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M1 Pacific Motorway extension to Raymond Terrace

Environmental impact statement – Chapter 12: Aboriginal cultural heritage

Transport for NSW | July 2021

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12. Aboriginal cultural heritage

This chapter describes the potential Aboriginal cultural heritage impacts that may be generated by the construction and operation of the project and presents the approach to the management of these impacts.

The desired performance outcomes for the project relating to Aboriginal cultural heritage, as outlined in the SEARs, are to:

- Ensure that the design, construction and operation of the project facilitates, to the greatest extent possible, the long term protection, conservation and management of the heritage significance of items of environmental heritage and Aboriginal objects and places
- Ensure the design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage and Aboriginal objects and places.

Table 12-1 outlines the SEARs that relate to Aboriginal cultural heritage and identifies where they are addressed in this EIS. The full assessment of Aboriginal cultural heritage impacts is provided in the Aboriginal Cultural Heritage Assessment Report (ACHAR) (**Appendix L**).

Table 12-1 SEARs (Aboriginal cultural heritage)

Secretary's requirement	Where addressed
13. Heritage	
1. The Proponent must identify and assess any direct and/or indirect impacts (including cumulative impacts) to the heritage significance of:	The cumulative Aboriginal cultural heritage impacts of the project are assessed in **Chapter 23** (cumulative impacts).
(a) Aboriginal places and objects, as defined under the *National Parks and Wildlife Act 1974* and in accordance with the principles and methods of assessment identified in the current guidelines;	Impacts on the heritage significance of Aboriginal places and objects are assessed in **Section 12.5**.
(b) Aboriginal places of heritage significance, as defined in the Standard Instrument – Principal Local Environmental Plan;	There are no Aboriginal places of heritage significance within the construction footprint listed on the Newcastle Local Environmental Plan 2012 or the Port Stephens Local Environmental Plan 2013. Refer to **Section 12.4.3**. There are no project related direct or indirect impacts on Aboriginal Heritage outside of the study area.
(c) environmental heritage, as defined under the *Heritage Act 1977*; and	There are no Aboriginal places of heritage significance defined as environmental heritage within the study area. Refer to **Section 12.4.3**. Non-Aboriginal heritage is discussed in **Chapter 17** (non-Aboriginal heritage).
(d) items listed on the National and World Heritage lists.	No heritage items relevant to the project are listed on the National and World Heritage lists (refer to **Section 12.4.3** and **Section 17.3.2**).
3. Where archaeological investigations of Aboriginal objects are proposed these must be conducted by a suitably qualified archaeologist, in accordance with section 1.6 of the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2010). In the event that harm to existing archaeological relics cannot be avoided, a Research Design and Excavation Methodology should be prepared to guide excavation works.	Archaeological investigations previously carried out for the project are described in **Section 12.2.6** and **Section 12.2.7**. A Research Design and Excavation Methodology will be prepared and included in the Aboriginal Cultural Heritage Management Plan for the project (refer to Chapter 9 of the ACHAR (**Appendix L**)).

Secretary's requirement	Where addressed
4. Where impacts to Aboriginal objects and/or places are proposed, consultation must be undertaken with Aboriginal people in accordance with the current guidelines. The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be assessed.	**Section 12.3** outlines consultation that must be carried out with Aboriginal people. **Section 12.4.4** identifies areas of cultural significance. Future consultation is described in **Section 6.4**.
3. Noise and vibration – structural	
1. The Proponent must assess construction and operation noise and vibration impacts in accordance with relevant NSW noise and vibration guidelines. The assessment must include consideration of impacts to the structural integrity and heritage significance of items (including Aboriginal places and items of environmental heritage).	Surface and subsurface artefacts (Aboriginal heritage) are not subject to potential noise or vibration impacts (refer to **Section 12.5.1** and **Section 12.5.2**). Statements of heritage impact (non-Aboriginal heritage) which consider noise and vibration impacts from the project during construction and operation are provided in **Section 17.4.2**.
4. Consultation	
1. The project must be informed by consultation, including with relevant local, State and Commonwealth government agencies, infrastructure and service providers, special interest groups (including Local Aboriginal Land Councils, Aboriginal stakeholders, and pedestrian and bicycle user groups), affected landowners, businesses and the community. The consultation process must be undertaken in accordance with the current guidelines.	**Section 12.2.2** outlines the guidelines used for the consultation process. **Section 12.3** summarises the consultation carried out to inform this chapter.
2. The Proponent must document the consultation process and demonstrate how the project has responded to the inputs received.	**Section 12.3**
3. The Proponent must describe the timing and type of community consultation proposed during the design and delivery of the project, the mechanisms for community feedback, the mechanisms for keeping the community informed, and procedures for complaints handling and resolution.	**Section 12.3**
11. Visual amenity	
1. The Proponent must assess the visual impact of the project and any ancillary infrastructure (including noise barriers) on: (c) heritage items including Aboriginal places and environmental heritage	Visual impacts on Aboriginal places are discussed in **Section 12.5.1**. Statements of heritage impact (non-Aboriginal heritage) which consider impacts, such as visual impacts of the project, are provided in **Section 17.4.2**.

12.1 Policy and planning setting

The Aboriginal cultural heritage assessment was prepared to assess the potential impacts of the project in accordance with the following relevant legislation, policy and guidelines:

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

- Commonwealth legislation:
  - *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
  - *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
  - *Native Title Act 1993.*
- Policy and guidelines:
  - Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011)
  - Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (the Code) (DECCW 2010e)
  - Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales 2010 (DECCW 2010f)
  - Aboriginal Cultural Heritage Consultation Requirements for Proponents (ACHCRP) 2010 (DECCW 2010a)
  - Procedure for Aboriginal cultural heritage consultation and investigation (PACHCI) (Roads and Maritime Services 2011b).

Further detail on the above legislation, policies and guidelines and how they apply to the project is provided in the ACHAR (**Appendix L**).

Details regarding legislation, policies and guidelines that apply to historical archaeology and heritage and how they apply to the project are provided in **Chapter 17** (non-Aboriginal heritage) and the Non Aboriginal Heritage Working Paper (**Appendix Q**).

12.2 Assessment methodology

12.2.1 Overview

The assessment of Aboriginal cultural heritage was conducted by a suitably qualified heritage consultant in accordance with the guidance documents in **Section 12.1**. The Aboriginal cultural heritage assessment involved:

- A review of previous archaeological assessments relevant to the project
- A desktop assessment of the study area to develop a predictive model
- Predictive modelling to determine the archaeological sensitivity of various landforms in the study area
- Archaeological survey to identify any archaeological objects, or areas with the potential to contain archaeological objects (PADs)
- Archaeological assessment of the study area, including archaeological surveys conducted in 2015 and 2020 to identify any archaeological objects, or areas with the potential to contain PADs
- Consultation with Aboriginal community representatives in accordance with PACHCI and ACHCRP
- Archaeological test excavation program to characterise and determine the extent of any potential areas of Aboriginal archaeological significance
- Identification of Aboriginal sites through consultation and desktop reviews
- Significance assessment of Aboriginal sites within the study area in accordance with The Australia ICOMOS Burra Charter (Australia ICOMOS 2013)
- Impact assessment to determine type and degree of impacts to Aboriginal cultural heritage items as a result of the project
- Development of management measures in accordance with relevant legislation and guidelines to avoid impacts and/or secondarily to mitigate impacts to Aboriginal cultural heritage items.

12.2.2 PACHCI and consultation

The PACHCI is a four-stage process for investigating potential impacts to Aboriginal cultural heritage as a result of Transport road planning, development, construction and maintenance activities. It includes a process of community consultation that aims to ensure that the role, function and views of Aboriginal people are adhered to by Transport. The PACHCI process is summarised as:

- Stage 1: A desktop assessment to identify if any Aboriginal objects or potential archaeological deposits are present, identifying if further assessment is necessary
- Stage 2: Carrying out further desktop assessment and survey with Local Aboriginal Land Council (LALC) representatives (if necessary)
- Stage 3: Formal consultation based on Stage 2 results and the preparation of a cultural assessment report. Consultation is carried out in accordance with ACHCRP. This stage may also include archaeological test excavations
- Stage 4: Post-approval implementation of management recommendations identified in the Stage 3 assessment and consultation.

Engagement with Aboriginal stakeholders was carried out to address the requirements of PACHCI, which provides an opportunity for Aboriginal people to participate in decision making about the management of cultural heritage. The consultation activities carried out in accordance with each stage of the PACHCI are detailed in **Section 12.3** and are detailed further in the ACHAR (**Appendix L**).

12.2.3 Study area

The study area for this assessment is about 15 kilometres in length and has a varying width between 150 to 400 metres in order to accommodate for project features such as interchanges with existing roads, proposed drainage features and the construction footprint, including the proposed ancillary areas.

The study area for this assessment is shown in **Figure 12-1**. The study area in 2015 incorporated a larger area than the 2020 study area. This is because the original assessment in 2015 identified certain areas that did not require further assessment, due to their highly disturbed nature. Both the 2015 and 2020 study areas are shown in **Figure 12-1**. For the purposes of the EIS, the ‘study area’ referred to in the rest of the chapter relates to the 2020 study area.

A broader study area was also used for discussion of Aboriginal cultural heritage values and background research into the archaeological nature of the study area. This has allowed the characterisation and assessment of the entire construction footprint. The impact assessment focusses on those heritage items within or next to the construction footprint.

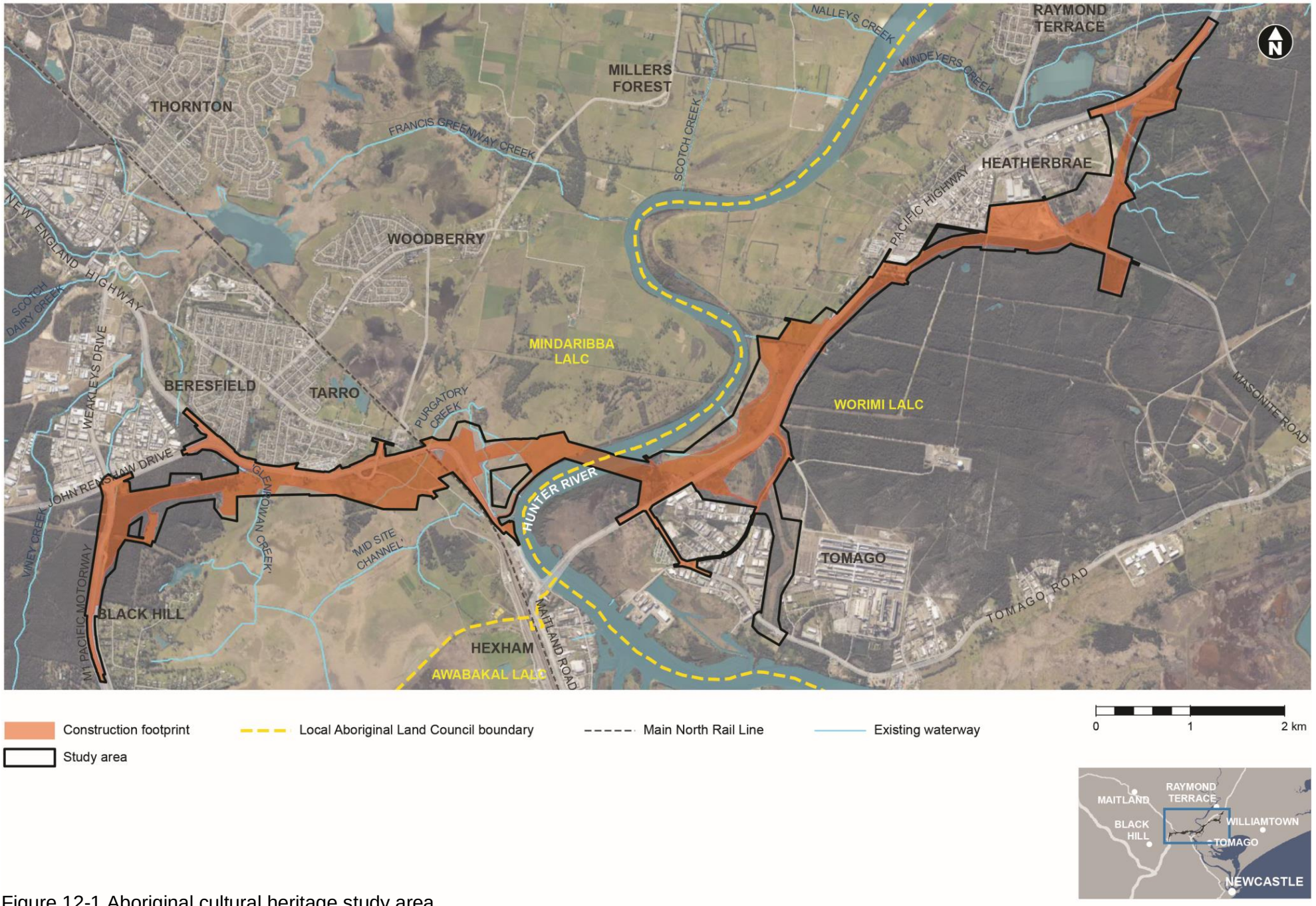

Figure 12-1 Aboriginal cultural heritage study area

12.2.4 Review of previous archaeological work

A review of previous archaeological work was carried out to provide an archaeological and cultural context for the study area. The review of work was used to inform the following:

- Development of a predictive model for Aboriginal cultural heritage relevant to the project
- Assessment of archaeological significance for any identified Aboriginal cultural heritage with the potential to be impacted by the project.

The archaeological work reviewed included fieldwork and consultation previously conducted for the concept design as well as any previous archeological assessments carried out in the locality of the area. A list of the previous archaeological work reviewed by the project is provided in the ACHAR (**Appendix L**).

12.2.5 Desktop assessment and predictive modelling

The desktop assessment involved collating relevant heritage and spatial data. This data included Aboriginal Heritage Information Management System (AHIMS) sites, aerial imagery, relevant legislation, local environmental plans, soil landscape data and contour data. Spatial data was used to determine the areas likely to be of archaeological sensitivity and require further assessment in the form of archaeological surveys.

Existing data sets were then used in conjunction with predictive modelling to determine the Aboriginal archaeological sensitivity of landforms in the study area. The predictive model is based on a 'land system' or 'archaeological landscape' model of site location. The predictive model was reviewed on the basis of:

- A review of previous models developed for the area
- An assessment of the results of the previous archaeological assessments reviewed
- The interpretation of the distribution patterns of known sites from AHIMS
- A study of previous impacts within the study area and the potential effects of these impacts on the archaeological record.

This type of modelling enables the prediction of site location based on known patterns of site distribution in similar landscape regions or archaeological landscapes. The outcomes of the predictive model were used to inform the archaeological survey.

12.2.6 Archaeological survey

The archaeological survey involved assessing the study area to identify any archaeological objects, or areas with the potential to contain archaeological objects (PADs). This included the inspection of any registered Aboriginal sites located within the study area.

The archaeological survey adopted a sampling strategy with targeted survey on each distinct landform within a given soil landscape. The following directives applied to the sampling strategy:

- Areas of higher visibility and exposures of the ground surface were targeted for particular scrutiny for the presence of midden material or stone artefacts
- All mature trees in the study area were inspected for cultural modification and scarring
- Any areas with potential to contain rocky outcrops close to waterways were inspected for grinding grooves, waterholes and wells.

The methodology for the archaeological survey consisted of:

- Pedestrian survey with nominated site officers from the LALCs, carried out in about 40 to 100 metre wide transects, covering as much as the study area as practicable. In many areas, access and visibility was severely limited by long grass or other vegetation
- Mapping Aboriginal sites and PADs identified, and survey transects into a Geographic Information System database
- Recording the following details for each surveyed area:
  - Landform
  - Ground surface exposure and nature of exposure
  - Visibility as a result of vegetation
  - Degree of disturbance
  - Nature of current and historical land use.

Archaeological surveys were carried out in 2015 and 2020. In the 2015 archaeological survey, four Aboriginal sites were identified, and three previously registered sites were inspected. Eight new areas of PAD were also identified, and four previously identified areas of PAD were reinspected and confirmed. Further archaeological survey was carried out in 2020 to survey areas not previously assessed. No new Aboriginal sites were identified during the 2020 archaeological survey, however five previously registered sites were identified as being impacted due to a change in the study area. These previously registered sites located within the study area were re-inspected to assess the current condition of the sites.

The identified Aboriginal sites and PAD areas are discussed in **Section 12.4**.

12.2.7 Archaeological test excavation

In accordance with Stage 2 of the PACHCI, a test excavation archaeological methodology was developed to describe how further investigations would be conducted. This methodology included:

- Investigation of areas of PAD identified within the study area
- A small number of control investigations outside areas of PAD to confirm areas of low archaeological potential and test predictions of PAD occurrence
- A description of how geotechnical investigation locations were assessed for potential impacts upon Aboriginal cultural heritage values.

The test excavation archaeological methodology was reviewed by all project Registered Aboriginal Parties (RAPs) and the Office of Environment and Heritage (OEH, now Heritage NSW), in accordance with Stage 3 of the PACHCI. The methodology was then updated and finalised based on any comments received.

The test program identified a further three PADs to the initial 12 Aboriginal site locations identified in the archaeological survey. In total, 15 locations underwent sub-surface testing as part of the test excavation program, comprising of about 446 test pits. Of the 15 locations for test excavation, sub-surface cultural deposits were identified at 11 of these locations. The results of the test excavation are discussed in **Section 12.4.3**.

The full excavation program was completed with the exception of a small area within the Hexham M12RT 1 site due to contamination issues. However, as the testing carried out was adequate to characterise the nature and extent of the archaeological deposits, no further sub-surface testing is considered to be required.

12.2.8 Aboriginal cultural values

Cultural significance can be associated with or attached to any place, places, and objects by any individual, group or groups of people. It is embodied in the place itself; its fabric, setting, use, associations, meanings, records, connected places and objects. The cultural values assessment identified locations of Aboriginal cultural significance relevant to the project. The methodology comprised:

- Reviewing archaeological fieldwork and consultation previously conducted for the concept design
- Reviewing literature relevant to the project and the surrounding landscape
- Consultation with knowledge holders for the region during Aboriginal Focus Group (AFG) meetings
- Consultation with knowledge holders at arranged meetings (e.g. oral history recording and site visits with knowledge holders)
- Consulting with Aboriginal site officers during field work regarding Aboriginal objects and cultural values.

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

12.2.9 Significance assessment

The significance assessment is made up of several criteria that attempt to define why a site is important and form its basis of management. The assessment of Aboriginal cultural heritage in this assessment is based upon the four values of the Australia ICOMOS Burra Charter (Australia ICOMOS 2013). These values include social values, historic significance, scientific significance and aesthetic significance. The significance assessment for the project included:

- Assessing each value for Aboriginal cultural heritage items newly identified as part of the project, then assigning an overall significance based on the average across the values
- Assessing Aboriginal cultural significance from consultation with the nominated site officers for the relevant RAPs during and following field assessments
- Determining historic, scientific and aesthetic significance
- Determining scale of significance at a state, regional or local level by comparing against sites investigated in the region.

The results of the significance assessment are discussed in **Section 12.4.5**.

12.2.10 Impact assessment

The impact assessment was used to determine the potential impact of the project to Aboriginal sites located within the construction footprint. The methodology included:

- Determining the overall significance of each site, assessed in the significance assessment
- Assessing the type of impact expected to each site by considering the construction activities that would occur near it
- Assessing the degree of impact expected to each site by calculating the area of each site within the construction footprint.

The results of the impact assessment are discussed in **Section 12.5**.

12.3 Aboriginal community consultation

Aboriginal stakeholder consultation has been completed in accordance with the ACHCRP. **Table 12-2** provides a summary of the consultation carried out to date the process and its outcomes are detailed further in the ACHAR (**Appendix L**).

Table 12-2 Consultation activities carried out during each of the PACHCI stages

PACHCI stage	Required actions	Activities and outcomes
Stage 1	Desktop risk assessment to determine whether the project would potentially impact Aboriginal cultural heritage, and if further assessment or investigation would be required.	The desktop assessment determined that the project may impact Aboriginal cultural heritage. This result triggered the following actions under Stage 2.
Stage 2	A further desktop assessment and consultation with relevant Aboriginal parties to determine the projects potential to harm Aboriginal cultural heritage.	The following activities were carried out as part of Stage 2: • A search of the National Native Title Register (NNTR) and the Register of Aboriginal Owners was carried out to identify key Aboriginal stakeholders for the project. Key stakeholders identified include the Awabakal, Guringai and Wonnarua Traditional Custodians as well as Mindaribba LALC and Worimi LALC • Site officers for Mindaribba LALC and Worimi LALC participated in archaeological surveys carried out in February, July and October 2015 to advise on Aboriginal cultural heritage issues that may arise as a result of the project. They were requested to provide a cultural survey heritage report to Roads and Maritime Services (now Transport).
Stage 3	Formal consultation based on Stage 2 results and the preparation of a Aboriginal cultural heritage report.	The following activities were carried out as part of Stage 3: • Correspondence sent on 13 January 2015 to government agencies and organisations: Newcastle OEH (now Heritage NSW), NSW Aboriginal Land Council, Mindaribba LALC, Worimi LALC, Awabakal LALC), The Registrar appointed under the *Aboriginal Land Rights Act 1983*, The National Native Title Tribunal (NNTT), The Native Title Services Corporation Limited, Newcastle City Council (now City of Newcastle), Port Stephens Council and Hunter Local Land Services. The correspondence requested details of Aboriginal people who may have an interest in the project and hold potential cultural knowledge. A list of 78 Aboriginal groups or people with potential cultural knowledge was compiled • Letters and advertisements inviting Aboriginal people with cultural knowledge to register were sent out in February 2015. Advertisements were placed in the Koori Mail, Indigenous Times, Newcastle Herald, Maitland Mercury, Port Stephens Examiner, and Cessnock Advertiser. Letters were sent to all Aboriginal persons and groups identified as potential cultural knowledge holders (detailed further in the ACHAR (**Appendix L**)). RAPs for the project were registered for subsequent consultation • A draft archaeological survey report and archaeological methodology were issued to RAPs for review • A survey was carried out with site officers for all RAPs on 11 and 12 November 2015, in response to comments received at the initial AFG • A further search of the NNTL was carried out in November 2015 at the request of the RAPs

PACHCI stage	Required actions	Activities and outcomes
		• Further survey with all RAPs was carried out on 22 and 23 July 2020 to survey areas previously not assessed • A total of five AFG meetings were held for the project: - Initial AFG was held on 15 October 2015 following the public display of the project - Two AFGs followed on 17 December 2015 and 1 September 2016 to discuss the test excavation archaeological methodology - Fourth AFG was held on 20 September 2018 where overview of project, text excavation results and proposed management measures were discussed - Fifth AFG was held on 1 December 2020 where overview of final study area and results of 2020 survey were discussed. A review of all impacts and proposed mitigation and management measures were discussed. • The draft of the ACHAR and Archaeological Assessment Report was provided to the RAPs for review and input. Responses received are provided in the in the ACHAR (**Appendix L**).

12.4 Existing environment

12.4.1 Landscape context

The project passes through three primary landscape regions which include the East Maitland Hills (about 20 per cent of the project), Hexham Swamp and the Hunter River Floodplain (about 40 per cent of the project) and the Tomago Sands (about 40 per cent of the project).

The East Maitland Hills region is characterised by undulating low hills and rises on Permian sediments. These hills reach up to 50 metres in elevation with slopes of around 13 to 15 per cent. The project within this region transverses broad low ridges and low gradient spurs that descend from Black Hill towards Hexham Swamp and the Hunter River floodplain. The East Maitland Hills region contains partially cleared tall open-forest comprising Spotted Gum, Ironbark, Grey Gum and Stringybark.

Hexham Swamp and the Hunter River Floodplain primarily consist of two distinct soil landscapes which include broad swampy Quaternary estuarine floodplain at the lower Hunter River delta, and Quaternary Holocene alluvial floodplain at either bank of the Hunter River. These landscapes are generally low relief and close to sea level, and are all subject to flooding, seasonal waterlogging and have permanently high-water tables. Hexham Swamp consists primarily of sedgeland with open woodland on swamp margins containing Swamp Oak and Paperbark. The Hunter River Floodplain consists primarily of cleared tall open-forest containing Swamp Oak, Paperbark, Tuckeroo and occasionally Cabbage Gum.

Tomago Sands consists of broad, irregular sandy rises and Aeolian deflation basins, with local relief rarely above one metre and slope gradients less than five per cent. Within this region, the project transverses a number of low rises and gullies, although two higher rises are located immediately west of Masonite Road. On the Tomago Sands the drier ridges and sandy rises primarily support dry heath comprising Red Bloodwood, Wallum Banksia, Geebung and Bracken. The poorly drained areas support a wet heath understorey (including Paperbark, Grass Tree and Red Bottlebrush) with a well-developed tree canopy comprising Smooth-barked Apple, Swamp Mahogany, Paperbark, Grey Gum and Scribbly Gum. The Holocene lake shore deposits have predominantly been cleared for pastoralism. Occasional species include She-oak, Swamp Oak, Paperbark, Cabbage Tree palms and Swamp Mahogany.

Various levels of human disturbance have occurred in the Lower Hunter Valley region. Industrial precincts are found at either side of the Hunter River at Hexham and Tomago, and further industrial and residential areas are found on either side of the Pacific Highway at Heatherbrae and Raymond Terrace. The remainder of the Lower Hunter Valley has largely been cleared and drained for the purpose of agricultural and pastoral activities, however native vegetation at Heatherbrae and south of Black Hill have been retained for the Hunter Region Botanic Garden. Land clearance and subsequent development is likely to have affected the archaeological integrity in this region.

12.4.2 Historical Aboriginal land use

Difficulties exist in determining tribal boundaries within the study area, largely due to 200 years of dislocation caused by European settlement. There were two native title claims before the NNTT that intersected the project which were the Wonnarua Traditional Custodians and the Awabakal and Guringai People. These claims have since been either discontinued by the claimant group or have been dismissed by the NNTT. However, the project is thought to traverse the boundaries of three tribal groups: the Awabakal, Worimi and Wonnarua.

Aboriginal people of the Lower Hunter region traditionally used a wide variety of natural resources present within this fertile landscape. Modification of the landscape by Aboriginal people took place through the use of fire farming and reed planting/weir development, but little evidence of such activities is likely to have been preserved in the archaeological record due to the perishable nature of the materials used and the historical alteration of the landscape.

Similarities existed amongst regional tribal groups in their use of traditional material culture. Many of the project region's material culture (shields, spears, boomerangs, clubs, digging sticks, canoes, containers, shelters, and woven nets and bags) were made from wood or other vegetative material that is rarely preserved in the archaeological record. Scarred trees, which were used in the production of items such as canoes, containers, shelters and bowls have the potential to be present within the region as do carved trees associated with ceremonial sites, although much rarer. Other sites, such as grinding grooves, stone quarries, burials and ceremonial grounds (bora rings, stone arrangements) are much rarer, however, have the potential to be present.

12.4.3 Identified sites

As detailed in **Section 12.2**, sites within the study area were identified by reviewing previous archaeological work, carrying out a desktop assessment and using a predictive model, and carrying out an archaeological assessment comprising archaeological survey and test excavation. The sites identified are detailed below.

Review of previous archaeological assessment

A review of existing archaeological assessments within the vicinity of the project show the East Maitland Hills landscape region to contain considerable amounts of archaeological material of very high sensitivity and cultural significance. These assessments suggest a nearly continuous distribution of artefacts across the elevated areas within the Black Hill area, with higher densities likely to occur closer to the swamp margin, at the break of slope. In the Tomago Sands, sites located within or near the study area consisted of surface artefact scatters containing reasonably high numbers of stone artefacts and hearth remnants. There is therefore moderate potential for substantial sub-surface archaeological deposits in Tomago Sands. The Hunter River Floodplain and Hexham Swamp area has an extremely low number of sites identified and has been assessed as containing low archaeological potential. However, slightly elevated areas near the margins of the swamp may be of slightly higher potential.

Predictive modelling

Predictive modelling was able to note specific predictive points for East Maitland Hills, Hexham Swamp and the Hunter River Floodplain and The Tomago Sands. Results of the predictive model are shown in **Table 12-3**.

Table 12-3 Predictive model based on landscape regions for the identification of areas of high, moderate and low archaeological sensitivity

Landscape region	Specific landscape characteristics within the broad landscape units	Sensitivity rating	Issues relating to assigning sensitivity ratings
East Maitland Hills	Basal slopes and crests of ridges/spurs bordering the wetlands.	High	Many known sites are recorded within this landform unit. Sites are likely to be of shallow nature.
	Upper and mid slopes of ridges/spurs greater than 100m from water.	Moderate	Known sites of low–moderate significance located in these areas.
Hexham Swamp and the Hunter River Floodplain	Low lying areas.	Low	Previous flooding, damp soils.
	Elevated, well drained areas adjacent to the margins of or within the swamp.	Moderate	A handful of sites are recorded within this landform unit. Sites are likely to be heavily disturbed or consist of imported material.
The Tomago Sands	Elevated landforms associated with remnant swamps and drainage lines.	Moderate	Several known sites of high archaeological and cultural significance are recorded within this landform unit.
	Low lying areas.	Low	Previous flooding, damp soils.

Sites identified during desktop assessment

Within the study area, there are no Aboriginal places of heritage significance listed on the World Heritage List, National Heritage List, Newcastle Local Environmental Plan 2012, Port Stephens Local Environmental Plan 2013 or defined as environmental heritage under the *Heritage Act 1977*.

Searches of the AHIMS were carried out with a two kilometre buffer around the study area to inform the desktop assessment by examining a wider archaeological context, with the most recent search carried out on 4 February 2021. The search resulted in 180 Aboriginal sites within the search area. This included 142 artefact scatters, isolated finds or open camp sites, 23 untested or partially tested PADs, 11 middens, three scarred trees and one art site. The desktop assessment also identified one area of potential archaeological sensitivity (PAS) within the study area which was not registered on the AHIMS.

A total of 24 Aboriginal sites, PADs or PAS were identified within the study area based on a desktop assessment.

Sites identified during archaeological survey and the test excavation program

Following archaeological survey and test excavation, a total of 26 Aboriginal sites, PADs and PAS were identified within the study area, comprising:

- Five artefact scatters
- Four isolated artefacts
- Twelve subsurface artefact sites (confirmed PADs) and one extra AHIMS record combining two of these sites (i.e. a total of 12 subsurface artefact sites)
- Four artefact scatters with subsurface artefacts (confirmed PADs).

One PAS not registered on AHIMS was not able to form part of the archaeological survey due to contamination risks associated with the former mineral sands processing site.

The 26 Aboriginal sites, PADs and PAS are described in **Table 12-4** and shown on **Figure 12-2**.

During the test excavation program a total of 3,026 stone artefacts were recovered and later analysed. Of these, 2,123 artefacts were recovered from the south side of the Hunter River, principally in the East Maitland Hills landscape region at Black Hill and a Pleistocene dune bordering the Hexham Swamp at Beresfield. The remaining 903 artefacts were recovered from the north side of the Hunter River principally from the Tomago Sands.

Subsequent to the 2020 archaeological survey, four new sites containing Aboriginal objects were identified through review of the recent archaeological assessment for the Newcastle Power Station (ERM 2019). These sites form part of an existing site, Hexham M12RT 1, which was inspected during the 2015 archaeological survey for this project. These four sites have been included as part of Hexham M12RT 1 for this assessment.

The findings of the archaeological assessment are presented in **Table 12-4**.

Table 12-4 Summary of Aboriginal sites, PADs and PAS within the study area

No.	AHIMS ID	Site name	Site type	AHIMS validity status	Initial description	Results of archaeological investigations
1	38-4-0464	Site 5; Beresfield	Artefact scatter	Valid	Three tuff artefacts identified within a vehicle track. Assessed as having low potential for sub surface artefacts.	Area overgrown. Site area could not be reidentified during survey. Site condition was not able to be determined.
2	38-4-0465	Site 6; Beresfield	PAD	Partially destroyed	PAD associated with artefact scatter (1 tuff flake, 2 silcrete flakes). Artefacts have been partially salvaged and reburied at Chichester Trunk Gravity Main (CTGM) Beresfield East artefacts (38-4-1689). Located on mid slope of a ridge.	5 test pits were excavated during testing within the PAD outside the water pipeline. No subsurface artefacts were identified. Site in poor condition, with a low likelihood of further subsurface artefacts.
3	38-4-0466	Site 7; Beresfield	Isolated artefact	Valid	Isolated artefact (1 silcrete flake) was located on the crest of a ridge. Moderate potential for associated sub–surface deposits (Thomas 2008).	Artefacts not reidentified during survey.
4	38-4-0467	Site 8; Beresfield	PAD (artefact component salvaged)	Valid	PAD associated with an isolated artefact (1 indurated tuff flake). Artefact that was located on the crest of a ridge was salvaged and reburied at CTGM Beresfield East artefacts (38-4-1689) by Hunter Water Corporation.	10 test pits were excavated during test excavation. 3 artefacts were identified.
5	38-4-0468	Site 9; Beresfield	Artefact scatter	Valid	Surface artefacts (1 silcrete flake, 1 tuff flake, 1 tuff blade core). Located on basal slope. High potential for associated sub–surface deposits (Thomas 2008).	Artefacts not reidentified during survey.
6	38-4-0471	Site 10; Beresfield	Artefact scatter	Valid	Surface artefacts (1 indurated tuff flake, 4 silcrete flakes/flaked pieces). Located on basal slope bordering wetland. High potential for associated sub–surface deposits (Thomas 2008).	Surface site could not be reidentified during survey. 38-4-0471 area included within M12RT Black Hill 3 (38-4-1747) PAD extent.

No.	AHIMS ID	Site name	Site type	AHIMS validity status	Initial description	Results of archaeological investigations
7	38-4-0473	Site 2; Beresfield	Isolated artefact	Valid	Isolated artefact (1 silcrete flake). Located on the crest of a ridge. Moderate potential for associated sub–surface deposits (Thomas 2008).	Hearth identified during test excavation.
8	38-4-0358	Glenrowan*	Artefact scatter	Partially destroyed	Unspecified number of stone artefacts found eroding out of an 'Early Holocene' foredune bordering Hexham Swamp in 1991.	16 surface artefacts identified during 2015 survey. PAD tested as a part of 38-4-0837 Beresfield 4 area
9	38-4-0837	Beresfield 4*	PAD	Partially destroyed	PAD identified in 2014 across sandy rise upon which Glenrowan Homestead is located. The PAD incorporates the Glenrowan artefact scatter 38-4-0358.	Extensive subsurface testing carried out. 1,687 artefacts identified.
10	38-4-1214	Beresfield WP AS 1	PAD (artefact scatter component salvaged)	Partially destroyed	Surface artefacts (2 indurated tuff flakes, 1 silcrete flake) and associated PAD. PAD identified on the lower-mid slope of a ridge. Site salvaged as part of CTGM Beresfield East artefacts by Hunter Water Corporation.	10 pits excavated as a part of testing. No subsurface artefacts were identified. Site has a low likelihood of further subsurface artefacts.
11	38-4-1217	CTGM PAD2	PAD (artefact scatter component salvaged)	Partially destroyed	PAD assigned to the length of the CTGM pipeline replaced by Hunter Water Corporation in 2010. Artefacts salvaged and reburied on Country. Remaining PAD extent Site 6, Beresfield (38-4-0465) and Site 8, Beresfield (38-4-0467).	Remaining PAD extent includes Site 6, Beresfield (38-4-0465) and Site 8, Beresfield (38-4-0467).
12	38-4-1709	TB IF 1	Isolated artefact	Valid	Isolated artefact (1 silcrete core). Located on the crest of a ridge.	Artefacts not relocated during survey.
13	38-4-1962	TB2	Artefact scatter	Valid	34 silcrete artefacts in a heavily disturbed area overlooking a drainage line down to Hexham Swamp (Kennedy et al. 2014).	3 silcrete artefacts identified during 2015 survey.

No.	AHIMS ID	Site name	Site type	AHIMS validity status	Initial description	Results of archaeological investigations
14	38-4-1810	Hunter River Isolated Find 1	Isolated find, PAD	Valid	A single weathered mudstone flake identified on a vehicle track located on the Hunter River bank.	Site could not be reidentified during survey in 2020. The access track the site was initially recorded on is located on the top of a levee constructed from introduced fill. Site condition is poor.
15	38-4-1811	Hunter River PAD	PAD	Valid	PAD identified in a slightly elevated section of the Hunter River bank.	The area is elevated as a result of its position on introduced fill (the flood plain is naturally a wetlands area). It is located in proximity to silos and a large area of gravel, concrete, pavers and other building rubble; within an area of fill reportedly the previous location of a wharf in the past. The area is assessed as not PAD but introduced fill and therefore unlikely to include subsurface deposits.
16	39-4-1834	Black Hill Power Artefact 1	Isolated find	Valid	One silcrete core. Located on an access track within high voltage electricity easement.	Site identified during 2015 survey. Area reinspected during 2020 survey, artefact could not be reidentified.
17	38-4-1745	M12RT Black Hill 1	PAD	Valid	Located on upper mid slope within the East Maitland Hills landscape region. High likelihood of subsurface deposits.	Site identified during 2015 survey. 48 pits excavated during testing. 16 artefacts identified.
18	38-4-1747	M12RT Black Hill 3	PAD	Valid	Located on upper mid slope within east Maitland Hills landscape region. High likelihood of subsurface deposits.	Site identified during 2015 survey. 124 pits excavated during testing. 409 artefacts were identified.
19	38-4-1751	Hexham M12RT 1	Artefact scatter and PAD	Valid	A total of 14 surface artefacts (silcrete and tuff flakes and cores) identified at six locations during survey. Elevated terrace and crest of rise within East Maitland Hills outlier landscape region. High likelihood of subsurface deposits.	Site identified during 2015 survey. 120 pits excavated during testing. 549 artefacts identified.

No.	AHIMS ID	Site name	Site type	AHIMS validity status	Initial description	Results of archaeological investigations
	38-4-2020	NPS01 (located in Hexham M12RT 1)	Artefact scatter	Valid	Site recorded after 2015 survey of area and test excavation of Hexham M12RT 1 during assessment for the Newcastle Power Station (ERM 2019).	Located within Hexham M12RT 1 (38-4-1751) PAD area.
	38-4-2021	NPS02 (located in Hexham M12RT 1)	Artefact scatter	Valid	Site recorded after 2015 survey of area and test excavation of Hexham M12RT 1 during assessment for the Newcastle Power Station (ERM 2019).	Located within the area subject to test excavation as a part of Hexham M12RT 1 (38-4-1751) PAD area. No subsurface artefacts were identified within this area. Located outside revised (as a result of test excavation results) PAD area.
	38-4-2022	NPS03 (located in Hexham M12RT 1)	Artefact scatter	Valid	Site recorded after 2015 survey of area and test excavation of Hexham M12RT 1 during assessment for the Newcastle Power Station (ERM 2019).	Located within the area subject to test excavation as a part of Hexham M12RT 1 (38-4-1751) PAD area. No subsurface artefacts were identified within this area. Located outside revised (as a result of test excavation results) PAD area.
	38-4-2038	NPS04 (located in Hexham M12RT 1)	Artefact scatter	Valid	Site recorded after 2015 survey of area and test excavation of Hexham M12RT 1 during assessment for the Newcastle Power Station (ERM 2019).	Located within Hexham M12RT 1 (38-4-1751) PAD area.
20	38-4-1750	Heatherbrae M12RT 3	Artefact scatter and PAD	Valid	An area of PAD on upper slopes and crest of dune overlooking Windeyers Creek. Moderate to high likelihood of subsurface deposits.	Site identified during 2015 survey. 27 pits excavated during testing. 245 artefacts identified. A hearth was also identified at the site location.
21	38-4-1835	Heatherbrae M12RT 4	PAD	Valid	An area of PAD on a crest of a dune within the Tomago sands landscape region. Moderate to high likelihood of subsurface deposits.	Site identified during 2015 survey. 4 pits excavated during testing. 5 artefacts identified. A hearth was also identified at the site location.

No.	AHIMS ID	Site name	Site type	AHIMS validity status	Initial description	Results of archaeological investigations
22	38-4-1749	Heatherbrae M12RT 2	Artefact scatter and PAD	Valid	A tuff flake identified and an associated area of PAD on a crest of a dune within the Tomago sands landscape region. Moderate to high likelihood of subsurface deposits.	Site identified during 2015 survey. 17 pits excavated during testing. 33 artefacts identified.
23	38-4-1833	Black Hill M12RT 4	PAD	Valid	Three silcrete artefacts comprising one angular fragment, one core, and one flake. Ex situ (heavily disturbed fill). This site was identified via test excavation of the Black Hill M12RT 1 (38-4-1745) PAD but has been interpreted as a separate site.	Site identified during 2015 survey. 3 artefacts located within one pit excavated during testing. Disturbed soil profile.
24	38-4-1838	Windeyers Creek 1	PAD	Valid	Subsurface site identified during test excavation within three control test pit locations. Upper slope of dune overlooking Windeyers Creek.	Site identified during 2015 survey. 21 pits excavated during testing. 33 artefacts identified.
25	38-4-1836	Purgatory Creek 1	PAD	Valid	This location was identified for inclusion in the test excavation program due to its landform features when seen during the control pit program.	Site identified during 2015 survey. 10 pits excavated during testing. 121 artefacts identified.
26	Not an AHIMS site	Former mineral sands processing site	PAS	N/A	Elevated landform in proximity to the Hunter River and wetland that cannot be accessed currently due to contamination issues.	Assessed as PAS beneath the concrete slab through desktop assessment.

*Glenrowan (38-4-0358) and Beresfield 4 (38-4-0837) PAD only are separate AHIMS registrations for what is in essence a single site.\

Figure 12-2 Aboriginal sites, PADs and PAS within the study area (map 1 of 2)

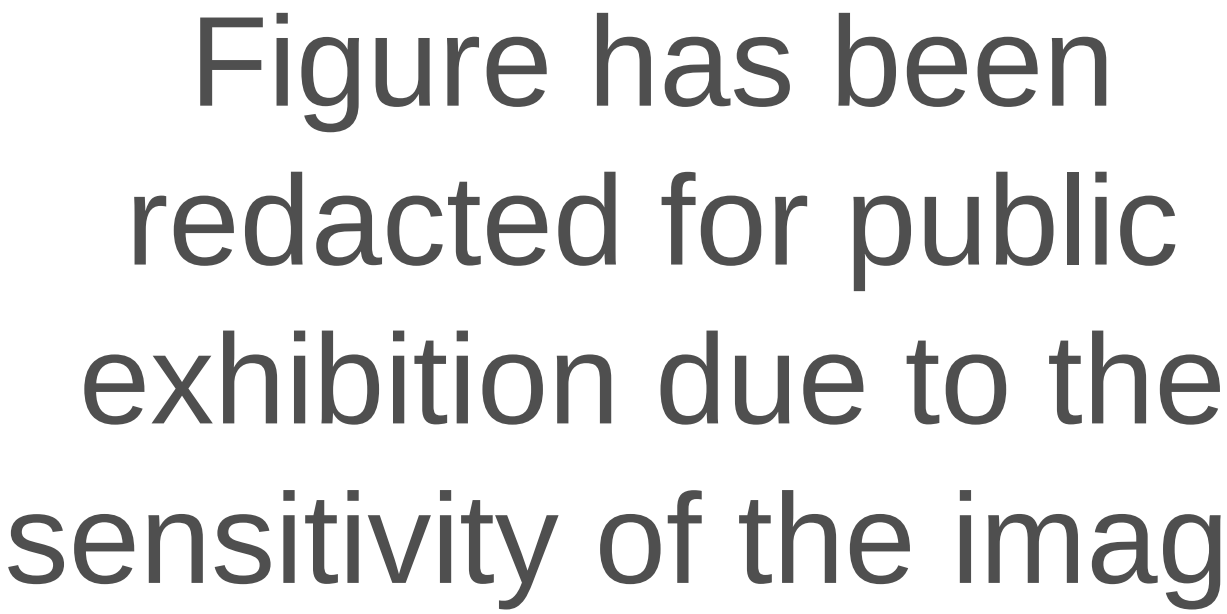

Figure 12-2 Aboriginal sites, PADs and PAS within the study area (map 2 of)

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12.4.4 Areas of cultural significance

Locations of Aboriginal cultural value relevant to the project were identified through consultation, field surveys and during the test excavation program. Within this assessment the wider region surrounding the study area is considered in the discussion of Aboriginal cultural heritage values as it is a part of a cultural landscape which must be considered as a part of this assessment.

Four locations of Aboriginal cultural values of local significance were identified. The three locations within the study area are a part of the identified 26 Aboriginal sites, PADs and PAS. Details of each of these cultural values and their locations are listed in **Table 12-5**.

Table 12-5 Aboriginal cultural values near or within the study area

Cultural value name (AHIMS ID)	Within or next to study area	Description
Black Hill M12RT 1 & 3 (38-4-1745 & 38-4-1747)	Within	• Part of cultural pathway/song line described by Wonnarua claimant group in the Hunter Valley as well as the Gomeroi claimant group in the Upper Hunter • Story place • Ridge line significant • Place of spiritual significance.
Glenrowan (38-4-0358)/ Beresfield 4 (38-4-0837)*	Within	• Landform with cultural sensitivity for burials • Songline from Black Hill to Mount Sugarloaf intersects this area • Story place.
Hexham M12RT 1 (38-4-1751)	Within	• Landform with cultural sensitivity for burials/ significant site • Place of spiritual significance.
Black Hill ochre quarry (not registered)	Next to	• Ochre quarry to the north of Hunter Water Corporation compound • Precise location unknown.

* Glenrowan (38-4-0358) and Beresfield 4 (38-4-0837) PAD only are separate AHIMS registrations for what is in essence a single site.

The statement of cultural significance and cultural value on behalf of the Awabakal and Guringai Traditional Owners emphasize the importance of the Hexham and Black Hill area. There is a high cultural value and significance of the area as a whole to the Awabakal and Guringai Traditional Owners as the landforms and resources fulfilled not just the basic needs of these People, but also many aspects of their cultural foundations.

The Statement for the Wonnarua Traditional Custodians is limited due to specific cultural information being confidential. However, it can be stated that the Beresfield 4 and Black Hill site areas are significant due to the stories they contain as well as being the last remaining landforms of their type in the area.

Contemporary cultural values were also associated with the large established fig tree on the western bank of the Hunter River by RAPs that participated in the field surveys. RAPs requested that the tree be protected from impact (potentially by a fence) and those working on the construction of the project should be made aware of the tree's significance.

12.4.5 Significance assessment summary

A summary of the significance assessment of the 26 Aboriginal sites, PADs and PAS located within the study area is presented in **Table 12-6**. These were developed in consultation with the RAPs and been provided for their review and feedback. Note the table does not provide a significance rating for the area of PAS at the former mineral sands processing site as contamination risks at the former mineral sands processing site restricted any sub-surface testing from occurring.

Table 12-6 Summary of the significance assessment for Aboriginal sites

No.	Name	Social significance	Historical significance	Scientific significance	Aesthetic significance	Overall significance (scale of significance)
1	Site 5; Beresfield (38-4-0464)	High	N/A	Low-moderate	N/A	**Moderate (local)**
2	Site 6; Beresfield (38-4-0465)	High	N/A	Low	N/A	**Low (local)**
3	Site 7; Beresfield (38-4-0466)	High	N/A	Low	N/A	**Low (local)**
4	Site 8;Beresfield (38-4-0467)	High	N/A	Low	N/A	**Low (local)**
5	Site 9; Beresfield (38-4-0468)	High	N/A	Low	N/A	**Low (local)**
6	Site 10; Beresfield (38-4-0471)	High	N/A	Moderate-high	Moderate	**Moderate-high (local)**
7	Site 2;Beresfield (38-4-0473)	High	N/A	Moderate-high	Low	**Moderate-high (local)**
8 9	Glenrowan (38-4-0358) / Beresfield 4 (38-4-0837)*	High	Moderate	High	Moderate	**High (local)**
10	Beresfield WP AS 1 (38-4-1214)	High	N/A	Low	N/A	**Low (local)**
11	CTGM PAD 2 (38-4-1217) Umbrella site only areas remaining post CTGM Salvage – Site 8;Beresfield (38-4-0467) and Site 6; Beresfield (38-4-0465)*	High	N/A	Low	N/A	**Low (local)**
12	TB IF 1 (38-4-1709)	High	N/A	Low	N/A	**Low (local)**

No.	Name	Social significance	Historical significance	Scientific significance	Aesthetic significance	Overall significance (scale of significance)
13	TB2 (38-4-1962)	High	N/A	Low	N/A	**Low (local)**
14	Hunter River Isolated Find 1 (38-4-1810)	High	N/A	Low	N/A	**Low (local)**
15	Hunter River PAD (38-4-1811)	Low	N/A	Low	N/A	**Low (local)**
16	Black Hill Power Artefact 1 (38-4-1834)	High	N/A	Low	N/A	**Low (local)**
17	Black Hill M12RT 1 (38-4-1745)	High	N/A	Low-moderate	Low	**Low-moderate (local)**
18	Black Hill M12RT 3 (38-4-1747) Includes – Site 10; Beresfield (38-4-0471)*	High	N/A	Moderate-high	Moderate	**Moderate-high (local)**
19	Hexham M12RT 1 (38-4-1751)* Includes – NPS01 (38-4-2020), NPS02 (38-4-2021), NPS03 (38-4-2022) and NPS04 (38-4-2038)	High	N/A	High	High	**High (local)**
20	Heatherbrae M12RT 3 (38-4-1750)	High	N/A	High	Moderate	**High (local)**
21	Heatherbrae M12RT 4 (38-4-1835)	High	N/A	High	Moderate	**High (local)**
22	Heatherbrae M12RT 2 (38-4-1749)	High	N/A	Moderate-high	Moderate	**Moderate-high (local)**
23	Black Hill M12RT 4 (38-4-1833)	High	N/A	Low	N/A	**Low (local)**
24	Windeyers Creek 1 (38-4-1838)	High	N/A	High	Moderate	**High (local)**
25	Purgatory Creek 1 (38-4-1836)	High	N/A	Low	Low	**Low (local)**
26	Former mineral sands processing site (not an AHIMS site)	N/A	N/A	N/A	N/A	N/A

12.5 Assessment of potential impacts

12.5.1 Construction

During project development, design and alignment refinements were made and the location of ancillary facilities were selected to avoid impacts to Aboriginal sites where possible, while considering engineering, environmental, social and economic requirements. The design has also placed the alignment as close as practicable to existing development and infrastructure to limit regional fragmentation impacts and to avoid impacts on less disturbed areas. Ancillary facilities in the Black Hill area were located and sized to align with existing disturbed areas to avoid adjacent undisturbed areas in this landform.

For the purpose of the impact assessment, it has been assumed that Aboriginal sites occurring within the construction footprint would be directly impacted by construction activities. A total of 26 Aboriginal sites, PADs and areas of PAS are located within the construction footprint, and would be directly impacted by the project, including visual impacts. The potential impact to Aboriginal sites, PADs and PAS recorded is summarised in **Table 12-7**.

Table 12-7 Impact assessment for Aboriginal sites, PADs and PAS

No.	Heritage item name	Heritage item type	Overall significance	Type of impact	Degree of impact	Description
1	Site 5 Beresfield (38-4-0464)	Artefact scatter	Moderate	Direct	Whole	The site is located in the construction footprint and will be directly impacted. The project would result in removal of the entire site and irreversible impact to its heritage values.
2	Site 6 Beresfield (38-4-0465)	PAD	Low	Direct	Whole	The remaining portions of this PAD are within the construction footprint. The PAD was tested within the study area with no Aboriginal objects identified. The project would result in removal of the entire PAD and irreversible impact to heritage values (if any). The area of PAD within the construction footprint has previously been impacted during the construction of the CTGM pipeline and associated access track and is unlikely to retain heritage values.
3	Site 7 Beresfield (38-4-0466)	Isolated find	Low	Direct	Whole	The site is located in the construction footprint and will be directly impacted. The project would result in removal of the entire site and irreversible impact to its heritage values.
4	Site 8 Beresfield (38-4-0467)	PAD	Low	Direct	Whole	The remaining portions of this PAD are within the construction footprint. The PAD was tested within the study area with no Aboriginal objects identified. The project would result in removal of the entire PAD and irreversible impact to heritage values (if any). The area of PAD within the construction footprint has previously been impacted during the construction of the CTGM pipeline and associated access track and is unlikely to retain heritage values.
5	Site 9;Beresfield (38-4-0468)	Artefact scatter	Low	Direct	Whole	The site is located entirely within the construction footprint and would be directly impacted. The project would result in removal of the entire site and irreversible impact to its heritage values.
6	Site 10; Beresfield (38-4-0471)*	Artefact scatter	Moderate-high	Direct	Whole	The site is located entirely within the construction footprint and will be directly impacted. The project would result in removal of the entire site and irreversible impact to its heritage values.
7	Site 2;Beresfield (38-4-0473)	Isolated artefact and hearth	Moderate-high	Direct	Partial	The site is partially located within the construction footprint and this component will be directly impacted. The project would result in the removal of about 90% of the site area and irreversible impact to its heritage values.

No.	Heritage item name	Heritage item type	Overall significance	Type of impact	Degree of impact	Description
8 9	Glenrowan (38-4-0358)/ Beresfield 4 (38-4-0837)	Artefact scatter	High	Direct	Partial	The site is partially located within the construction footprint and this component will be directly impacted. The site is likely to extend beyond the study area. The project would result in removal of about 65% of the currently known construction footprint and irreversible impact to its heritage values.
10	Beresfield WP AS 1 (38-4-1214)	PAD	Low	Direct	Whole	The site is located entirely within the construction footprint and would be directly impacted. The area of PAD within the construction footprint area has previously been impacted during the construction of the CTGM pipeline and associated access track and is unlikely to retain heritage values.
11	CTGM PAD2 (38-4-1217) Note: Site consists of Site 6 Beresfield (38-4-0465) and Site 8; Beresfield (38-4-0467)	PAD	Low	Direct	Whole	The remaining portions of this PAD are within the construction footprint. The PAD was tested within the study area with no Aboriginal objects identified. The project would result in removal of the entire PAD and irreversible impact to heritage values (if any). The area of PAD within the construction footprint has previously been impacted during the construction of the CTGM pipeline and associated access track and is unlikely to retain heritage values.
12	TB IF 1 (38-4-1709)	Isolated find	Low	Direct	Whole	The site is located entirely within the construction footprint and will be directly impacted. The project would result in removal of the entire site and irreversible impact to its heritage values.
13	TB2 (38-4-1962)	Artefact scatter	Low	Direct	Whole	The site is located entirely within the construction footprint and will be directly impacted. The project would result in removal of the entire site and irreversible impact to its heritage values.
14	Hunter River Isolated Find 1 (38-4-1810)	Isolated find	Low	Direct	Whole	The site is located entirely within the construction footprint and will be directly impacted. The project would result in removal of the entire site and irreversible impact to its heritage values.
15	Hunter River PAD (38-4-1811)	PAD	Low	Direct	Whole	The site is located entirely within the construction footprint and will be directly impacted. The site was identified during survey to be located entirely on fill and is unlikely to have heritage values.

No.	Heritage item name	Heritage item type	Overall significance	Type of impact	Degree of impact	Description
16	Black Hill Power Artefact 1 (38-4-1834)	Isolated artefact	Low	Direct	Whole	The site is located entirely within the construction footprint and will be directly impacted. The project would result in removal of the artefact yet would have no additional impact to its heritage values as it is an ex-situ context.
17	Black Hill M12RT 1 (38-4-1745)	Artefact scatter	Low-moderate	Direct	Partial	The site is located in the construction footprint and will be directly impacted. The project would result in the removal of about 50% of the site area and irreversible impact to its heritage values.
18	Black Hill M12RT 3 (38-4-1747) Note: Includes Site 10; Beresfield (38-4-0471)	Artefact scatter	Moderate-high	Direct	Partial	The site is partially located within the construction footprint and this component will be directly impacted. The site is likely to extend beyond the construction footprint. The project would result in removal of about 50% of the currently known site area and irreversible impact to its heritage values.
19	Hexham M12RT 1 (38-4-1751) Note: Includes NPS01 (38-4-2020), NPS02 (38-4-2021), NPS03 (38-4-2022) and NPS04 (38-4-2038)	Artefact scatter and PAD	High	Direct	Whole	The site is located entirely within the construction footprint and will be directly impacted. The project would result in removal of the entire site and irreversible impact to its heritage values.
20	Heatherbrae M12RT 3 (38-4-1750)	Artefact scatter	High	Direct	Partial	The site is partially located within the construction footprint and this component will be directly impacted. The site is likely to extend beyond the construction footprint. The project would result in removal of about 75% of the currently known site area and irreversible impact to its heritage values.
21	Heatherbrae M12RT 4 (38-4-1835)	Artefact scatter	High	Direct	Whole	The site is located entirely within the construction footprint and will be directly impacted. The project would result in removal of the entire site and irreversible impact to its heritage values.
22	Heatherbrae M12RT 2 (38-4-1749)	Artefact scatter	Moderate-high	Direct	Whole	The site is located entirely within the construction footprint and will be directly impacted. However, this site is currently subject to an AHIP (C0003580 and C0005569) for its salvage and destruction as a part of an industrial development.

No.	Heritage item name	Heritage item type	Overall significance	Type of impact	Degree of impact	Description
23	Black Hill M12RT 4 (38-4-1833)	Artefact scatter	Low	Direct	Whole	The site is located in the construction footprint and will be directly impacted. The project would result in removal of the entire site and irreversible impact to its heritage values.
24	Windeyers Creek 1 (38-4-1838)	Artefact scatter	High	Direct	Whole	The site is located entirely within the construction footprint and will be directly impacted. The project would result in removal of the entire site and irreversible impact to its heritage values.
25	Purgatory Creek 1 (38-4-1836)	Artefact scatter	Low	Direct	Whole	The site is located entirely within the construction footprint and will be directly impacted. The project would result in removal of the entire site and irreversible impact to its heritage values.
26	Former mineral sands processing facility	PAS	N/A	Direct	Whole	The area of PAS identified in the desktop assessment (access not possible due to contamination) is located entirely within the study area and will be directly impacted. The project would result in removal of the entire area and irreversible impact to its heritage values (if any).

The impacts in **Table 12-7** cannot be avoided and environmental management measures to minimise and mitigate impacts are provided in **Section 12.6** and further detailed in the ACHAR (**Appendix L**).

Construction for the project includes indirect (visual) impacts caused by the project and any ancillary infrastructure (including noise barriers).

An examination of potential indirect (visual) impacts in relation to the identified Aboriginal sites and Aboriginal places has demonstrated that there would be no indirect (visual) impacts. There are no Aboriginal places, as defined under the relevant legislation, planning instruments or heritage lists, within or adjacent to the study area. Therefore, there would be no indirect visual or noise and vibration impacts on Aboriginal places as a result of construction of the project.

Surface and subsurface artefacts (Aboriginal heritage) are not subject to potential noise or vibration impacts. Therefore, noise and vibration generated during construction is not expected to result in indirect impacts to the structural integrity and/or heritage significance of any Aboriginal heritage items identified in this assessment.

Direct impacts of noise barriers are discussed in **Chapter 8** (noise and vibration) while visual impacts are assessed in **Chapter 15** (urban design, landscape and visual amenity).

12.5.2 Operation

No impacts on Aboriginal cultural heritage, both direct and indirect, are expected during the operation of the project. Impacts to Aboriginal sites located within the construction footprint will occur during the construction phase with no further impact during operation. Aboriginal sites that include areas that extend outside the construct footprint will have those portions conserved during construction and will not be impacted during the operation of the project.

As there are no Aboriginal places defined under the relevant legislation, planning instruments or heritage lists within the study area there would be no indirect visual or noise and vibration impacts on Aboriginal places during operation of the project.

Noise and vibration during operation would not result in indirect impacts to the structural integrity and/or heritage significance of any Aboriginal heritage items identified in this assessment.

12.6 Environmental management measures

The environmental management measures that will be implemented to minimise the Aboriginal cultural heritage impacts from the project, along with the responsibility and timing for those measures, are presented in **Table 12-8**.

Table 12-8 Environmental management measures (Aboriginal cultural heritage)

Impact	Reference	Management measure	Responsibility	Timing
Impacts on known Aboriginal sites	AH01	An Aboriginal Cultural Heritage Management Plan (ACHMP) will be prepared in accordance with the Procedure for Aboriginal cultural heritage consultation and investigation (Roads and Maritime Services 2011b) and Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime Services 2015f). The ACHMP will be prepared in consultation with all relevant Aboriginal groups. The ACHMP will include: • Details of investigations completed or planned to be carried out and any associated approvals required • Mapping of areas of Aboriginal heritage value and identification of protection measures to be applied during construction • Procedures to be implemented if previously unidentified Aboriginal objects, including skeletal remains, are discovered during construction • An induction program for construction personnel on the management of Aboriginal heritage values • Opportunities for on-going Aboriginal community engagement in the project.	Transport/ Contractor	Prior to construction
	AH02	Archaeological salvage excavation, surface collection and exclusion fencing as detailed in Table 9-1 of the Aboriginal Cultural Heritage Assessment Report must be carried out in accordance with the methodology specified in the Chapter 9 of the Aboriginal Cultural Heritage Assessment Report (**Appendix L**).	Contractor/ Transport	Prior to construction/ construction

Impact	Reference	Management measure	Responsibility	Timing
Other relevant management measures				
Non-Aboriginal heritage impacts	NA01	A Non-Aboriginal Heritage Management Plan (NAHMP) would be prepared prior to construction in consultation with Heritage NSW. As a minimum, the NAHMP would include the following: • A list, plan and maps with GIS layers showing the location of identified heritage items both within, and near, the construction footprint • Procedures to be implemented during construction to avoid or minimise impacts on items of heritage significance including protective fencing • The Unexpected Heritage Items Procedure (Transport for NSW 2019b) which will be followed in the event that unexpected heritage finds are uncovered during construction • A procedure for the unexpected discovery of human skeletal remains as per the Skeletal remains: guidelines for the management of human skeletal remains (NSW Heritage Office 1998).	Transport/ Contractor	Prior to construction
Aboriginal cultural heritage	UD06	The project detailed design will incorporate relevant Aboriginal cultural heritage elements of Beyond The Pavement (Transport for NSW 2020a) and Designing With Country (GANSW 2020), where practical.	Transport/ Contractor	Prior to construction/ construction