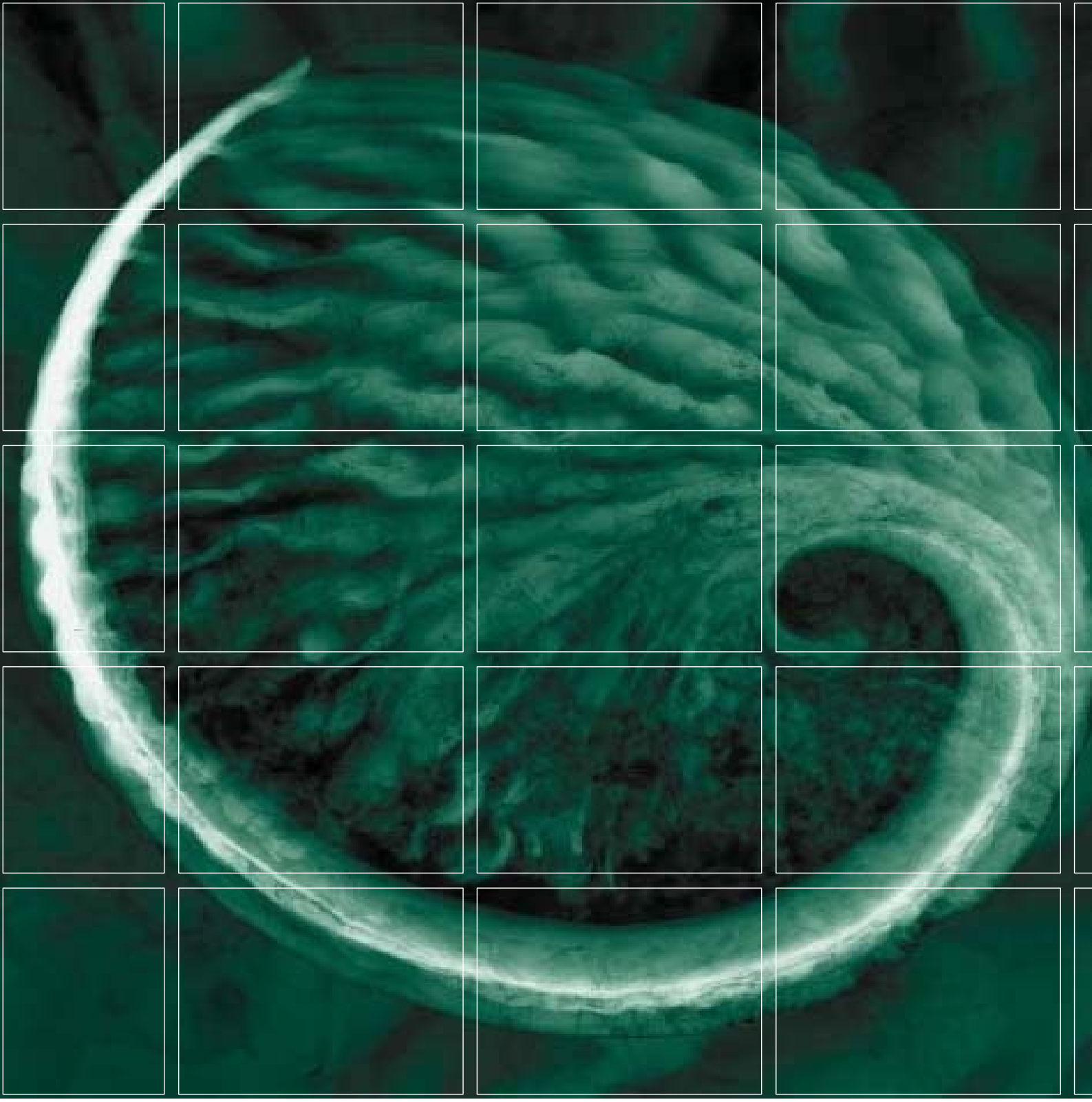
ANNEX H

Cultural Heritage Assessment



Ardglen Quarry Extension
Cultural Heritage Assessment

Daracon Quarries

December 2006

Job No. 0038419 Final

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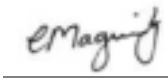
ERM

Approved by:	*Carolyn Maginnity*
Position:	Project Manager
Signed:	
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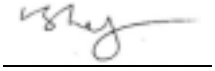
Partner:	
	Mike Shelly

Environmental Resources Management Australia Pty Ltd Quality System

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CONTENTS

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

Daracon Quarries Pty Ltd (Daracon) operates a hard rock quarry at Ardglen, north-west of Murrurundi, New South Wales. Existing reserves of hard rock are diminishing and therefore Daracon proposes to extend the extraction area to the west, to enable up to 500 000 tonnes of material to continue to be extracted per year for up to 30 years. Daracon have commissioned Environmental Resources Management Australia Pty Ltd (ERM) to undertake a cultural heritage assessment of the proposed extension area. This report will support a Part 3A development application for the proposed quarry extension and details the assessment and management measures in regard to Aboriginal and historic cultural heritage.

1.1 THE STUDY AREA

The site is west of the village of Ardglen, approximately 4.5 kilometres north-west of Murrurundi (refer to *Figure 1.1*). The site is on the border between the Liverpool Ranges and the north-eastern mountains of the Hunter Valley catchment (CSIRO Land Systems Map).

The site comprises Lot 1 DP 1001734 and Lots 187 and 218 DP 751028. The existing quarry is on Lot 1 DP 1001734, which is owned by Daracon and is approximately 32 hectares in area. The extension area incorporates Lots 187 and 218 DP 751028, which are owned by County Property Holdings Pty Limited and have a combined area of approximately 34 hectares.

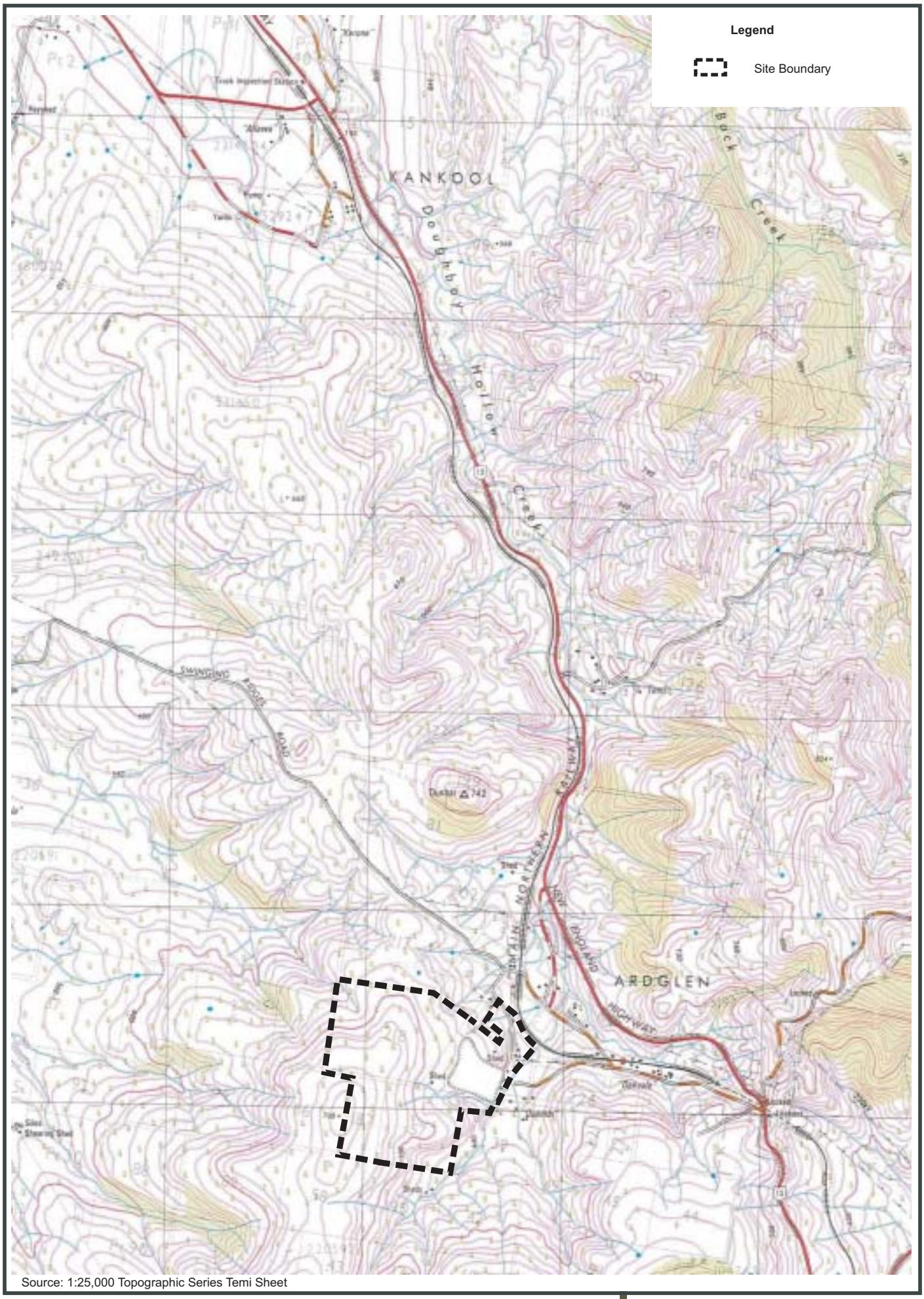
The site is bounded to the north, south and west by farmland and to the east by the village of Ardglen.

Whilst the site includes Lot 1 DP 1001734 on which the existing quarry is situated, this part of the site has been heavily disturbed as a result of past and present quarrying and it is likely that any artefacts or historical relics that may have been present in this area have long been destroyed or displaced. Further, this area will not be impacted upon by the proposed development. Field survey work was therefore limited to the proposed extension area.

1.2 SCOPE OF WORKS

Within the scope of the project, ERM has undertaken the following tasks:

- a search of the relevant databases, inventories and registers, including the Aboriginal Heritage Information Management System (AHIMS) database, historical heritage registers and *Murrurundi Local Environment Plan 1993*, to determine the location of any sites and heritage items within the vicinity of the site;



Source: 1:25,000 Topographic Series Temi Sheet

ERM

0 500m

Figure 1.1 **Locality Plan**

Daracon Engineering - Ardglen Quarry, NSW

- a review of the archaeological, historical and environmental context of the area;

- consultation with the Aboriginal community in regard to the social significance of the site and any Aboriginal sites / objects incorporated within the boundaries of the proposed extension area;

- a field survey conducted with members of the Aboriginal community to identify and record any Aboriginal sites / objects and historic heritage items that may be present within the proposed extension area; and

- a review of the potential impacts of the proposed extension on cultural heritage and a discussion of the relevant mitigation and management strategies where applicable.

1.3 ABORIGINAL COMMUNITY CONSULTATION

The following organisations were contacted in accordance with the Department of Environment and Conservation (DEC) Interim Community Consultation Requirements:

- Nungaroo Local Aboriginal Land Council (NLALC);

- Liverpool Plains Shire Council;

- DEC;

- Native Title Services; and

- the Office of the Registrar of Aboriginal Owners.

As a result of discussions with DEC Northern Directorate, ERM were advised that the registered Aboriginal groups for the Hunter Valley should be contacted to determine whether they would like to be involved in the project. Subsequent advice from DEC was that the Ardglen area is actually in the Western Directorate and that the NLALC were the only group that ERM were required to contact.

The groups listed in *Table 1.1* (including a number of groups from the Hunter Valley) expressed an interest in being consulted in relation to all aspects of the project. All groups were provided with a survey methodology and further information regarding the proposed extension. No objections were raised to the proposed survey methodology. Representatives from NLALC participated in the field survey. A copy of the draft report was forwarded to all groups in August 2006. No comment was received from these groups by the due date.

In November 2006 groups were contacted by phone on the number provided at their registration. Some groups were no longer contactable. Where

possible, the appropriate contact was asked to respond to the project either verbally or in writing. No comment has been received.

Table 1.1 Aboriginal Groups Consulted

Group Name	Representative
Nungaroo Local Aboriginal Land Council	Sandra Allen
Aboriginal Native Title Consultants	John and Margaret Matthews
Wonnarua Nation Aboriginal Corporation	Robert Lester
Wattaka Wonnarua Cultural C. Service	Des Hickey
Upper Hunter Heritage Consultants	Melissa Newman
Giwiirr Consultants Pty Ltd	Rodney Matthews
Hunter Valley Cultural Consultants	Christine Matthews
Wonnarua Culture Heritage	Gordon Griffiths

1.4 RELEVANT CULTURAL HERITAGE LEGISLATION

Aboriginal cultural heritage in New South Wales is primarily protected and managed under the *National Parks and Wildlife Act 1974* (NPW Act). The NPW Act defines an Aboriginal object as any deposit, object or material evidence (not being a handicraft made for sale) relating to Aboriginal habitation of the area that comprises New South Wales. Under Section 90 of the Act, it is an offence to knowingly destroy, deface or damage Aboriginal objects or Aboriginal places (defined under Section 86 of the NPW Act) without the prior written consent of the Director-General of National Parks and Wildlife.

The *Environmental Planning and Assessment Act* 1979 (EP&A Act) also provides protection for cultural heritage. Part 3A of the EP&A Act covers the assessment and approvals process for projects that are considered (by the Minister for Planning) to be of State Significance. The Director General of Planning may deem an Aboriginal cultural heritage assessment necessary for a project being assessed under Part 3A. The recommendations of this assessment may then form part of a Statement of Commitments for the project. Approved projects under Part 3A of the EP & A Act do not require Section 87 permits or Section 90 consents under the NPW Act.

The *Heritage Act 1977* (NSW) is designed to protect items of non-Aboriginal heritage significance, which are defined as a place, building, work, relic or precinct. Under the Heritage Act, a relic is any deposit, object or material evidence that relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement and which is more than 50 years old. Under Section 139 of the Act it is an offence to disturb or excavate land where it is known or suspected that this activity will result in the discovery, exposure, movement, damage or destruction of heritage relics, unless the activity is conducted under an excavation permit.

Other acts and planning instruments relevant to Aboriginal and historical cultural heritage include the *Murrurundi Local Environment Plan 1993* and *The*

Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Commonwealth).

1.5 PROJECT TEAM

The field survey was conducted by Nicola Roche (ERM) and Chris Allen and Peter Allen (NLALC). This report was written by Nicola Roche and reviewed by Neville Baker.

2 ENVIRONMENTAL CONTEXT

Interactions between people and their surroundings are important in both the initial formation and the subsequent preservation of the archaeological record. Although social networks and cultural factors influence human behaviour, the nature and availability of resources directly underpins the way in which people utilise the landscape. Alterations to the natural environment also impact upon the preservation and integrity of any cultural materials that may have been deposited whilst vegetation communities and patterns of erosion affect the visibility and detectability of sites and relics.

2.1 GEOLOGY AND SOILS

The site is on the boundary between the Liverpool Ranges and the north-eastern mountains of the Hunter Valley catchment. The Liverpool Ranges are primarily composed of basalt whilst the north-eastern mountains are a Devonian and Carboniferous formation of sedimentary rocks and lavas with basalt capping in areas (ERM 2004:9). Geological materials present within the area include basalts, dolerites, tuffs and boles (McInnes-Clarke 2002:116,132).

The site is within two soil landscapes, the Moan and Glen Oak landscapes. The Moan soil landscape consists of rolling hills of between 400 and 800 metres elevation. Sideslopes are moderately inclined (10-30 per cent) and long to very long. The upper soil horizon typically consists of a dark brown or dark reddish brown clay loam or clay that is generally no more than five centimetres in depth and overlies a dark brown to reddish brown heavy clay B horizon. The soils are formed on Tertiary basalts, dolerites, tuffs and boles (McInnes-Clarke 2002:132-135).

The Glen Oak landscape consists of undulating hills, gently inclined footslopes, low hills and alluvial fans. Parent geological material is the same as that of the Moan soil landscape. Slopes are gently inclined (between four and eight per cent). The topsoil is typically a dark brown to reddish brown sandy clay loam overlying a variable B horizon consisting of a reddish brown, dark brown or red clay (McInnes-Clarke 2002:116-117).

2.2 LANDFORMS

The rugged and elevated country of the Liverpool Ranges and north-eastern mountains varies in elevation from 1200 to 600 metres above sea level and consists of range and valley formations (ERM 2004:9). These formations can be divided into landform elements following the ten morphological landform element units described by Speight (1990). For the purpose of archaeological investigations, landform units divide the landscape into standardised elements that can be used for comparative purposes.

As shown in *Figure 2.1*, the proposed extension area includes a portion of elevated crest, surrounding slopes (the majority of which are over 700 metres above sea level) and several open drainage depressions.

2.3 RESOURCE AVAILABILITY

There are a number of minor ephemeral drainage lines within the proposed extension area, including one in the north-western corner and another in the north-eastern portion of Lot 218, as shown in *Figure 2.1*.

The proposed extension area is characterised by two vegetation communities - disturbed white box - yellow box - Blakely's red gum woodland and cleared grassland. The woodland community occupies approximately 16.3 hectares of the proposed extension area. The main vegetation types are inland grey gum (*Eucalyptus microcarpa*), rough barked apple (*Angophora robur*), white box (*Eucalyptus albens*), yellow box (*Eucalyptus melliodora*) and Blakely's red gum (*Eucalyptus blakeyi*). Fauna observed in the vicinity include eastern grey kangaroo, swamp wallaby, galahs, cockatoos and other birds.

2.4 PAST LAND USE AND DISTURBANCES

Past land management and the level of disturbance within an area will impact not only upon the preservation of the archaeological record but also on the likelihood that sites or artefacts will be visible during field survey. Artefacts present in a sub-surface context will only be identified in areas where the topsoil has been partially or entirely removed.

Much of the proposed extension area has been cleared and is currently used for cattle grazing. Clearance of native vegetation potentially results in the felling of scarred trees and the disturbance of subsurface deposits by the uprooting or ripping of trees and shrubs. Vegetation clearance and grazing by hard-hoofed animals greatly increases the occurrence and rate of erosion, resulting in the exposure of subsurface soils and the lateral and horizontal movement of artefacts. However, the direct impacts of cattle grazing on the archaeological record are comparatively moderate. Whilst the proposed extension area is immediately adjacent to the existing quarry, the direct impacts of quarrying have not extended beyond the boundaries of Lot 1 DP1001734.

2.5 SUMMARY

The environmental context of the site does not indicate that the area would have served as a focal point for human activity. Although water supplies are present, they are ephemeral at best and there are no other resources present in the vicinity that would have been conducive to Aboriginal or European settlement.

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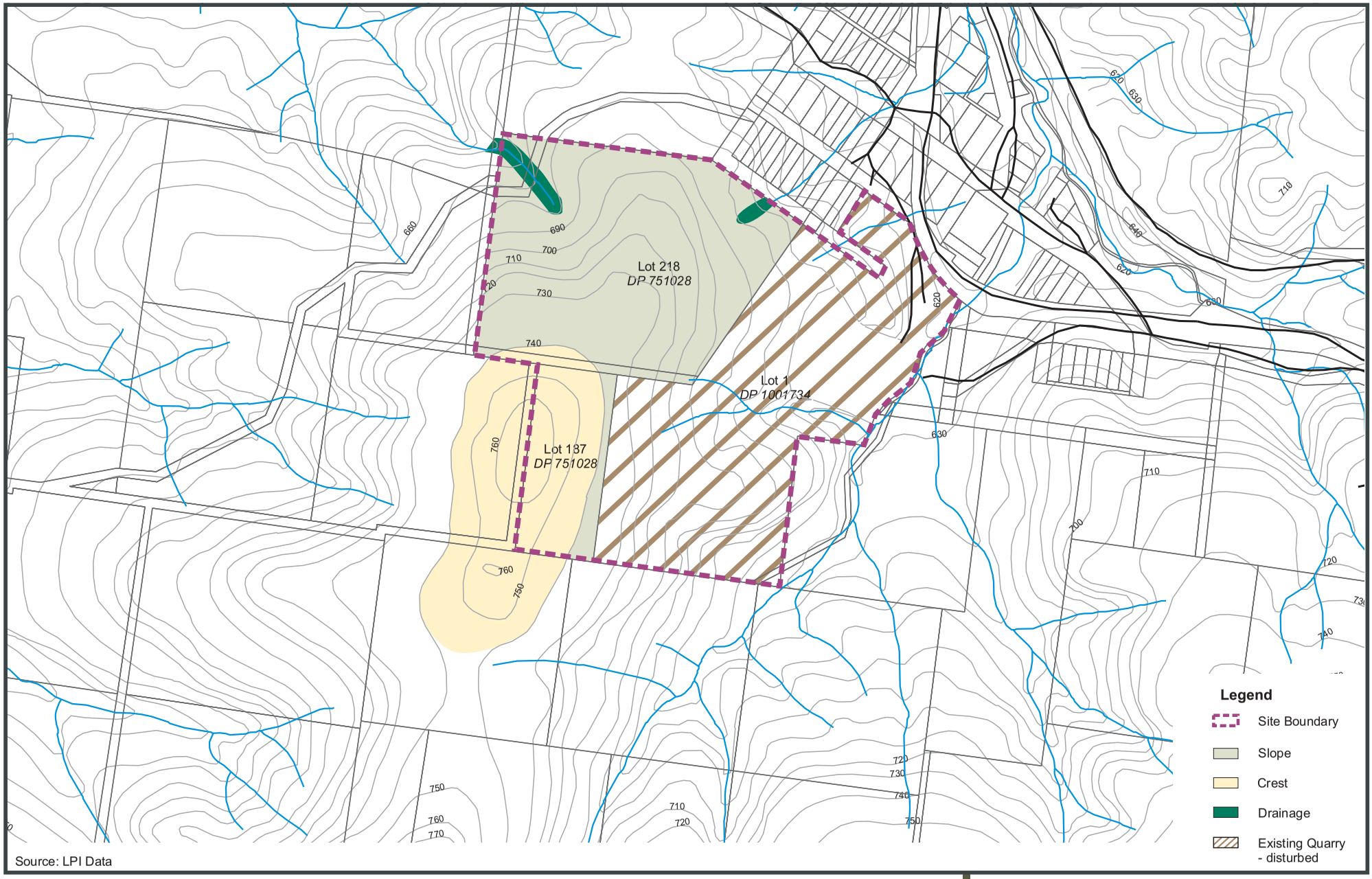

ERM

0 200m

Approximate only

Figure 2.1

Landforms

Daracon Engineering - Ardglen Quarry, NSW

3 ARCHAEOLOGICAL CONTEXT

The following information includes a review of historic records relating to the area and a discussion of previous archaeological investigations in the region and in the local area. Based on this information, a predictive model was established for the proposed extension area.

3.1 DEC AHIMS SEARCH

A search of the DEC AHIMS database revealed that 12 sites have been recorded in the area between the AMG coordinates 283000E-295000E and 6468000N-6492000N. The closest of these sites is over 12 kilometres from the site. The AHIMS database describes sites according to site feature rather than site type and sites may include several different features. As listed in *Table 3.1*, the recorded features of sites within the search area are AFT (artefact), TRE (scarred/carved tree), STA (stone arrangement) and GDG (grinding groove). The feature 'artefact' refers to the presence of stone, bone, shell, ceramic or metal. Sites with this feature are generally stone artefact scatters or isolated artefacts and are the most common sites within the search area.

Table 3.1 Recorded Sites by Site Feature

Site feature	Number of sites
AFT (Artefact)	7
TRE (Scarred/carved tree)	2
STA (Stone arrangement)	2
GDG (Grinding groove)	1
Total	**12**

1. Results of DEC AHIMS search on 1/11/05.

3.2 ARCHAEOLOGICAL CONTEXT

There are no records of formal archaeological studies close to the site. However, the quarry is on the boundary of the north-eastern mountains, where a small number of studies have been undertaken. Thus, although the environmental context differs to that of the present assessment, the review of the limited number of reports from the north-eastern mountains region provides an indication of the distribution, nature and extent of archaeological sites in the surrounding area.

Brayshaw (1981)

This survey was conducted in relation to the proposed enlargement of Glenbawn Dam and the associated infrastructure. The dam is east of Scone and is fed by the Hunter River. Two open sites, two scarred trees and three isolated finds were recorded during this assessment. Sites were only located in areas of exposure. A potential habitation site was recorded in a shelter on a

conglomerate outcrop at the top of a north-south orientated ridge. Limited test excavations were conducted at the shelter and no archaeological material was present.

Brayshaw (1983)

Brayshaw (1983) conducted a cultural heritage assessment of the area to be impacted by the proposed construction of the Cameron Dam on the Pages River, east of Scone. Watercourses and exposures were the focus of the survey and nine sites and an unreported number of isolated finds were recorded. All open sites were situated within 100 metres of water and on landforms with slopes of less than five degrees. The sites all contained less than 40 artefacts. The presence of a number of isolated finds also indicates a general low-density background scatter of artefacts.

Koettig (1984)

As a component of the major Hunter Valley Region Archaeological Project, Koettig (1984) conducted a review of the archaeological context of the north-eastern mountains region and also undertook additional field survey. Forty-two open artefact scatters, two scarred trees and 42 isolated finds were recorded, with the majority of sites being within 50 metres of the nearest creek line (Koettig 1984:20). However, as the study focussed on creek lines, this is not unexpected. No site contained more than 39 artefacts and over 70 per cent of sites contained less than 10 artefacts (Koettig 1984:Table 5).

Koettig (1984:23-24) concluded that artefacts are distributed across all land systems within the north-eastern mountains and were concentrated in association with watercourses but that it is not possible to predict artefact densities due to the lack of detailed information. The majority of survey areas with good visibility are located in areas considered to have low archaeological potential (Koettig 1984:27).

A range of artefact types were recorded, with the most common being flakes, flaked pieces and cores manufactured from raw materials including silcrete, mudstone, quartz, quartzite, chert and other non-specific rock types. Artefacts with retouch or usewear were present at approximately 40 per cent of sites and included backed artefacts. Evidence for the use of bipolar flaking techniques was present at two sites (Koettig 1984:24-25).

In summarising her findings, Koettig (1984:27-28) concluded that the low density of artefacts within the study area may reflect the low levels of exposure and visibility in landforms where it was expected that large numbers of artefacts may be present. Greater artefact densities may occur along creeks, river flats and lower footslopes (Koettig 1984:27).

Effenberger (1993)

An archaeological survey was conducted between Scone and Ellerston in the Upper Hunter Valley in relation to the proposed placement of a fibre optic cable. The survey followed a linear route and focussed on areas of predicted archaeological sensitivity, exposure and enhanced visibility. Areas of high archaeological sensitivity were defined as being close to creek lines, and along hilltops and ridges (Effenberger 1993:12). Eleven isolated finds were recorded and included flakes, cores and hand axes made from a variety of raw materials, namely basalt, mudstone and volcanic materials (Effenberger 1993:8-10).

Umwelt (2004)

This survey was conducted at the proposed Bickham Coal Mine, between Blandford and Wingen (south of Murrurundi) on comparatively low-lying land along the Pages River. The survey focussed on watercourses, floodplains and terraces (Umwelt 2004:5.1). Eighteen artefact scatters and a stone arrangement were recorded during the survey, with the majority of sites situated on an alluvial terrace. Eleven of the 18 sites were within 50 metres of water and only two sites contained more than four artefacts. Porcellanite was the most common raw material, with siliceous and volcanic materials also relatively common. Interestingly, there was not a major increase in the number of sites in association with proximity to water resources. However, this may be a reflection of the fact that the terraces are aggrading surfaces with limited exposure in contrast to the eroded slope formations (Umwelt 2004:6.17). Although this argument raises a valid point, the level of coverage within the floodplains and terraces was in fact higher than that of the surrounding landforms and therefore this anomaly may not be solely explicable in terms of visibility.

This study identified a very notable difference between the archaeological pattern of the lower portion of the Upper Hunter Valley and that of the northern Upper Hunter Valley in that archaeological materials are considerably less frequent and concentrated in the north-eastern mountains, despite the presence of adequate resources and landforms conducive to occupation (Umwelt 2004:7.2). It was therefore suggested that Aboriginal use of the Bickham area was highly mobile and of short-term duration (Umwelt 2004:7.1).

Summary

The limited numbers of studies conducted within the north-eastern mountains have identified a relatively low number of archaeological sites containing comparatively few artefacts. Although Koettig (1987:26) suggested that this may be a factor of limited visibility and exposure in areas likely to contain higher numbers of artefacts, Umwelt (2004:72) concluded that, in the Bickham area, the lack of archaeological materials represents infrequent and highly

mobile occupation by Aboriginal people. These assessments were conducted in a different environmental context to the present study and therefore their findings may not be directly applicable but merely provide an indication of possible expectations.

3.3 PREDICTIVE MODEL OF SITE TYPE AND SITE LOCATION

Stone artefact scatters/isolated finds

Surface scatters of stone artefacts are ubiquitous within the Australian archaeological record and are the most durable form of open site. The review of previous studies in the north-eastern mountains indicates that the presence of stone artefact scatters is closely related to resource availability, landform and the level of exposure and visibility. Archaeological evidence from the north-eastern mountains region is comparatively sparse and limited in its extent. Due to the fact that the proposed extension area does not contain permanent water supplies and consists predominantly of steeply sloping landforms, stone artefact scatters and isolated finds may be present in the area but are not predicted to be extensive or concentrated.

Scarred trees

Scarred trees are defined as trees that have been deliberately altered by Aboriginal people through the removal of bark or wood (Long 2005:6). Scarred trees have been recorded in the local area, however the presence of sites of this type is dependent on the level of clearance and the range of mature trees present. Based on the results of an ecological assessment undertaken by ERM, it is unlikely that trees of sufficient age to bear scars of Aboriginal origin will be located within the proposed extension area.

Stone arrangements and ceremonial sites

Stone arrangements consist of intentional placements of stone and can range from simple rock piles to more complex stone circles (Hughes 1984:46). Although stone arrangements have been identified in the Murrurundi area, sites of this type are vulnerable to disturbance and/or destruction. Given the length of European settlement in the area and the previous clearance of the proposed extension area, stone arrangements and ceremonial sites are unlikely to remain extant.

4 HISTORICAL CONTEXT

The earliest European use of the Ardglen area occurred in conjunction with the expansion of pastoralism in the Upper Hunter Valley (Perry 1963). In 1827 William Nowland, a Singleton property owner, was the first recorded non-Aboriginal person to cross the Murrurundi Gap. The Murrurundi Gap (now known as Nowlands Gap) is a relatively low-lying pass situated between Murrurundi and Ardglen and provides access through the Liverpool Ranges. The Murrurundi Gap became part of the Great North Road (now the New England Highway) and opened up a means of transport and communication between the large pastoral settlements in the Upper Hunter region and those of the Liverpool Plains.

Ardglen was originally known as Doughboy Hollow (City of Tamworth website http://www.cityoftamworth.com.au/asp/index.asp?pgid=9281&cid=48883&id=7186). The earliest parish map for the area shows that notification for the village of Doughboy Hollow had occurred by March 1858. The original name is said to relate to the fact that the Jew Boy Bushrangers, who based themselves in the area between Doughboy Hollow and Willow Tree, were arrested in 1840 whilst baking doughboys near the future location of the village (Mitchell nd). In 1877 the Ardglen railway tunnel (situated approximately 350 metres north-east of the site) was completed. It was one of the earliest single line tunnels in New South Wales and opened up a swifter and more efficient means of access from the Upper Hunter to the Liverpool Plains. By 1893, the parish map shows that the village had been renamed Ardglen and it is likely that this is the result of efforts by the Hoddle Brothers (refer to Mitchell nd), one of whom owned Lot 187 within the proposed extension area.

The initial date of the opening of the basalt quarry is unclear, however, the parish map for 1907 shows Lot R285976 as a quarry and lists it as being notified in April 1896. The main purpose of the quarry was to provide ballast to the State rail authority.

4.1 STATUTORY REGISTERS

A search of the Australian Heritage Database and the Murrurundi Local Environment Plan 1993 on the 21st of December 2005 revealed that there are no listed sites close to the proposed extension area. The Jubilee Register lists the Burning Mountain Landscape Conservation Area and the Macquarie Marshes Landscape Conservation Area, however, both of these areas lie outside the boundaries of the site. The Ardglen Railway tunnel is listed on the State Heritage Register, the State Rail Authority Section 170 register and the Murrurundi Local Environment Plan 1993. The State Heritage Register describes the tunnel as having high significance due to its historical, archaeological, scientific and social rarity. The Ardglen tunnel is not within the site.

4.2 CONSULTATION WITH THE MURRURUNDI LOCAL HISTORICAL SOCIETY

The Murrurundi Local Historical Society was advised of the project and was asked to provide any relevant information regarding Ardglen and the site. Mrs Riddle of the Historical Society advised that ERM should contact Mr Phillip Mitchell, a former administration clerk at the Ardglen Quarry. In a subsequent telephone conversation, Mr Mitchell stated that he did not know of any sites within the proposed extension area and offered to provide an article that he had written reviewing the history of the quarry and the village. The article provided much of the information included within the review of the historical context outlined above.

4.3 PREDICTIVE MODEL FOR THE LOCATION OF HISTORICAL SITES

Although the Ardglen area has been the subject of historical settlement since 1858, there is no evidence to indicate that the proposed extension area will contain historical structures. There is however, a likelihood that isolated relics, such as farm machinery and discarded mine equipment may be present within the area.

5 METHODOLOGY

5.1 INTRODUCTION

This section describes the sampling strategy, the criteria used to identify artefacts and the means by which survey coverage was calculated.

5.2 SURVEY STRATEGY

The survey was undertaken in a series of pedestrian transects by three people spaced approximately ten metres apart. Transects were selected to provide coverage of each of the three landform elements identified within the proposed extension area. Areas of exposure and reduced vegetation coverage were targeted. Transect descriptions are provided in *Table 5.1* and transect locations are shown in *Figure 5.1*.

5.3 SURVEY COVERAGE

As per NSW NPWS (1997:18), the description of survey coverage includes the landform, landform unit area and a quantification of the level of exposure and visibility. The survey transects were mapped using a combination of hand-held GPS, property boundaries and topographic features.

Visibility refers to the amount of ground upon which artefacts could be sighted. The presence of vegetation, leaf litter and other variables can obscure visibility, which is expressed as a percentage (NSW NPWS 1997:18). Exposure is defined as areas in which disturbance (usually in the form of erosion) result in the removal of soils and permit the detection of archaeological material that was formerly subsurface. The level of exposure is similarly determined as a percentage (NSW NPWS 1997:18).

The calculation of survey coverage involves multiplying the landform unit area by the percentage of exposure and the percentage of visibility (ie survey coverage = area multiplied by percentage exposure multiplied by percentage visibility) and expressing this as a percentage of the total study area. The consideration of survey coverage is important in assessing the potential of the study area to contain archaeological material that was not visible during the survey.

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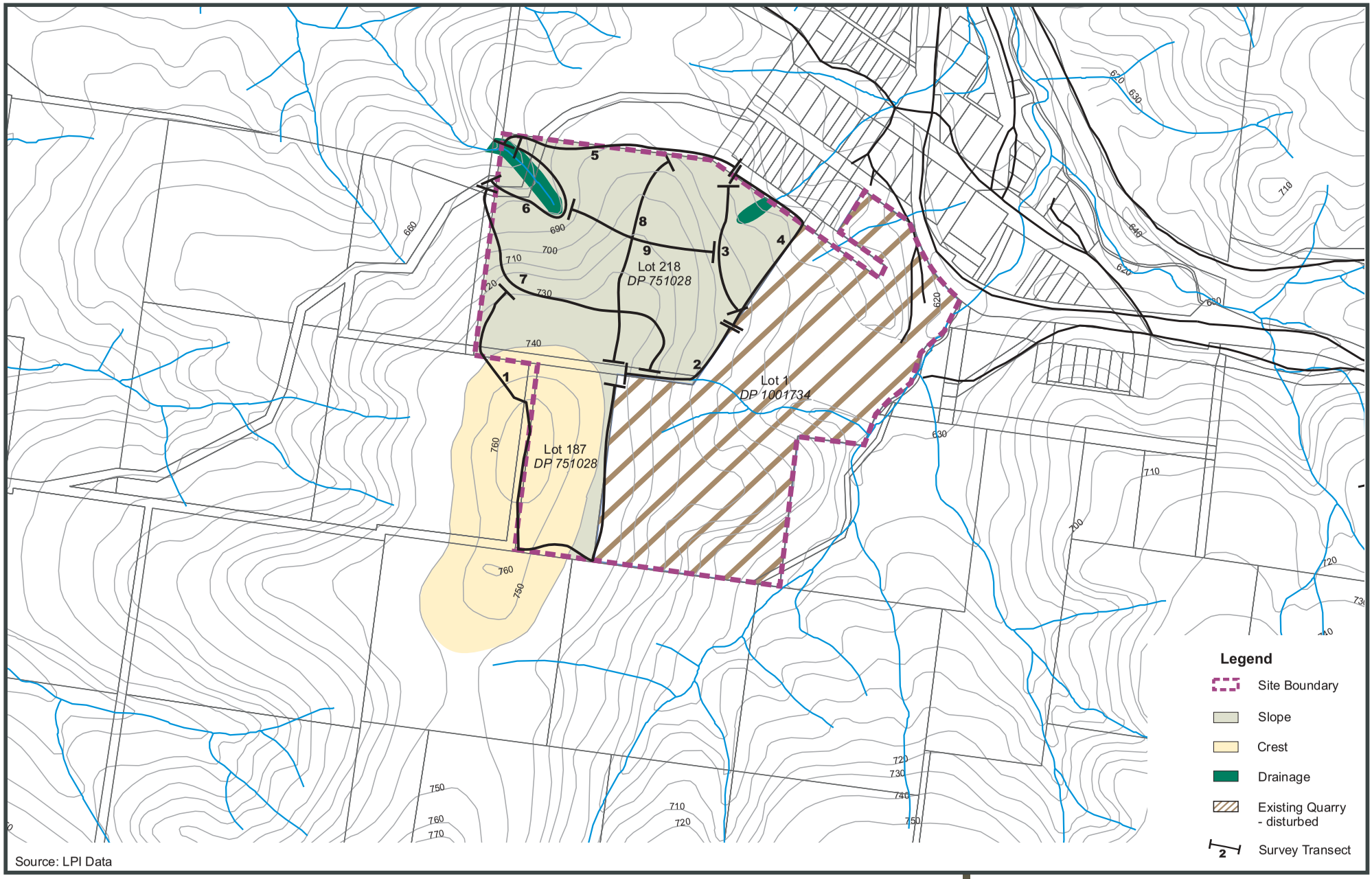

Figure 5.1

Survey Transects

Daracon Engineering - Ardglen Quarry, NSW

Table5.1 Survey Transect Descriptions

Transect	Landform(s)	Area surveyed (m^2)	Description	Exposure (%)	Visibility (%)	Effective coverage (m^2)
1	Crest and slopes	28 925	Transect 1 began on the eastern boundary of Lot 187 adjacent to the existing quarry and followed the slopes to a level crest in the southern portion of the proposed extension area before continuing downslope along the western boundary of Lot 218. Slopes within Transect 1 consisted of a steep upper slope benching to gentle mid and lower slopes. The northern extent of the crest provides a broad outlook over the Liverpool Plains and surrounding area. There is an area of outcropping basalt along the crest; however, there was no evidence of artefact manufacturing. Vegetation coverage in Transect 1 consisted of heavy pasture grass with limited exposures.	5	>5	Crest 36 Slopes 36
2	Slopes	7 375	Transect 2 covered the area downslope from Transect 1 and consisted of moderately inclined slopes with heavy pasture grass coverage. Visibility was extremely limited and there were no areas of discrete exposure.	5	>5	18
3	Slopes	8 425	Transect 3 covered an area of slopes in the north-eastern portion of the proposed extension area and passed directly above a minor drainage line that continues in a north-easterly direction into the village of Ardglen. Slopes directly above the drainage line are very steep and have been eroded to expose basalt cobbles in some areas.	10	5	42
4	Slopes and open depression	12 025	Transect 4 followed the eastern and northern boundaries of the proposed extension area, including the fence line abutting the residential dwellings. Transect 4 consisted predominantly of moderate to steep slopes and also crossed a minor drainage line. The drainage line was not deeply incised and did not contain any water. The level of exposure within the drainage line was limited in comparison to of the slopes above in Transect 3.	7	5	Slopes 39 Open depression 3
5	Slopes	13 300	Transect 5 followed the northern boundary of the proposed extension area and terminated at the edge of a minor drainage line in the north-western corner of Lot 218. Slopes were relatively gentle but increased in gradient in proximity to the drainage line. No areas of discrete exposure were present and visibility was impeded by grass coverage.	>5	5	33

Transect	Landform(s)	Area surveyed (m^2)	Description	Exposure (%)	Visibility (%)	Effective coverage (m^2)
6	Open depression	8 775	Transect 6 followed a drainage line located in the north-western corner of the proposed extension area. The drainage line was very shallowly incised and large numbers of basalt cobbles were exposed within the drainage line. Transect 6 included a dam approximately 40 metres in diameter. An area approximately 7.5 metres in width and passing around the circumference of the dam was exposed to the depth of the B soil horizon.	25	40	878
7	Slopes	16 675	Transect 7 passed from steep slopes on the western boundary of Lot 218, across gentle benching slopes directly below the crest surveyed in Transect 1, to moderate slopes adjoining Transect 2. Exposure was limited to two small geotechnical test pits. Vegetation coverage obscured visibility.	>5	>5	42
8	Slopes	8 670	Transect 8 traversed the slopes within the central portion of the proposed extension area. Slopes were initially gentle at the southern end of Transect 8 but gradually increased in steepness before reducing in gradient again at the northern extent of Transect 8. Visibility and exposure levels were very low.	>5	5	22
9	Slopes	12 025	Transect 9 also traversed the slopes within the central portion of the proposed extension area. Slopes increased in steepness on the western and eastern margins of Transect 9. Visibility and exposure were as in Transect 8.	>5	5	30
Total		**116 195**				**1,179**

The survey area was heavily vegetated, limiting ground surface visibility. The ground surface was relatively undisturbed, with very few exposures. Areas of exposure consisted of vehicle tracks, geotechnical test pits and erosion exposures surrounding the dam and drainage lines. Effective coverage was low within all landform units, with the exception of open depression landforms (refer to *Table 5.2*) and the overall effective coverage across the survey area was very low.

Table 5.2 Effective Coverage

Landform unit	Total area (m^2)	Area surveyed (m^2)	Effective Coverage (%)
Open depression	8,600	881	10.24
Slope	260,000	262	0.1
Crest	65,000	36	0.06
Total Effective Coverage (%)			**0.35**

5.4 ABORIGINAL SITE IDENTIFICATION

The criteria applied to the identification of Aboriginal sites are outlined below.

Stone Artefacts

There are a number of grounds for distinguishing between artefacts that have been flaked through human activity and those that result from natural processes. These include features such as negative and positive bulbs of percussion, ring cracks, ripple marks, flake terminations and errailure scars (Holdaway and Stern 2004). For the purposes of this assessment, flaked stone artefacts were identified on the basis of the presence of one or more of these attributes. The primary criterion for identifying other stone artefacts such as grindstones or hammerstones was the presence of distinctive pitted, crushed or abraded surfaces.

Scarred Trees

The removal of bark and wood from trees results in the presence of scarring on the tree trunk. However, it is often difficult to distinguish between scars of natural and anthropogenic origin. It is similarly important to identify where scarring relates to Aboriginal rather than European activities. Three broad criteria, detailed below, are distinctive of Aboriginal scarred trees:

- the scar must be of a size and shape and location on the tree that suggests it was caused by removal of bark by an Aboriginal person or Aboriginal people. Typically scars are symmetrical in form and a size that suggests the removal of bark for containers, carrying implements, shields or canoes. There may also be small scars resulting from the cutting of footholds used to climb trees or as a result of the removal of 'sugarbag' (native honey);

- any tool/axe marks that may be present should demonstrate a degree of weathering that indicates that they are not of recent origin; and

- the tree (and the scar) must be sufficiently old to indicate that the scarring of the tree took place at a time when Aboriginal people were employing traditional methods in the production of their material culture.

6 SURVEY RESULTS

6.1 ABORIGINAL HERITAGE

6.1.1 Archaeological Sites

No sites containing Aboriginal cultural materials were identified within the proposed extension area.

6.1.2 Potential Archaeological Deposits

It is essential to consider the potential for archaeological material to be present either in areas of poor visibility and / or in a subsurface context. In relation to the management of the archaeological resource and legislative requirements, the likelihood that sub-surface archaeological deposits may be present within an area has implications for any proposed development activity.

In terms of archaeological assessment, it is important to recognise that not all potential deposits necessarily contribute to our understanding of past human activities. The primary archaeological importance of subsurface deposits lies in their potential to provide information that will assist in interpretation of the archaeological record through time and space. For this reason, areas described as potential archaeological deposits should satisfy one or more of the following criteria:

- deposits that contain sufficiently high numbers of artefacts to allow for statistically viable analysis and intra- and inter-site comparison of artefact assemblages;
- deposits that have been subject to minimal disturbance and retain integrity; and
- deposits that contain materials that may be dated, either in chronological or absolute terms.

The proposed extension area is relatively undisturbed, with the exception of clearance for grazing. However, due to the lack of available resources and level areas suitable for camping and with access to water, no potential archaeological deposits were identified during the survey.

6.1.3 In-field Aboriginal Consultation

During the field survey, Chris and Peter Allen said that they felt that the area was unlikely to have been occupied by Aboriginal people. The major ridgeline on which the New England Highway is now located was seen to have been a more likely focus of the movement of Aboriginal people between

the Liverpool Plains and the Upper Hunter. Both Chris and Peter commented that it was unlikely that people would want to walk across the steeply sloping ground within and surrounding the study area when they could more easily traverse the ridgelines.

6.2 HISTORICAL HERITAGE

A series of heavily weathered wooden fence posts were identified in transects one, three and four. The hardwood fence posts have been subject to varying degrees of modification. Some had been completely squared off on four sides whilst others consisted of tree limbs with only one modified side. Twelve posts were visible across the three transects and eleven had been removed and were lying on the ground adjacent to the current fence. A single in-situ post was present in transect four and consisted of a heavily weathered tree limb with a single flat face and three holes for fence wire.

No structures or other items of potential historical heritage significance were recorded during the survey.

6.3 DISCUSSION

6.3.1 Aboriginal Heritage

The lack of Aboriginal archaeological sites within the proposed extension area confirms pre-survey expectations. Based on the available resources and topography, it is unlikely that the area would have been the target of human occupation. The lack of sites is considered to be a reflection of the limited use of the area by Aboriginal people rather than solely a result of low survey coverage.

6.3.2 Historical Heritage

The series of fence posts identified during the survey were situated along the current fence alignment and had been recently removed. The Ardglen area has been settled since the late 1800s and has been associated with mining, farming and residential settlement for a lengthy period of time. It is possible that the fence posts may be the remainder of fence lines dating to the early period of settlement in the Ardglen area. However, there is very little additional information that can be provided by further study of the fence posts.

7 SIGNIFICANCE ASSESSMENT

7.1 ABORIGINAL HERITAGE

The assessment of significance is an integral component in the formulation of management and mitigation plans in relation to cultural heritage resources (Pearson and Sullivan 1994:21). Cultural heritage management recommendations are typically made in response to an assessment of cultural significance. The Burra Charter (Australia ICOMOS Burra Charter 1999) defines cultural significance in terms of the aesthetic, historic, scientific and social value of a heritage item or place. In relation to Aboriginal cultural material, considerations of social and scientific significance are generally weighted most heavily, although other factors may also be of relevance. This report will be provided to the Aboriginal community for input prior to finalisation of the report. Feedback from the Aboriginal community regarding social significance will be an important component of the significance assessment.

For management purposes, the levels of site significance can be described as follows:

- sites that are assessed to be of high significance should be conserved and warrant protection against development;
- sites that are assessed to be of moderate significance should be conserved if possible, however, in the event that these may be affected by development, management strategies should be implemented to mitigate against the impact; and
- sites that are assessed to be of low significance should be conserved if possible, but should not represent an obstacle to development.

7.1.1 Aboriginal (Social) Significance

The assessment of social significance is the prerogative of the Aboriginal community and typically involves the consideration of a site or sites in conjunction with the archaeological, cultural and natural aspects of the surrounding landscape.

During the field survey, the sites officers from NLALC indicated that the proposed extension area did not contain any areas or sites of particular cultural value. The area was considered unlikely to have been the focus of activity or a major transitory route. No comments were received from the Aboriginal community in response to the draft copy of this report provided in August 2006. In November 2006 groups were contacted by phone on the number provided at their registration. Some groups were no longer

contactable. Where possible, the appropriate contact was asked to respond to the project either verbally or in writing. No comment has been received.

7.1.2 Archaeological (Scientific) Significance

The archaeological significance of an Aboriginal site, object or place is assessed according to its potential to address research questions and provide additional information of value to interpretations of past human activities (Australia ICOMOS Incorporated 2000:12). The assessment of scientific significance should consider the rarity and representativeness of the site, its integrity and connectedness in relation to research potential. No archaeological sites or areas of archaeological potential were identified within the proposed extension area.

7.2 HISTORICAL HERITAGE

In accordance with The Burra Charter (Australia ICOMOS Burra Charter 1999), the NSW Heritage Office requires that significance assessment addresses four values: historical significance; aesthetic significance; scientific significance; and social significance. The guidelines for the assessment of heritage significance (NSW Heritage Office 2001) also provide a list of criteria, under which an item can be considered to have State (or local) heritage significance. The fence posts identified within the study area do not satisfy any of these criteria and are not considered to be significant on a local or regional level.

8 IMPACT ASSESSMENT

In order to formulate appropriate measures for the management of cultural heritage, it is essential to understand the impacts that the proposed quarry extension will have on the area. This will involve both the direct impacts associated with the proposed quarry extension and the cumulative impacts of ongoing quarrying and other land disturbance activities within the locality.

The proposed quarry extension will involve significant surface and subsurface impacts and will result in the destruction or displacement of any artefacts or historical relics present within the survey area. However, it is unlikely that large numbers of artefacts or unrecorded historical relics will be present in the proposed extension area. The impacts of the proposed quarry extension will be in addition to the impacts associated with previous quarrying activities.

9 MITIGATION AND MANAGEMENT MEASURES

The following measures have been formulated in light of the local and regional context of the site; the results of the survey; the potential impacts of the proposed quarry extension and the requirements of cultural heritage legislation.

No further archaeological investigation is required. However, should any Aboriginal objects (artefacts) be exposed during ground surface disturbance, all works involving ground surface disturbance should be suspended. A representative of the Nungaroo Local Aboriginal Land Council and an archaeologist should conduct an assessment of the significance of the Aboriginal object(s) and identify appropriate mitigation and management measures.

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