

Hexham Relief Roads Project: Aboriginal Heritage Impact Assessment

Prepared by Australian Museum Business Services
for KMH Environmental

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Executive Summary

Australian Museum Business Services (AMBS) has been commissioned by KMH Environmental (KMH) to prepare an Aboriginal Heritage Impact Assessment (AHIA) to address potential impacts to Aboriginal cultural heritage arising from the Hexham Relief Roads Project. This AHIA forms part of the Environmental Impact Statement (EIS) prepared by KMH for the Australian Rail Track Corporation (ARTC) under Part 5.1 of the *Environmental and Planning Assessment Act 1979* (EP&A Act).

This report has been prepared in accordance with legislative requirements and heritage best practice. Aboriginal consultation has been undertaken throughout the project in accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010*.

An archaeological survey of the study area was undertaken by AMBS Project Officer, Jenna Weston, and Aboriginal stakeholders on 31 August 2011 and 23 November 2011. The proposed development will have an impact on two Aboriginal sites/PADs: HS1, an artefact scatter with potential subsurface deposit; and the Cultural PAD, a potential subsurface archaeological deposit recorded by McCardle Cultural Heritage (MCH). A rise of land on the north-eastern side of the intersection of Woodlands Close and the New England Highway was also identified as having some potential for subsurface deposit; although this is no longer proposed to be impacted by the relief roads development, it is recommended that care should be taken in this area to avoid any inadvertent impacts caused by vehicles and equipment turning from/to the New England Highway. A rounded stone and some shell material were also located in fill material near the southern end of the proposed relief roads area.

An Aboriginal Heritage Management Plan (AHMP) for the project is to be developed in consultation with the registered Aboriginal stakeholders, as part of the next stage of the approvals process, to ensure appropriate management of the Aboriginal heritage of the project area.

It is recommended that a program of archaeological test and salvage excavation should be undertaken in any section of site HS1 and the Cultural PAD (as redefined on the basis of previous disturbance) proposed to be impacted, prior to or at the time of enabling works for the project. A keeping place for the Aboriginal heritage material recovered from within the Hexham Relief Roads project area should be nominated in consultation with the registered Aboriginal community stakeholders, and identified in the AHMP. Other requests of the registered Aboriginal stakeholders should also be addressed in the AHMP.

It is also recommended that registered Aboriginal stakeholders should be offered the opportunity to collect the rounded stone and the surface shell material seen during the survey in fill material near the southern end of the proposed relief roads area, prior to any development works in this area. Any Aboriginal heritage material should be collected and recorded.

Finally, the rise of land on the north-eastern side of the intersection of Woodlands Close and the New England Highway is not proposed to be impacted, and would be designated a no go area.

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1 Introduction

1.1 Preamble

Australian Museum Business Services (AMBS) has been commissioned by KMH Environmental (KMH) to prepare an Aboriginal Heritage Impact Assessment (AHIA) to address potential impacts to Aboriginal cultural heritage arising from the Hexham Relief Roads Project. This AHIA forms part of the Environmental Impact Statement (EIS) prepared by KMH for the Australian Rail Track Corporation (ARTC) under Part 5.1 of the *Environmental and Planning Assessment Act 1979* (EP&A Act).

1.2 Study Area and Proposed Development

The ARTC proposes to develop five Relief Roads (tracks) and associated infrastructure at Hexham in the NSW Hunter Valley (the proposed Project). The proposed Project is located approximately 16km north west of the town of Newcastle (Figure 1.1).

Key components of the proposed Project comprise:

- Five Up Relief Roads (train lines) to the west of the existing Up Main, Down Main and Up Coal including:
 - o The removal of the existing Down Coal (located to the west of the Up Coal);
 - o The construction of five new train lines (tracks) for the Relief Roads;
 - o The construction of a new Down Coal to the west and outside of the proposed Relief Roads;
 - o Each Relief Road to accommodate trains generally comprising two or three locomotives and up to 91 wagons (1,543m long) requiring a minimum standing room of 1,670m; and
 - o New turnouts, return curves and associated track changes.
- Installation of new signal infrastructure for the five Relief Roads including signal location cases, huts and gantries.
- Earth and civil works of approximately 265,000 cubic metres, including cut to fill, track formation, drainage and minor structures.
- Ancillary infrastructure including vehicle access tracks, temporary construction compounds and stockpile sites.
- Land acquisition and the upgrading of existing rail infrastructure and public utilities as required.

The estimated cost of the Project is approximately \$90 million and it is expected to take approximately 18 months to construct.

The study area (also referred to as the Project Area) is within the Newcastle Local Government Area (LGA).

1.3 Methodology

This report is consistent with the principles of the Burra Charter (*The Australia ICOMOS charter for the conservation of places of cultural significance*). It has been prepared in accordance with current best-practice and the requirements of the Office of Environment and Heritage, Department of Premier & Cabinet (OEH; comprising the former Department of Environment, Climate Change and Water [DECCW], formerly the Department of Environment and Conservation [DEC]) guidelines as specified in the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005), the *Code of Practice for Archaeological Investigation of Aboriginal Objects in*

New South Wales (DECCW 2010) and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010).

The key heritage requirements for this project are:

- identification of any Aboriginal heritage sites present within the study area;
- assessment of the Aboriginal heritage values of the study area; and
- provision of recommendations for the management of Aboriginal heritage resources in the study area.

To fulfil the requirements of the project, the following tasks were undertaken:

- consultation with registered Aboriginal stakeholders, as per the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*;
- search and review of the OEH Aboriginal Heritage Information Management System (AHIMS) database, to determine the location and nature of any Aboriginal heritage sites recorded within, or in the vicinity of, the study area;
- review of relevant previous archaeological reports specific to the area, to determine the extent of past archaeological research in the region;
- review of relevant contextual environmental information and previous land use history;
- field survey with registered Aboriginal stakeholder representatives, to allow identification and assessment of Aboriginal heritage values present in the study area; and
- preparation of a report describing the results of the background research, the extent and significance of any Aboriginal heritage items recorded in the study area, and management recommendations and mitigation measures for any Aboriginal heritage resources, including constraints and opportunities.

1.4 Authorship

This report has been prepared by AMBS Project Officer Jenna Weston. AMBS Project Manager Christopher Langeluddecke reviewed the report. AMBS Senior Project Manager Jennie Lindbergh reviewed the report for quality and consistency.

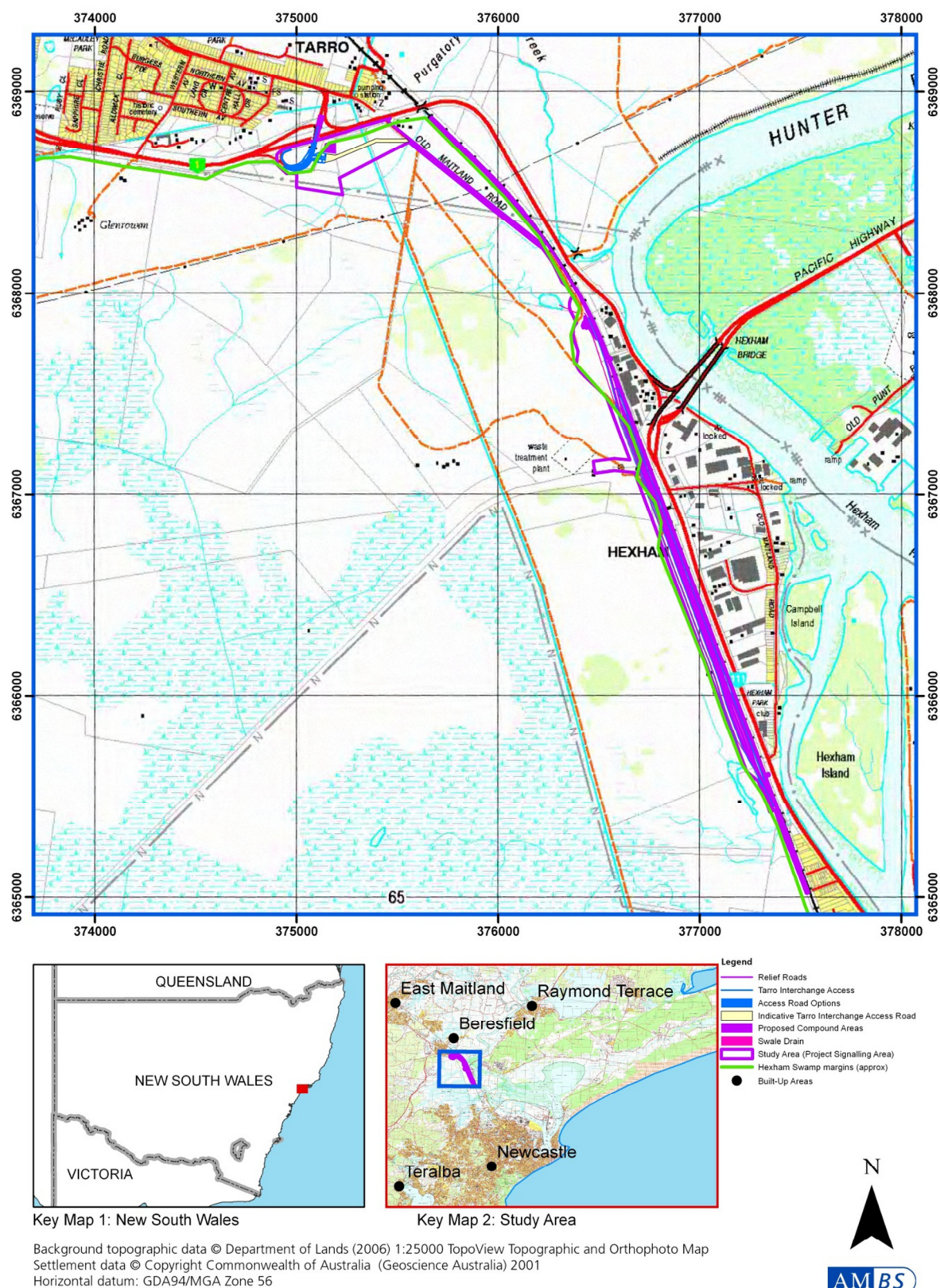


Figure 1.1 Location of the study area, showing the approximate extent of the margins of Hexham Swamp.

2 Statutory Context

2.1 Preamble

As a major project under Part 5.1 of the EP&A Act the proponent is not required to apply for approvals or permits under the *National Parks and Wildlife Act 1974* (Amended 2010) or the *Heritage Act 1977*. However, the Office of Environment and Heritage, Department of Premier & Cabinet (comprising the former Department of Environment, Climate Change and Water [DECCW], and Heritage Branch, Department of Planning) is given the opportunity to review Part 5.1 applications. The following outlines the relevant heritage context for the study area.

2.2 *Environment Protection and Biodiversity Conservation Act 1999*

In 2004, a new Commonwealth heritage management system was introduced under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The National Heritage List (NHL) was established to protect places that have outstanding value to the nation. The Commonwealth Heritage List (CHL) was established to protect items and places owned or managed by Commonwealth agencies. The Australian Government Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) is responsible for the implementation of national policy, programs and legislation to protect and conserve Australia's environment and heritage and to promote Australian arts and culture. Approval from the Minister is required for controlled actions which will have a significant impact on items and places included on the NHL or CHL.

There are no Aboriginal heritage items listed on the NHL or CHL within the study area or in its vicinity.

2.2.1 *Register of the National Estate*

The Register of the National Estate (RNE) was originally established under Section 22 of the *Australian Heritage Commission Act 1975* (AHC Act). Since the establishment of the NHL and CHL, there is now a considerable level of overlap between the RNE and heritage lists at the national, state and territory, and local government levels. To address this situation, the Register has been frozen since February 2007, meaning that no places can be added or removed. The RNE should be understood as an information resource only. Where an action has been referred to the Minister, in accordance with the EPBC Act, concerning World Heritage, National Heritage, Wetlands, endangered communities, or on Commonwealth land, the RNE may be used as a reference, where appropriate.

There are no Aboriginal heritage items listed on the RNE within the study area or in its vicinity.

2.3 *National Parks & Wildlife Act 1974 (Amended 2010) and National Parks & Wildlife Amendment Regulation 2010*

Under the provisions of the *National Parks & Wildlife Act 1974* (NPW Act), the Director-General of the National Parks and Wildlife Service (NPWS; now OEH) is responsible for the care, control and management of all national parks, historic sites, nature reserves, state conservation areas, karst conservation reserves and regional parks. The Director-General is also responsible, under this legislation, for the protection and care of native fauna and flora, and Aboriginal places and objects throughout NSW.

All Aboriginal objects are protected regardless of their significance or land tenure under the NPW Act. Aboriginal objects can include pre-contact features such as scarred trees, middens and open camp sites, as well as physical evidence of post-contact use of the area such as Aboriginal built fencing and fringe camps. The NPW Act also protects Aboriginal places, which are defined as 'is or was of special

significance with respect to Aboriginal culture'. Aboriginal places can only be declared by the Minister administering the NPW Act.

Under Sections 86-87 and 90 of the NPW Act, a person must not harm or desecrate an Aboriginal place or object without the prior issue of an Aboriginal Heritage Impact Permit (AHIP). The Act requires a person to take reasonable precautions and due diligence to avoid impacts on Aboriginal objects. AHIPs may only be obtained from the Environmental Protection and Regulation Division (EPRD) of OEH. However, under Part 5.1, Clause 115ZG(1)(d) of the EP&A Act, the project developer, ARTC, is not required to apply for approvals or permits under the NPW Act.

The *National Parks and Wildlife Amendment Regulation 2010* commenced on 1 October 2010. This Regulation excludes activities carried out in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* from the definition of harm in the Act. That is, test excavations may be carried out in accordance with this Code of Practice, without requiring an AHIP. The Regulation also specifies Aboriginal community consultation requirements (*Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*). In addition, the Regulation adopts a Due Diligence Code of Practice and specifies activities that are low impact, providing a defence to the strict liability offence of harming an Aboriginal object.

Part of the regulatory framework for the implementation of the NPW Act is the Aboriginal Heritage Information Management System (AHIMS), maintained by OEH. AHIMS includes a database of Aboriginal heritage sites, items, places and other objects that have been reported to the OEH. Site cards are available through AHIMS, which describe Aboriginal sites registered in the database. Also available are Aboriginal heritage assessment reports, which contribute to assessments of scientific significance for Aboriginal sites. The AHIMS is not a comprehensive list of all Aboriginal heritage in NSW, rather it reflects information which has been reported to OEH. As such, site co-ordinates in the database vary in accuracy depending on the method used to record their location. Heritage consultants are obliged to report Aboriginal sites identified during field investigations to OEH, regardless of land tenure, or whether such sites are likely to be impacted by a proposed development. The results of a site search for the local area are presented in Section 5.2.1.

The assessment of Aboriginal sites also requires consideration of environmentally sustainable development (ESD) stipulated in Section 2A(2) of the NPW Act. One of the principles of ESD is intergenerational equity whereby the present generation should ensure that the health, diversity and productivity of the environment, which includes cultural sites within such environments, be maintained for the benefit of future generations. Assessment of proposed impacts and/or conservation measures should consider intergeneration equity, as well as considering the scientific and cultural significance of Aboriginal sites.

2.4 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) provides protection for heritage places, buildings, works and archaeological sites that are important to the people of NSW. These include items of Aboriginal and non-Aboriginal heritage significance. Where these items or places have particular importance to the State of NSW, they are listed on the State Heritage Register (SHR).

There are no Aboriginal sites listed on the SHR within the vicinity of the study area.

2.5 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the main act regulating land use planning and development in NSW.

Part 5.1, Division 1, Clause 115ZG of the Act lists the approvals and legislation that does not apply to Part 5.1 projects, which includes permits under Section 90 of the NPW Act.

2.5.1 Newcastle Local Environmental Plan 2012

The *Newcastle Local Environmental Plan* (LEP) was gazetted on 19 June 2012. Part 5.10, clauses 1-10 'Heritage Conservation' provide for the protection of items, places and archaeological sites, including Aboriginal sites.

There are no Aboriginal heritage items in the vicinity of the proposed development listed on Schedule 5 'Environmental Heritage' of the LEP.

2.6 National Trust of Australia NSW

The National Trust of Australia is a private, not-for-profit organisation committed to conserving Australia's heritage. Listing with the National Trust of Australia does not have statutory authority; however, it does have a role in raising public awareness of heritage issues.

There are no Aboriginal heritage items within the study area or its vicinity listed on the Register of the National Trust of Australia (NSW).

3 Aboriginal Consultation

Aboriginal community consultation is an integral part of the Aboriginal cultural heritage assessment process, and this project has been undertaken in accordance with the OEH *Aboriginal Cultural Heritage Consultation Requirements For Proponents 2010*. The aims of the consultation process are to:

- provide the opportunity for the registered Aboriginal stakeholders to provide input into identifying cultural heritage values and be involved in the heritage assessment process;
- provide the opportunity for the registered Aboriginal stakeholders to inspect the study area with the aim of identifying Aboriginal sites and areas of archaeological and cultural sensitivity;
- identify the Aboriginal cultural heritage significance of the study area;
- integrate Aboriginal heritage values into the heritage assessment; and
- provide an opportunity for the registered Aboriginal stakeholders to comment on the heritage management strategy and proposed outcome.

AMBS wrote to the following organisations on 27 June 2011, requesting notification of any Aboriginal organisations who may wish to register as stakeholders:

- OEH;
- Awabakal Local Aboriginal Land Council (ALALC);
- Worimi Local Aboriginal Land Council (WLALC);
- National Native Title Tribunal (NNTT);
- Office of the Registrar, Aboriginal Land Rights Act 1983 (ORALRA);
- Native Title Services Corporation (NTSCorp);
- Hunter-Central Rivers Catchment Management Authority (HCRCMA); and
- Newcastle City Council.

Newcastle City Council identified ALALC as a potential stakeholder. A Native Title Search undertaken on 1 July 2011 by the NNTT found no registered native title claimants, native title holders or registered Indigenous Land Use Agreements for the study area.

OEH advised that the following organisations should be contacted:

- Cacatua Cultural Consultants (CCC);
- Awabakal Newcastle Aboriginal Co-op (ANAC);
- Awabakal Traditional Owners Aboriginal Corporation (ATOAC);
- Awabakal Descendants Traditional Owners Aboriginal Corporation (ADTOAC);
- Yamulong Group Initiatives Ltd (YGI);
- Arwarbukarl Cultural Resource Association (ACRA); and
- ALALC.

In accordance with OEH requirements, an advertisement was placed in the Newcastle Herald on 25 June 2011. The advertisement sought expressions of interest for participation in the Aboriginal heritage assessment process for this project. The closing date for registrations was 11 July 2011. Registrations were received from Lower Hunter Wonnarua Council (LHWC) and CCC.

In summary, the following Aboriginal organisations registered their interest to be consulted on this project:

- ACRA;
- ADTOAC;
- ALALC;

- ANAC;
- ATOAC;
- CCC;
- LHCW; and
- WLALC.

Details of the proposed development and a draft heritage assessment methodology were sent to each of the registered Aboriginal parties on 26 July 2011. Responses received regarding the methodology are attached in Appendix A.

Registered stakeholder organisations which participated in a survey and assessment of the study area on Wednesday 31 August 2011 are listed in Table 3.1.

Table 3.1 Registered Aboriginal stakeholder fieldwork participants.

Aboriginal Organisation	Field Representative
ADTOAC	Shane Frost
ALALC	William Baker
ATOAC	Kerrie Brauer
CCC	George Sampson
LHCW	Dean Miller

Registered stakeholder organisations which participated in a survey and assessment of the study area on Wednesday 23 November 2011 are listed in Table 3.1.

Table 3.2 Registered Aboriginal stakeholder fieldwork participants.

Aboriginal Organisation	Field Representative
ADTOAC	Shane Frost
ALALC	Peter Townsend, Julie Smith
CCC	George Sampson

The results of the survey and the proposed recommendations were discussed with representatives in the field. Information provided by the registered Aboriginal stakeholder groups during the consultation process, and during the field survey, has been integrated into the assessment, and has been attached to this report upon receipt, where appropriate (Appendix A). The draft Aboriginal heritage assessment report was provided to each registered stakeholder organisation for review and comment for 28 days, as per the OEH 2010 guidelines. Feedback received on the draft report from the registered Aboriginal stakeholder groups has been addressed in this final report.

4 Environmental Context

An understanding of environmental factors within the local landscape provides a context for past human occupation and history of an area. The analysis of environmental factors contributes to the development of the predictive modelling of archaeological sites, but it is also required to contextualise archaeological material and to interpret patterns of past human behaviour. In particular, the nature of the local landscape including topography, geology, soils, hydrology and vegetation are factors which affect patterns of past human occupation. Current land use practices have the potential to affect the visibility of archaeological material; they may obscure, or expose archaeological sites. In addition, previous disturbances may have also exposed archaeological material, such as excavation for dams or other ground disturbance. It is important that such factors are also considered in making assessments of archaeological resources in an area and understanding the distribution of observed sites.

4.1 Geology

The study area is underlain by deposits of gravel, sand, silt, clay, Waterloo Rock, marine and freshwater deposits from the Quaternary period (1:250,000 Geological Series Sheet S1 56-2 Newcastle). This geology does not result in stone outcroppings suitable as surfaces for art (such as engraving and drawing/painting) or sharpening stone axes/tools, or shelters for camping. This stone is also unsuitable for artefact manufacture. As such, stone quarry sites, rock engravings/art sites, axe grinding grooves and shelter sites are highly unlikely to be present in the study area, although it would still have been suitable for camping, given the other resources (see Section 4.3 below).

4.2 Soils, Topography and Vegetation

Soils in the study area are the Millers Forest and Hexham Swamp Soil Landscapes, with some disturbed terrain in the southern central part of the study area, in the vicinity of coal mining and railway infrastructure (see Section 4.4 below; Figure 4.1). There is also Beresfield soil at the northern tip of the study area. Millers Forest soils primarily consist of deep (>150cm), imperfectly to poorly drained Prairie Soils (Gn3.21, Gn3.23). This is an estuarine landscape comprising extensive alluvial plain on recent sediments, with elevation of 6-<3m and local relief and slopes <1m. Vegetation consists of cleared tall open-forest. Limitations of this soil landscape are flood hazard; permanently high watertables; seasonal waterlogging; foundation hazard; and low wet bearing strength soils (Matthei 1995:194).

Hexham Swamp soils primarily consist of deep (>200cm), waterlogged humic gleys (Gn2.83, Gn3.93, Gn3.92, Uf6.41, Uf6.6, Uf5.4). This is a swamp landscape comprising broad, swampy, estuarine backplains on the Hunter delta, with elevation to 2m, local relief of <2m and slopes <1%. Vegetation consists of sedgeland with open-woodland on swamp margins. Limitations of this soil landscape are flood hazard; permanently high watertables; seasonal waterlogging; foundation hazard; ground water pollution hazard; localised tidal inundation; and highly plastic potential acid sulphate soils of low fertility (Matthei 1995:220).

Aboriginal occupation was often focussed on prominent landforms such as ridges, which were favourable locations for camping and travelling, and from which surrounding plant and animal resources could be viewed. However, they also camped on lower, elevated areas adjacent to reliable water sources. The study area would have been suitable for camping, particularly given the resources of Hexham Swamp (see Section 4.3 below).

4.3 Hydrology and Drainage

The study area is located between Hexham Swamp and the Hunter River, with Tarro Swamp located c.450 to the north, and Purgatory Creek is located in the north of the study area. These water sources,

and particularly Hexham Swamp, would have provided an attractive habitat for mammals and waterbirds and therefore would have been a rich food resource for Aboriginal people. This is likely to have led to fairly extensive Aboriginal occupation of the area. As such, occupation sites including open stone artefact scatters may occur within the study area or its vicinity.

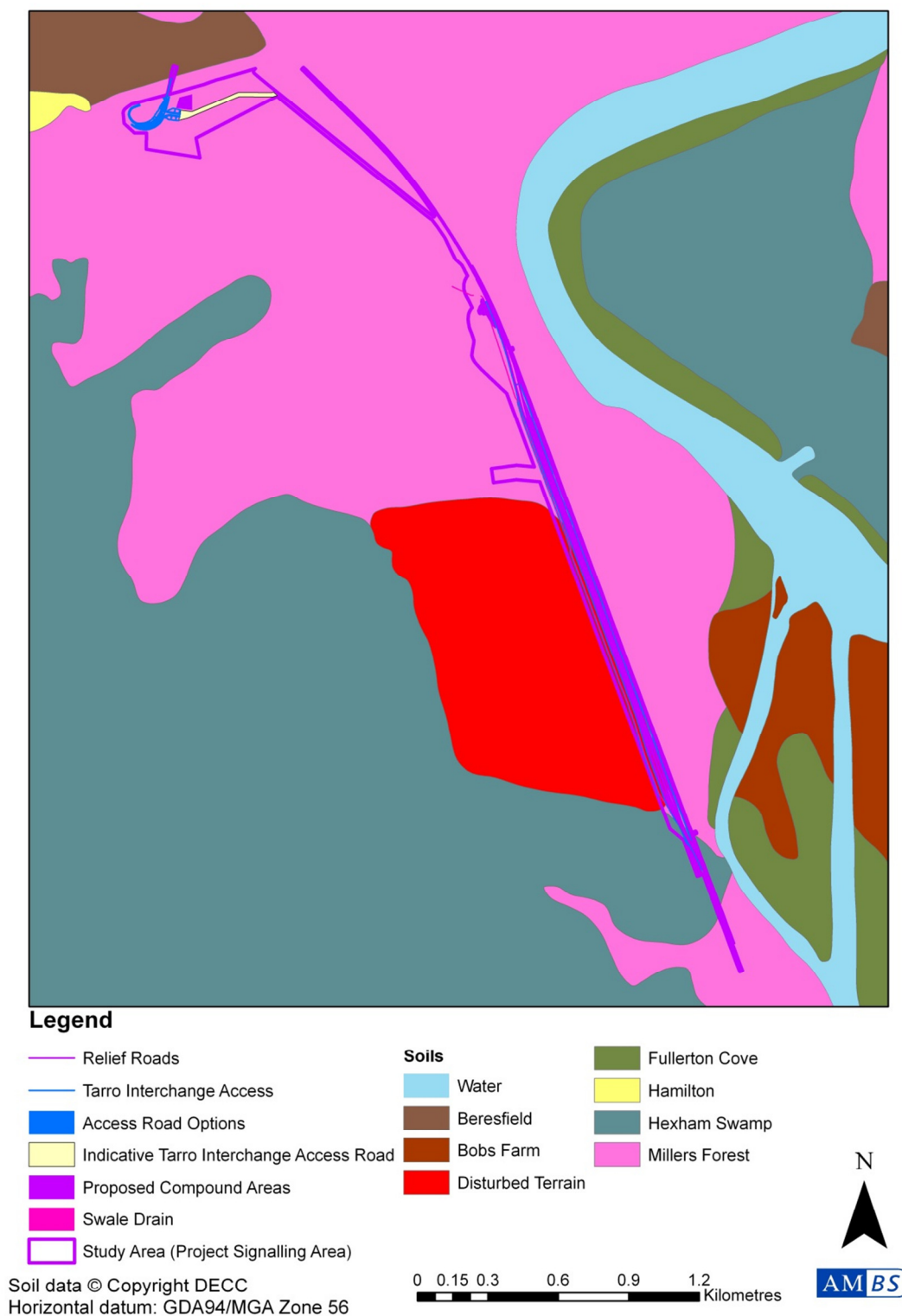


Figure 4.1 Soils in the study area.

4.4 Land Use and Disturbance

Newcastle was the site of the second European settlement in Australia, beginning in 1804. Major industries have developed since the 1830s, predominantly focussed around coal and timber, which have modified the Aboriginal landscape. The felling of older trees indicates that modified trees are unlikely to remain in the area, and extant Aboriginal deposits may also have been disturbed. Coal mining will have disturbed subsurface Aboriginal deposits. The population in the Newcastle area has been increasing over the last few decades, which has resulted in increasing pressure for residential and commercial development, including roads and railways.

The Great Northern Railway and the Minmi to Hexham Railway has occupied the majority of the study area for over 150 years, with a natural gas pipeline also located in the vicinity. A coal preparation plant and additional railway sidings, now mostly demolished, stood within the study area and its vicinity (Figure 4.2). Further, the northern part of the study area comprises an existing road easement, and the Chichester Trunk Gravity Main water pipeline is within the vicinity. As such, there has been a long history of European use and disturbance to the original ground surface, which will have impacted upon the integrity of, and possibly have destroyed entirely, any Aboriginal sites that were present in the study area. However, in the northern section of the study area, the main previous land use seems to have been pastoral, and this would have had a lesser impact on any archaeological resources.

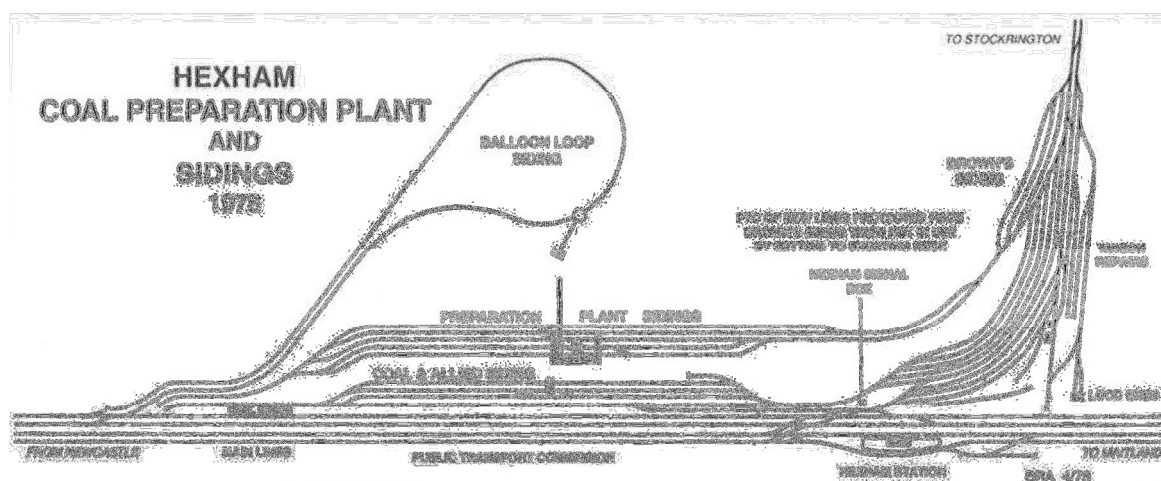


Figure 4.2 Railway lines and old Coal Preparation Plant at Hexham in 1978 (Source: Andrews 2007:130).

4.5 Summary

The environmental context of the study area provides a background to the predictive model of site location, as well informing the results of field investigations. The environmental context shows that the underlying geology is not suitable as a medium for rock art or tool sharpening, does not outcrop as shelters for camping, and is unsuitable for artefact manufacture. As such, stone quarry sites, rock engravings/art sites, axe grinding grooves and shelter sites are highly unlikely to be present in the study area. However, the presence of extensive permanent and temporal water sources, particularly the Hunter River and Hexham Swamp, would have provided a rich food resource for Aboriginal people. This is likely to have led to fairly extensive Aboriginal occupation of the area, and therefore occupation sites including open stone artefact scatters may occur within the study area or its vicinity. Although the majority of the study area has been subject to such extensive land disturbance that evidence of Aboriginal occupation is unlikely to remain, there are a few areas that have had less disturbance, particularly in the north. Evidence for Aboriginal occupation may therefore still be extant in the landscape in these areas.

5 Archaeological Context

This chapter describes the nature of the known Aboriginal archaeology of the study area, based upon a review of relevant archaeological reports and publications, and a search and review of previously recorded sites in the OEH Aboriginal Heritage Information Management System (AHIMS). This review and discussion allows for the development of a predictive model for potential Aboriginal sites within the study area, and establishes context for a comparative significance assessment. Summary descriptions of site types are provided in Table 5.1 below.

Table 5.1 Summary descriptions of Aboriginal site types referred to in this report.

Site Type	Details
Open camp sites/ stone artefact scatters/ isolated finds	Open camp sites represent past Aboriginal subsistence and stone knapping activities, and include archaeological remains such as stone artefacts and hearths. This site type usually appears as surface scatters of stone artefacts in areas where vegetation is limited and ground surface visibility increases. Such scatters of artefacts are also often exposed by erosion, agricultural events such as ploughing, and the creation of informal, unsealed vehicle access tracks and walking paths. These types of sites are often located on dry, relatively flat land along or adjacent to rivers and creeks. Camp sites containing surface or subsurface deposit from repeated or continued occupation are more likely to occur on elevated ground near the most permanent, reliable water sources. Flat, open areas associated with creeks and their resource-rich surrounds would have offered ideal camping areas to the Aboriginal inhabitants of the local area. Isolated finds may represent a single item discard event, or be the result of limited stone knapping activity. The presence of such isolated artefacts may indicate the presence of a more extensive, in situ buried archaeological deposit, or a larger deposit obscured by low ground visibility. Isolated artefacts are likely to be located on landforms associated with past Aboriginal activities, such as ridgelines that would have provided ease of movement through the area, and level areas with access to water, particularly creeks and rivers.
Scarred trees	Tree bark was utilised by Aboriginal people for various purposes, including the construction of shelters (huts), canoes, paddles, shields, baskets and bowls, fishing lines, cloaks, torches and bedding, as well as being beaten into fibre for string bags or ornaments. The removal of bark exposes the heart wood of the tree, resulting in a scar. Over time the outer bark of the tree grows across the scar (overgrowth), producing a bulging protrusion around the edges of the scar. Trees may also have been scarred in order to gain access to food resources (e.g. cutting toe-holds so as to climb the tree and catch possums or birds), or to mark locations such as tribal territories. The locations of scarred trees often reflect historical clearance of vegetation rather than the actual pattern of scarred trees. Unless the tree is over 150 years old, scarring is not likely to be of Aboriginal cultural origin; therefore, these sites most often occur in areas with mature, remnant native vegetation.
Axe grinding grooves	Grinding grooves are the physical evidence of tool making or food processing activities undertaken by Aboriginal people. The manual rubbing of stones against each other creates grooves in the rock, which are usually found on flat areas of soft rock such as sandstone, in areas of creek beds and other water sources. They are often associated with rock pools in creek beds and on platforms to enable the wet-grinding technique.
Quarries	Aboriginal quarry sites are sources of raw materials, primarily for the manufacture of stone tools, but also for ochre procurement. They are only found where raw materials (stone or ochre) occur within the landscape, and where these have been exploited in the past. Such sites are often associated with stone artefact scatters and stone knapping areas. Loose or surface exposures of stone or cobbles may be coarsely flaked for removal of portable cores. Raw materials can be sourced to these sites and provide evidence for Aboriginal movement and/or exchange.
Rock engravings	Rock engravings are a type of Aboriginal art, and are often located on high vantage points along ridge lines at the headwaters of creeks, but can be located on any suitable fine grained stone surface.
Shelter sites with art (engraving, painting or drawing) or occupation deposit	These are art or occupation sites located in areas where suitable rock outcrops and surfaces occur, where weathering has resulted in suitable overhangs or recesses in boulder outcrops or cliff-lines.

Middens	Shell middens result from Aboriginal exploitation and consumption of shellfish, in marine, estuarine or freshwater contexts. Middens may also include faunal remains such as fish or mammal bone, stone artefacts, hearths, charcoal and occasionally, burials. They are usually located on elevated dry ground close to the aquatic environment from which the shellfish has been exploited and where fresh water resources are available. Deeper, more compacted, midden sites are often found in areas containing the greatest diversity of resources, such as river estuaries and coastal lagoons.
Bora/ceremonial	Aboriginal ceremonial sites are locations that have spiritual or ceremonial values to Aboriginal people. Aboriginal ceremonial sites may comprise natural landforms and, in some cases, will also have archaeological material. Bora grounds are a ceremonial site type, usually consisting of a cleared area around one or more raised earth circles, and often comprised two circles of different sizes, connected by a pathway, and accompanied by ground drawings or mouldings of people, animals or deities, and geometrically carved designs on the surrounding trees. Unfortunately, the raised earth features are easily destroyed by agricultural and pastoral activities, vegetation growth and exposure to weather.
Stone arrangements	Stone arrangements usually consist of geometric arrangements of portable stone on prominent rock outcrops, such as vantage points along escarpments where other key landmarks are visible. Some stone arrangements also include circles and pathways. They are thought to be ceremonial in nature, and may have also sometimes been used for corroborees (dances), fights or judicial meetings. Stone arrangements are often isolated from known camp site areas.
Natural mythological (ritual) sites	These types of sites are usually identified by the local Aboriginal community/traditional owners as locations of cultural significance, and they may not necessarily contain material evidence of Aboriginal associations with the place.
Carved trees	Carved trees generally marked areas for ceremonial purposes, or the locations of graves.
Burial sites	Aboriginal burial of the dead often took place relatively close to camp site locations. This is due to the fact that most people tended to die in or close to camp (unless killed in warfare or hunting accidents), and it is difficult to move a body long distances. Soft, sandy soils on, or close to, rivers and creeks allowed for easier movement of earth for burial; and burials may also occur within rockshelters or middens. Aboriginal burial sites may be marked by stone cairns, carved trees or a natural landmark. Burial sites may also be identified through historic records, or oral histories.
Contact/ historical sites	These types of sites are most likely to occur in locations of Aboriginal and settler interaction, such as on the edge of pastoral properties or towns. Artefacts located at such sites may involve the use of introduced materials such as glass or ceramics by Aboriginal people, or be sites of Aboriginal occupation in the historical period.

5.1 Regional Archaeological Context

Ethnographic evidence suggests that the Newcastle area was originally inhabited by the Awabakal people (Threlkeld 1892). The abundant resources of the coast, the Hunter River and Lake Macquarie indicate that the Newcastle area would have held great appeal for Aboriginal groups, and archaeological investigations have provided evidence for Aboriginal occupation throughout the region (Bowdler & Happ 1982; Brayshaw 1984, 1985, 1986; Brayshaw & Kerr 2000; Darwala-Lia 2001; Dean-Jones 1989; Dyall 1975; Effenberger 1996, 1997; Effenberger & Baker 1996; HLA 1996; Insite Heritage 2003; Jo McDonald Cultural Heritage Management [JMCHM] 1997; Mills 1999; Mills & Wilkinson 1994a, 1994b; Navin & Dallas 1992; Resource Planning 1991; Silcox & Ruig 1995; Umwelt 2002a, 2002b).

Archaeological evidence suggests that the Hunter region was occupied by at least 35,000 years Before Present (BP) (Koettig 1987). Recent evidence from Mt Thorley suggests that occupation could date to around 50,000 years BP, although these results have not been confirmed in scientific publication. Aboriginal artefacts recovered from the Hunter Valley's northeast mountains (SGCD.16) were associated with soil profiles for which dates of >20,000 BP (Beta-20056), 13,020±360 BP (Beta-17271) and 34,580±650 (Beta-17009) (Koettig 1987, cited in Attenbrow 2006:352) were assigned, although most sites fall within the Holocene period (that is, within the last 10,000 years). A number

of excavations have recovered material for which radiocarbon dates have been calibrated (cal.) to produce a more accurate date for the deposit; with a date of 7,760cal. years BP obtained at Bobadeen, 1,420 cal. years BP at Milbrodale and 1,310 cal. years BP at Sandy Hollow (Moore 1970:58). Aboriginal occupation of Moffats Swamp was dated to c.15,000 BP (Baker 1993:62), but most sites in the region have been dated to the last 4,000 years (Kuskie 2007a:14).

Aboriginal site patterning in the region has been affected by the fact that many archaeological investigations have been and are undertaken in response to development proposals and hence sites are registered in the location of development areas. However, a range of site types are represented in the region, including stone artefact sites, shell middens (particularly around Lake Macquarie and on the coast, some of which contain burials), axe grinding grooves, scarred trees and quarry sites. Axe grinding grooves exist in close proximity to creeks of the region, when suitable stone outcrops occur (although no such outcrops occur in the study area). As distance from the Lake and coast increases, shells middens become less frequent than stone artefact sites, the latter site type being most frequent and dense in close proximity to water, particularly reliable water. However, the various types of sites are increasingly being impacted by developments, leading to a cumulative negative impact on the Aboriginal archaeological resources of the area.

Archaeological research in the Hunter Valley region has been undertaken from the first half of the twentieth century (McCarthy & Davidson 1943; Moore 1967, 1969, 1970, 1981). Artefact types identified in the Hunter region include eloueras, scrapers, backed artefacts, geometric microliths and pebble implements. Many of the early studies concentrated on providing baseline data, rather than technological analysis.

A number of studies undertaken in the second half of the twentieth century have contributed new scientific information regarding flaked stone assemblages, particularly the technology and manufacture of implements (Hiscock 1985, 1986, 1993; Moore 2000). Heat treatment of mudstone and silcrete has been suggested for Hunter Valley assemblages (Moore 2000), which involves the slow heating of the stone to temperatures of 250-400°C. Ethnographic evidence suggests that this was usually done in a sand oven located under a small fire and stone was heated for up to eight hours. This process causes re-crystallisation within the rock which generally increases the flakability of the stone and the predictability of fracture planes (Holdaway & Stern 2004:28-29). Heat treatment has been associated with technological developments in the Holocene (Mulvaney & Kamminga 1999:233). Experiments on stone material from the Hunter region revealed that heat treatment of silcrete materials resulted in improvements in texture as well as a marked change in colour; whilst heat treatment of well silicified mudstone resulted in only a marginal improvement in texture, although it also produced a marked change in colour (Moore 2000:34).

In recent times, the most frequently occurring raw materials for stone artefacts found in the area are tuff/indurated mudstone, chert and silcrete, with lesser amounts of artefacts manufactured from quartzite, quartz, basalt, petrified wood and volcanic stone. Artefact types resulting from flaking manufacture of stone (unmodified or broken flakes and flaked pieces/debitage) are most frequently found, with more use-oriented artefact types (cores, retouched or backed flakes and edge-ground axes) found in lesser frequencies. This is to be expected, given the longer life of useful tools, and the relative abundance of raw materials for use in manufacture.

5.2 Local Archaeological Context

5.2.1 Site Types

A search of the AHIMS database within approximately 3km of the study area was undertaken on 13 July 2011, and 70 registered Aboriginal sites were identified. The extent of the search area, and the search results are presented in Figure 5.1 and summarised in Table 5.2.

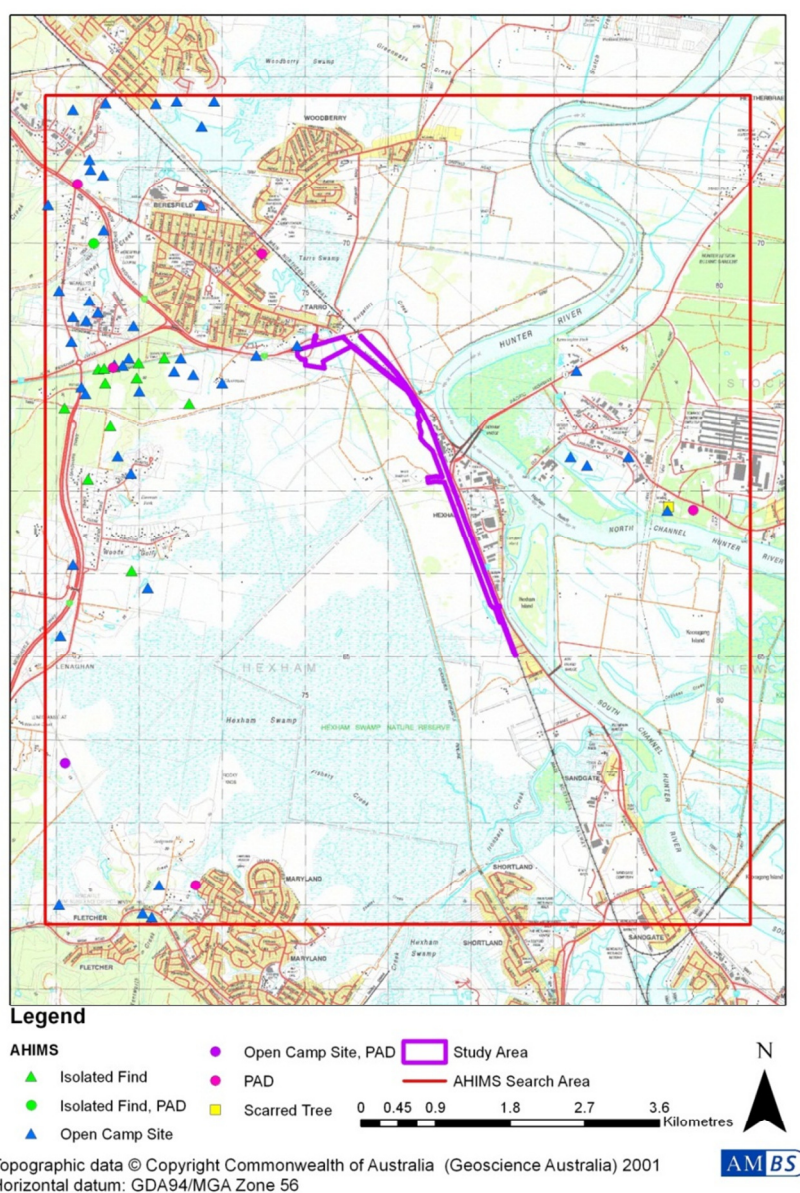
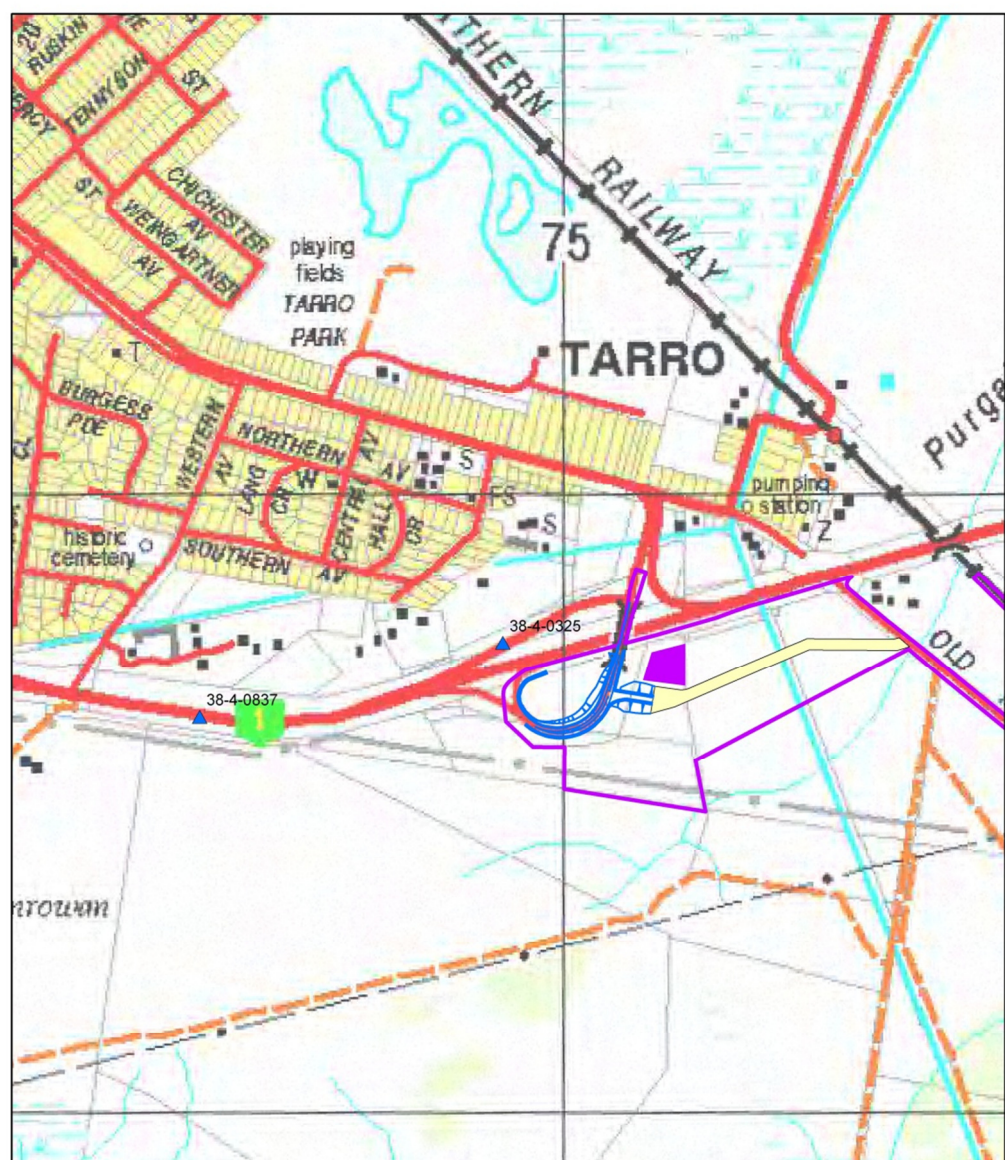


Figure 5.1 Registered Aboriginal sites identified during an AHIMS search on 13/7/11.

Table 5.2 Summary of registered Aboriginal sites identified during an AHIMS search on 13/7/11.

Site types	Count	Percentage
Open camp site	50	71.5
Isolated find	12	17
Potential Archaeological Deposit (PAD)	5	7
Scarred tree	1	1.5
Open camp site, PAD	1	1.5
Isolated find, PAD	1	1.5
Total	70	100

The sites recorded in closest proximity to the study area are open camp sites and Potential Archaeological Deposits (PADs) (Figure 5.1). The most frequently occurring sites previously recorded in the local area are artefact sites (open camp sites or isolated artefacts). Open camp site #38-4-0325 plots approximately 50m from the study area (Figure 5.2; see Section 5.2.2 below for further discussion of this site).



Legend

AHIMS

- ▲ Isolated Find
- Isolated Find, PAD
- ▲ Open Camp Site
- Open Camp Site, PAD
- PAD
- Scarred Tree

- Relief Roads
- Tarro Interchange Access
- Access Road Options
- Proposed Compound Areas

- Indicative Tarro Interchange Access Road
- Swale Drain
- Study Area (Project Signalling Area)

0 85 170 340 510 680 Metres



Topographic data © Copyright Commonwealth of Australia (Geoscience Australia) 2001
Horizontal datum: GDA94/MGA Zone 56

Figure 5.2 Detail of AHIMS site #38-4-0325, located c.50m from the study area.

As reported by Umwelt (2002a), the ethnographic literature suggests that there may have been a number of sites of cultural importance in the region, including a corroborree centre near Nelson and John Streets, Wallsend (approximately 6.5km south east of the study area), a sacred marriage ground near Minmi (probably around Stockrington, approximately 9km west), a spiritual/burial area around Rocky Knob (approximately 3.5km south west), spiritual and ceremonial sites at Mount Sugarloaf (approximately 15km south west) and spiritual sites at Nobbys Head (approximately 13km south east).

5.2.2 Previous Archaeological Investigations

There have been a number of archaeological investigations in the general vicinity of the study area (see Appendix B). The investigations most relevant to the study area are discussed below.

Previous Investigations within the Study Area

In closest proximity to the study area, Brayshaw surveyed two proposed stockpile areas between the Main Northern Railway and the Chichester Trunk Gravity Main (CTGM), including part of the current study area (Figure 5.3). No sites were identified in the swampy study area, which was expected as Brayshaw noted that in the Hexham Swamp area, “Aboriginal campsites appear to be located in situations elevated above the swamp”. Brayshaw also noted that “burials are unlikely to occur in such swampy areas” (1986a:2).

In 1992, Pam Dean-Jones surveyed the proposed Anderson Drive Interchange, which includes a small section of the study area. The survey identified an open camp site (AHIMS Site #38-4-0325), comprising three flaked mudstone/tuff artefacts, on the face of an embankment. Two of the artefacts were located adjacent to the southern fenceline of Tarro Public School, and 20m east of a small gully remnant, while the third artefact was located c.100m to the west, on a flat margin of Hexham Swamp, isolated from the other two artefacts by a road (Figure 5.4). The area was considered to have been largely disturbed by construction of previous roads and dumping of rubbish, and was therefore considered to be of low significance. A consent to destroy was recommended, as the road was to extend through the area in which the artefacts were found; however, the footprint assessed differs from the road that currently exists (compare Figure 5.4 with Figure 5.1). Further, no permit number is associated with the site on the AHIMS register. It is therefore possible that the site has not been destroyed, although it is likely to have at least been damaged by construction and disturbance that has occurred in the intervening years.

Kuskie (2007a) also surveyed parts of the current study area and its vicinity, in a preliminary Aboriginal heritage assessment for the proposed upgrade of CTGM, between Tarro and Shortland (Figure 5.3). He noted that, apart from an area at Shortland, and one at Sandgate (south of the current study area), the rest of the area was low lying and would have comprised swamp and possibly terrestrial floodplain prior to European settlement. This would not have been favourable for Aboriginal occupation because of water saturation, resulting in standing water precluding camping on the ground. Kuskie also noted that the area had been substantially modified by Europeans through drainage and fill deposition, which would have removed evidence of any Aboriginal occupation (2007a:7). The survey located only two isolated artefacts, in the Shortland area.

In 2008, Indigenous Outcomes (IO) undertook an archaeological assessment of the majority of the current study area, which was proposed for a Train Servicing Facility, as well as future intermodal and industrial subdivision (Figure 5.3). No sites were identified and the area was considered to be of low research potential. Although IO concluded that there were no archaeological constraints for the proposed development, it was noted that the area was still considered to be of cultural importance to the registered Aboriginal stakeholders.

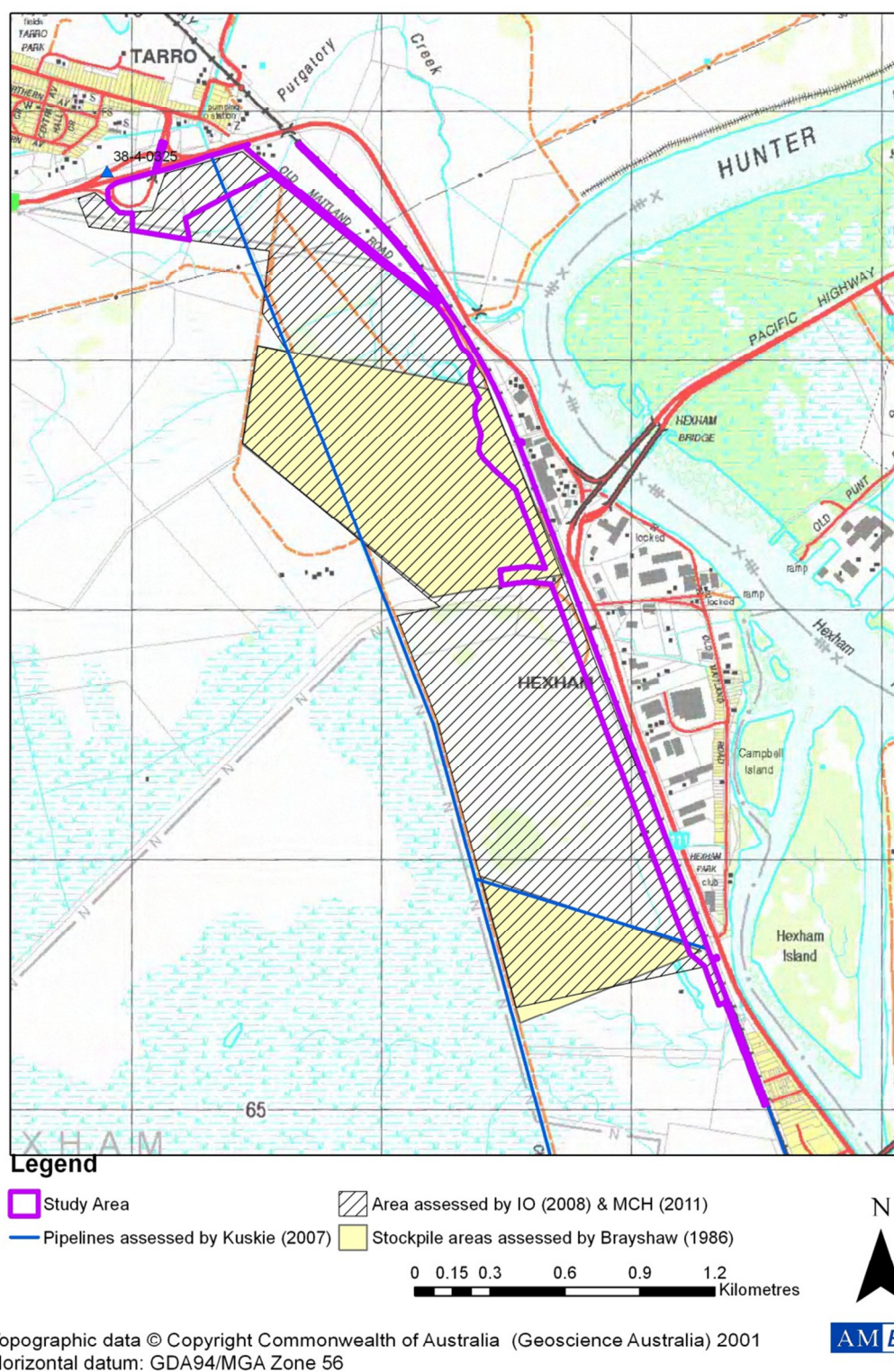


Figure 5.3 Locations of previous investigations within the study area.

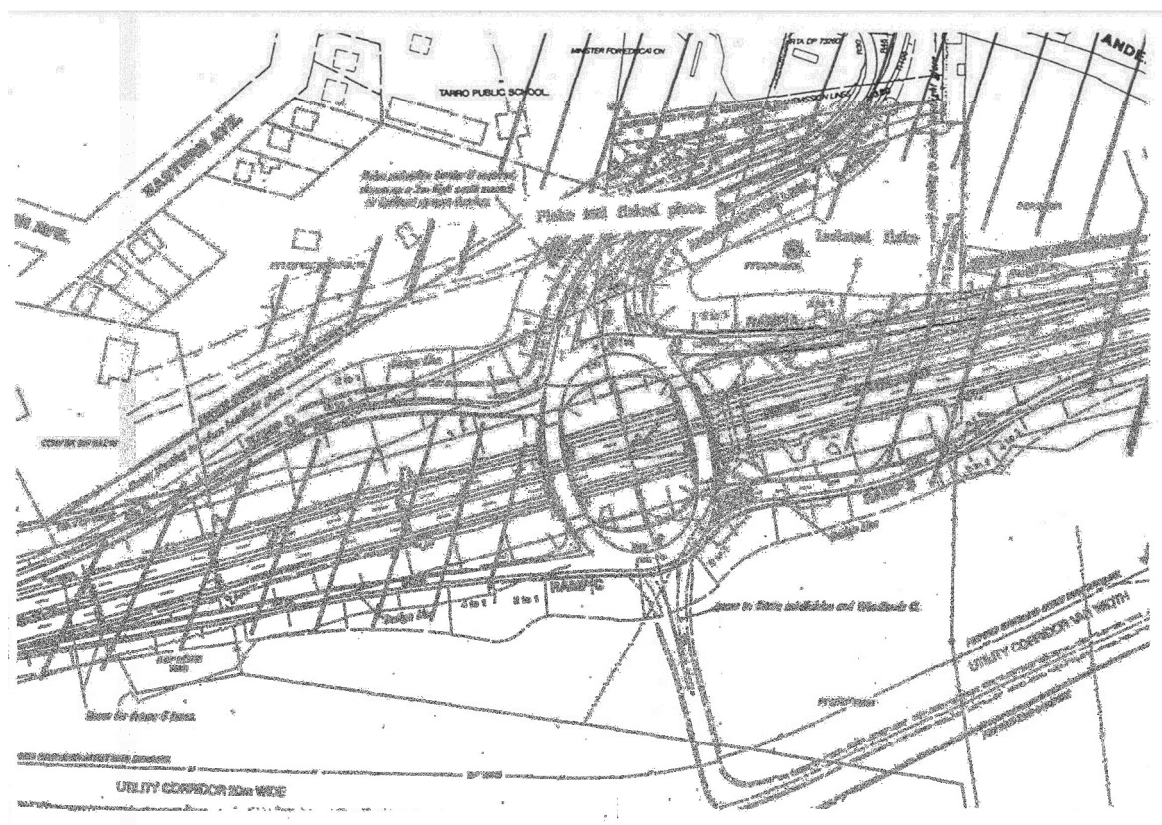


Figure 5.4 Location of AHIMS Site #38-4-0325 artefacts and proposed road footprint (Dean-Jones 1992:Figure 4).

Most recently, McCardle Cultural Heritage (MCH) undertook further archaeological assessment for the proposed Train Servicing Facility, and future intermodal and industrial subdivision of land (MCH 2011). No sites were identified and the area was considered to be of low research potential and scientific significance, given the predictive model of the area which considered that the low-lying land of Hexham Swamp would have been unfavourable for camping because of water saturation. However, it was noted that the area was considered to be of high cultural significance to the registered Aboriginal stakeholders, and as such, MCH identified the less disturbed, northern section of land as a “cultural PAD” (Figure 5.5). MCH stated that “no *in situ* cultural materials are expected to be present” (2011:82), in light of the predictive model; however, the registered Aboriginal stakeholders considered that the area would have been used for camping. The results of the survey for the Hexham Relief Roads project has provided supporting evidence for the Aboriginal occupation of this low-lying area of cultural PAD. MCH recommended that any areas of the cultural PAD to be impacted should be subject to test excavation; but noted that the majority of the area identified as cultural PAD would not be impacted by the proposed project.

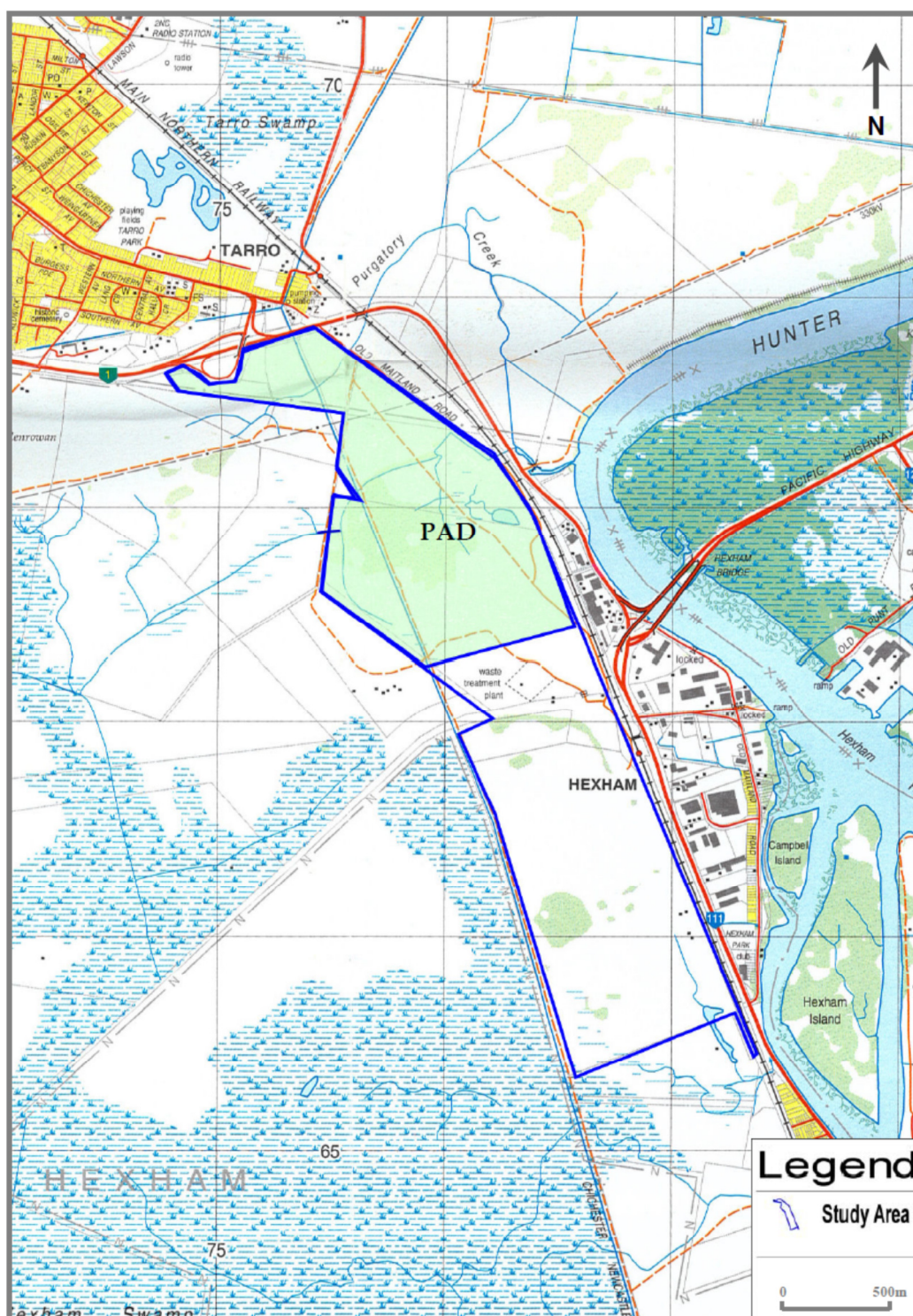


Figure 5.5 Location of “cultural PAD” identified by MCH (2001:Figure 6.5).

Previous Investigations in the Vicinity of the Study Area

A survey of the natural gas pipeline around Hexham Swamp, undertaken by Brayshaw in 1979, did not identify any artefacts on the low-lying sections of the pipeline adjacent to the current study area, but located a small stone artefact scatter on a light rise elevated above the swamp, at Stockrington (approximately 7km south west of the current study area). Similarly, a larger stone artefact scatter was located just above the level of the swamp on a tributary of Flaggy Creek, to the south of the swamp (Brayshaw 1982, cited in Brayshaw 1986a).