal heritage from construction of the proposal is provided in the following sections.

15.4.1 Aboriginal heritage

Technical Paper 7 concluded that 7 of the 22 identified Aboriginal sites outlined in section 15.3.2.2 would be completely or partially impacted by the proposal. This includes direct impact to Aboriginal archaeological sites—two in Zone 1 and one in Zone 2; two PAD sites (Zone 5 and Zone 6); and four isolated artefacts (ARTC10, ARTC11, ARTC12 and ARTC16) at two sites. These sites are identified in Table 15-10 and detailed in Technical Paper 7.

Direct impacts in Zone 1 would be only partial (less than 20%) to the southern side of two areas of higher artefact density. There would also be partial (75%) direct impacts to two areas of lower artefact density. Zone 2 direct impacts would be to the whole areas (100%) of two areas of higher artefact density. These areas are of low to moderate scientific significance. PAD Zone 5 and PAD Zone 6 would experience total loss of values.

Technical Paper 7 states that indirect impacts would have little effect to the majority of identified Aboriginal objects and sites. Subsurface sites that comprise isolated artefacts or low-density artefact scatters would not be affected by impacts to surface conditions (e.g. noise, visual amenities, or vistas) or by the effects of vibration. Sites that may be affected by indirect impacts from changes to the visual setting, include Scarred tree ARTC18, Scarred tree ARTC19, and Scarred tree ARTC20. RAPs identified that a buffer of 50 m should be provided between the final alignment and the locations of all scarred trees. The design of the proposal maintains this buffer.

PAD Zones 4, 7, 11 and 11 East were excluded from the impact assessment as they were found not to be Aboriginal sites.

TABLE 15-10: DIRECT AND INDIRECT IMPACT TO ABORIGINAL HERITAGE FROM THE PROPOSAL

Zone	Site ID	AHIMS ID	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Comments
Zone 1	Artefact sites ARTC1–4	50-5-0266 50-5-0267 50-5-0274 50-5-0276	Low	Nil	Nil	Nil	Outside of the proposal site.
	Artefact site ARTC5	50-5-0275	Moderate	Nil	Nil	Nil	Collected during test excavation
	Site Zone 1	50-5-0280	Moderate	Direct	Partial—less than 20%	Potential loss of values	The southern edge of two of the three high-density areas in Zone 1 will be impacted by the construction zone.
	Zone 1—low-density scatter	50-5-0280	Low	Direct	Partial – 75%	Potential loss of values	The two lower-density areas in Zone 1 will be substantially impacted by the construction zone.
Zone 2	Scarred tree ARTC6	50-5-0277	High	Indirect	Nil	Nil	Outside of the proposal site.
	Site Zone 2	50-5-0287	Low to Moderate	Direct	Total	Loss of values	The two high-density areas in Zone 2 will be totally impacted by the construction zone.
Zone 3	Scarred tree 50-5-0117	50-5-0117	Nil	Nil	Nil	Nil	Not a site. AHIMS site record to be updated
	Scarred tree ARTC18	50-5-0286	High	Indirect	Nil	Nil	Outside of the proposal site.
	Scarred tree ARTC 20	AHIMS # pending	High	Indirect	Nil	Nil	Within the proposal site.
Zone 4	Artefact site ARTC7	50-5-0285	Low	Nil	Nil	Nil	Outside of the proposal site.
	ARTC8	50-5-0284	Low	Nil	Nil	Nil	Outside of the proposal site.
	ARTC9	50-5-0283	Low	Nil	Nil	Nil	Outside of the proposal site.
Zone 5	PAD Zone 5	–	–	Direct	Total	Loss of values	Currently within the proposal site. The significance of this PAD is predicted to be moderate—high adopting a precautionary approach.
Zone 6	PAD Zone 6	–	–	Direct	Total	Loss of values	Currently within the proposed alignment. The significance of this PAD is predicted to be moderate—high adopting a precautionary approach.

Zone	Site ID	AHIMS ID	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Comments
Zone 7	Artefact sites ARTC12 and ARTC16	50-5-0268 50-5-0272	Low	Direct	Total	Loss of values	Isolated artefacts could not be found again during the testing program.
	Artefact sites ARTC13–15, ARTC17	50-5-0269 50-5-0270 50-5-0271 50-5-0273	Low	Nil	Nil	Nil	Outside of the proposal site.
Zone 11	Artefact site ARTC10 and 11	50-2-0054 50-2-0055	Low	Direct	Total	Loss of values	Isolated artefacts could not be found again during the testing program.
Zone 11 East	Scarred tree ARTC19	50-2-0058	High	Indirect	Nil	Nil	Outside of the proposal site.

15.4.2 Non-Aboriginal heritage

Two non-Aboriginal heritage listed items have been identified within the proposal site—the Stockinbingal Railway Station and Stockinbingal Heritage Conservation Area (heritage conservation area), which are listed with 'local' significance under the Cootamundra LEP (refer to section 15.3.3).

While the proposal site incorporates these items, construction activity at these locations would be minimal and no impact would occur to non-Aboriginal heritage listed items. As shown in Figure 15-3, the upgrade of the level crossing at Dudauman Street, while directly adjacent to the heritage conservation area, would have minimal impact on the significance of the heritage conservation area. Other than this, physical activities within the proposal site would be located approximately 44 m away from these heritage items at the closest point and the nearest activities would be limited to minimal construction activity (temporary access and minor storage of plant and equipment).

In terms of vibrational impacts, the non-Aboriginal heritage receivers—Cohen's Trade Palace (CWA Rooms) (Cootamundra LEP (i71)) and the Stockinbingal Railway Station (Cootamundra LEP (i78))—located within Stockinbingal have been identified as having works potentially occur within minimum working distances. However, based on a review of the offset distance between the proposal site and these receivers, the size or power of the vibration-generating equipment can be controlled to minimise impacts (refer to Chapter 16: Noise and vibration).

There are no permanent works proposed within or adjacent to any listed heritage item at Stockinbingal other than the upgrade of the Dudauman Street level crossing. Elements surrounding heritage items, such as mature vegetation along Hibernia Street and existing buildings screen views from these locations to the proposal. In addition, the distance between the heritage items and major elements of the proposal, namely the realigned Burley Griffin Way, removes views to and from the heritage items, and no visual impacts have been identified (refer to Technical Paper 13: Landscape Character and Visual Impact Assessment).

One item of potential heritage significance has been identified adjacent to the proposal site, comprising the Billabong Creek rail underbridge (refer to section 15.3.3.3). No direct impacts to this bridge are required for construction of the proposal. Further, the rail bridge is operational and would not be considered to be vibration sensitive. A minor visual impact would occur from the construction of an adjacent rail bridge as part of the proposal; however, the addition of another rail bridge is consistent with the context of the significance of rail and historical association with the area and would not be considered to result in a significant impact to its heritage potential.

No other items of built heritage are present that would be impacted by the proposal, and no areas of archaeological potential have been identified within the proposal site. Management measures would be implemented in the event of the unexpected discovery of archaeological items during construction.

With the implementation of mitigation measures detailed in Table 15-11, impacts to non-Aboriginal heritage would be minimised for construction of the proposal.

15.5 Impact assessment—operation

The proposal could have indirect impacts (visual amenity, landscape and vistas) on surrounding heritage items (including the Stockinbingal Railway Station and Stockinbingal Heritage Conservation Area), as a result of a permanent change in their setting, from the presence of new infrastructure and the movement of trains. However, the permanent project works within the vicinity of the listed heritage items are limited to the upgrade of the level crossing at Dudauman Street, and no significant impacts to views from these to and from heritage listed items are anticipated, due to existing railway infrastructure. Refer to Chapter 19: Landscape and visual impacts for further detail.

Operation of the proposal would require access to the rail corridor, and minor activities undertaken for routine maintenance and repairs. While some disturbance would be required for these activities, they would not result in further disturbance of areas not included in this assessment and/or disturbed during construction of the proposal.

No other operational impacts from rail or road infrastructure were identified.

15.6 Mitigation and management

15.6.1 Approach to mitigation and management

15.6.1.1 Approach to managing the key potential impacts identified

ARTC is committed to minimising the environmental impact of the proposal as far as practicable and has undertaken measures through current phases of design to reduce actual impact areas where practicable (refer to Chapter 6: Alternatives and proposal options for more detail). The area that would be directly impacted by construction activities would depend on factors such as presence of significant vegetation, constructability, construction management and safety considerations, landform, slopes and anticipated sub-soil structures. Direct impacts would be reduced as far as practicable. The exact amount of disturbance, within the proposal site, would continue to be refined during detailed design.

Where practicable, the proposal would avoid impacts to Aboriginal and non-Aboriginal heritage. The proposal's development has been, and would continue to be, informed by Aboriginal consultation undertaken for the proposal (as outlined in section 15.2.3). This has contributed to the development of proposed mitigation measures relating to the management of salvaged items and the minimisation of impact to Aboriginal heritage as identified in section 15.6.4.

With the implementation of mitigation measures detailed in section 15.6.4, material impacts to Aboriginal and non-Aboriginal heritage would be minimised for the proposal.

Where avoidance of impact to Aboriginal heritage is not feasible, the approach to mitigation would be guided by the type and significance of the site, in consultation with Aboriginal stakeholders, where practicable. Isolated artefacts identified on the surface would be collected prior to construction of the proposal and relocated in consultation with Aboriginal stakeholders.

Where areas of significant archaeological potential have been identified, salvage from the proposal site would be undertaken prior to construction. In this instance, the collected items would be stored at an appropriate keeping place identified in consultation with Aboriginal stakeholders and NSW Environment, Energy and Science.

For significant archaeological sites located outside the proposal site, the extent of the site would be clearly communicated to all site workers to avoid accidental impact during construction impacts. The sites would be clearly marked on all mapping and plans used by contractors working on the project. Other measures, such as demarcation of the site with fencing may be implemented where construction is required in close proximity.

15.6.1.2 Approach to managing other impacts

The potential for impacts during construction would be managed in accordance with a project-specific Aboriginal and non-Aboriginal heritage management plan, which would be implemented as part of the CEMP. The plan would detail processes and responsibilities to minimise potential impacts on Aboriginal and non-Aboriginal heritage during construction. The plan would be prepared in accordance with relevant guidelines, standards and Technical Paper 7. The plan would also include an unexpected finds procedure and the proposed salvage methodology. Further information on the CEMP, including requirements for the heritage management plan, is provided in Appendix E.

15.6.2 Expected effectiveness

During development of the design, impacts on listed and potential Aboriginal and non-Aboriginal heritage items were avoided where practicable; however, not all impacts can be avoided for Aboriginal and non-Aboriginal heritage items, as this would result in additional impacts in other areas.

Therefore, further measures to mitigate impacts are required. The measures in Table 15-11 have been identified as an outcome of the Aboriginal and non-Aboriginal heritage assessment (refer to Technical Paper 7) and through considering best-practice approaches to managing potential impacts, as defined by relevant guidelines. The Aboriginal heritage assessment was prepared, and relevant mitigation measures identified, by specialist Aboriginal heritage consultants and qualified archaeologists. As a result, the measures are expected to be effective.

The proposal has been designed to provide an important piece of national infrastructure that would provide local, state and national benefits once operational. In the context of the strategic benefit of the overall proposal, it is considered that the identified heritage impacts are acceptable.

15.6.3 Interactions between mitigation measures

There are no expected interactions between mitigation measures for Aboriginal heritage and other measures. Measures to minimise the potential for landscape character and visual impacts (refer to Chapter 19: Landscape and visual impacts) and noise and vibration (refer to Chapter 16: Noise and vibration) would minimise the potential for indirect impacts to non-Aboriginal heritage as a result of the proposal.

15.6.4 Recommended mitigation measures

The measures outlined in Table 15-11 will be implemented to mitigate the potential impacts to Aboriginal and non-Aboriginal heritage for the proposal.

TABLE 15-11: MITIGATION MEASURES

Ref	Impact	Mitigation measures	Timing
AH-1	Avoiding and minimising impacts on Aboriginal heritage	Detailed design and construction planning would avoid direct impacts on identified items/sites of Aboriginal heritage significance as far as reasonably practicable. The location of construction compounds and associated access routes would be reviewed to ensure, as far as practicable, they are not located in areas of medium or high archaeological potential.	Detailed design/pre-construction
AH-2	Management of salvaged items	<p>A detailed salvage methodology would be prepared by a suitably qualified archaeologist in consultation with relevant registered Aboriginal parties. The methodology would be included in the Aboriginal cultural heritage management plan (mitigation measure AH-9 to ensure any artefacts salvaged are managed in accordance with the requirements of the <i>National Parks and Wildlife Act 1974</i> (NSW). This includes artefacts within the areas of Zone 1 and Zone 2.</p> <p>The methodology would include the process for consultation with Heritage NSW and registered Aboriginal Parties in accordance with the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW</i> (DECCW, 2010a) the <i>Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010</i> (DECCW, 2010b), and the <i>Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW</i> (OEH, 2011a). It would also include requirements in relation to the management of, and care and control plans for, salvaged objects.</p> <p>Registered Aboriginal parties would be engaged to assist in the salvage, which would be managed by an appropriately qualified archaeologist engaged to support the process.</p> <p>Detailed analysis and reporting of cultural material collected would be provided to the NSW Department of Planning and Environment.</p>	Detailed design/pre-construction
AH-3	Management of salvaged items	Archaeological survey and test excavation (if required) would be performed prior to the commencement of impact works at Zone 5 and Zone 6 to confirm the precise nature and extent of the archaeological resource and to inform the selection of the applicable mitigation measures.	Detailed design/pre-construction
AH-4	Management of salvaged items	Additional mitigation and management measures would be developed, in consultation with the registered Aboriginal parties, for areas or items of Aboriginal cultural heritage significance identified during the archaeological survey (mitigation measure AH-3). The additional measures would be included in the Aboriginal cultural heritage management plan (mitigation measure AH-9).	Detailed design/pre-construction
AH-5	Avoiding and minimising impacts on Aboriginal heritage	<p>A pre-construction survey would be undertaken to update the AHIMS record and/or confirm the locations of the previously listed AHIMS sites that could not be located during the site survey:</p> <ul style="list-style-type: none"> ▶ Artefact Sites ARTC12 and ARTC16 (AHIMS 50-5-0268, 50-5-0272) ▶ Artefact Sites ARTC10 and ARTC11 (AHIMS 50-2-0054, 50-2-0055). <p>Surveys would be undertaken with registered Aboriginal parties in accordance with the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales</i> (DECCW, 2010a).</p> <p>If the sites are located, impacts would be avoided as far as practicable and protection measures put in place in accordance with the Aboriginal cultural heritage management plan (mitigation measure AH-9).</p> <p>Any sites with the potential to be impacted would be managed in accordance with the salvage methodology (mitigation measure AH-2).</p>	Detailed design/pre-construction

Ref	Impact	Mitigation measures	Timing
AH-6	Impacts on artefact scatters	Surface collection (salvage) of artefacts that have been identified in Zones 1, 2, 4, 7 and 11 would occur prior to construction in accordance with the approved salvage methodology.	Detailed design/pre-construction
AH-7	Avoiding and minimising impacts on Aboriginal heritage	<p>For registered AHIMS sites and Aboriginal sites identified during archaeological surveys located in close proximity to, but outside of, the proposal site, the extent of these sites would be demarcated with high visibility fencing as far as practicable to avoid accidental impact during construction impacts. This particularly applies to scarred trees ARTC6, ARTC18 and ARTC19. The sites would also be clearly marked on all mapping and plans used by contractors working on the project.</p> <p>Scarred tree ARTC20, which is located within the proposal site, should be marked on all mapping and plans used by contractors working on the project and should be fenced with high visibility fencing to avoid accidental impact during construction works. Potential excavation near the tree should include consideration of a tree protection zone, defined in consultation with an arborist.</p>	Detailed design/pre-construction
AH-8	Avoiding and minimising impacts on Aboriginal heritage	Clearing extents/site boundary/limit of works would be consistent with project extents defined in a condition of approval and would be clearly defined with flagging or marking tape, signage or other suitable means to delineate no go areas.	Detailed design/pre-construction
NAH-1	Avoiding and minimising impacts on Aboriginal heritage	<p>Detailed design and construction planning would avoid direct impacts on identified items/sites of non-Aboriginal heritage significance as far as reasonably practicable. This would include the following listed items within the construction footprint:</p> <ul style="list-style-type: none"> ▶ Stockinbingal Railway Station ▶ Stockinbingal Heritage Conservation Area. 	Detailed design/pre-construction
AH-9	Protecting Aboriginal heritage and minimising impacts during construction	<p>An Aboriginal cultural heritage management plan would be prepared prior to construction and implemented as part of the CEMP. The plan would include measures to minimise the potential for impacts and manage Aboriginal heritage, including:</p> <ul style="list-style-type: none"> ▶ a salvage methodology (mitigation measure AH-2) ▶ an unexpected finds procedure (mitigation measure AH-11) ▶ plans and installation procedures for fencing and protective coverings ▶ induction package for construction workers and supervisors ▶ erosion and sediment controls in accordance with <i>Managing Urban Stormwater: Soils and construction—Volume 1</i> (Landcom, 2004) to minimise the potential for erosion impacts to Aboriginal sites located close to watercourses/drainage lines ▶ measures to manage the potential for impacts to potential Aboriginal heritage items (including burial sites) located in sensitive landscapes (such as alluvium landscapes) ▶ measures to protect sites close to the proposal site from inadvertent impacts ▶ outcomes of further investigations (mitigation measures AH-3 and AH-5). <p>The plan would be prepared in consultation with registered Aboriginal parties and the NSW Department of Planning and Environment.</p>	Construction
AH-10	Protecting Aboriginal heritage and minimising impacts during construction	A requirement for cultural heritage awareness training would be included in the Aboriginal cultural heritage management plan. Cultural heritage awareness training would be provided by an Aboriginal representative at the commencement of substantial works for the project.	Construction
AH-11	Unexpected finds	An unexpected finds procedure would be developed and included in the Aboriginal cultural heritage management plan to provide a consistent method for managing any unexpected Aboriginal heritage items discovered during construction, including potential heritage items or objects and a flow chart of the procedure on the findings of skeletal remains.	Construction

Ref	Impact	Mitigation measures	Timing
AH-12	Update AHIMS records	AHIMS records would be updated for AHIMS Register locations no longer considered to be sites: <ul style="list-style-type: none"> ▶ Scarred tree 50-5-0117 (AHIMS 50-5-0117) ▶ Scarred Tree 50-5-0120 (AHIMS 50-5-0120) ▶ Scarred Tree 50-5-0121 (AHIMS 50-5-0121) ▶ Zone 1—low-density scatter (AHIMS 50-5-0280) (part) ▶ PAD Zone 7 North (AHIMS 50-5-0281) ▶ PAD Zone 7 South (AHIMS 50-5-0288) ▶ PAD Zone 8 (AHIMS 50-5-0282) ▶ PAD Zone 11 (AHIMS 50-2-0056) ▶ PAD Zone 11 East (AHIMS 50-2-0057). 	Construction
NAH-2	Avoiding impacts during construction	The CEMP would define a requirement for non-Aboriginal historical heritage awareness training for site workers prior to commencement of construction works. The awareness training would promote an understanding of heritage items that may be impacted during the works, and the requirements of the unexpected finds procedure.	Construction
NAH-3	Unexpected finds including human skeletal remains	An unexpected finds procedure would be developed as part of the CEMP to provide a consistent method for managing any unexpected heritage or archaeological items and unexpected human skeletal remains. Non-Aboriginal awareness training (mitigation measure NAH-2) is to include a flow chart of the procedure on the findings of skeletal remains.	Construction
NAH-4	Avoiding impacts during construction	The existing fencing and signage around Stockinbingal Railway Station would be maintained to avoid impacts during construction. The Billabong Creek rail underbridge would be fenced and marked on site plans within the CEMP as an area to be avoided during construction.	Construction

15.6.5 Managing residual impacts

Residual impacts are impacts of the proposal that may remain after implementation of:

- ▶ design and construction planning measures to avoid and minimise impacts (see section 15.2.5 and Chapter 8: Proposal description—construction)
- ▶ specific measures to mitigate and manage identified potential impacts (refer to section 15.6.1).

The key potential Aboriginal and non-Aboriginal heritage issues and impacts originally identified by the environmental risk assessment (refer to Appendix G) are listed in Table 15-12. The (pre-mitigation) risks associated with these impacts, which were identified by the environmental risk assessment, are provided. Further information on the approach to the environmental risk assessment, including descriptions of criteria and risk ratings, is provided in Appendix G.

The potential issues and impacts identified by the environmental risk assessment were considered as part of the Aboriginal and non-Aboriginal heritage assessment, summarised in sections 15.4 and 15.5. The mitigation and management measures (listed in Table 15-11) that would be applied to manage these impacts are also identified. The significance of potential residual impacts (after application of these mitigation measures) is rated using the same approach as the original environmental risk assessment. The approach to managing significant residual impacts (considered to be those rated medium or above) is also described.

TABLE 15-12: RESIDUAL IMPACT ASSESSMENT—CULTURAL HERITAGE

Key issue (SEARS)	Phase	Potential impacts	Pre-mitigated risk			Mitigation measures (refer to Table 15- 11)	Residual risk			How residual impacts would be managed
			Likelihood	Consequence	Risk rating		Likelihood	Consequence	Risk rating	
Heritage (Aboriginal)	Construction	▶ Potential impacts on registered Aboriginal heritage items/sites in the proposal site	Possible	Major	High	AH-1 to AH-11	Unlikely	Moderate	Low	n/a
		▶ Impacts on unrecorded Aboriginal sites and/or areas of archaeological sensitivity or cultural value	Possible	Major	High	AH-1 to AH-11	Unlikely	Moderate	Low	n/a
		▶ Impacts on areas predicted to have moderate to high archaeological potential	Possible	Major	High	AH-1 to AH-11	Possible	Moderate	Medium	Any areas identified as having heritage significance that have the potential to be impacted by the proposal would be managed in accordance with the mitigation measures. If salvage is required, it would be managed in accordance with the agreed salvage methodology. The Aboriginal cultural heritage management plan would detail the approach to managing Aboriginal sites and would be prepared in consultation with relevant stakeholders. This would minimise the potential for residual impacts as far as reasonably practicable.
Heritage (Aboriginal)	Operation	▶ Visual impacts on heritage items and close to the proposal site	Possible	Moderate	Medium	AH-1 to AH-11	Unlikely	Moderate	Low	n/a
		▶ Impacts on heritage items from vibration during operation	Possible	Moderate	Medium	AH-1 to AH-11	Unlikely	Moderate	Low	n/a

Key issue (SEARS)	Phase	Potential impacts	Pre-mitigated risk			Mitigation measures (refer to Table 15- 11)	Residual risk			How residual impacts would be managed
			Likelihood	Consequence	Risk rating		Likelihood	Consequence	Risk rating	
Heritage (non- Aboriginal)	Construction	▶ Potential direct impacts on heritage listed sites located within the proposal site and any potential heritage items located within/ near the proposal site	Unlikely	Major	Medium	NAH-1 to NAH-3	Unlikely	Minor	Low	n/a
		▶ Disturbance of known or unidentified items or places of non-Aboriginal heritage significance	Unlikely	Major	Medium	NAH-2 to NAH-4	Unlikely	Moderate	Low	n/a
		▶ Impacts on listed heritage items or items of heritage values due to demolition, altered historic arrangements and access, visual amenity, landscape and vistas, curtilage, subsidence and architectural noise treatment.	Possible	Moderate	Medium	NAH-1 to NAH-4	Rare	Moderate	Low	n/a