Attachment 4 – Indigenous Archaeological Due Diligence Assessment Report

McCardle Cultural Heritage Pty Ltd

Belford Land Corporation P/L

Proposed Subdivision: 'Murrays Rise' at Lower Belford, NSW

LGA: Singleton

Indigenous Archaeological Due Diligence Assessment

August 2011

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Report No: J11010

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Position:	**Project Manager**
Signed:	
Date:	**August 2011**

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1 INTRODUCTION

1.1 INTRODUCTION

McCardle Cultural Heritage Pty Ltd (MCH) has been commissioned by Belford Land Corporation P/L to prepare an Indigenous Archaeological Assessment for the proposed rezoning of land referred to as "Murrays Rise".

The assessment has been undertaken to meet the Department of Environment Climate Change and Water (DECCW) Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010), the DECCW Due Diligence Code of Practice for the protection of Aboriginal Objects in New South Wales, the DECCW Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales and the Brief.

1.2 PROPONENT DETAILS

Belford Land Corporation P/L
PO Box 224,
Leichhardt 2040

1.3 STUDY AREA & HOW IT IS DEFINED

The study area is defined by the proponent and is located approximately 5 kilometres west of Branxton. Situated along Standen Drive at Lower Belford the study area includes Lot 11, DP844443, 7 Part of Lot 12, DP1100005, Part of Lot 13, DP1100005,Part of Lot 6, DP237936, Lot 91, DP1138554, and Lot 92, DP1138554. The location and extent of the study area is illustrated in *Figures 1.1* to *1.3*.

1.4 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The project is only in the rezoning stage and as such there is no development or plans at this stage.

1.5 DESCRIPTION OF IMPACTS

The project is only in the rezoning stage and as such there is no development or impacts at this stage.

1.6 PROJECT FRAMEWORK

The project is a Planning Proposal (rezoning) amendment to Singleton Local Environmental Plan 1996. Council's file reference for it is LA 65/2008.

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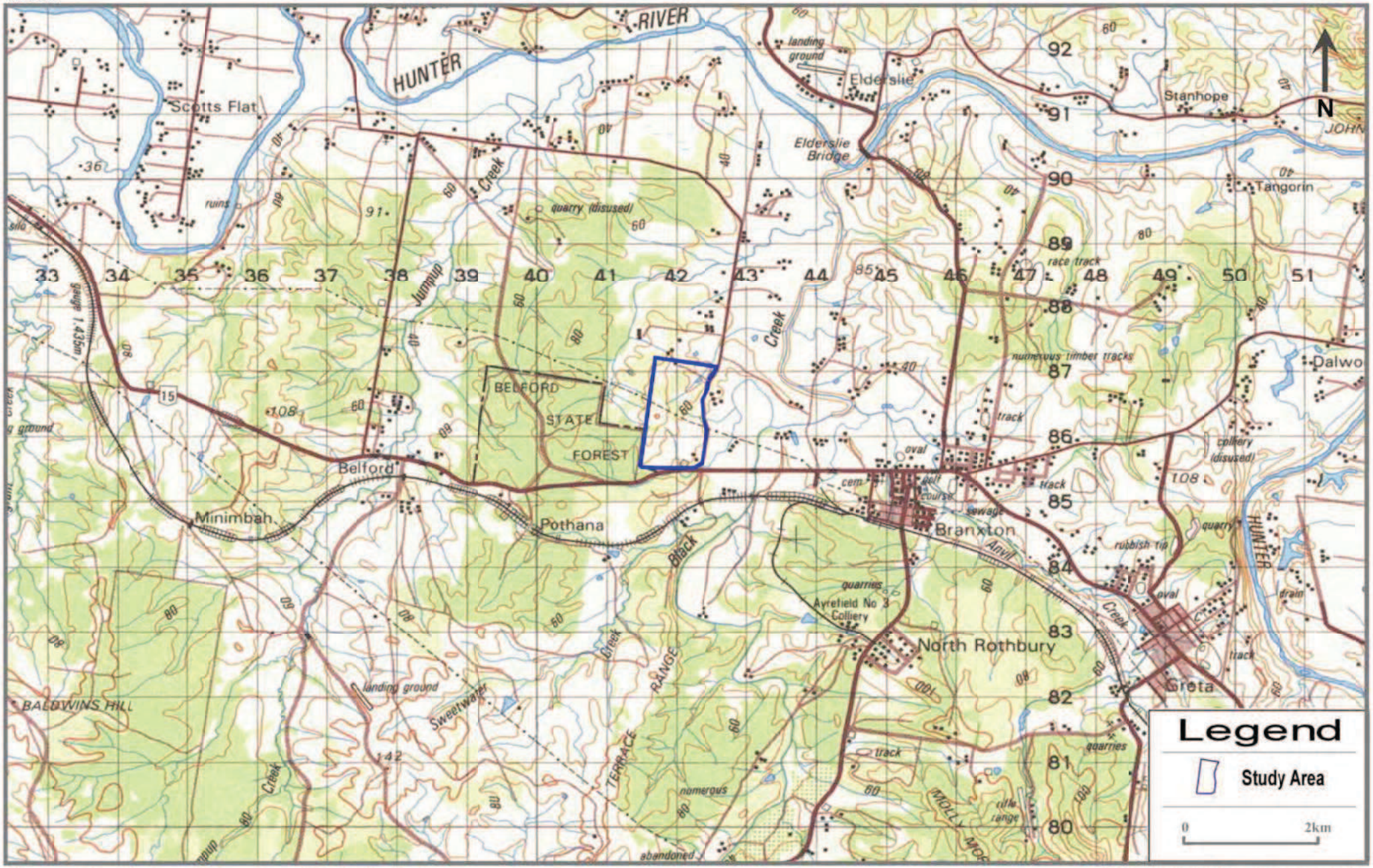

Figure 1.1 Regional Location of the Study Area

Source: 1:100 000 Topo Series: Cessnock

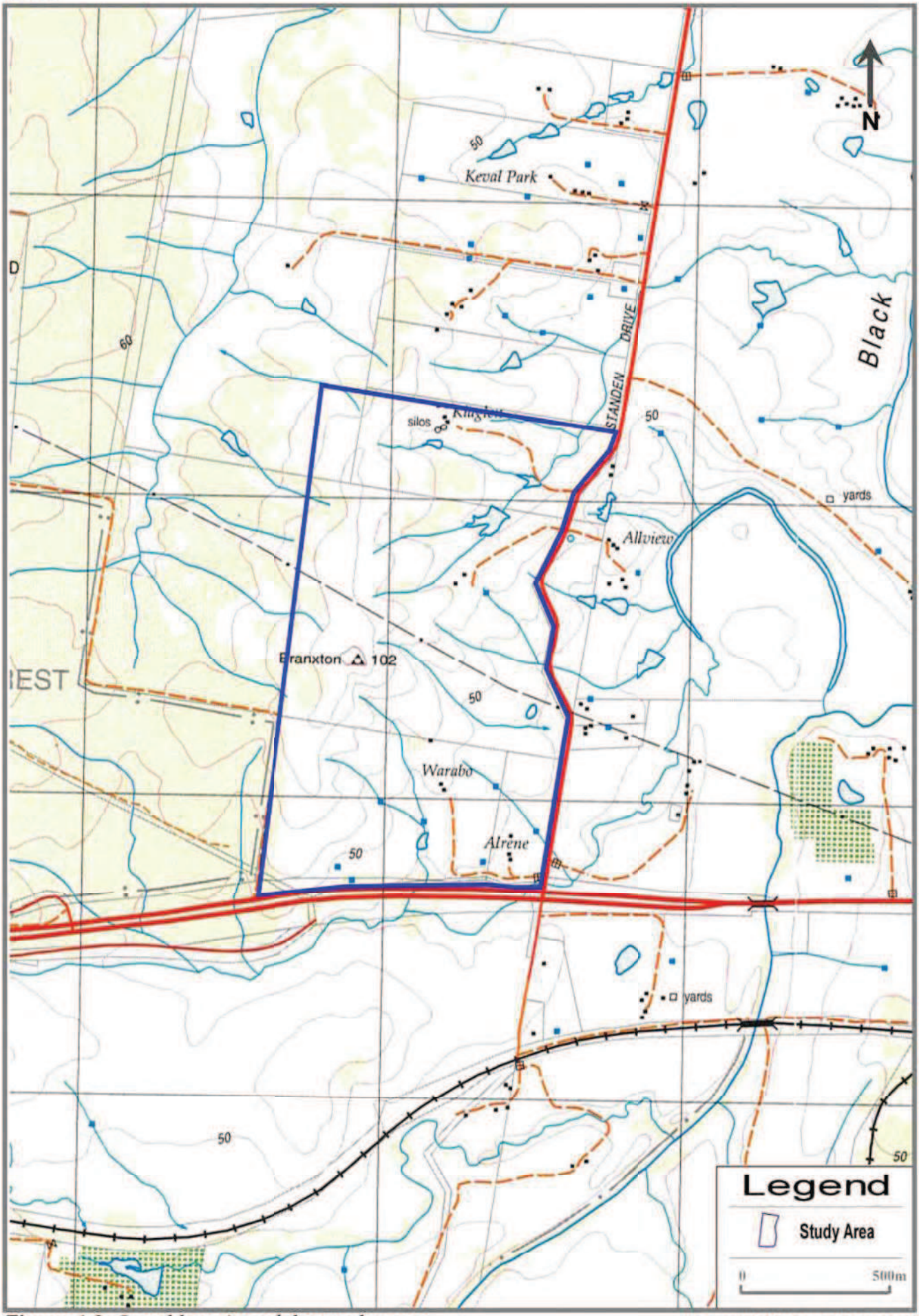

Figure 1.2 Local location of the study area

Source: 1:25 000 Topo Series: Greta

Figure 1.3 Aerial location of the study area

Source: Google Earth

1.7 *PURPOSE OF THE ARCHAEOLOGICAL ASSESSMENT*

The purpose of the assessment is to assess any archaeological constraints to support the subdivision and to provide opportunities and options to ensure any cultural materials present are protected.

1.8 *OBJECTIVES OF THE ASSESSMENT*

The objective of the assessment is to identify areas of indigenous cultural heritage value, to determine possible impacts on any indigenous cultural heritage identified (including potential subsurface evidence) and to develop management recommendations where appropriate.

The assessment employs a regional approach, taking into consideration both the landscape of the study area (landforms, water resources, soils, geology etc) and the regional archaeological patterning identified by past studies.

1.9 *PROJECT BRIEF/SCOPE OF WORKS*

The following tasks were carried out:

- a review of relevant statutory registers and inventories for indigenous cultural heritage including the NSW Department of Environment Climate Change and Water (DECCW) Aboriginal Heritage Information Management System (AHIMS) for known archaeological sites, the State Heritage Register, the Australian Heritage Database (includes data from the World Heritage List UNESCO, National Heritage List, Commonwealth Heritage List, Register of the National Estate) and the Singleton Local Environmental Plan;

- a review of local environmental information (topographic, geological, soil, geomorphological and vegetation descriptions) to determine the likelihood of archaeological sites and specific site types, prior and existing land uses and site disturbance that may effect site integrity;

- a review of previous cultural heritage investigations to determine the extent of archaeological investigations in the area and any archaeological patterns;

- the development of a predictive archaeological statement based on the data searches and literature review;

- identification of human and natural impacts in relation to known and recorded archaeological sites and predicted archaeological potential of the study area;

- consultation with the Aboriginal community as per DECCW Interim Community Consultation Requirements for Applicants (2005);

- undertake a site inspection with the participation of the registered Aboriginal groups, and

- the development of mitigation and conservation measures.

1.10 STATUTORY CONTROLS

Land managers are required to consider the affects of their activities or proposed development on the environment under several pieces of legislation. Indigenous cultural heritage in NSW is protected and managed under both Commonwealth and State legislation. The appropriate legislation is summarised below.

- *New South Wales National Parks and Wildlife Act* 1974, Amendment 2010

The National Parks and Wildlife Act (1974), Amended 2010, administered by the Department of Environment, Climate Change and Water (DECCW) is the primary legislation for the protection of Aboriginal cultural heritage in New South Wales.

Part 6 of the Act provides protection for Aboriginal objects and declared Aboriginal places through the establishment of offences of 'harm' to these objects and places. Under the Act, it is an offence to knowingly harm or desecrate an Aboriginal object or Aboriginal place. If harm to an object or place is anticipated, an Aboriginal Heritage Impact Permit (AHIP) must be applied for and DECCW may issue and AHIP under the s90 of the Act.

Previously, the NPW Act required two permits for the majority of activities and included one for test excavations (s87) and one for the activity itself (s90). The new provisions collapse these requirements into a single regulatory provision.

A permit is no longer required to undertake test excavations (providing the excavations are in accordance with the Code of Practice for Archaeological Investigations in NSW). If a Potential Archaeological Deposit (PAD) is identified during an assessment or the boundaries of a know site is unknown, and is excluded from areas identified to have harm objects (i.e. in or within 50 metres where known burials are located or likely to be located; in or within 50 metres of a declared Aboriginal place; in or within 50 metres of a rock shelter, shell midden or earth mound; in areas known or suspected to be Aboriginal missions or previous Aboriginal reserves or institutes), and it can be demonstrated that sub-surface Aboriginal objects with potential conservation value have a high probability of being present, and that the area cannot be substantially avoided by the proposed activity, an AHIP is no longer required under the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales.

An archaeological test excavation may be undertaken using only the methods described in the Code of Practice for Archaeological Investigations of Aboriginal Objects in New South Wales. However, an AHIP s90 to undertake test excavations will be required should the consultation and

assessment processes determine that the DECCW test excavation methods are not appropriate.

Where an AHIP s90 is required, they can now be issued in relation to specific parcels of land, deal with multi stage developments, and there are clear provisions for variation, transfer, suspension and revocation.

Linked to the NPW Act (amendment 2010) are the Due Diligence Code of Practice and the Archaeological Code of Practice. The Due Diligence Code of Practice explains and provides guidance about what due diligence means. It also provides steps in which individuals or organisations that own, use or manage land can identify if Aboriginal objects are or likely to be there, determine if their activities will harm Aboriginal objects and determine of an AHIP is required. The code enables people to take reasonable steps or precautions to consider if Aboriginal objects may be present and avoid harm to them. If harm cannot be avoided, then an AHIP is required. The Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW assists in establishing the requirements for undertaking test excavations as part of an archaeological investigation without an AHIP and to establish the requirements that must be followed when undertaking an archaeological investigation in NSW where an AHIP application is likely to be made.

- *Environmental Planning and Assessment Act* 1979, (EP&A Act, NSW)

Consideration of potential impacts of a development on Aboriginal heritage is a key component of the environmental impact assessment process under the EP&A Act.

In NSW the Environmental Planning and Assessment Act (EP&A Act) is the principal law overseeing the assessment and determination of development proposals which are considered under the following different parts of the Act (DoP 2010):

Part 3A: for major projects of regional or state significance and which require an approval from the Minister for Planning;

Part 4: for other proposals that require consent, usually by the local council (but by the Minister in limited circumstances). Under Part 4, minor or routine development may also be complying development approval by accredited certifiers.

Part 5: for proposals that do not fall under Part 4 or Part 3A. These are often infrastructure proposals approved by local councils or State agencies which are undertaking them.

The standards of the DECCW Due Diligence Code may be used or adapted by proponents to inform the initial assessment of the environmental impacts of an activity on Aboriginal heritage. An environmental assessment that meets all the requirements of the Due Diligence Code will satisfy the Due Diligence test.

- *The Heritage Act* 1977 (NSW)

The Heritage Act 1977 protects the natural and cultural history of NSW with emphasis on non-indigenous cultural heritage through protection provisions and the establishment of a Heritage Council. While Aboriginal heritage sites and objects are protected primarily by the NPW Act 1974, if an Aboriginal site, object or place is of great significance it can be protected by a heritage order issued by the Minister on the advice of the Heritage Council.

- *The Aboriginal and Torres Strait Islander Heritage Protection Act* 1984, Amendment 1987 (Commonwealth)

The Aboriginal and Torres Strait Islander Heritage Protection Act 1984 protects areas and/or objects which are of significance to Aboriginal people and which are under threat of destruction. A significant area or object is defined as one that is of particular importance to Aboriginal people according to Aboriginal tradition. The Act can, in certain circumstances override state and territory provisions, or it can be implemented in circumstances where state or territory provisions are lacking or are not enforced. The Act must be invoked by or on behalf of an Aboriginal or Torres Strait Islander or organisation.

- *The Australian Heritage Commission Act* 1975 (Commonwealth)

The Australian Heritage Commission Act 1975 established the Australian Heritage Commission, which assesses places to be included in the National Estate and maintains a register of these places, which are significant in terms of their association with particular community or social groups for social, cultural or spiritual reasons. The Act does not include specific protective clauses.

1.11 *QUALIFICATIONS OF THE INVESTIGATOR*

Penny McCardle: Principal Archaeologist & Forensic Anthropologist has 10 years experience in Indigenous archaeological assessments, excavation, research, reporting, analysis and consultation. Six years in skeletal identification, biological profiling and skeletal trauma identification.

- BA (Archaeology and Palaeoanthropology, University of New England 1999
- Hons (Archaeology and Palaeoanthropology: Physical Anthropology), University of New England 2001
- Forensic Anthropology Course, University of New England 2003
- Armed Forces Institute of Pathology Forensic Anthropology Course, Ashburn, VA 2008
- Analysis of Bone trauma and Psedu-Trauma in Suspected Violent Death Course, Erie College, Pennsylvania, 2009
- Currently undertaking a PhD, University of Newcastle, 2010

1.12 *REPORT STRUCTURE*

The report includes *Chapter 1* which outlines the project, *Chapter 2* provides the consultation, *Chapter 3* presents the environmental context, *Chapter 4* presents ethno historic context, *Chapter 5* provides the archaeological background, *Chapter 6* provides the results of the fieldwork, analysis and discussion; *Chapter 7* presents the development impact assessment, *Chapter 8* presents the mitigation strategies and *Chapter 9* presents the management recommendations.

2 CONSULTATION

As per the DECCW Aboriginal cultural heritage consultation requirements for proponents (April 2010), MCH followed the four stages of consultation as set out below. All correspondences for each stage are provided in *Annex A*.

In relation to cultural significance, MCH recognises and supports the indigenous system of knowledge. That is, that knowledge is not 'open' in the sense that everyone has access and an equal right to it. Knowledge is not always definitive (in the sense that there is only one right answer) and knowledge is often restricted. As access to this knowledge is power, it must be controlled by people with the appropriate qualifications (usually based on age seniority, but may be based on other factors). Thus, it is important to obtain to obtain information from the correct people: those that hold the appropriate knowledge of those sites and/or areas relevant to the project.

If knowledge is shared, that information must be used correctly and per the wishes of the knowledge holder. Whilst an archaeologist may view this information as data, a custodian may view this information as highly sensitive, secret/sacred information and may place restrictions on its use. Thus it is important for MCH to engage in affective and long term consultation to ensure knowledge is shared and managed in a suitable manner that will allow for the appropriate management of that site/area.

MCH also know that archaeologists do not have the capability nor the right to adjudicate on the spirituality of a particular location or site as this is the exclusive right of the traditional owners who have the cultural and hereditary association with the land of their own ancestors. For these reasons, consultation forms an integral component of all projects and this information is sought form the registered stakeholders to be included in the report in the appropriate manner that is stipulated by those with the information.

2.1 STAGE 1: NOTIFICATION OF PROJECT PROPOSAL & REGISTRATION OF INTEREST

The aim of this stage is to identify, notify and register Aboriginal people and/or groups who hold cultural knowledge that is relevant to the project area, and who can determine the cultural significance of any Aboriginal objects and/or places within the proposed project area.

In order to do this, the sources identified by DECCW (2010:10) and listed in *Table 2.1*, to provide the names of people who may hold cultural knowledge that is relevant to determining the significance of Aboriginal objects and/or places were contacted by letter on 11 January 2011. A reply was requested by the 21 January 2011 and it was stipulated that if no response was received, the project and consultation will proceed. Information included in the correspondence to the sources listed in *Table 2.1* included the name and contact details of the proponent, an overview of the proposed project including the location and a map showing the location.

Table 2.1 ***Sources contacted***

Organisations contacted	Response
Department of Climate Change and Water	35 groups
WLALC	31 groups
Singleton Council	no response
Registrar Aboriginal Land Rights Act 1983	
National Native Title Tribunal	no groups
Native Title Services Corporation Limited	no response
Catchment Authority	no response

Following this, MCH compiled a list of people/groups to contact (Refer to *Table 2.2*).

It is recognised that these lists also provide groups not from the traditional boundaries from which the study area is located and that this is very offensive to the traditional owners of the area. Unfortunately some Government departments written to requesting a list of groups to consult with do not differentiate groups from different traditional boundaries and provide an exhaustive list of groups from across the region including those outside their traditional boundaries. And as per the DECCW Aboriginal cultural heritage consultation requirements for proponents (April 2010), archaeologists and proponents must write to all those groups provided asking if they would like to register.

Table 2.2 ***List of people/groups to contact***

Culturally Aware	Valley Culture
Ungooroo Cultural & Community Services Inc.	Hunter Valley Natural & Cultural Resources
Lower Wonnarua Tribal Consultancy Pty Ltd	Wonnaruah Elders Council
Cacutua Cultural Consultants	Wonn 1 Contracting
Upper Hunter Wonnarua Council	Mindaribba Local Aboriginal Land Council
Ungooroo Aboriginal Corporation	Lower Hunter Wonnarua Council Inc
Wanaruah Aboriginal Custodians Corporation	Wonnarua Culture Heritage
Aboriginal Native Title Elders Consultants	Musswellbrook Cultural Consultants Pty Ltd
Hunter Valley Cultural Consultants	Black Creek Aboriginal Corporation
Upper Hunter Heritage Consultants	Hunter Valley Aboriginal Corporation
Mingga Consultants	Bullen Bullen
Giwiirr Consultants	Gidawaa Walang & Barkuma Neighbourhood Centre Inc.
Carrawonga Consultants	Wanaruah Nations Aboriginal Corporation
St Clair Singleton Aboriginal Corporation	YarraWalk
Widescope Indigenous group Pty Ltd	Yinnar Cultural Services
Wattaka Wonnarua Traditional Owner	Hunter Traditional Owner
Hunter Valley Cultural Surveying	

MCH wrote to all parties identified in *Table 2.2* on 24 January 2011, and an advertisement was placed in the Singleton Argus on 14 January 2011. The correspondence and advertisement included the following information:

- the name and contact details of the proponent;
- an overview of the proposed project including the location of the proposed project;
- a statement that the purpose of community consultation with Aboriginal people is to assist the proposed applicant in the preparation of an application for an AHIP and to assist the Director General of DECCW in his or her consideration and determination of the application should an

AHIP be required;

- an invitation for Aboriginal people who hold cultural knowledge relevant to the proposed project area and who can determine the significance of Aboriginal object(s) and/or place(s) in the area of the proposed project to register an interest in a process of community consultation;
- the closing date for the registration of interests (4 February 2011 for the letter and 28 January 2011 for the add);
- that unless otherwise specified that those who are registering their interest that their details will be provided to DECCW and the LALC;
- that LALC's who hold cultural knowledge relevant to the proposed project area that is relevant to determining the significance of Aboriginal objects and/or places within the proposed project area who wish to register must do so as an Aboriginal organisation not an individual;
- where an Aboriginal organisation representing Aboriginal people who hold cultural knowledge relevant to the proposed project area and that is relevant to determining the significance of Aboriginal objects and/or places within the proposed project area who wish to register must nominate a contact person and provide written confirmation and contact details of this person or persons, and
- to nominate the preferred option for the presentation of information about the proposed project: an information packet or a meeting and information packet (Refer to Stage 2).

The registered parties are listed in *Table 2.3*.

Table 2.3 ***List of registered parties***

Group	Contact
Ungooroo Cultural & Community Services Inc.	Rhonda Ward
Wanaruah Local Aboriginal Land Council	Noel Downs
Cacatua Cultural Consultants	Donna Sampson
Ungooroo Aboriginal Corporation	Taasha Layer

2.2 *STAGE 2: PRESENTATION OF INFORMATION ABOUT THE PROPOSED PROJECT*

The aim of this stage is to provide the registered Aboriginal parties with information regarding the scope of the proposed project and the cultural heritage assessment process.

As the registered parties opted for an information packet to be forwarded to them instead of a meeting, the following information was provided to each party.

As some of the registered parties opted for the information packet to be forwarded to them, and others did not stipulate they would like a meeting,

MCH forwarded the information packet to those who registered (Refer to *Table 2.3*);

- an outline of the project details including the nature, scope and methodology, as well as any impacts;
- an outline of the impact assessment process;
- an outline of critical timelines and milestones for the completion of the assessment and delivery of reports;
- to clearly define agreed roles, functions and responsibilities of the DECCW, proponent, the registered Aboriginal parties and the LALC,
- to allow for opportunities for the registered Aboriginal parties to identify, raise and discuss their cultural concerns, perspectives and assessment requirements (if any);
- requested the preferred option for the gathering of information about cultural significance (Stage 3): information packet with questions and options and/or a meeting;
- a written response to the methods and the preferred method of sharing traditional knowledge methods was due no later than 25 October 2010.

This pack also stipulated that consultation was not employment, and requested that in order to assist the proponent in the selection of field workers, that the groups provide information in relation to two of the criteria as set out in the DECCW Interim Community Consultation Requirements for Applicants (January 2005). This included:

- the ability to assist in communicating the results of the survey back to the stakeholders for the assessment of cultural significance and returning advice on their response to MCH (asked to provide details on their ability to discuss results of field work, ability to effectively represent the Aboriginal community and provide a cultural heritage report in an appropriate time frame)and
- experience in field work and in providing cultural heritage advice (asked to nominate at least two individuals who will be available and fit for work (physically able to undertake field work) and their relevant experience.

This pack also asked the registered groups to provide a CV and insurance details for MCH to pass onto the client.

2.3 *STAGE 3: GATHERING INFORMATION ABOUT CULTURAL SIGNIFICANCE*

The aim of this stage is to facilitate a process whereby the registered Aboriginal parties can contribute to culturally appropriate information gathering and the research methodology, provide information that will

enable the cultural significance of any Aboriginal objects and or/places within the proposed project area to be determined and have input into the development of any cultural heritage management options and mitigation measures.

In order to do his, included in the information pack sent for Stage 2, was information pertaining to the gathering of cultural knowledge. This included the following information;

- request for cultural knowledge in relation to Aboriginal objects of cultural value within the proposed project area
- request for cultural knowledge in relation to Aboriginal places of cultural value to the Aboriginal people in the area of the proposed project. This may include places of social, spiritual and cultural value, historic places with cultural significance, and potential places/areas of historic, social, spiritual and/or cultural significance
- request for cultural knowledge in relation to any other cultural information in relation to the proposed project area
- MCH noted that information provided by registered Aboriginal parties may be sensitive and MCH and the proponent will not share that information with all registered Aboriginal parties or others without the express permission of the individual. MCH and the proponent extended an invitation to develop and implement appropriate protocols for sourcing and holding cultural information including any restrictions to place on information, as well as the preferred method of providing information.

Information, including the cultural significance of the study area, provided by the registered Aboriginal stakeholders includes:

The WLALC have written to MCH stating that the area is of great cultural significance being near resource rich permanent water and shelter, it is also part of the song line between the Hunter and the coast, The general area has numerous know sites, and is within easy walking distance to a number of significant areas. The area is also within easy walking distance of a teaching tree. Further to that only a few hundred meters away from the area in question, situated on the Black creek flood plain is a large (and very significant) site of possibly Pleistocene age. The extent of the site is unknown as most of the area is in private hands and has not been studied. It is possible that it follows the length of Black creek to the Hunter River.

On the other side of the ridge it extends east to Jump Up Creek. This area also shows evidence of regular use by Aboriginal People over an extended period.

2.4 STAGE 4: REVIEW OF DRAFT CULTURAL HERITAGE ASSESSMENT

A copy of the DRAFT report was forwarded to all registered Aboriginal parties (those listed in *Table 1.3*) for their review and were asked to provide a written or verbal response no later than 9 May 2011. MCH sent all groups two reminders (26 April 2011 and 4 May 2011) but received no reports/letters or comments from any of the registered Aboriginal groups. A copy of the final report was forwarded to all groups on 9 May 2011.

All submissions from the registered Aboriginal parties were responded to, the draft report altered to include their comments, and all parties were provided a copy of the final report.

Belford Land Corporation received a letter from Singleton Council on 10 August 2011 requesting the report be updated and addresses issues raised by WLALC. The letter Council is referring to (dated 16 June 2011) was not received by MCH and was therefore not included or responded to at that time. WLALC concerns are regarding the consultation process and their claim that they were not consulted with according to the (DECCW) Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010). MCH responded to the WLALC on 13 August 2011 stating that the consultation requirements had been met. *Table 2.4* provides a summary of the consultation with WLALC, the requirements and all correspondences are provided in *Annex A*.

Table 2.4 Consultation summary with WLALC

Requirements	Consultation with WLALC	WLALC response
Stage 1 – Notification of the project proposal and registration of interest	11 January 2011: letter to WLALC asking for a list of groups who MCH should consult with to no later than 21 January 2011.	19 January 2011: supplied MCH with a list of 31 groups & registered their interest in the project.
	21 January 2011: letter to WLALC (and all groups) asking if they would like to register, to do so by 3 March 2011 and asked to nominate their preferred option of receiving the information pack (Stage 2), meeting, mail, fax or email.	No response from WLALC
Stage 2 – Presentation of information about the proposed project	7 February 2011: As no group requested a meeting, including WLALC, the information packs were mailed to the registered groups. The information packs contained all the required information and maps	28 February 2011: agreed with the methodology of consultation, knowledge gathering and survey. Also states the area is highly significant (see Annex A).
Stage 3 –Gathering information about cultural significance	Stage 2 also requested the groups to nominate the way in which they would like to share the cultural knowledge or the gathering of knowledge.	WLALC did not respond to this request
Survey	7 January 2011: MCH invited all groups to participate in the survey on 18 March 2011 starting at 8am on site and asked for a copy of the relevant insurances.	No one attended and MCH tried calling all registered groups. WLALC did not answer. As all groups were invited and no one cancelled or asked to rearrange the survey, MCH proceeded to ensure the project was not delayed.

Stage 4 – Review of draft cultural heritage assessment report	12 April 2011: MCH mailed all groups a copy of the draft report asking for their letter/report no later than 9 May 2011, it was also stated that failure to provide the required information by the date would result in a missed opportunity to contribute to their cultural heritage and the project will proceed.	No response from WLALC
	26 April 2011: MCH sent all groups a reminder letter asking for their letter/ response no later than 9 May 2011, it was also stated that failure to provide the required information by the date would result in a missed opportunity to contribute to their cultural heritage and the project will proceed.	No response from WLALC
	4 May 2011: MCH sent all groups a reminder letter asking for their letter/ response no later than 9 May 2011, it was also stated that failure to provide the required information by the date would result in a missed opportunity to contribute to their cultural heritage and the project will proceed.	No response from WLALC
Final report	9 May 2011: MCH sent all groups a copy of the final report for their records.	No response from WLALC
	15 June 2011: MLALC sent a letter to MCH (not received by MCH) raising concerns in relation to consultation.	

On the 13 August 2011, MCH received a copy of the letter from WLALC from Belford Land Corporation and responded. MCH responded by providing the above table, copies of all correspondences and pointed out that it has been the choice of WLALC not to respond to MCH or participate in the assessment. MCH also apologised for not including the cultural significance in the report, that this was an oversight by MCH and this woiuld be rectified immediately (*Annex A*).

MCH has followed the Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010), the Due Diligence Code of Practice for the protection of Aboriginal Objects in New South Wales, and have consulted with all groups identified who registered an interest in the project. All documentation regarding the consultation process is presented in *Annex A*.

2.5 *SURVEY*

All groups were invited to participate in the survey on 18 March 2011. Unfortunately no group attended, no one called to cancel or re schedule and MCH tried calling all groups and either there was no answer or a message was left and as such in order to prevent delays for the project the organised survey proceeded.

3 LANDSCAPE CONTEXT

3.1 INTRODUCTION

The nature and distribution of Aboriginal cultural materials in a landscape are strongly influenced by environmental factors such as topography, geology, landforms, climate, geomorphology, hydrology and the associated soils and vegetation (Hughes and Sullivan 1984). These factors influence the availability of plants, animals, water, raw materials, the location of suitable camping places, ceremonial grounds, burials, and suitable surfaces for the application of rock art. As site locations may differ between landforms due to differing environmental constraints that result in the physical manifestation of different spatial distributions and forms of archaeological evidence, these environmental factors are used in constructing predictive models of Aboriginal site locations.

Environmental factors also effect the degree to which cultural materials have survived in the face of both natural and human influences and affect the likelihood of sites being detected during ground surface survey. Site detection is dependent on a number of environmental factors including surface visibility (which is determined by the nature and extent of ground cover including grass and leaf litter etc), the survival of the original land surface and associated cultural materials (by flood alluvium and slope wash materials), and the exposure of the original landscape and associated cultural materials (by water, sheet and gully erosion, ploughing, vehicle tracks etc), (Hughes and Sullivan 1984). Combined, these processes and activities are used in determining the likelihood of both surface and subsurface cultural materials surviving and being detected.

It is therefore necessary to have an understanding of the environmental factors, processes and activities, all of which affect site location, preservation, detection during surface survey and the likelihood of subsurface cultural materials being present. The environmental factors, processes and disturbances of the surrounding environment and specific study area are discussed below.

3.2 TOPOGRAPHY

The topographical context is important to identify potential factors relating to past Aboriginal land use patterns. Story *et al* (1963) divided the Hunter Valley into eight main sub-regions including the Southern Mountains, Central Goulburn Valley, Merriwa Plateau, Liverpool and Mt Royal Ranges, Barrington tops, North-Eastern Mountains, Central lowlands and the Coastal Zone.

The study area is located within the Central Lowlands, (a broad lowland belt of lowlands approximately 15 kilometres wide) which lies at the centre of the region, from Singleton to Scone and Murrurundi. It is bounded on all sides by steep rugged country except in the far west where the Cassilis Gate

provides access to the interior. To the south is dissected plateau country; to the north and west are the Liverpool Range and Barrington Uplands. This area contains much alluvial land consisting of open undulating grassland and level alluvial plains. Formerly rural, open cut mining has developed throughout on a large scale, especially around Singleton and Muswellbrook. The specific study area includes a ridge/crest that runs north/south, slopes and drainage lines flowing from the ridge/crest (Refer to *Figure 3.1*).

3.3 GEOLOGY

The geology of a region is not only reflected in the environment (landforms, topography, geomorphology, vegetation, climate etc), it also influences past occupation and its manifestation in the archaeological record.

The nature of the surrounding and local geology along with the availability and distribution of stone materials has a number of implications for Aboriginal land use and archaeological implications. The implications for past Aboriginal land use mainly relate to location of stone resources or raw materials and their procurement for manufacturing and modification for stone tools. Evidence of stone extraction, and manufacture, can be predicted to be concentrated in the areas of stone availability. However, stone can be transported for manufacture and/or trading across the region.

The Hunter Valley consists of four major geological provinces: the New England Geosyncline in the northeast, the Sydney Basin in the centre and south, the Great Artesian Basin in the northwest, and the eastern Australian Tertiary Volcanic Province in the north and west (Hughes 1984). The Central Lowlands are situated on the Sydney Basin, on Permian rocks that are folded and consist of shales, tuffs, sandstone, mudstones, and conglomerate, with some lava beds in the basal portion, and contain the extensive coal measures that are mined throughout the region. Generally, the Permian rocks are only moderately resistant, consequently forming the lowlands.

The study area is situated on the Maitland Permian group of Mulbring siltstone on the eastern half of the study area which includes siltstone and sandstone, and the western portion is on the Muree sandstones that consist of sandstone and conglomerate (Singleton Geological Map 1996).

Materials most dominant in stone tool manufacture throughout the Central Lowlands are indurated mudstone/tuff and silcrete (Kuskie 2000) and are commonly found in creek line deposits, such as those observed at Black Hill and Woods Gully (Kuskie and Kamminga 2000:183).

3.4 GEOMORPHOLOGY

The study of the evolution of the landscape within the Hunter Valley demonstrates that certain land systems, landforms and soil types can be considered as having higher archaeological potential and research value.

MCH:

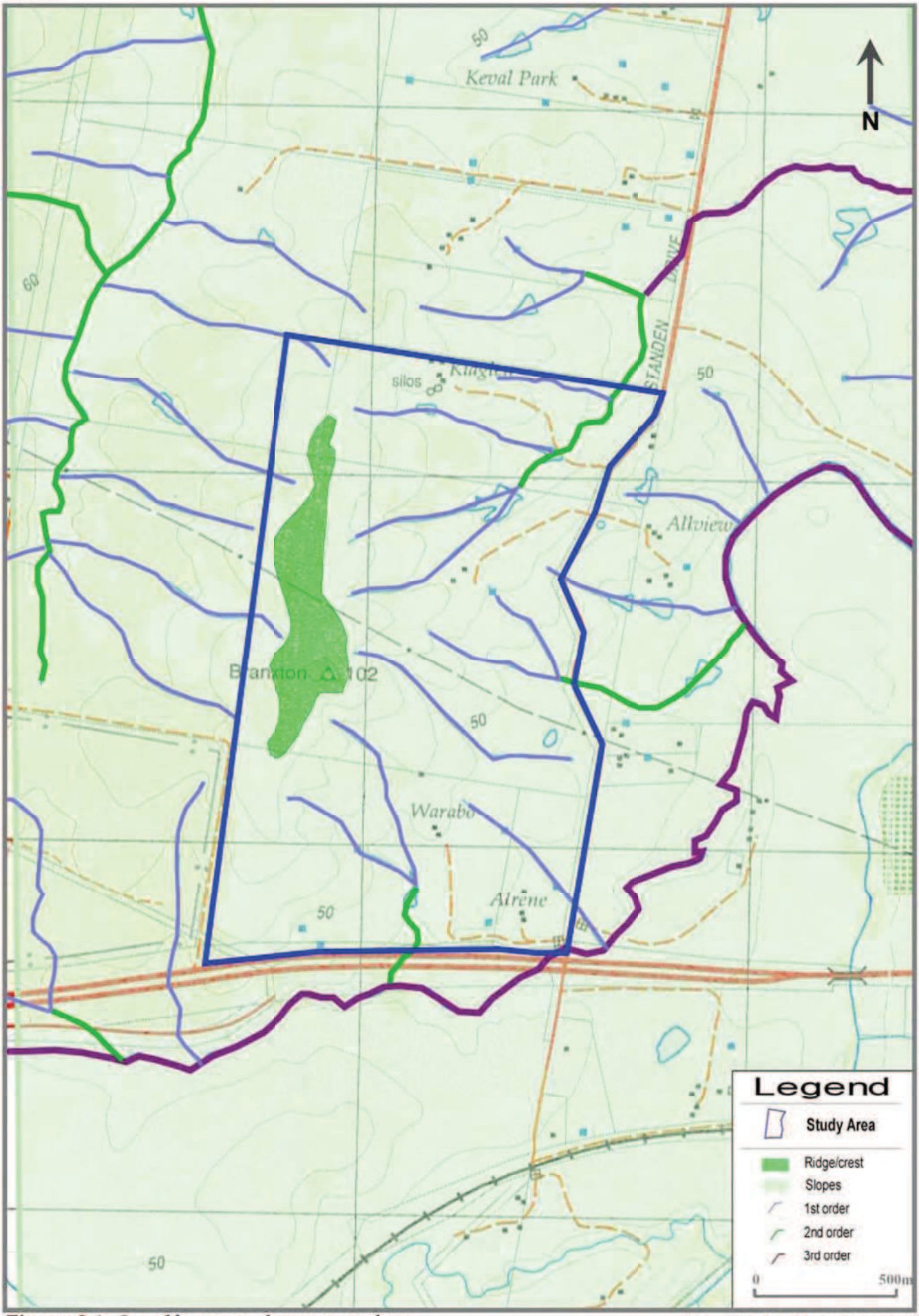

Figure 3.1 Landforms and stream orders

Source: 1:25 000 Topo Series: Greta

Geomorphology is the study of landscapes, their evolution and the processes operating within earth systems. Cultural remains are part of these systems, having being deposited on, and in part, resulting from interactions within landscapes of the past. An understanding of geomorphological patterning and alterations is therefore essential in assess and interpreting the archaeological record.

The geomorphology of the Hunter Valley is complex and is summarised below based upon studies undertaken by Galloway (1963) and Hughes (1984). The Hunter Valley contains a variety of landforms ranging from rugged mountains to plains and varying in elevation from sea level to over 1500 metres (AHD). It is surrounded on all sides by mountainous terrain with the exception of the western portion where a low rise divides it from the Darling River drainage area and the south eastern zone where it is bounded by the Pacific Ocean.

Four major elements are distinguished in the drainage pattern. The western half of the valley is drained by the Goulburn River and its tributaries that flow east to Denman. The north-eastern part is drained by the upper Hunter River, which flows southwest to unite with the Goulburn River at Denman. The combined rivers then flow east-south-east as the lower Hunter River, opening to the ocean at Newcastle. The Williams and Paterson Rivers drain the high country of the Barrington Tops in the east and join the Hunter River near its mouth. The watershed of the Goulburn River coincides with the Great Dividing Range, where it swings west in a vast loop.

The CSIRO (Story *et al* 1963) conducted a study of the Hunter Region and classified the landforms into nine sub-regions (Mt Royal Range, Liverpool Ranges, Northeast Mountains, Barrington Tops, Merriwa Plateau, Central Goulburn Valley, Southern Mountains, Central Lowlands and the Coastal Zone). The study area lies within the Central Lowlands, which is a belt of lowlands developed on the weak sedimentary rocks that extend from Murrurundi to Newcastle.

The soils throughout the region reflect the influence of a range of factors including the parent geological material, topography, climate, organisms and length of formation time. Differences between these elements are reflected in variation in soil types across the Hunter Valley. Texture contrast soils mantle the undulating to hilly landscapes on Permian and Carboniferous rocks and the older alluvial terraces and valley fills. The two major groups of texture contrast soils include solonetzic and podzolic soils. These soils consist of an upper soil Horizon A and underlying B (referred to as duplex soils). The upper A unit consists of grey to buff silts and sand with gravels, is usually no greater than one metre in depth, has a weakly developed soil profile and is typically discontinuous, especially along hill slopes. The underlying B unit consists of brown-red gravel rich clays with evidence of deep weathering and strongly contrasting horizons.

Unit A and Unit B are interpreted as being Holocene and Pleistocene in age respectively. Within the region, sites tend to occur on or within soil

Horizon A or are often present at the interface of the A and B horizons. Within the A horizon the lowermost (in terms of vertical positioning) artefact assemblages tend to contain artefacts that are typically attributed to the mid-Holocene, as characterised by an increase in the number of backed artefacts. Given the lack of detailed information regarding artefact sequences and chronologies in the Hunter Valley, this assumption should not be accepted without question. However, on geomorphological grounds, A horizon soils in this context are generally considered as dating to the mid-late Holocene (Dean-Jones and Mitchell 1993:76).

In contrast, the underlying weathered nature of the clayey B-horizon indicates that its parent material is much older. Evidence of earlier occupation of the region was identified at Warkworth West (AMBS 2002) where a limited artefact assemblage is present within deposit older than 14,000 years. It is also suggested that materials from Fal Brook and Carrington date to the Pleistocene period (Koettig 1987). The B-horizon parent material in hill slope formations is typically composed of weathered, in-situ bedrock whereas soils along the valley floors are generally alluvial or colluvial in origin.

The archaeological importance of foot slopes and valley floors with soils of this type is enhanced by the fact that the interaction between alluvial and colluvial deposition can result in the formation of sealed deposits. However, landforms of this type area also prone to erosion which may broadly reveal previously buried archaeological evidence. Extensive sheet and gully erosion occurs throughout the area, potentially resulting in artefacts that were originally deposited on or within the A-horizon being exposed as highly visible lag. Thus, although erosion greatly increases the visibility of artefacts, it also disturbs and damages them.

Similarly, the impacts of bioturbation upon the archaeological record must also be addressed. Focussed studies regarding bioturbation have primarily been conducted outside Australia (e.g. Armour-Chelu and Andrews 1994; Fowler *et al* 2004; Peacock and Fant 2002). Therefore, whilst the subsequent findings are broadly applicable within the Australian context, further research is certainly warranted. In general, it appears that, within duplex soils, the burrowing activities of fauna including earthworms can often cause the lateral and horizontal movement of artefacts through the soil profile, eventually resulting in the formation of a stone layer at the interface of the A and B horizons. The other important element to address is the differential movement of artefacts according to size/weight. In this respect, bioturbation has the potential to artificially conflate and separate artefacts according to size grouping as opposed to depositional context (Fowler *et al* 2004; Armour-Chelu and Andrews 1994).

As duplex soils are the dominant soil type within the Central Lowlands, the inherent properties of these soils must be taken into consideration in regard to the likelihood of site detection (through exposure by erosion), the stratigraphic context and age of sites, potential site location in relation to past use of the landscape and landscape instability. Certain land systems and types of deposit are however, considered to have greater potential to

contain stratified and/or older archaeological sites. This does not imply that older sites are intrinsically more significant than more recent sites, rather, the more important issue in scientific terms is the level of integrity within the site. In broad terms, windblown sand sheets/dunes (such as those at Warkworth), alluvial fan deposits and foot slopes with the potential to have colluvial deposits should be considered as archaeologically sensitive landforms (refer to Dean-Jones and Mitchell 1993; Hughes 1984).

It must also be noted that local landowners have verified that the area is highly disturbed and have also noted that significant (up to several metres) silt/sediment has been deposited within that area of the floodplain over the past 50 years (pers. comm. Lauren Randall, HWC, owners of lot 5 DP 1050080, 9/11/07). This was noticed when an irrigation pipeline broke and needed to be replaced and they had to dig down several meters to find the pipeline which was originally laid 47-50 years ago.

3.5 *Soils*

The nature of the surrounding soil landscape also has implications for Aboriginal land use and site preservation, mainly relating to supporting vegetation and the preservation of organic materials and burials.

The study area is situated on the Rothbury soil landscape that is characterised by undulating to rolling hills with elevations ranging from 60-140 metres. Local relief is 60-80 metres and drainage lines are common throughout the area (Kovac and Lawrie 1991:338).

The main soils are Red Podzolic (dark brown fine sandy loam topsoil to a depth up to 30cm and pH 6.0-6.5, changing to reddish brown clay subsoil with a pH 5.5-6.0) occurring on upper slopes with Yellow Podzolic soils (dark brown sandy loam topsoil with a depth up to 20cm and pH 5.5-6.0, and changes to bright reddish brown clay at depth with pH of 5.5) on mid slopes.

Yellow Solodic soils (dull yellowish brown loamy sand topsoil to depth of 15cm and pH 6.0, changing to dull yellow orange clay and pH of 6.5) and brown Solotyhs (brown sandy loam topsoil to a depth of 25cm and pH 7.0, changes to brown clay at depth with pH of 5.5-6.5) occur on lower slopes with Prairie Soils (dark brown silt loam to a depth of 70cm and pH of 6.0, changes to dark brown clay and pH of 8.0) in the drainage lines (Kovac and Lawrie 1991:339). Minor sheet erosion on slopes with moderate sheet and gully erosion occurs on the lower slope areas.

Douglas Partners (2009) undertook a geotechnical investigation and reporting for the effluent disposal, erosion and salinity for the study area. Thirty test pits were undertaken across the study area (location shown in *Figure 3.1*) ranging from .7 metre to 2 metres. General observations during the investigation and walk over indicated the consistent erosion across the study area resulting in the A horizon being eroded away and the B horizon exposed throughout. The geotechnical report and letter explaining the

difference in topsoil terminology between geotechnical and archaeological reports are provided in *Annex B*.

3.6 *CLIMATE*

Climatic conditions would also have played a part in occupation of an area as well as impacted upon the soils and vegetation and associated cultural materials. The climatic zone as defined by Kovac and Lawrie (1991) is 3E which is characterised by temperatures ranging from an average minimum of below 5°C to an average maximum of 28°C. Winter rainfall levels are somewhat variable and generally average 30 millimetres per month. Summer rainfalls are more stable at approximately 55-60 millimetres per month, giving a mean annual rainfall of 740 millimetres. During summer, the increased rainfall rate and reduced ground cover is reflected in a proportionately higher risk of erosion.

3.7 *WATERWAYS*

The availability of water (and the associated faunal and floral resources) is one of the most important factors influencing patterns of past Aboriginal land use. This assertion is undisputedly supported by the regional archaeological investigations carried out in the Hunter Valley.

Stream order assessment is one way of determining the reliability of streams as a water source. Stream order is determined by applying the Strahler method to 1:25 000 topographic maps. Based on the climatic analysis (see *Section 2.5*), the study area will typically experience comparatively reliable rainfalls under normal conditions and thus it is assumed that any streams above a third order classification will constitute a relatively permanent water source.

The Strahler method dictates that upper tributaries do not exhibit flow permanence and are defined as first order streams. When two first order streams meet they form a second order stream. Where two-second order streams converge, a third order stream is formed and so on. When a stream of lower order joins a stream of higher order, the downstream section of the stream will retain the order of the higher order upstream section (Anon 2003; Wheeling Jesuit University 2002).

The study area has eleven first order streams (ephemeral drainage lines) that flow north east, east and south east from the ridge/crest. Some of these flow into second order ephemeral streams, one that is located to the northeast within the study area, another to the east along the eastern boarder and another one to the south east within the study area. One third order ephemeral stream is located approximately 300 metres to the north of the study area and one to the south eastern corner of the study area (Refer to *Figure 3.1*). Thus, the study area may be considered moderately resourced in terms of water availability during wet seasons or after continuous heavy rain when water was available.

3.8 *FLORA AND FAUNA*

The availability of flora and associated water sources affect fauna resources, all of which are primary factors influencing patterns of past Aboriginal land use and occupation. The preservation and detection of surface cultural materials from of past Aboriginal land uses are also influenced by flora and fauna.

European settlers extensively cleared the original native vegetation in the 1800's. Prior to clearing native vegetation would have included forest oak with some river oak (Kovac and Lawrie 1991:425). Presently, the specific study area is primarily covered in grasses with a sparse scattering of trees. The drainage throughout the study area would have supported a limited range of faunal populations including kangaroo, wallaby, goanna, snakes and a variety of birds. A wider variety of resources would have been available in areas to the north and south east where more reliable water would have been available.

Typically, due to vegetation cover, most artefacts identified through surface inspection are identified when they are visible on exposures created by erosion or ground surface disturbances (Dean-Jones and Mitchell 1993; Kuskie and Kamminga 2000). The grass ground cover throughout the study area expected to result in limited visibility, hence reducing the detection of surface cultural materials.

3.9 *PAST LAND USES AND DISTURBANCES*

Based upon archaeological evidence, the occupation of Australia extends back some 40,000 years (Mulvaney and Kamminga 1999) whilst Aboriginal people have been present within the Hunter Valley for at least 20,000 years (Koettig 1987). Although the impact of past Aboriginal occupation on the natural landscape is thought to have been relatively minimal, it cannot simply be assumed that 20,000 years of land use have passed without affecting various environmental variables.

The practice of 'firestick farming' whereby the judicious setting of fires served to drive game from cover, provide protection and alter vegetation communities significantly influenced seed germination, thus increasing diversity within the floral community.

Following European settlement of the Hunter Valley in the 1820s, the landscape has been subjected to a range of different modifactory activities including extensive logging and clearing, agricultural cultivation (ploughing), pastoral grazing, residential developments and mining (Turner 1985). The associated high degree of landscape disturbance has resulted in the alteration of large tracts of land and the cultural materials contained within these areas.

The specific study area has been cleared and primarily used for pastoral purposes (grazing), involving the wholesale clearance of native vegetation, the introduction of pasture grass, the construction of dams, housing,

fencing, numerous tracks and associated infrastructure (water, electricity, telephone).

Although pastoralism is a comparatively low impact activity, it does result in disturbances due to vegetation clearance and the trampling and compaction of grazed areas. These factors accelerate the natural processes of sheet and gully erosion, which in turn can cause the horizontal and lateral displacement of artefacts. Furthermore, grazing by hoofed animals can affect the archaeological record due to the displacement and breakage of artefacts resulting from trampling (Yorston *et al* 1990). Pastoral land uses are also closely linked to alterations in the landscape due to the construction of dams, fence lines and associated structures.

As a sub-set of agricultural land use, ploughing typically disturbs the top 10-12 centimetres of topsoil (Koettig 1986b) depending on the method and machinery used during the process. Ploughing increases the occurrence of erosion and can also result in the direct horizontal and vertical movement of artefacts, thus causing artificial changes in artefact densities and distributions. In fact, studies undertaken on artefact movement due to ploughing (e.g. Roper 1976; Odell and Cowan 1987) has shown that artefact move between one centimetre up to 18 metres laterally depending on the equipment used.

Ploughing may also interfere with other features and disrupt soil stratigraphy (Lewarch and O'Brien 1981). Ploughing activities are typically evidenced through 'ridges and furrows' however a lengthy cessation in ploughing activities dictates that these features may no longer be apparent on the surface.

Whilst the impacts of vehicular movements on sites have not been well documented, based on general observations it is expected that the creation of dirt tracks for vehicle access would result in the loss of vegetation and therefore will enhance erosion and the associated relocation of cultural materials.

Excavation works required for dam construction and the laying of infrastructure (water, telephone) would require the removal of soils thus displacing and destroying any cultural materials that may have been present. As fence construction and the erection of telegraph poles require the removal of sols for the holes, this would also have resulted in the disturbance and possible destruction of any cultural materials.

3.10 NATURAL DISTURBANCES

It must be recognised that the disturbance of cultural materials can also be a result of natural processes.

The patterns of deposition and erosion within a locality can influence the formation and/or destruction of archaeological sites. Within an environment where the rate of sediment accumulation is generally very high, artefacts deposited in such an environment will be buried shortly after

being abandoned. Frequent and lengthy depositional events will also increase the likelihood of the presence of well-stratified cultural deposits (Waters 2000:538,540).

In a stable landscape with few episodes of deposition and minimal to moderate erosion, soils will form and cultural materials will remain on the surface until they are buried. Repeated and extended periods of stability will result in the compression of the archaeological record with multiple occupational episodes being located on one surface prior to burial (Waters 2000:538-539). Within the Hunter Valley duplex soils artefacts typically stay within the A horizon on the interface between the A and B horizons (Refer to *Section 2.4*).

If erosion occurs after cultural material is deposited, it will disturb or destroy sections of archaeological sites even if they were initially in a good state of preservation. The more frequent and severe the episodes of erosional events the more likely it is that the archaeological record in that area will be disturbed or destroyed (Waters 2000:539; Waters and Kuehn 1996:484). Regional erosional events may entirely remove older sediments, soils and cultural deposits so that archaeological material or deposits of a certain time interval no longer exist within a region (Waters and Kuehn 1996:484-485).

The severe rain and flooding in recent times has had a significant impact of soils and cultural materials within the soils. MCH have noted that throughout the Hunter Valley previously recorded sites have been completely moved with nothing remaining or a significant reduction in artefacts numbers as well as erosion. Thus, the archaeological record had been greatly altered in some areas along with the soils and landscapes.

The role of bioturbation is another significant factor in the formation of the archaeological record. Post-depositional processes can disturb and destroy artefacts and sites as well as preserve cultural materials. Redistribution and mixing of cultural deposits occurs as a result of burrowing and mounding by earthworms, ants and other species of burrowing animals. Artefacts can move downwards through root holes as well as through sorting and settling due to gravity. Translocation can also occur as a result of tree falls (Balek 2002:41-42; Peacock and Fant 2002:92). Depth of artefact burial and movement as a result of bioturbation corresponds to the limit of major biologic activity (Balek 2002:43). Artefacts may also be moved as a result of an oscillating water table causing alternate drying and wetting of sediments, and by percolating rainwater (Villa 1982:279).

Experiments to assess the degree that bioturbation can affect material have been undertaken. In abandoned cultivated fields in South Carolina, Michie (summarised in Balek 2002:42-43) found that over a 100 year period 35% of shell fragments that had been previously used to fertilise the fields were found between 15 and 60 centimetres below the surface, inferred to be as a result of bioturbation and gravity. Earthworms have been known to completely destroy stratification within 450 years (Balek 2002:48). At sites in Africa, conjoined artefacts have been found over a metre apart within the

soil profile. The vertical distribution of artefacts from reconstructed cores did not follow the order in which they were struck off (Cahen and Moeyersons 1977:813). These kinds of variations in the depths of conjoined artefacts can occur without any other visible trace of disturbance (Villa 1982:287).

However, bioturbation does not always destroy the stratigraphy of cultural deposits. In upland sites in America, temporally-distinct cultural horizons were found to move downwards through the soil as a layer within minimal mixing of artefacts (Balek 2002:48).

3.11 *Discussion*

The regional environment provided resources, including raw materials, fauna, flora and water, that would have allowed for sustainable occupation of the area. Within the study area, the landforms of a ridge/crest overlooking a third order stream may have been suitable for occupation during the wet season and/or during times of heavy rain as this would have provided water along the 1st, 2nd and 3rd order streams.

In relation to modern alterations to the landscape, the use of the majority of the study area for agricultural purposes can be expected to have had low impacts upon the archaeological record. European land uses such as clearing, grazing, ploughing, and the construction of dams, housing and fences would have displaced cultural materials, and the severe erosion throughout the study area would also have displaced cultural materials that may have been present.

Vegetation cover across the study area consists of grasses with scattered areas of trees. This will affect visibility and thereby reduce the potential for identifying archaeological evidence. Typically, due to vegetation cover, most artefacts identified through surface inspection are identified when they are visible on exposures created by erosion or ground surface disturbances (Kuskic and Kamminga 2000).

Because of the natural and cultural processes discussed above, site integrity cannot be assumed for the study area. However, the existence of *in situ* cultural materials cannot be ruled out.

4 ETHNO-HISTORIC BACKGROUND

Unfortunately, due to European settlement and associated destruction of past Aboriginal communities, their culture, social structure, activities and beliefs, little information with regards to the early traditional way of life of past Aboriginal societies remains.

4.1 USING ETHNO-HISTORIC DATA

Anthropologists and ethnographers have attempted to piece together a picture of past Aboriginal societies throughout the Hunter Valley. Although providing a glimpse into the past, one must be aware that information obtained on cultural and social practices were commonly biased and generally obtained from informants including white settlers, bureaucrats, officials and explorers. Problems encountered with such sources are well documented (e.g. Barwick 1984; L'Oste-Brown *et al* 1998). There is little information about who collected information or their skills. There were language barrier and interpretation issues, and the degree of interest and attitudes towards Aboriginal people varied in light of the violent settlement history. Access to view certain ceremonies was limited. Cultural practices (such as initiation ceremonies and burial practices) were commonly only viewed once by an informant who would then interpret what he saw based on his own understanding and then generalise about those practices.

4.2 HUNTER VALLEY ETHNO-HISTORIC ACCOUNTS

Brayshaw (1987) examined early ethnographic literature relating to the Aboriginal occupation and European settlement of the Hunter Valley in order to determine the manner in which past Aboriginal communities adapted to their environment, the extent to which they utilised the available resources, and to assess the comparability of the described material culture (ethno-historic documentation) with the archaeological evidence.

In relation to the limitations inherent within the ethno-historic documentation, Brayshaw (1987) notes that the early records of settlers, explorers and surveyors provide the only picture of past Aboriginal life in the Hunter Valley, as it was prior to the impact of contact and white settlement and therefore worthy of consideration.

Dawson (1830; in Brayshaw 1987) and Fawcett (1898; in Brayshaw 1987) suggest that fire was used to deter Europeans, to attract game for hunting and to signal to other tribes for both hunting and ceremonial purposes. It is also commonly known that firestick farming was used to modify the environment throughout Australia (Mulvaney and Kamminga 1999).

Floral resources were also utilised in many ways. Bark appears to have been widely used as huts or 'gunyahs', canoes, string, baskets, drinking containers and in burial practices. Vegetable and bark fibres were also used for fishing lines, nets and sewing. Wood was used for clubs, yam sticks,

boomerangs, spears, spear throwers and hatchets, and both wood and bark was used to make shields (Paterson 1801; Barrallier 1802; Eyre 1959).

Shells were used as scrapers to sharpen spears (later replaced by glass) and ground into shape for fishhooks (Caswell 1841 and Gunson 1974, both in Brayshaw 1987:67). There is no apparent ethnographic reference to stone being used as tools. However, physical evidence indicates stone was utilised at as tools. Kangaroo bones were made into awls and used to repair canoes and in sewing possum and kangaroo skins for clothing (Boswell 1890; Fawcett 1898 in Brayshaw 1987). Dawson (1830:115-116) notes that kangaroo bone also functioned as a comb.

Dietary staples included a variety of plant foods, shellfish and other animal foods (Grant 1803:161; Wood 1972:44). Animal foods may have included kangaroos, wallabies, echidna, emus, possums, birds, goannas, snakes and honey from native trees. The occurrence of these resources would have depended largely on seasonality and geographic location. Little is known of past ritual life, as access to these rites was restricted.

5 ARCHAEOLOGICAL CONTEXT

A review of the archaeological literature of the Central Lowlands, and more specifically the Branxton area and the results of a DECCW AHIMS search provide essential contextual information for the current assessment. Thus, it is possible to obtain a broader picture of the wider cultural landscape highlighting the range of site types throughout the region, frequency and distribution patterns and the presence of any sites within the study area. It is then possible to use the archaeological context in combination with the review of environmental conditions to establish an archaeological predictive model for the study area.

5.1 REGIONAL ARCHAEOLOGICAL CONTEXT

The majority of archaeological surveys and excavations throughout the region have been undertaken in relation to environmental assessments for the coal mining and power industries of the Central Lowlands. A review of the most relevant investigations (Dyall 1979, 1980; Davidson *et al* 1993; Dean-Jones and Mitchell 1993; Koettig and Hughes 1984; McDonald 1997; Haglund 1999; Kuskie 2000; HLA-Envirosciences 2002; AMBS 2002; MCH 2003c, MCH 2004a, b) illustrates consistency in site type and location across the region as well as a possible bias in the results due to a focus on specific landforms. The corpus of recorded sites are described and assessed qualitatively in MCH (2004b) and these findings are summarised and supplemented below.

Based on the available information it is possible to identify a number of trends in site location and patterning within the local area. Open campsites are by far the most common site type with isolated finds also comparatively well represented. A variety of other site types have been identified in the Central Lowlands in far lower concentrations and include grinding grooves, scarred trees, rock shelters, shelters with art and burials. The high representation of sites containing stone artefacts is to be expected due to the durability of stone in comparison to other raw materials.

In relation to stone artefact raw materials, it is important to note that there is a potential for discrepancies in the way in which archaeologists classify lithic materials. This will consequently affect the proportional representation of raw materials within the recorded assemblages. However, as a whole mudstone is the most common lithic artefactual material found in the region, followed by silcrete. Chert, tuff, quartz, quartzite, petrified wood, porcellanite, hornfels, porphyry, basalt, limestone, sandstone, rhyolite, basalt, European glass and other non-specific lithic types also occur in smaller quantities.

Variation in the classificatory definitions employed by archaeologists will again significantly influence the range of artefact types identified within a study area. For example, the distinction between a waste flake, a debitage flake and a flaked piece may be heavily subject to the perspective of the

recorder. Thus, it is not productive to attempt to quantify the proportionate representation of artefact types identified in previous studies.

That said, based on the information collated from previous regional studies (refer to MCH 2004b) it is apparent that the most common artefact types are flakes, flake fragments and flaked pieces. Cores, edge ground axes, millstones, grindstones, hammer stones and backed artefacts including backed blades, bondi points, geometric microliths and eloueras also occur though in lower frequencies.

In general, the stone artefact assemblage in the area has been relatively dated to what was previously known as the Small Tool Tradition (10,000 years BP). On the basis of stone tool technology, the overwhelming majority of Aboriginal open sites within the region are attributed to the Holocene period. However, at Glennies Creek, north of Singleton, based on radiocarbon dated charcoal and geomorphological evidence it is suggested that artefacts found in the B-horizon may have been deposited between 10,000 and 13,000 BP (Koettig 1986a, 1986b).

An analysis of recorded sites according to the number of artefacts present, the distance from water and the landform type of each site allows for the identification of a number of trends. It must be recognised however, that there are various factors influencing these results, including, but not limited to:

- the fact that the landform on which a site area is observed may not necessarily be its origin, for example, artefacts from a crest may be relocated by erosion such that they are recorded further down a slope;

- effects of biased sampling of landforms due to decisions made by archaeologists and as a result of development area boundaries, levels of exposure on different landforms and variable recording by archaeologists. For example, the large percentage of sites found along creek lines may be (at least partially), a result of the biased focus of many cultural heritage surveys towards this landform. In addition, it was not possible to obtain sufficient information from a large number of site cards and reports; and

- artefact counts can be skewed due to factors such as the differing fragmentation levels of discrete stone types and levels of ground surface visibility. Typically, a very large number of sites/artefacts are located on exposures and yet no, or very few artefacts are visible away from these exposures.

Therefore these results are purely indicative of what may be expected in terms of site location and distribution.

Artefact scatters and isolated artefact finds have been divided into three arbitrary artefact volume categories: small (ten or fewer artefacts); medium (11-100 artefacts); and large (over 100 artefacts). Landform divisions were

determined from the information included on site cards and reports (refer to MCH 2004b for additional detail).

When assessing sites in terms of distance to water, there is a bi-modal distribution, in that the majority of sites are situated within 50 metres of water and the next highest proportion of sites are over 100 metres from water, with comparatively few sites present in the zone 50-100 metres from water. This contrasts somewhat with the generally accepted theorem that, within the Hunter Valley, site numbers decrease with distance from water. Rather, it appears that there is a distinct pattern whereby site numbers are greatest within 50 metres of water, becoming scarce 50-100 metres from water before again increasing in number beyond this distance category.

This bimodal pattern is echoed in relation to site size. The bulk of large and medium sites are situated within 50 metres of water, dropping in representation in the area 50-100 metres from water before reaching another lesser peak at distances over 100 metres from water.

Thus, it is apparent that open campsites/isolated finds are most concentrated in number and size within 50 metres of water. A secondary, lesser, peak in site numbers and size occurs at distances over 100 metres from water This represents a refinement of the generally accepted premise that site numbers and artefact quantities within sites decrease in inverse proportion with distance to water. However, it must also be said that this pattern can be considered indicative only and is by no means conclusively proven.

As is to be expected, the majority of sites within 50 metres of water are present on creek lines whilst slopes and crest/ridge formations are also common site locations. The frequent presence of sites on crest/ridges and slopes is also noticeable for sites located over 50 metres from water.

All grinding groove sites (for which all variables could be assessed) were located within 50 metres of water. Due to the importance of water in the grinding process, it is not surprising that sites of this type are situated close to water.

Unfortunately, due to the very small number of sites of other types (for example, shelter with art, burials and scarred trees) present in the area, it is not possible to reliably discuss patterning in these varied sites.

5.1.1 *Discussion*

In summary, despite the recognised limitations of utilising previous studies as the basis for generalisations regarding archaeological patterning, the following broad predictions can be made for the Central Lowlands region:

- a wide variety of site types are represented in the study area with open campsites and isolated artefacts by far the most common;

- lithic artefacts are primarily manufactured from mudstone and silcrete with a variety of other raw materials also utilised but in smaller proportions;

- site numbers and artefact volumes are greatest within close proximity to water;

- there appears to be a secondary peak in site numbers and artefact volumes at distances over 100 metres from water;

- creek lines, crest/ridges and slopes are the most archaeologically sensitive landforms.

These findings are consistent with models developed for the area (see *Section 5.7*).

5.2 *DECCW ABORIGINAL HERITAGE INFORMATION MANAGEMENT SYSTEM*

It must be noted that there are many limitation with an AHIMS search. Firstly site coordinates are not always correct due to errors and changing of computer systems at DECCW over the years that failed to correctly translate old coordinate systems to new systems. Secondly, DECCW will only provide up to 100 sites per search, thus limiting the search area surrounding the study area and enabling a more comprehensive analysis and finally, few sites have been updated on the DECCW AHIMS register to notify if they have been subject to a s87 or s90 and as such what sites remain in the local area and what sites have been destroyed is unknown.

In addition to this, other limitations include the number of studies in the local area. Fewer studies suggests that sites have not been recorded, ground surface visibility also hinders site identification and the geomorphology of the majority of NSW soils and high levels of erosion have proven to disturb sites and site contents, and the extent of those disturbances is unknown (i.e. we do not know if a site identified at the base of an eroded slope derived from the upper crest, was washed along the bottom etc: thus altering our predictive modelling in an unknown way). Thus the DECCW AHIMS search is limited and provides a basis only that aids in predictive modelling.

The new terminology for site names including (amongst many) an 'artefact' site encompasses stone, bone, shell, glass, ceramic and/or metal and combines both open camps and isolated finds into the one site name. Unfortunately this greatly hinders in the predictive modelling as different sites types grouped under one name provided inaccurate data.

A search of the DECCW AHIMS register has shown that 89 known Aboriginal sites are currently recorded within five kilometres of the study area and include 82 artefact sites, 4 Artefact/Pads, 3 PADs. The AHIMs results are provided in *Annex C* and the location of sites is shown in *Figure 5.1*.

MCH:

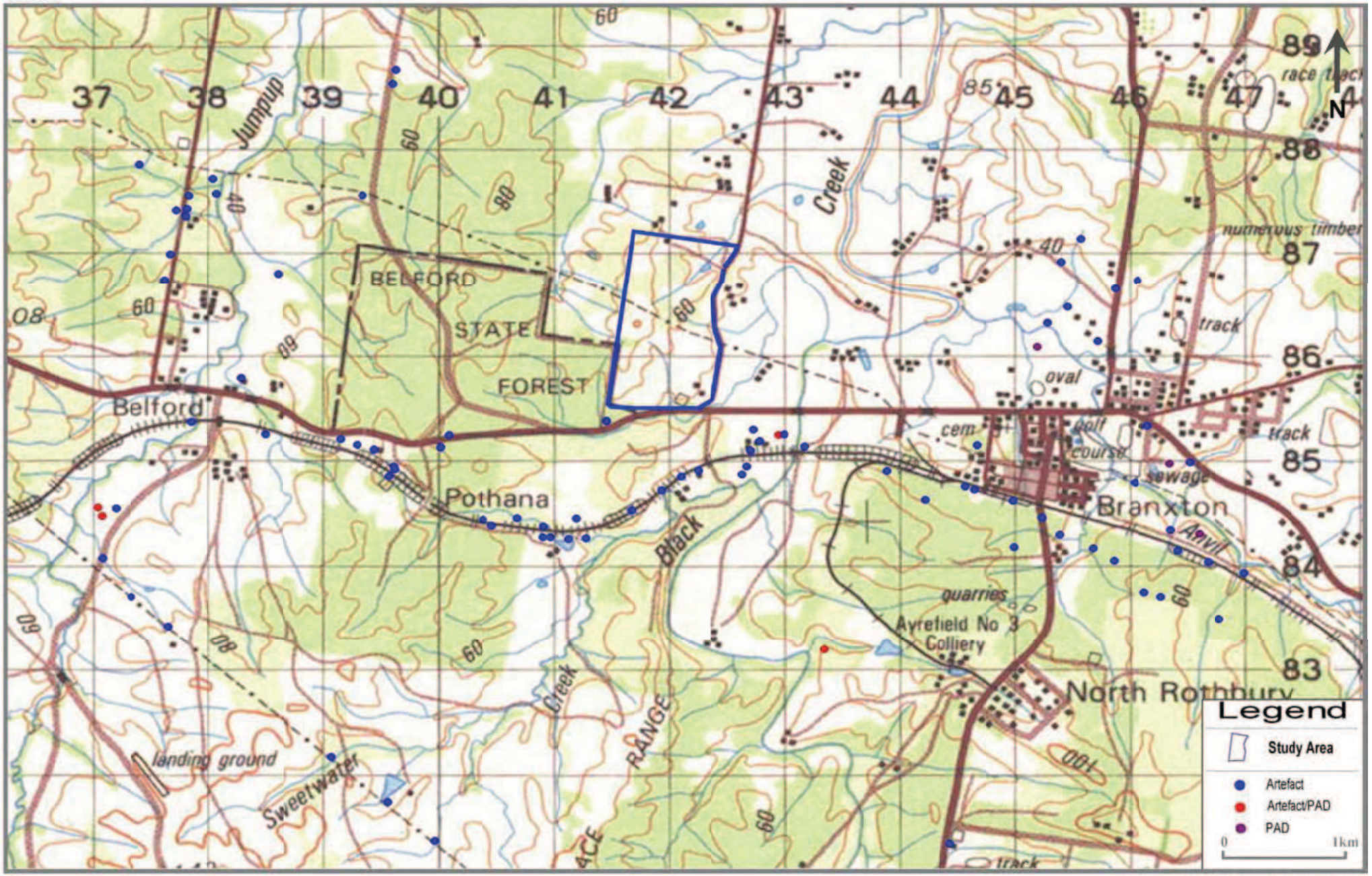

Figure 5.1 Known sites

Source: 1:100 000 Topo Series: Cessnock

5.3 LOCAL ARCHAEOLOGICAL CONTEXT

All archaeological surveys throughout the local area have been undertaken in relation to environmental assessments for developments. The most relevant investigations indicate differing results and observations based on surface visibility and exposure, alterations to the landscape (including mining, industrial and residential development), proximity to water sources and geomorphology. The reports available from DECCW are discussed below and their location illustrated in *Figure 5.2*.

Hughes (1984b) undertook an investigation for a proposed new section of the New England Highway at Belford, near Newcastle. The reserve for the highway was 90m wide, crosses the Belford State Forest, the length is not provided and Jump Up Creek is the nearest water source.

It was noted that the study area was heavily vegetated with no discussion of vegetation species and prevalence and no detailed information regarding topography, environmental data, or survey methods was provided.

A single site was identified on an exposure of the western bank of Jump Up Creek (*Table 5.1*).

Table 5.1 Summary of sites (Hughes 1984)

Site Name	Site type	Landform	Distance to Water	Stream Order	Artefacts	Disturbance	Potential for subsurface
Jump Up Creek Site 1	Artefact scatter	creek	0-50m	3rd	15 artefacts	Yes	Yes

The dominant raw material used was silcrete (12), with the dominant artefact type being flaked pieces (6) and 2 silcrete cores were also noted. The artefacts were located along a bulldozed track, and although these artefacts were not *in situ*, Hughes believed that there were likely to be further artefacts along the creek for at least 250m.

Brayshaw (1994) undercook an assessment for the proposed extension to the F3 Freeway at West Wallsend through to the New England Highway, Branxton. The study area was approximately 40 km long and 100m wide, crossing both the Great Northern Railway and Anvil Creek.

The study area is generally low-lying, with the exception of an area near Mt Sugarloaf where it reaches above 100m ASL. The rest of the study area comprises gentle slopes and broad, rounded ridge tops. Generally, the study area comprises hill slopes of <3° gradient (68%), with some flat areas (15%) and ridge/spurs (9%). The remainder (8%) comprises hill slopes of >3° gradient. Numerous permanent and ephemeral streams are within the area, and are given to ponding, with half being 1st order streams. These streams flow north to the Hunter River from elevated landforms, and northwest to Wentworth and Hexham Swamps. The northern portion of the study area has been extensively cleared and subject to timber getting, mining and agriculture, leaving an open woodland dominated by ironbark/box regrowth.

MCH:

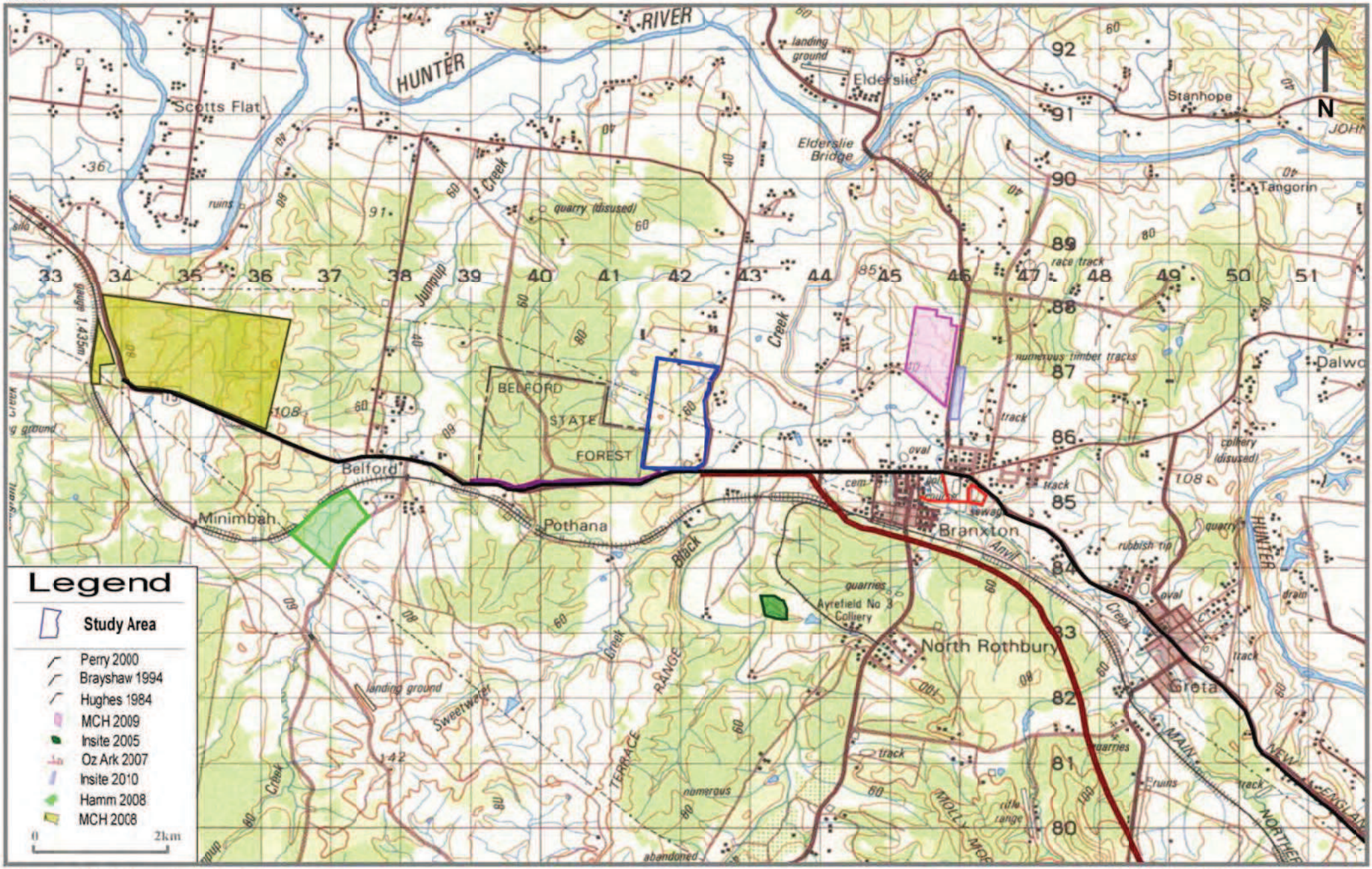

Figure 5.2 Previous studies

Source: 1:100 000 Topo Series: Cessnock

A search of DECCW database found 72 sites recorded within the vicinity of the study area. The most common site type was open camp sites (69.5%). Other site types recorded included grinding grooves (16.6%), scarred trees (5.5%), stone arrangements (2.8%), burial (1.4%), fish trap (1.4%), quarry (1.4%) and shelter with art/grinding grooves (1.4%).

Based on previous investigations in the area, the following predictive model was developed for the study area:

- scarred trees can occur, however land clearance has reduced the probability of their survival;
- shelter sites may be found in the Sugarloaf ranges, as they are only found in areas with suitable rocky outcrops;
- grinding grooves may be found near creeks where Permian sandstone has been exposed;
- open camp sites are likely to be found on elevated, flat ground above wetlands, along creeks, and creek junctions, saddles, ridges and spurs;
- subsurface artefacts may exist in areas where no surface artefacts are found, and
- taking subsurface finds into account, site frequency is likely to be higher than the rate of 1/4.6 km identified as at the date of the report by surface straight line surveys.

Approximately 90% of the route was surveyed, with the exception of the Blue Gum-Seahampton area, where recent burning showed no suitable land for occupation. Areas in the upper sections of Surveyors Creek, short sections south of Alcan Road and west of Maitland Road were viewed and assessed as being too steep for open camp sites, therefore were not surveyed. The study area was divided into six survey units, based on geographic location and landform. Visibility across the study area was assessed as poor to fair, ranging between 13.65% and 22.89%. Effective coverage was not given. Ten sites and 10 PADs were identified and are summarised in *Tables 5.2* and *5.3*.

Table 5.2 Summary of sites (Brayshaw 1995)

Site Name	Site type	Landform	Distance to Water	Stream Order	Artefacts	Disturbance	Potential for subsurface
Black Creek	artefact scatter	upper slope	50-100m	2nd	11	bulldozing	moderate
Allandale 1	artefact scatter	upper slope	50-100m	2nd	2	erosion	moderate
Allandale 2	artefact scatter	lower slope	50-100m	3rd	5	erosion, flooding	low
Wallis Creek	artefact scatter	elevated area	200m	swamp	6	Yes	moderate
Surveyors Creek	artefact scatter	rise	0-50m	1st	2	Yes	low
IF1	isolated	creek bank	0-50m	3rd	1	not provided	not provided
IF2	isolated	hill slope	100-150m	3rd	1	not provided	not provided
IF3	isolated	upper slope	200m+	3rd	1	not provided	not provided
IF4	isolated	hill slope	600m	3rd	1	not provided	not provided
IF5	isolated	lower slope	0-50m	3rd	1	not provided	not provided

Table 5.3 *Summary of PADs (Brayshaw (1995)*

Site Name	Landform	Water source	Disturbance	Potential
PAD 1	creek bank	Anvil Creek	moderate	moderate
PAD 2	creek bank	Sawyers Creek	low	moderate
PAD 3	creek bank	Tributary of Anvil Creek	moderate	moderate
PAD 4	creek bank	Tributary of Anvil Creek	moderate	moderate
PAD 5	creek terrace	Bishops Creek	low	moderate
PAD 6	creek flat	Sawyers Creek	low	high
PAD 7	creek bank	Swamp Creek	low	moderate
PAD 8	overhang	Wallis Creek	low	low
PAD 9	floodplain	Wallis Creek	moderate	moderate
PAD 10	shelter adjacent Creek	Burnt Creek	moderate	low

Brayshaw noted that all of the sits and PADs were within 200m of watercourses, and that visibility was around 70% across the study area. Nonetheless, only 31 artefacts were identified across the study area. Brayshaw also notes, however, that surface artefacts are not an indication of the presence/absence of subsurface artefacts. Brayshaw recommended that after the route was finalised and pegged out that areas with potential for subsurface artefacts should be further investigated.

OzArk (2007) undertook an assessment for the proposed upgrade of the waste water treatment plant at Branxton. The proposed works entailed the construction of additional infrastructure elements of the plant, and the possible replacement of an effluent pipe.

The study area was situated at the confluence of two creeks, Anvil Creek (3rd order) and Redhouse Creek (2nd order) and the dominant landform was an elevated terrace which has been modified by the construction of the waste water treatment plant. The vegetation in the study area included Hunter-Macleay dry sclerophyll forest, dominated by dry, open eucalypts, with an understory of mixed sclerophyll and mesophyll shrub stratum and semi-continuous grass groundcover. Much of the study area has been cleared, with the exception of scattered casuarina and eucalypt regrowth. Disturbance of the area since construction of the plant is extensive.

A search of the AHIMS database shows a total of 36 sites with 10km of the study area. The dominant site type is the open camp site (76.5%), followed by PAD, (13.5%), grinding grooves (5%) and Aboriginal resource site (5%).

As a result of previous investigations, the following predictive model was developed for the study area:

- proximity to permanent water is a primary factor in determining open camp sites;
- in lower reaches of tributary creeks (3rd order), archaeological evidence will be more frequent and intense, indicating more permanent or repeated occupation by small groups and may show evidence of concentrated activities;
- on major creek lines and rivers (4th order) more permanent and repeated occupation may be evidenced by a more diverse stone tool

assemblage indicating greater range of lithic activities. Sites in this location may even be stratified;

- creek junctions may provide a popular location for occupation and the size of the confluence (in terms of ranking nodes) may influence the size of the site, and
- open camp sites, grinding grooves and scarred trees are all likely in the study area.

The entire study area was traversed by foot, visibility was varied, and disturbances were high. No sites were identified and one PAD was identified and is summarised in *Table 5.4*.

Table 5.4 ***Summary of PADs (OzArk 2007)***

PAD	Landform	Distance to water	Water source	Size	Disturbance
Redhouse Creek 1b/PAD	terrace/ slope	0-50m	Redhouse Creek	entire terrace	clearing, construction

It was noted that the PAD is likely to be disturbed, and that it is likely to continue under the current waste water treatment plant. For these reasons, it was determined that the scientific significance of this PAD is low. As the site was likely to have little integrity, it was recommended that a s90 consent to destroy be sought from DECCW.

Perry (2000) undertook an assessment for a proposed extension of the gas main pipeline between Rutherford and Singleton. The route is 45km long, and follows the New England Highway, travelling through the townships of Lochinvar, Greta and Branxton. The main watercourse crossed is Black Creek. The report does not discuss environmental data.

The survey was conducted on foot and by vehicle and it was noted that visibility along the route was very poor and as it was part of a major road corridor, was highly disturbed. Four sites were identified and are summarised in *Table 5.5*.

Table 5.5 ***Summary of sites (Perry 2000)***

Site Name	Site type	Landform	Distance to Water	Stream Order	Artefacts	Disturbance	Potential for subsurface
AGL1	isolated	not provided	900m	3rd	1	Yes	not provided
AGL2	artefact scatter	not provided	1km	3rd	3	Yes	not provided
AGL3	artefact scatter	not provided	3km	3rd	2	Yes	not provided
AGL4	artefact scatter	not provided	3.5km	3rd	3	Yes	not provided

A total of nine artefacts were identified as part of the survey. The dominant raw material was silcrete (5), followed by mudstone (4). The most common artefact type was the flaked piece (7), followed by a backed blade (1) and a core (1).

It was noted that as Junburra is an Aboriginal organisation, all sites have significance. It was recommended that all artefacts be collected at that the local land council be involved in monitoring during the construction of the gas pipeline.

An investigation by Insite (2005) was undertaken of Lot 183, DP 871751 for a proposed subdivision of the property for residential purposes. It was proposed that the study area be subdivided into two lots, with dwellings to be constructed on the properties. It was anticipated that the land would be impacted by construction of a dwelling, as well as associated infrastructure. A partially completed dwelling and sheds were already on the property.

The study area was approximately 4.62 ha and is located on the northern bank of Black Creek. An unnamed ephemeral first order watercourse also ran along the western boundary of the study area. On the western banks of that watercourse was a rock outcrop, with riparian vegetation located to the north of the study area. To the south and east is cleared pasture. The study area is partially cleared in the south east, with mature stands of riparian vegetation along the watercourses and the dominant vegetation type was red and narrow-leaved ironbark, with occasional stands of smooth-barked eucalypts and casuarina along the creek flats.

A search of the AHIMS database showed a total of 25 sites within 11 km of the study area. The dominant site type was artefact sites (12 isolated finds, 8 artefact scatters, 4 open camp sites). Only one other site type was identified, being a grinding groove site. It was noted that the landforms upon which these sites were located were diverse, with no clearly discernible pattern.

Based on previous archaeological investigations, the following predictive model was developed for the study area:

- artefact scatters or isolated finds are the most likely site types to be encountered;
- sites may be surface scatters, or more likely, subsurface deposits of varying depths, and
- sites are likely to occur on higher, level ground or on the slopes leading to the terraces above Black Creek.

The study area was divided into five separate survey units, based on the area's topography, with each survey unit surveyed separately. Visibility was poor, and previous ground works had also obscured the ground surface. The effective coverage was assessed as 2%. As shown in *Table 5.6*, six sites were identified.

Table 5.6 Summary of sites (Insite 2005)

Site name	Site type	landform	Distance to water	Stream Order	Artefacts	Disturbance	Potential for subsurface
L1	artefact scatter	spur crest	0-50m	3rd	3	low	moderate/high
L2	isolated	spur crest	0-50m	3rd	1	low	moderate/high
L3	artefact scatter	spur crest	0-50m	3rd	4	low	moderate/high
L4	isolated	upper slope	0-50m	3rd	1	high	moderate/high
L5	isolated	spur crest	0-50m	3rd	1	low	moderate/high
L6	artefact scatter	mid slope	0-50m	3rd	4	high	moderate/high

A total of 14 artefacts were recorded in six locations, with the most common artefact type being flakes (8), followed by flaked pieces (3), cores (2) and one backed blade. The dominant raw material used was silcrete (8), followed by tuff (5) and fine-grained siliceous (1). In addition, one PAD was identified (*Table 5.7*).

Table 5.7 ***Summary of PAD (Insite 2005)***

Site Name	Landform	Water source	Disturbance	Potential
PAD	lower terrace	Black Creek	moderate	high

It was concluded that as the spur crest, upper slope and mid slope within the study area were relatively undisturbed, there was a moderate to high potential for in situ subsurface artefacts to be present. Therefore, the sites were assessed as being of moderate archaeological significance, and further investigations should be carried out. With regards to the PAD, it was concluded that as the area was not to be impacted by any construction works, no further action was required at that time. It was, however, noted that should it be impacted in the future, that further archaeological testing be carried out.

Hamm (2008) undertook an assessment for the proposed development of a caravan and camping resort facility. The study area is located approximately 1.5km south of the township of Belford, between Branxton and Singleton townships and was approximately 40.4 ha.

Being zoned Rural 1(a), and used for horse and cattle grazing, it was proposed that the project use 8.4 ha for permanent lots, bungalows, long-term vans/campsites, short-term vans/campsites, restaurant and cellar door, administration and community buildings, caravan and campsites including en-suite sites and associated amenities and recreation facilities. The south-western border of the study area also has a 132kV transmission line, and a Telstra fibre optic cable along the west-south-west boundary.

The study area is within the Central Lowlands topographic zone, characterised by undulating rises to low hills and creek flats. Slopes are generally 3-5%, measuring up to 600m. Elevations range from 50-80m.

The study area itself was dominated by a series of broad north-south ridges which terminate with the valley of Jump Up Creek, which traverses the study area. The north-western side of the lot is dominated by hill slopes formed on bedrock and this area is an archaeologically sensitive area and will not be disturbed as it is part of a managed woodland and bird sanctuary. As such, it was not included in the survey. There is also a paired terrace on either side of the creek (the left bank is also an archaeologically sensitive area, and will not be disturbed), a floodplain and the creek channel.

The study area is now largely cleared, however prior to European occupation, it is thought that vegetation would have been a dry sclerophyll forest environment, dominated by spotted gum, grey gum, red ironbark

and narrow-leaved red ironbark. Swamp oak and black wattle would have been found along the drainage lines.

A search of the AHIMS database shows a total of 39 sites within 3-5 km of the study area. The dominant site types are artefact sites (open camp sites and isolated finds), with some PAD and one grinding groove site. No sites were identified within the study area.

No predictive model was developed for the study area, however a general regional model was discussed:

- artefact scatters and isolated finds are the most likely site type to be encountered;
- sand dunes, sand sheets and river terraces may contain evidence of Pleistocene occupation, and
- fringe camps and mission sites, pristine wetlands, riverine corridors, untouched woodlands, forested landscapes and prominent scenic escarpments all have cultural heritage values.

The study area was divided into survey units based on landform, and particular attention was paid to areas of exposure. Visibility was described as poor, and heavy rain contributed to the poor visibility. A total of 15 sires were identified and these are summarised in *Table 5.8.*

Table 5.8 Summary of Sites (Hamm 2008)

Site name	Site type	landform	Distance to water	Stream Order	Artefacts	Disturbance	Potential for subsurface
Belford South 1	isolated	mid slope	0-50m	1st	1	grazing, ploughing	low
Belford South 2	artefact scatter/ PAD	creek flat	0-50m	1st	8	grazing, ploughing	moderate
Belford South 3	artefact scatter/ PAD	creek flat	0-50m	1st	66	grazing, ploughing	moderate
Belford South 4	artefact scatter/ PAD	creek flat & terrace	0-50m	1st	136	grazing, ploughing	moderate
Belford South 5	artefact scatter	simple slope	Not given	3rd	3	grazing, ploughing	low
Belford South 6	isolated	simple slope/ flat	Not given	3rd	1	grazing, ploughing	low
Belford South 7	artefact scatter/ PAD	flat/terrace	0-50	2nd	141	grazing, ploughing	moderate
Belford South 8	artefact scatter/ PAD	flat/terrace	0-50m	3rd	34	grazing, ploughing	low
Belford South 9	artefact scatter/ PAD	alluvial flat	0-50m	3rd	4	grazing, ploughing	low
Belford South 10	artefact scatter/ PAD	creek flat/terrace	0-50m	3rd	28	grazing, ploughing	moderate
Belford South 11	artefact scatter/ PAD	creek flat/terrace	0-50m	3rd	18	grazing, ploughing	moderate
Belford South 12	isolated	flat	not provided	0-50m	3rd	grazing, ploughing	low
Belford South 13	artefact scatter	ridge slope	50-100	3rd	not provided	track, fencing	low
Belford South 14	artefact scatter	ridge crest	50-100	3rd	not provided	fencing, ploughing	low
Belford South 15	isolated find	ridge crest	50-100	3rd	not provided	not provided	low

The majority of the artefacts were silcrete (79%), followed by rhyolitic tuff (17%) and quartz (2.4%). The dominant artefact type was the broken flake (44%), followed by complete flakes (32%), flaked pieces (11%), and cores (7%). Approximately 5% of the assemblage contained retouched or backed blades. It was assessed that the assemblage was consistent with a mid to late Holocene technology.

Of the 15 sites, eight were to be impacted by the development (Belford South 1, 3-7, 9, 12, 13) and it was therefore recommended that if any of the sites could not be avoided by the development, that further archaeological investigation be undertaken.

MCH (2009a) undertook an assessment for a proposed rezoning of rural lands at Singleton, NSW. The study area comprised 345 ha of cleared pasture, with a few stands of native regrowth along a creek in the eastern portion of the study area and was being used for cattle grazing.

Based on previous investigations in the area, MCH provided a predictive model that showed occupation sites (open camps and artefact scatters) and isolated finds as the predominant site types. Sites were most like to be found along watercourses, gentle slopes, hilltops and ridges, with artefact densities being greater within 50m of water, or on elevated land, within 100m of a watercourse (ibid). As the study area contained two creeks and associated streams in the east, MCH predicted that there would be a high potential for sites, particularly in those areas close to the watercourses and on elevated landforms (ibid).

The study area was divided into four survey units based on its geography and dominant landforms. Each survey unit was surveyed by a group of seven people spaced 5-10m apart walking transects. Visibility ranged from 5%-30%, with an effective coverage of 1.13% (ibid:30). Thirty nine sites were identified and these are summarised in *Table 5.9*.

Table 5.9 Summary of Sites (MCH 2009a)

Site Name	Site type	Landform	Distance to Water	Stream Order	Artefacts	Disturbance	Potential for subsurface
USR1	artefact scatter	mid slope	5m	3rd	45	agricultural, sheet erosion	low
USR2	artefact scatter	mid slope	10m	3rd	not provided	not provided	low
USR3	isolated	creek bank	5m	3rd	1	vehicle track	low
USR4	artefact scatter	upper slope	4m	3rd	200	cattle tracks, erosion	low
USR5	artefact scatter	creek bank	5-20m	3rd	12	sheet erosion	moderate
USR6	artefact scatter	creek bank	3m	3rd	11	erosion	low
USR7	isolated	lower slope	3m	3rd	1	track, erosion	low
USR8	artefact scatter	creek bank	5m	3rd	not provided	cattle track, ant's nest erosion	low

USR9	artefact scatter	creek bank	1m	3rd	9	track, erosion	low to moderate
USR10	artefact scatter	dam wall	2m	3rd	55	erosion, dam construction	low
USR11	artefact scatter	simple slope	250m	1st	not provided	erosion	low
USR12	isolated	drainage channel	>50m	1st	1	erosion	low
USR13	artefact scatter	gentle slope	150m	1st	2	erosion	low
USR14	artefact scatter	lower slope	>300m	1st	12	erosion	low
USR15	isolated	slope	80m	1st	1	erosion	low
USR16	artefact scatter	mid slope	>50m	1st	5	grazing, erosion	low
USR17	artefact scatter	upper slope	>300m	1st	3	Erosion	low
USR18	isolated	mid slope	>550m	1st	1	sheet wash	low
USR19	isolated	dam	>250m	1st	1	dam	nil
USR20	artefact scatter	erosion control bank	>500m	1st	3	construction, excavation	low
USR21	artefact scatter	erosion control bank	>500m	1st	3	construction, excavation	low
USR22	artefact scatter	erosion control bank	>500m	1st	5	construction, excavation	low
USR23	artefact scatter	lower slope	>500m	1st	4	sheet wash	low
USR24	artefact scatter	slope	>550m	1st	15	erosion	not provided
USR25	artefact scatter	slope	>500m	1st	4	erosion	low
USR26	artefact scatter	slope	8m	3rd	2	erosion	Low
USR27	artefact scatter	slope	<50m	3rd	2	construction, erosion	not provided
USR28	artefact scatter	slope	15m	3rd	7	clearing, erosion	low
USR29	isolated	slope	50m	3rd	1	erosion	low
USR30	isolated	drainage line	75m	3rd	1	erosion	low
USR31	artefact scatter	drainage line	10m	3rd	14	erosion	low
USR32	isolated	mid slope	>50m	3rd	1	erosion	low
USR33	artefact scatter	mid slope	<1m	3rd	11	erosion	low
USR34	artefact scatter	slope	2m	3rd	22	erosion	moderate
USR35	artefact scatter	slope	10m	3rd	3	erosion	moderate
USR36	artefact scatter	slope	>50m	3rd	17	tracks	low

USR37	isolated	drainage line	300m	3rd	1	erosion	low
USR38	artefact scatter	dam	>500m	3rd	19	dam, erosion	not provided
USR39	isolated	Slope	25m	3rd	1	erosion	moderate

Sites included 29 artefact scatters and 10 isolated finds. Over 400 artefacts were recovered from these sites, with the dominant artefact type being complete flakes (43%), followed by flaked pieces (20%), broken flakes (traverse) (18%), multiplatform cores (4.5%), single platform cores, broken flakes (longitudinal), flakes with use wear (1.5%), backed artefacts (symmetrical) and hammer stone (1%) and other (buried) (2%) (ibid:45). The most dominant raw material was mudstone/tuff (58%), followed by silcrete (35%), with the remainder made up of chert, quartz, quartzite and unidentified (<8%) (ibid). Four sites were assessed as having moderate potential for subsurface artefacts, 26 sites as low potential, and eight sites were assessed as having no potential. All sites were assessed as being of low archaeological significance and research potential (ibid:57-58). 64% of the sites were found on slopes, 18% in drainage depressions, 10% on creek banks and 8% in dam depressions (ibid:48).

MCH therefore concluded that the findings are consistent with the predictive model for this site and the Hunter Valley generally (ibid:49). It was further concluded that grazing and sheet wash erosion had caused significant disturbance across the site. MCH suggested that although there was research potential at some sites, subsurface investigation may not clarify further the extent of occupation of the study area.

An investigation undertaken by Insite (2010) was for a proposed rural residential subdivision where it was proposed that the study area be subdivided into 20 lots of approximately 1 acre in size. The study area was approximately 20 acres and situated on the eastern side of Elderslie Road, Branxton approximately 800m from the New England Highway.

The region surrounding the study area consisted of undulating rises to low hills and creek flats with elevations ranging from 50m-80m. Slope lengths can be up to 600m, with slope gradients between 3-5%. Local relief was between 10m-40m. Drainage lines are common, and occur at 400m-1500m intervals. The native vegetation had been largely cleared, with sparse remnant stands of spotted gum, red ironbark, narrow-leaved red ironbark and swamp oak occurring in drainage lines. There was a dam located on Lot 2 of the study area, as well as a tributary of Anvil Creek, located 620m to the south. The Hunter River is located approximately 4.4 km to the east of the study area.

A search of the AHIMS database showed a total of 37 sites located within a 10km radius of the property. The dominant site type are artefact sites (open camp sites and isolated finds), as well as seven PAD, and three grinding groove sites. No previously recorded sites occurred within the study area, however three sites were located on the western side of Elderslie Road,

consisting of two isolated finds and one open camp site. Based on previous archaeological investigations, the following predictive model was developed for the study area:

- artefact sites (open camp sites, isolated finds) are the most likely site types to be encountered within the study area, and
- sites are likely to be located in close proximity to water sources, and river terraces.

The study area was divided into survey units based on paddock divisions and focused on areas of exposure. Visibility was variable across the study area, ranging from 0%-90%. The effective coverage was assessed at 16.6%. One site was identified (Refer to *Table 5.10*).

Table 5.10 Summary of Sites (Insite 2010)

Site	Site type	landform	Distance to water	Stream Order	Artefacts	Disturbance	Potential for subsurface
Elderslie Road 1	isolated	undulating low hill	0-50m	1st	1	high	low

The artefact was a silcrete broken flake. The site was assessed as being of low archaeological significance and low potential for subsurface artefacts. It was therefore recommended that a permit be sought from DECCW to collect the artefact. No further archaeological investigation was recommended.

An investigation was undertaken by MCH (2009b) for a proposed application for rezoning of a parcel of land known as 103A, 137, 181 and 211 Elderslie Road, North Branxton. The study area was situated 3 km north of the town of Branxton, is located on the western side of Elderslie Road and had been used mainly for hobby farming and rural residential purposes.

The study area comprised 63.81 ha, and was gently sloping to the south with a number of first order drainage lines/tributaries, and one second order stream in the south of the study area. A number of large dams were on the property. It has largely been cleared of native vegetation, and consists of pasture grasses with scattered trees. The uncleared bush consists largely of spotted gum, red ironbark and narrow-leaved red ironbark. Swamp oak can be found along drainage lines. Prior to clearing, it is believed that the native vegetation consisted of tall open forest. This type of landscape would have supported faunal resources such as kangaroo, wallaby, goanna, marsupial mice, snakes, possum, koala and a variety of birds.

A search of the AHIMS database shows a total of 29 sites within 5 km of the study area. The dominant site type are artefact sites (11 isolated finds, 9 artefact scatters), with PAD (4), grinding groove (1), isolated find/PAD (1), Aboriginal resource (1), Aboriginal resource/PAD (1) and artefact scatter/PAD (1) also recorded.

Based on previous archaeological investigations, the following predictive model was developed for the study area:

- occupation sites are the predominant site types to be encountered;
- reliable watercourses, gentle slopes, hilltops and ridges are the likely landforms to contain sites;
- artefact densities are likely to be greater within 50m of a reliable watercourse and comparatively high on elevated, level ground over 100m from water;
- owing to the number of watercourses within the study area, there is moderate potential for sites, particularly low density artefact scatters, within 50m of these watercourses, with isolated finds and reduced artefact densities possible further from the watercourses;
- mid to late Holocene sites are likely, with artefacts likely to be made of mudstone or silcrete, with smaller amounts of quartz, chert, petrified wood and other raw materials;
- artefact types are likely to be debitage from flaking, flakes, broken flakes and a few cores, with smaller amounts of retouched flakes, asymmetrical and symmetrical backed blades, and
- sites are likely to be disturbed.

The study area was divided into three survey units, based on landform elements and the survey focused on areas of high ground visibility and exposures. Visibility across the study area was varied, ranging from 10%-50%. The effective coverage was assessed as 8%. Three isolated finds were identified (Refer to Table 5.11).

Table 5.11 Summary of Sites (MCH 2009b)

Site	Site type	landform	Distance to water	Stream Order	Artefacts	Disturbance	Potential for subsurface
ERB1	isolated	lower slope	200m	2nd	1	excavation, sheet wash	low
ERB2	isolated	mid slope	0-50m	1st	1	excavation, sheet wash	low
ERB3	isolated	mid slope	0-50m	1st	1	excavation, sheet wash	low

The three artefacts identified were a mudstone flake (ERB1), silcrete flaked piece (ERB2) and a mudstone core (ERB3).

Due to the disturbance of all three sites, they were all assessed as having low potential for subsurface artefacts and due to their representativeness, as being of low archaeological significance. No further archaeological investigation was recommended.