

# Winten Property Group

M

## Broken Head Quarry, Suffolk Park

**LGA: Byron Shire Council**

**Archaeological Desk Top Report**

**15 July 2024**

McCARDLE CULTURAL HERITAGE PTY LTD

ACN 104 590 141 • ABN 89 104 590 141

PO Box 166, Adamstown, NSW 2289

Mobile: 0412 702 396 • Email: penny@mcheritage.com.au



**Report No: J202475 DT**

Approved by: Penny McCardle

Position: Director

Signed: 

Date: 15 July 2024

This report has been prepared in accordance with the scope of services described in the contract or agreement between McCardle Cultural Heritage Pty Ltd (MCH), ACN: 104 590 141, ABN: 89 104 590 141, and the proponent. The report relies upon data, surveys, measurements and specific times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the proponent. Furthermore, the report has been prepared solely for use by the proponent and MCH accepts no responsibility for its use by other parties.

## CONTENTS

<b>EXECUTIVE SUMMARY.....</b>	<b>1</b>
<b>GLOSSARY .....</b>	<b>2</b>
<b>ACRONYMS .....</b>	<b>3</b>
AHIMS SITE ACRONYMS.....	3
 <b>1 INTRODUCTION.....</b>	 <b>4</b>
1.1 INTRODUCTION .....	4
1.2 THE SUBJECT SITE .....	4
1.3 PROPOSED REZONING .....	5
1.4 OBJECTIVES OF THE DUE DILIGENCE ASSESSMENT .....	6
1.5 LEGISLATIVE CONTEXT .....	6
1.5.1 NATIONAL PARKS AND WILDLIFE ACT (1974, AS AMENDED) .....	6
1.5.2 NATIONAL PARKS AND WILDLIFE REGULATION (2019) .....	7
1.5.3 ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1979 (EP&A ACT).....	7
1.5.4 LOCAL ENVIRONMENTAL PLAN .....	7
1.6 ABORIGINAL COMMUNITY CONSULTATION .....	8
1.7 QUALIFICATIONS OF THE INVESTIGATOR .....	8
1.8 REPORT STRUCTURE.....	8
 <b>2 ENVIRONMENTAL AND ARCHAEOLOGICAL CONTEXT.....</b>	 <b>9</b>
2.1 LOCAL ENVIRONMENT.....	9
2.2 ARCHAEOLOGICAL CONTEXT .....	18
2.2.1 ABORIGINAL HERITAGE INFORMATION MANAGEMENT SYSTEM (AHIMS) .....	18
2.2.2 HERITAGE REGISTER LISTINGS .....	20
2.2.3 SUMMARY OF THE ARCHAEOLOGICAL CONTEXT .....	20
2.3 PREVIOUS ASSESSMENTS OF THE SUBJECT SITE .....	22
2.4 SYNTHESIS OF ENVIRONMENTAL AND ARCHAEOLOGICAL CONTEXTS .....	22
2.5 MODELS OF PAST ABORIGINAL LAND USE .....	23
2.6 MODEL OF OCCUPATION FOR THE LOCAL AREA .....	24
2.7 PREDICTIVE MODEL FOR THE SUBJECT SITE .....	25
 <b>3 CONCLUSIONS.....</b>	 <b>27</b>
3.1 CONCLUSIONS .....	27

## APPENDICES

APPENDIX A	AHIMS SEARCH RESULTS
------------	----------------------

**LIST OF TABLES**

TABLE 2.1 LAND USE SCALE (CSIRO 2010) .....	12
TABLE 2.2 SITE DESCRIPTIONS (KUSKIE & KAMMINGA 2000). ....	25

**LIST OF FIGURES**

FIGURE 1.1 LOCATION OF THE SUBJECT SITE (NEARMAP).....	4
FIGURE 1.2 AERIAL PHOTOGRAPH OF THE SUBJECT SITE (NEARMAP MAY 2024) .....	5
FIGURE 1.3 CONCEPTUAL RESIDENTIAL SUBDIVISION.....	5
FIGURE 2.1 GEOLOGY OF THE SUBJECT SITE (NSW SEAMLESS GEOLOGY).....	9
FIGURE 2.2 TOPOGRAPHY OF THE SUBJECT SITE (ADW JOHNSON) .....	10
FIGURE 2.3 STREAM ORDERS .....	11
FIGURE 2.4 2012 AERIAL PHOTOGRAPH SHOWING THE ORIGINAL LOCATION OF THE 2 <sup>ND</sup> ORDER CREEK AND DAMS .....	12
FIGURE 2.5 1947 AERIAL PHOTOGRAPH OF THE SUBJECT SITE OUTLINED IN BLUE (EVERICK 2015).....	13
FIGURE 2.6 1958 AERIAL PHOTOGRAPH OF THE SUBJECT SITE OUTLINED IN BLUE (EVERICK 2015).....	14
FIGURE 2.7 1967 AERIAL PHOTOGRAPH OF THE SUBJECT SITE OUTLINED IN BLUE (EVERICK 2015).....	14
FIGURE 2.8 1979 AERIAL PHOTOGRAPH OF THE SUBJECT SITE OUTLINED IN BLUE (EVERICK 2015).....	15
FIGURE 2.8 1987 AERIAL PHOTOGRAPH OF THE SUBJECT SITE OUTLINED IN BLUE (EVERICK 2015).....	15
FIGURE 2.10 2006 AERIAL PHOTOGRAPH OF THE SUBJECT SITE OUTLINED IN BLUE (EVERICK 2015).....	16
FIGURE 2.11 2015 AERIAL PHOTOGRAPH OF THE SUBJECT SITE (NEARMAP) .....	16
FIGURE 2.12 LOCATION OF AHIMS SITES .....	18
FIGURE 2.13 LOCATION OF AHIMS SITES IN THE SUBJECT SITE USING AHIMS COORDINATES AND SITE CARD MAP LOCATIONS .....	19
FIGURE 2.13 FOLEY’S MODEL (L) AND ITS MANIFESTATION IN THE ARCHAEOLOGICAL RECORD (R), (FOLEY 1981).....	24

## EXECUTIVE SUMMARY

McCardle Cultural Heritage Pty Ltd (MCH) has been engaged by Winten Property Group to undertake an Archaeological report for the proposed rezoning of land at the former Broken Head Quarry site (Lot 1 DP123302 and Lot 1 DP700806) located on Broken Head Road, Suffolk Park NSW. A portion of the Subject Site is proposed to be rezoned from RU1 to R2 Low Density Residential, and intended to be subdivided for residential purposes in the future.

The underlying geology of the Subject Site consists of the Late Triassic Ripley Road sandstone formation and consists of thick-bedded, fine- to medium- to very coarse-grained quartz-rich sandstone and quartz-rich granule conglomerate and a grey clay matrix is characteristic of fresh rock. The presence of sandstone in the Subject Site, if exposed, may have provided suitable surfaces for the application of art, or, if exposed along any water sources, grinding grooves may be present. Consisting of a disturbed landscape through the centre, the remainder of the Subject Site includes slopes dissected by drainage lines and creek in the west. The Subject Site includes the Bogotville soil landscape that is characterised by an upper soil Horizon A and underlying B, sites tend to occur on or within soil Horizon A or are often present at the interface of the A and B horizons.

In terms of fresh water sources, a number of drainage lines are present in the Subject Site with the northern one draining north into Tallow Creek (2<sup>nd</sup> order that forms 4<sup>th</sup> order further north east) located approximately 200 metres north of the Subject Site at its closest point. The drainage in the west, drain into an un-named 2<sup>nd</sup> order creek that flows through the western side of the Subject Site. The closest reliable fresh water source is an un-named 4<sup>th</sup> order creek located approximately 840 metres south west of the Subject Site and Tallow Creek (4<sup>th</sup> order) located about 640 metres north east. As water is necessary for survival, the Subject Site may be considered under-resourced in terms of water availability. However, the 2<sup>nd</sup> order creek may have been utilised for more transitory activities (e.g., hunting and gathering) following heavy rain which manifests in the archaeological record as a background scatter of artefacts.

In relation to land uses and impacts, the Subject Site has been quarried since the 1920s. Clearing of vegetation had also occurred prior to the quarrying, as part of the former use of the site as a dairy farm, although its extent is unknown. Extraction of materials from the quarry ceased in 2015 and processing of extracted materials ceased in 2016. The site is currently vacant, excluding a few single storey site office buildings, and a large shed associated with the former use. Extensive rehabilitation works have also occurred on the site. These land uses have significantly impacted on the landscape and any cultural materials that may have been present at the quarrying activity locations.

A search of the AHIMS register has identified one Aboriginal Place and seven known Aboriginal sites currently recorded within two kilometres of the Subject Site and include four artefact sites, one art site and one stone quarry. Two sites appear to be located in the Proposed Rezoning Area. However, examination of the AHIMS site card site descriptions and maps were undertaken, all of which indicate that they are not located within the proposed development footprint. The limited availability of fresh water suggests that this area was primarily used for hunting and gathering rather than long-term camping on a large scale.

It should be noted that the Proposed Rezoning Area, where the development will take place, has undergone extensive land clearing, quarrying, and subsequent rehabilitation activities. These activities have disrupted the archaeological record by removing cultural materials throughout the Proposed Rezoning Area.

No sites are expected to remain within the Proposed Rezoning Area, which generally aligns with the previous quarrying areas. This conclusion has been reached by four independent archaeologists, all of whom arrived at the same independent finding.

## GLOSSARY

**Aboriginal Place:** are locations that have been recognised by the Minister (and gazetted under the *National Parks and Wildlife Act 1974*) as having special cultural significance to the Aboriginal community. An Aboriginal Place may or may not include archaeological materials.

**Aboriginal Site:** an Aboriginal site is the location of one or more Aboriginal archaeological objects, including flaked stone artefacts, midden shell, grinding grooves, archaeological deposits, scarred trees etc.

**Artefact:** any object that is physically modified by humans.

**Artefact scatter:** a collection of artefacts scattered across the surface of the ground (also referred to as open camp sites).

**Backed artefact:** a stone tool where the margin of a flake is retouched at a steep angle and that margin is opposite a sharp edge.

**Background scatter:** a term used to describe low density scatter of isolated finds that are distributed across the landscape without any obvious focal point.

**Core:** a chunk of stone from which flakes are removed and will have one or more negative flake scars but no positive flake scars. The core itself can be shaped into a tool or used as a source of flakes to be formed into tools.

**Flake:** any piece of stone struck off a core and has a number of characteristics including ring cracks showing where the hammer hit the core and a bulb of percussion. May be used as a tool with no further working, may be retouched or serve as a platform for further reduction.

**Flaked piece/waste flake:** an unmodified and unused flake, usually the by-product of tool manufacture or core preparation (also referred to as debitage).

**Harm:** is defined as an act that may destroy, deface or damage an Aboriginal object or place. In relation to an object, this means the movement or removal of an object from the land in which it has been situated

**In situ:** archaeological items are said to be "in situ" when they are found in the location where they were last deposited.

**Proposed Rezoning Area:** that part of the Subject Site that is proposed to be rezoned from RU1 to R2, as shown on Figure 1.2.

**RU1:** Primary Production

**R2:** Low Density Residential

**Retouched flake:** a flake that has been flaked again in a manner that modified the edge for the purpose of sharpening that edge.

**Subject Site:** the whole of the land in Lot 1 DP 123302 and Lot 1 DP700806.

**Typology:** the systematic organization of artefacts into types on the basis of shared attributes.

## ACRONYMS

<b>ACHA</b>	Aboriginal Cultural Heritage Assessment
<b>ACHMP</b>	Aboriginal Cultural Heritage Management Plan
<b>AHIMS</b>	Aboriginal Heritage Information Management System
<b>AHIP</b>	Aboriginal Heritage Impact Permit

## AHIMS SITE ACRONYMS

<b>ACD</b>	Aboriginal ceremonial and dreaming
<b>AFT</b>	Artefact (stone, bone, shell, glass, ceramic and metal)
<b>ARG</b>	Aboriginal resource and gathering
<b>ART</b>	Art (pigment or engraving)
<b>BOM</b>	Non-human bone and organic material
<b>BUR</b>	Burial
<b>CFT</b>	Conflict site
<b>CMR</b>	Ceremonial ring (stone or earth)
<b>ETM</b>	Earth mound
<b>FSH</b>	Fish trap
<b>GDG</b>	Grinding groove
<b>HAB</b>	Habitation structure
<b>HTH</b>	Hearth
<b>OCQ</b>	Ochre quarry
<b>PAD</b>	Potential archaeological deposit.
<b>SHL</b>	Shell
<b>STA</b>	Stone arrangement
<b>STQ</b>	Stone quarry
<b>TRE</b>	Modified tree (carved or scarred)
<b>WTR</b>	Water hole

# 1 INTRODUCTION

## 1.1 INTRODUCTION

McCardle Cultural Heritage Pty Ltd (MCH) has been engaged by Winten Property Group to undertake an Archaeological report for the proposed rezoning of land located at the former Broken Head Quarry site, located on Broken Head Road, Suffolk Park NSW. A portion of the Subject Site that is proposed to be rezoned from RU1 to R2 Low Density Residential, and intended to be subdivided for residential purposes in the future.

The assessment has been undertaken to meet the Heritage NSWs' Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW and the brief. The purpose of a due diligence assessment is to assist proponents to exercise due diligence when carrying out activities that may harm Aboriginal objects or Aboriginal places and to determine whether that should apply for a consent to harm Aboriginal objects or Places through an Aboriginal Heritage Impact Assessment (AHIP).

This report has met the Heritage NSW Due Diligence requirements and considered the relevant environmental and archaeological information, the condition of the Subject Site, the nature of any future development activity and impacts (no actual development activity is proposed at this stage as this is a land rezoning application only), as well as preparing appropriate recommendations.

## 1.2 THE SUBJECT SITE

The Subject Site is located at on Broken Head Road, Suffolk Park NSW. Comprising Lot 1 DP123302 and Lot 1 DP700806, the location of the Subject Site is shown in Figures 1.1 and 1.2.

Figure 1.1 Location of the Subject Site (Nearmap)

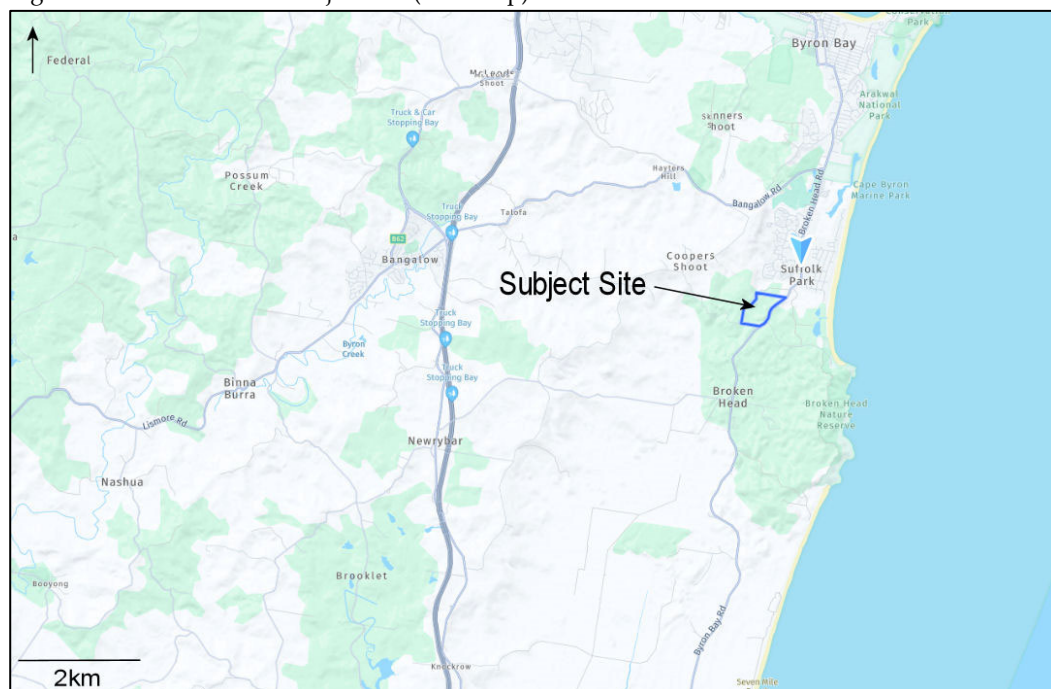
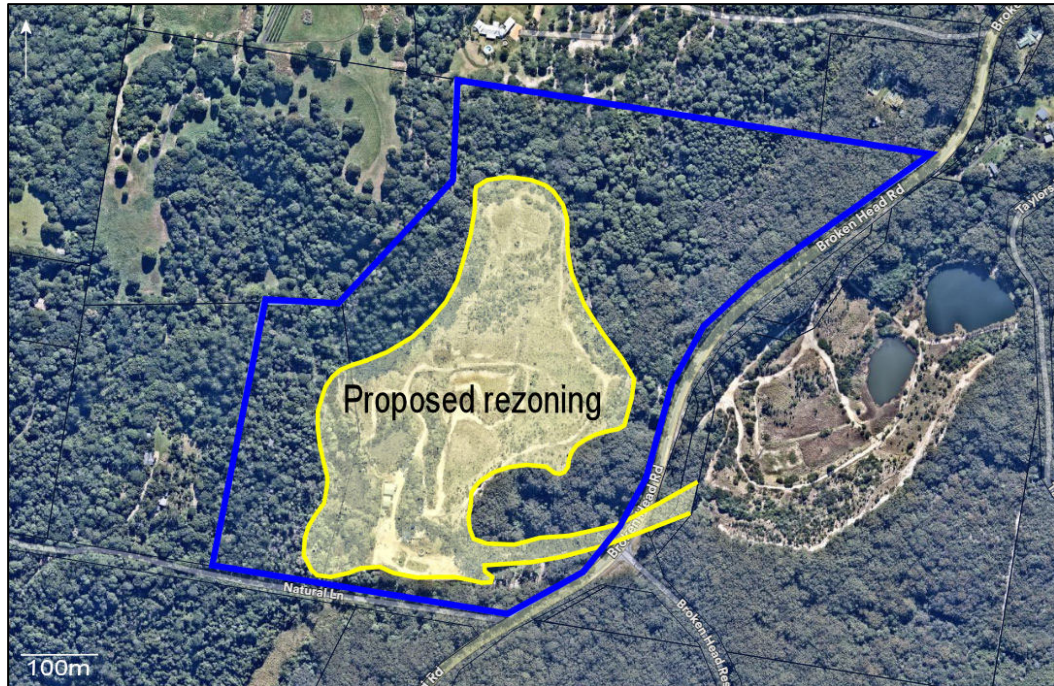




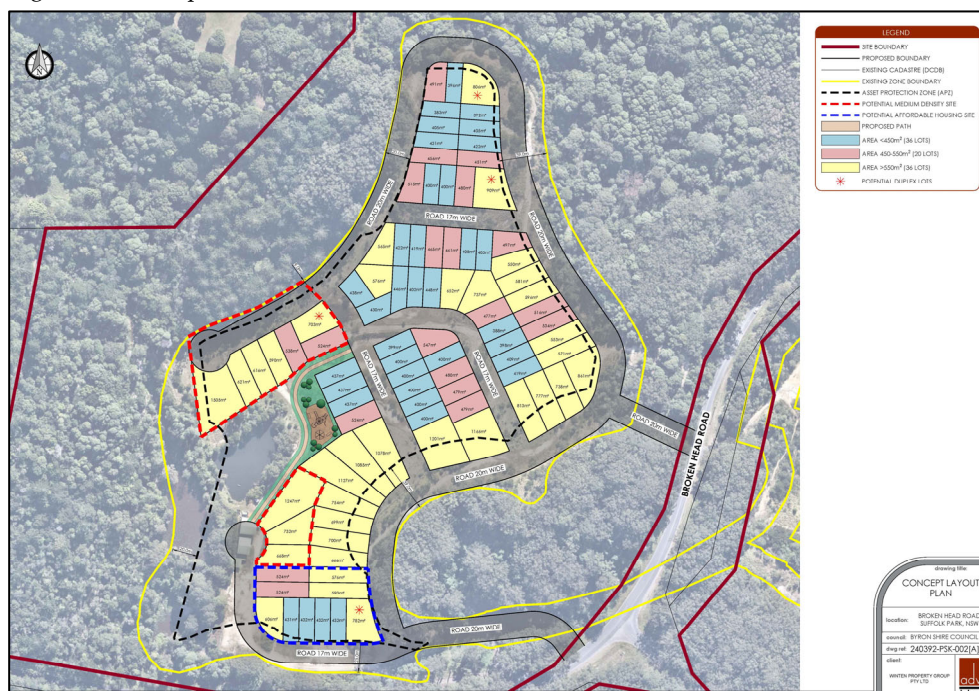
Figure 1.2 Aerial photograph of the Subject Site (Nearmap May 2024)



### 1.3 PROPOSED REZONING

The proposal is for the rezoning of the former quarrying area from RU1 to R2 low density residential, with the surrounding areas to retain their C2 environmental conservation zoning. The rezoning would make permissible the subdivision of the Proposed Rezoning Area into residential lots, although the subdivision itself would need to be the subject of a future development application and assessment process. A conceptual plan of the overall intended development outcomes for the site is provided in Figure 1.3.

Figure 1.3 Conceptual residential subdivision



## 1.4 OBJECTIVES OF THE DUE DILIGENCE ASSESSMENT

The objectives and primary tasks of this due diligence assessment were to:

- undertake a search of the Aboriginal Heritage Management System (AHIMS) and other relative registers;
- undertake research into the environmental and archaeological contexts of the Subject Site;
- develop a predictive model of site location for the Subject Site; and
- provide a report detailing the above findings.

## 1.5 LEGISLATIVE CONTEXT

The following overview of the legislative framework, is provided solely for information purposes for the client, and should not be interpreted as legal advice. MCH will not be liable for any actions taken by any person, body or group as a result of this general overview and MCH recommends that specific legal advice be obtained from a qualified legal practitioner prior to any action being taken as a result of the general summary below.

Land managers are required to consider the effects of their activities or proposed development on the environment under several pieces of legislation. Although there are a number of Acts and regulations protecting Aboriginal heritage, including places, sites and objects, within NSW, the three main ones include:

- National Parks and Wildlife Act (1974, as amended)
- National Parks and Wildlife Regulation (2019)
- Environmental Planning and Assessment Act (1979)

### 1.5.1 NATIONAL PARKS AND WILDLIFE ACT (1974, AS AMENDED)

The National Parks and Wildlife Act (1974), Amended 2019, is the primary legislation for the protection of Aboriginal cultural heritage in New South Wales. The NPW Act protects Aboriginal heritage (places, sites and objects) within NSW and the protection of Aboriginal heritage is outlined in s86 of the Act, as follows:

- “A person must not harm or desecrate an object that the person knows is an Aboriginal object” s86(1)
- “A person must not harm an Aboriginal object” s86(2)
- “A person must not harm or desecrate an Aboriginal place” s86(4)

Penalties apply for harming an Aboriginal object, site or place. The penalty for knowingly harming an Aboriginal object (s86[1]) and/or an Aboriginal place (s86[4]) is up to \$550,000 for an individual and/or imprisonment for 2 years; and in the case of a corporation the penalty is up to \$1.1 million. The penalty for a strict liability offence (s86[2]) is up to \$110,000 for an individual and \$220,000 for a corporation.

Harm under the National Parks and Wildlife Act (1974, as amended) is defined as any act that destroys defaces or damages the object, moves the object from the land on which it has been situated, causes or permits the object to be harmed. However, it is a defence from prosecution if the proponent can demonstrate that;



- 1) harm was authorised under an Aboriginal Heritage Impact Permit (AHIP) (and the permit was properly followed), or
- 2) the proponent exercised due diligence in respect to Aboriginal heritage.

The 'due diligence' defence (s87[2]), states that if a person or company has applied due diligence to determine that no Aboriginal object, site or place was likely to be harmed as a result of the activities proposed for the Subject Site, then liability from prosecution under the NPW Act 1974 will be removed or mitigated if it later transpires that an Aboriginal object, site or place was harmed. If any Aboriginal objects are identified during the activity, then works should cease in that area and Heritage NSW, Department of Premier & Cabinet notified (DECCW 2010:13). The due diligence defence does not allow for continuing harm or as defence to s.86(1) or (4).

The archaeological due diligence assessment and report has been carried out in compliance with the Heritage NSW (DECCW 2010) Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW.

#### 1.5.2 NATIONAL PARKS AND WILDLIFE REGULATION (2019)

The National Parks and Wildlife Regulation 2019 provides a framework for undertaking activities and exercising due diligence in respect to Aboriginal heritage. The Regulation (2019) recognises various due diligence codes of practice, including the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW, but it also outlines procedures for Aboriginal Heritage Impact Permit (AHIP) applications and Aboriginal Cultural Heritage Consultation Requirements (ACHCRs); amongst other regulatory processes.

#### 1.5.3 ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1979 (EP&A ACT)

The *Environmental Planning and Assessment Act 1979* (EP&A Act) establishes the statutory framework for planning and environmental assessment in NSW and the implementation of the EP&A Act is the responsibility of the Minister for Planning, statutory authorities and local councils. The EP&A Act sets up a planning structure that requires developers (individuals or companies) to consider the environmental impacts of new projects. Under this Act, cultural heritage is considered to be a part of the environment. It provides for the identification, protection and management of heritage items through inclusion of these items into schedules of planning instruments, such as Local Environmental Plans (LEPs). This Act requires that Aboriginal cultural heritage and the possible impacts to Aboriginal heritage that development may have, are formally considered in land-use planning and development approval processes.

This Act has three main parts of direct relevance to Aboriginal cultural heritage. Namely, Part 3 which governs the preparation of planning instruments, Part 4 which relates to development assessment provisions for local government (consent) authorities and Part 5 which relates to activity approvals by governing (determining) authorities. Planning decisions within Local Government Areas (LGAs) are guided by Local Environmental Plans (LEPs). Each LGA is required to develop and maintain an LEP that includes Aboriginal and historical heritage items which are protected under the EP&A Act and the NPW Act. The Subject Site is located within the Byron Shire Council LGA and falls under the Byron LEP 2014.

#### 1.5.4 LOCAL ENVIRONMENTAL PLAN

The Subject Site is located within the Byron Shire Council LGA. Schedule 5 of the LEP 2014 details the included environmental heritage items covered by the plan. No Aboriginal sites or places are identified within proximity to the Subject Site.

## 1.6 ABORIGINAL COMMUNITY CONSULTATION

A due diligence assessment relates to the physical identification of Aboriginal objects, sites and places. Community consultation is only required once Aboriginal objects, sites or places have been identified and an Aboriginal Heritage Impact Permit (AHIP) is deemed necessary. Section 5.2 of the Heritage NSW (DECCW 2010) Due Diligence Code of Practice for the protection of Aboriginal Objects in NSW specifically states that;

*‘consultation with the Aboriginal community is not a formal requirement of the due diligence process’ (2010:8).*

## 1.7 QUALIFICATIONS OF THE INVESTIGATOR

Dr. Penny McCardle: Principal Archaeologist & Forensic Anthropologist has 22 years experience in Indigenous archaeological assessments, excavation, research, reporting, analysis and consultation and 19 years in skeletal identification, biological profiling and skeletal trauma identification for NPWS, NSW Police and the NSW Department of Forensic Medicine.

- BA (Archaeology and Palaeoanthropology): Indigenous archaeology, 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 Pseudo-Trauma in Suspected Violent Death Course, Erie College, Pennsylvania, 2009
- Documenting Scenes of War and Human Rights Violations. Institute for International Criminal Investigations, 2018
- PhD, University of Newcastle, 2019

## 1.8 REPORT STRUCTURE

The report includes Section 1 which outlines the proposal, Section 2 presents the environmental and archaeological context, Section 3 provides the conclusion.

## 2 ENVIRONMENTAL AND ARCHAEOLOGICAL CONTEXT

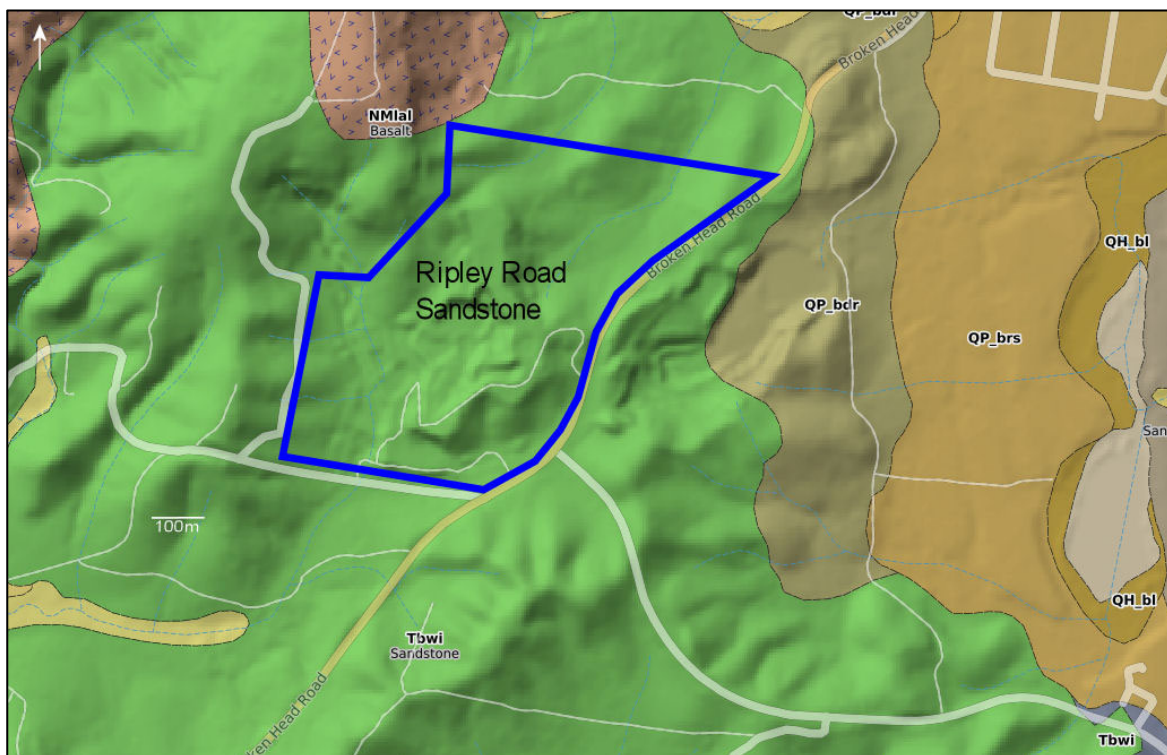
The archaeological due diligence process and assessment requires that the available knowledge and information in relation to the environmental and archaeological contexts are considered. The purpose of this is to assist in identifying whether Aboriginal objects, sites or places are likely to be present within the Subject Site based on archaeological predictive modelling and in what condition they may be found in given the environmental impacts, both natural and anthropogenic.

### 2.1 LOCAL ENVIRONMENT

Past site location and land use are closely linked to the environment including the landform, geology, geomorphology, soils, waterways and associated resources. The environmental context is important to identify potential factors relating to past Aboriginal land use patterns. The underlying regional geology plays a major role in the structure of the surrounding environment (e.g., landforms, topography, geomorphology, vegetation, climate, hydrology etc), and also influences patterns of past occupation and their manifestation in the archaeological record. This is primarily relevant to past Aboriginal land use in regard to the location of stone resources or raw materials and their procurement for the manufacturing and modification of stone tools.

The underlying geology of the Subject Site consists of the Late Triassic Ripley Road sandstone formation (Figure 2.1) and consists of thick-bedded, fine- to medium- to very coarse-grained quartz-rich sandstone and quartz-rich granule conglomerate and a grey clay matrix is characteristic of fresh rock (NSW Seamless Geology). The presence of sandstone in the Subject Site, if exposed, may have provided suitable surfaces for the application of art, or, if exposed along any water sources, grinding grooves may be present. There is, however, an absence of any suitable raw materials for stone tool manufacturing (e.g., silcrete, mudstone, tuff, basalt).

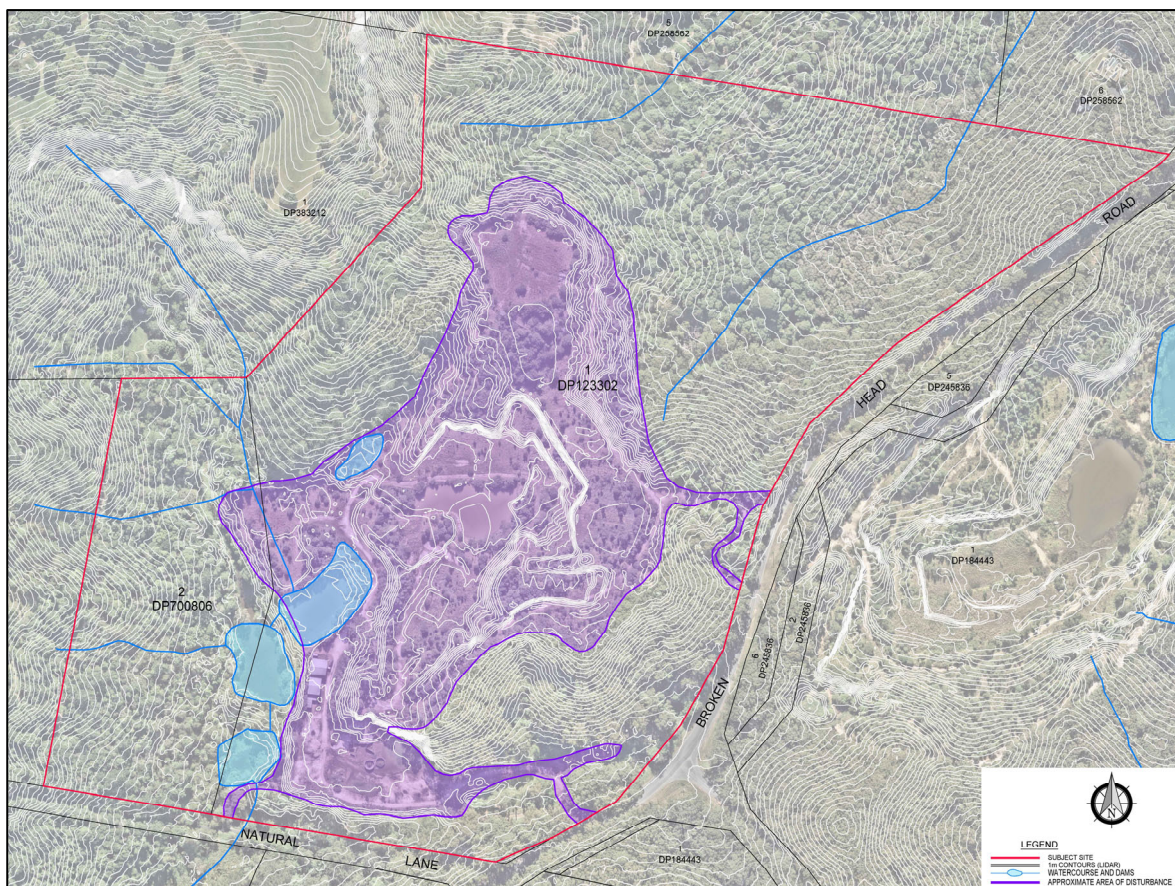
Figure 2.1 Geology of the Subject Site (NSW Seamless Geology)





Consisting of a disturbed landscape through the centre, the remainder of the Subject Site includes slopes dissected by drainage lines and creek in the west. Figure 2.2 shows the current topography as well as the disturbed part of the Subject Site are highlighted in purple, which is essentially, the proposed footprint of the R2 zone and future residential subdivision.

Figure 2.2 Topography of the Subject Site (ADW Johnson)



The Subject Site includes the Bogotville soil landscape that is characterised by the conglomerate crests and caps consisting of up to 100 cm of grey coarse sand (A horizon). Sandstone slopes consist of up to 40 cm of grey coarse sand (A horizon). that overlies 10–20 cm of crumbly clay loam (A2 horizon). The A2 horizon may exist as topsoil, with A1 being absent. The A2 horizon overlies up to 100 cm of mottled clay (B horizon), (eSpade Soils).

Consisting of an upper soil Horizon A and underlying B, 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. The A horizon of the Subject Site is generally 20cm or less in depth and soil deflation and erosion expose rather than bury former land surfaces on which stone artefacts may have been present, removing the upper part of the soil profile, usually to the exposed B horizon. Additional changes to the soil depth derive from land uses, which are discussed below.

In terms of fresh water sources, water sources are classified into permanent (rivers and soaks), semi-permanent (large streams, swamps, and billabongs), ephemeral (drainage lines, small streams and creeks), and underground (artesian). Stream order assessment, through the Strahler method applied to 1:25 000 topographic maps, helps determine stream reliability. Streams above third order may be



considered relatively permanent water sources based on the expected reliable rainfalls under normal conditions. The closest reliable fresh water source is an un-named 4<sup>th</sup> order creek located approximately 840 metres south west of the Subject Site and Tallow Creek (4<sup>th</sup> order) approximately 640 metres north east (Figure 2.3). A number of drainage lines (1<sup>st</sup> order) are present in the Subject Site with the northern ones draining north into Tallow Creek (2<sup>nd</sup> order that forms the 4<sup>th</sup> order further north east) located approximately 200 metres north of the Subject Site at its closest point. The drainage in the west, drain into an un-named 2<sup>nd</sup> order creek that flows through the western side of the Subject Site and is located in the APZ area on the Concept Plan (Figure 1.3) and will be retained with no major impacts.

It is noted, however, that this creek appears to no longer exist in its mapped location (refer to Figure 2.4) and has been significantly impacted through the construction of dams as evident in the 2012 aerial photograph (Figure 2,4). It is possible that some remnant portions of the creek may exist to the north of the Proposed Rezoning Area and between the dams at the south western edge of the Proposed Rezoning Area.

As water is necessary for survival, the Subject Site may be considered under-resourced in terms of water availability. However, the 2<sup>nd</sup> order creek may have been utilised for more transitory activities (e.g., hunting and gathering) following heavy rain which manifests in the archaeological record as a background scatter of artefacts.

Figure 2.3 Stream orders

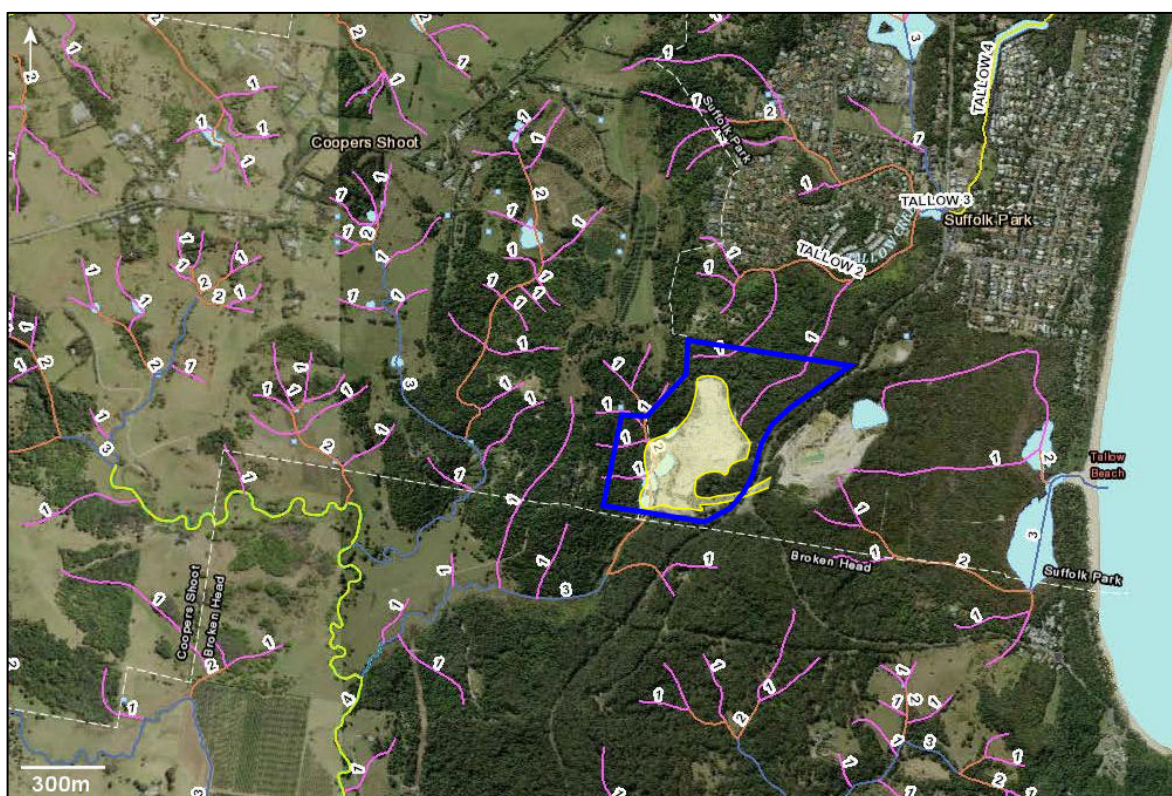
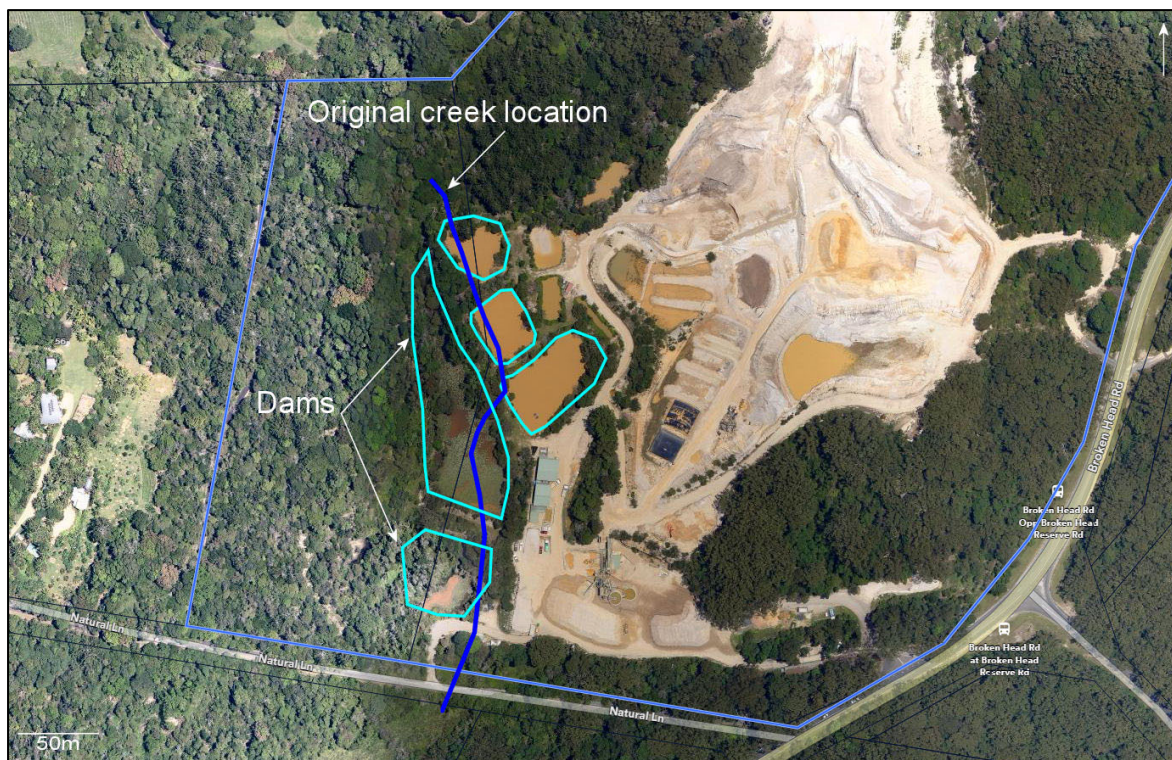




Figure 2.4 2012 aerial photograph showing the original location of the 2<sup>nd</sup> order creek and dams

In relation to land uses and associated impacts, Heritage NSW (DECCW 2010) defines disturbed lands as land that has been the subject of human activity that has changed the lands' surface and, or subsurface, these changes being changes that remain clear and observable. This definition is based on the types of disturbances classified in The Australian Soil and Land Survey Field Handbook (CSIRO 2010) and Table 2.1 provides a scale formulated by the CSIRO of the levels of disturbances and their classification, which will assist in determining the level of disturbance across the Subject Site and its impact on potential cultural material that may be present. Based on past land uses (see below) and based on this scale, the Subject Site is classified at the highest level of disturbance.

Table 2.1 Land use scale (CSIRO 2010)

Minor disturbance		Moderate disturbance		Major disturbance	
Cleared and/or grazed at some time, but apparently never ploughed		Cleared and/or grazed at some time, with ploughing also attested		Severe disturbance to natural soil profiles; complete-to-near complete topsoil loss/disturbance	
0	No effective disturbance; natural	3	Extensive clearing (e.g., poisoning and ringbarking)	6	Cultivation: grain fed
1	No effective disturbance other than grazed by hoofed animals	4	Complete clearing: pasture native or improved, but never cultivated	7	Cultivation: irrigated, past and present
2	Limited clearing (e.g., selected logging)	5	Complete clearing: pasture native or improved, cultivated at some stage	8	Highly disturbed: e.g., quarry, road works, mining, landfill, urban

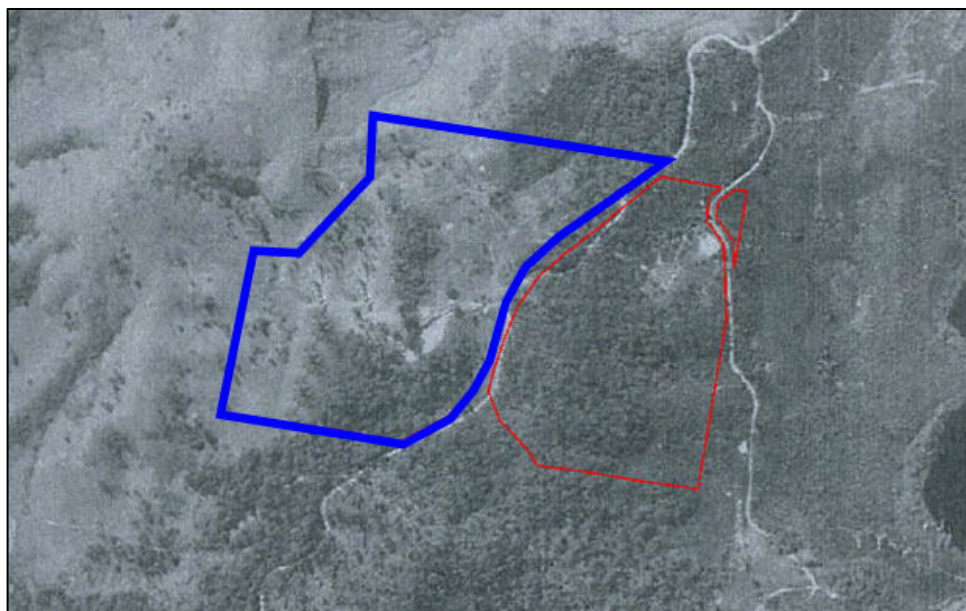


Regionally, following European settlement of the area in the 1820s, the regional landscape has been subjected to a range of different modifactory activities including extensive logging and clearing, agricultural cultivation (ploughing), pastoral grazing, residential developments and other construction works. 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 Subject Site contains dunal sand which has been quarried since the 1920s. Clearing of vegetation had also occurred prior to the quarrying, as part of the former use of the site as a dairy farm, although its extent is unknown. Extraction of materials from the quarry ceased in 2015 and processing of extracted materials ceased in 2016. The site is currently vacant, excluding an unused demountable building associated with the former use. Extensive rehabilitation works have also occurred on the site with a detailed plan for rehabilitation established with DPE's Compliance Branch that has been implemented with the rehabilitation works very advanced.

As indicated in Figure 2.5, the majority of the Subject Site was cleared as of 1947. Additionally, Broken Head Road and Taylors Creek Road have been constructed by this time, however, it is noted that the alignment of Broken Head Road is now different from in 1947.

Figure 2.5 1947 aerial photograph of the Subject Site outlined in blue (Everick 2015)



By 1958 (Figure 2.6), quarrying works are underway and both Broken Head Road and Taylors Creek Road appear to have been widened. Additionally, significant excavation/clearing works in the south western area appear to extend to the 2<sup>nd</sup> order creek at that location. The 1967 aerial photograph (Figure 2.7) indicates that quarrying activities continue, there is significant vegetation regrowth in areas not directly impacted by the quarrying activities.

Figure 2.6 1958 aerial photograph of the Subject Site outlined in blue (Everick 2015)

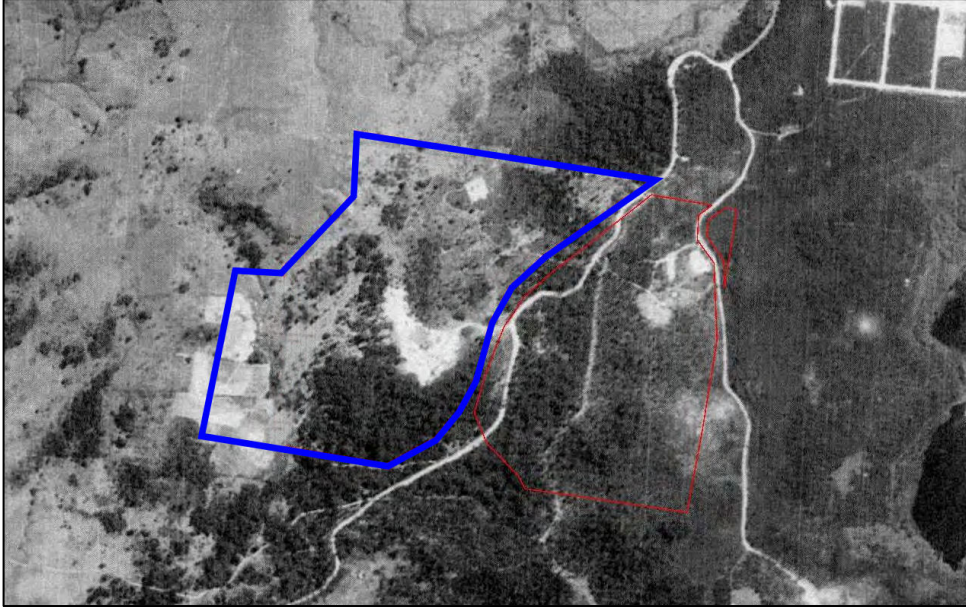
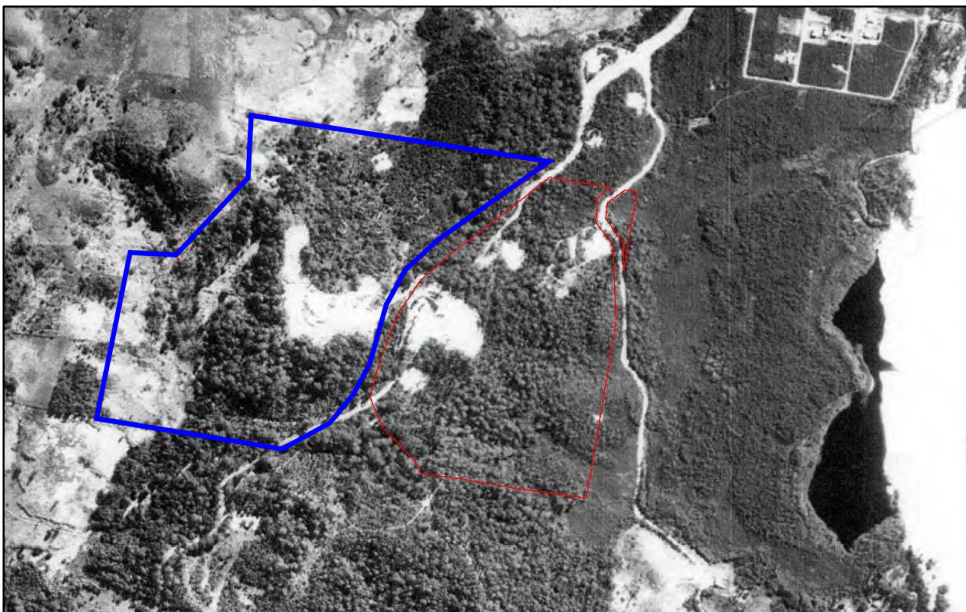


Figure 2.7 1967 aerial photograph of the Subject Site outlined in blue (Everick 2015)



Based on the 1979 aerial photograph (Figure 2.8), it can be observed that quarrying operations have continued, while Broken Head Road has undergone a realignment to its current position. Additionally, Broken Head Reserve Road has been established, and the surrounding vegetation on the Subject Site still retains its dense growth. Figure 2.9, the aerial photograph taken in 1987, reveals an expansion in quarrying operations.



Figure 2.8 1979 aerial photograph of the Subject Site outlined in blue (Everick 2015)

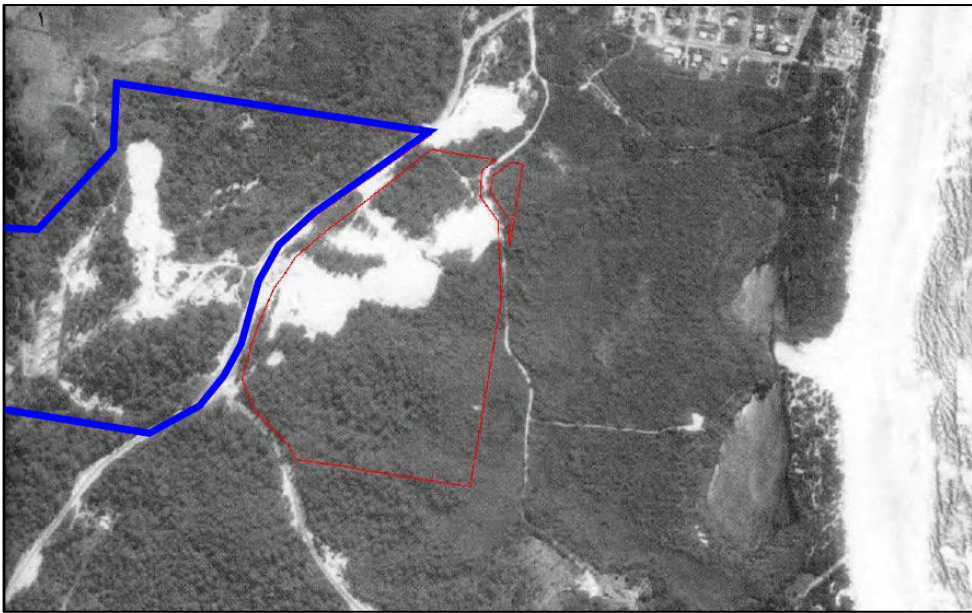
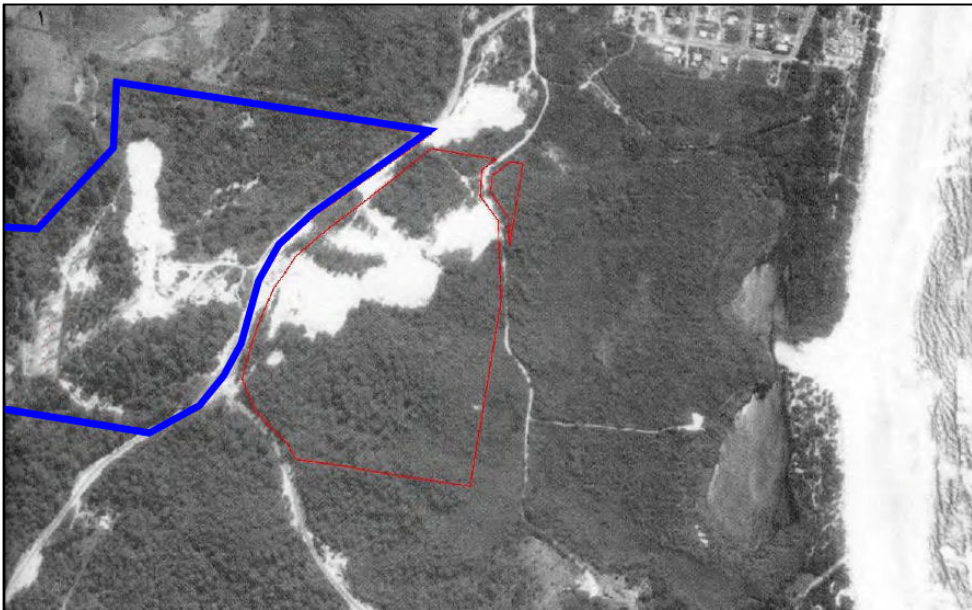


Figure 2.9 1987 aerial photograph of the Subject Site outlined in blue (Everick 2015)



As shown in the 2006 aerial photograph (Figure 2.10), there is a distinct rise in quarrying activities, with only certain sections of the land remaining densely covered in vegetation. By 2015 (Figure 2.11), quarry activities are well established through the middle of the Subject Site and dense vegetation remains in the remainder of the Subject Site, and numerous dams have been constructed along the 2<sup>nd</sup> order creek in the south western part of the Subject Site



McCardle Cultural Heritage Pty Ltd

Early vegetation clearing included the uprooting of trees by chaining which disturbed or destroyed any cultural materials that may be present near, or underneath trees and vegetation (Wood 1982). Alternatively, timber was harvested manually, using axes and hand saws and generally, only the trees that were wanted for timber were felled (selective logging). However, after the 1950s, there was an increase in mechanisation in the logging industry, and clear-felling became widely practised whereby the best logs were removed for processing, but nearly every other tree was bulldozed and burnt, and had increased impacts to the landscape.

Excavation works required for developments, including but not limited to business, residential, industrial, works depots, dams and associated infrastructure and utilities, require excavation, cut and fill methods. These direct impacts to the land and associated cultural materials that may be present are easy to see and understand. Any form of construction or resource exploitation that involves the removal of, relocation of or compaction of soils sediments or minerals, requires the modification of the topography, thus displacing and/or destroying any cultural materials that may have been present (Wood 1982). These significant disturbances have resulted in none of the original topsoils remaining in situ.

In terms of everyday land uses, vehicular movements on sites have been well documented through several experiments (DeBlois, Green and Wylie 1974, Gallagher 1978), have shown that vehicle movements over an archaeological site are extremely destructive to the site through compaction and movement, thus altering the spatial relationship and location of the artefacts. Based on general observations it is expected that the creation of dirt tracks for vehicle access would also result in the loss of vegetation and therefore will enhance erosion and the associated relocation of cultural materials.

Additional disturbances would have derived from 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 erosion is generally high, artefacts deposited in such an environment will be eroded downslope after being abandoned (Waters 2000; Waters and Kuehn 1996). If erosion occurs after cultural material is deposited, it will disturb or destroy sections, or all of, archaeological sites even if they were initially in a good state of preservation. Bioturbation processes, such as burrowing and mounding by earthworms, ants, and other burrowing animals, contribute to the redistribution and mixing of cultural deposits. Artefacts can move downwards through root holes as well as through sorting and settling due to gravity, and translocation can also occur as a result of tree falls (Balek 2002; Peacock and Fant 2002; Canti 2003; Stein 2003:). 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. The ways in which earthworms can affect cultural deposits includes: creating false artefact concentrations and stratigraphy by moving artefacts downwards through the soil; indirectly displacing larger artefacts as they burrow through the soil; burying artefacts through the deposition of faecal material on the surface; and blurring natural and cultural boundaries (Fowler et al. 2004:462; Stein 1983:280-281).

The Subject Site is located within an environment that provided limited resources. Without a reliable fresh water supply to enable camping, the Subject Site may have been utilised for more transitory activities such as travel and hunting and gathering following heavy rain, on the way to reliable water and associated subsistence resources. Such past Aboriginal land uses are manifest in the archaeological record as a background scatter of discarded artefacts (such as isolated artefacts and/or very low-density artefact scatters). In relation to modern alterations to the landscape, the adverse effect on cultural materials from clearing and quarrying activities are well documented and lead to



the removal of cultural materials if present. Additionally, the construction of dams, and infrastructure, along with the installation of utilities, tracks, and fencing, has proven to be highly disturbing. Consequently, these activities are expected to cause significant impacts across the centre of Subject Site. The remainder of the Subject Site appear to remain relatively undisturbed and as such may contain evidence of past Aboriginal land use.

## 2.2 ARCHAEOLOGICAL CONTEXT

A review of the archaeological literature of the region, and more specifically the local area and the results of an AHIMS search provide essential contextual information for the current assessment. There are many types of evidence past Aboriginal occupation across the landscape which form the archaeological record of a region. Places which show evidence of Aboriginal occupation of an area are archaeological sites. These sites contain numerous site features, and some contain more than one features. The Aboriginal heritage information management system (AHIMS) provides information of the known archaeological sites in NSW.

### 2.2.1 ABORIGINAL HERITAGE INFORMATION MANAGEMENT SYSTEM (AHIMS)

It must be noted that there are many limitations with an AHIMS search including incorrect site coordinates due to errors and changing of computer systems at AHIMS over the years that failed to correctly translate old coordinate systems to new systems. Secondly, AHIMS will only provide up to 110 sites per search, thus limiting the search area surrounding the Subject Site and limiting a more comprehensive analysis and finally, few sites have been updated on the 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, to assist in determining the cumulative impacts, is unknown.

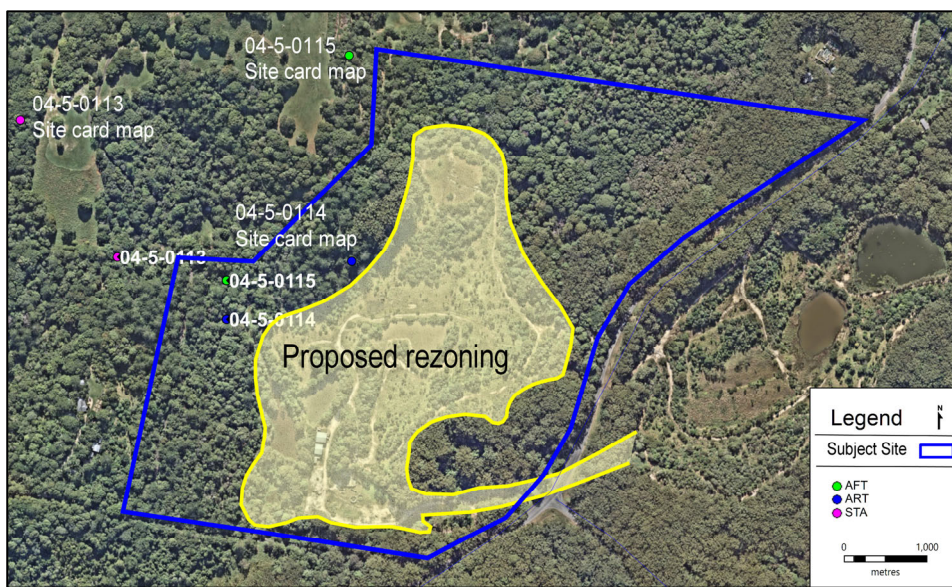
A search of the AHIMS register (Appendix A) has identified one (1) Aboriginal Place and seven (7) known Aboriginal sites currently recorded within two kilometres of the Subject Site and include four artefact sites (AFT), one art site and one stone quarry (STQ) (Figure 2.12).

Figure 2.12 Location of AHIMS sites



As indicated in Figure 2.12 two sites appear to be in the Subject Site. However, as AHIMS coordinates may not be accurate, examination of the AHIMS site card site descriptions and maps were undertaken. The maps provided with the site cards places the sites further north (Figure 2.13), but the site descriptions and mud maps place them along the 2<sup>nd</sup> order creek. All available mapping information, including coordinates, site card maps, and descriptions, indicates that they are situated outside the Proposed Rezoning Area.

Figure 2.13 Location of AHIMS sites in the Subject Site using AHIMS coordinates and site card map locations



AHIMS 04-5-0114 is registered on AHIMS as an art site. However, the site card notes this as being grooved rocks adjacent to a creek bed approximately 1.5-2m above the creek. It is possible that this may be grinding grooves. No other information is available.

However, the Proposed Rezoning Area does contain a mapped 2<sup>nd</sup> order stream, which has been highly disturbed as part of past quarrying activities (refer to Section 2). Given this level of disturbance, and the site card descriptions, it is most likely that this site, if it still exists, is located adjacent to that part of the 2<sup>nd</sup> order stream that is to the north of the Proposed Rezoning Area. However, there is a remote chance that it may be located along one of the remnant sections of this creek within that section of the Proposed Rezoning Area that is nominated as an APZ on the conceptual plan at Figure 1.3. To address the possibility, a survey will need to be undertaken as part of any future development application and if the site is located within the R2 land (as it will then be), this will need to be factored into the design of the subdivision to avoid adverse impacts on the site.

AHIMS site 04-5-0115 is registered on AHIMS as an artefact site, however, the site card describes this site as being caves in a rock face with a fig tree growing around it on the north side of a creek that is located north east of the quarry. As the only creek located north east of the quarry is the first order stream that is located totally outside of the Proposed Rezoning Area, this site is not located in the Proposed Rezoning Area.

### 2.2.2 HERITAGE REGISTER LISTINGS

The National Heritage List, the Commonwealth Heritage List, the Australian Heritage Database, Australia's National Heritage List, The National Trust Heritage Register State Heritage Inventory the and the relevant Local Environmental Plan have no Aboriginal objects, sites or places listed within the Subject Site.

### 2.2.3 SUMMARY OF THE ARCHAEOLOGICAL CONTEXT

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, proximity to water sources and geomorphology. A number of archaeological studies of the region have been conducted which provide baseline data for placing Aboriginal sites within a regional landscape context. These include Starling (1974), Collins (1990, 1996, 2001, 2007), (Piper 2007), Turner (2001) and Everick (2011).

Starling (1974) noted the impacts of sand mining of cultural materials on the North Coast recording bora/ceremonial grounds at Tallow Beach at the northern extent of Tallow Creek and in Suffolk Park. In both these locations, burials were found associated with middens and artefact scatter.

The Collins (1990) extensive study of the southern Byron Shire identified eighteen sites between Suffolk Park and Broken Head. Collins found that sites in close proximity to the coastline exhibited smaller, more recent middens predominantly consisting of pipi shells and included cartrut shell where rock platforms were close by. Conversely, inland sites were predominantly situated on firm soils and rock formations near watercourses, being primarily low-density artifact scatters. Artefacts consisted primarily of white quartz flake pieces, followed by reduced numbers of flakes, cores and blades. Raw materials were mainly quartz followed in reduced numbers of siliceous volcanics, quartzite and chert. Furthermore, Collins recorded natural mythological sites of significance to Awakwal elders. These included women's sites, fighting grounds and massacre sites.

Collins (1996) undertook an augur investigation of a midden located at Oceanside Place, Suffolk Park and found that the midden contained beach, rock platform and estuarine shell fish, stone artefacts and fish bone. Collins (2001) also assessed the condition of three previously recorded artefact sites from her 1990 study. Collins could not locate the sites and found that due to the site's location (hilly terrain), erosion, poor visibility and other disturbances, these sites could not be found.

An assessment undertaken by Turner (2001) examined the land at Kalamajere Drive and Sally West Drive in Suffolk Park for potential sites of archaeological significance. The assessment specifically focused on the dune area in the vicinity. Multiple surveys were performed in collaboration with the Local Aboriginal Land Council (LALC) and traditional owners to gather comprehensive information. The research findings indicated that the dune under investigation originated during the Pleistocene period. Subsurface archaeological testing was conducted to explore the possibility of uncovering any archaeological evidence within the area. However, the investigation yielded no significant findings.

Two studies were undertaken by Collins (2007, 2007) of 23 ha of adjoining land at west Suffolk Park. The site consisted of an escarpment characterised by gullies, spurs and small valleys. Collins identified one stone artefact on the crest of a spur falling into a creek and concluded that the scarcity of archaeological sites along the spurs and slopes of the escarpment indicated a relatively low level of archaeological sensitivity in these areas. Conversely, Collins noted that creek lines held greater archaeological potential.



Piper (2007) undertook an assessment of the South Byron Sewage Treatment Works. The assessment found no sites. Piper noted that the wider landscape contained significant sites, but the survey revealed that the study area was highly disturbed.

Everick (2011) undertook an assessment at Taylors Creek Road, Broken Head. The survey was undertaken with the relevant local Aboriginal community and no sites were identified. It was found that the site was highly disturbed with no potential for sites to be present.

These previous assessments have identified that artefact scatters and isolated finds are the most prominent site type inland. These assessments have also identified that both landform and distance to water were important factors in past Aboriginal land use. The higher the stream order (and more reliable water source) the higher the numbers of sites and site densities, and both decrease with distance from the water source, and a decrease in stream order. Overall, the previous investigations have highlighted that evidence of past Aboriginal land use within the area would most likely be on elevated flat landforms in close proximity to water sources, and that the slopes were not expected to have a high number of sites. Additionally, where sandstone is exposed, these surfaces may have been used for the application of rock art/engravings, naturally occurring rock shelters and caves may have been used for shelter and exposed sandstone areas close to water, used for grinding implements (grinding grooves). All recorded artefacts sites were noted to have been disturbed through past landuses including but not limited to clearing, agricultural and pastoral activities, residential developments, utilities, infrastructure and erosion.

The following is a summary of the previous investigations and it is noted that there are various factors which will have skewed the results. Therefore, the summary provides an indication of what may be expected in terms of site location and distribution.

- a wide variety of site types are represented in the region with open campsites and isolated artefacts by far the most common;
- lithic artefacts are primarily manufactured from quartz, with a variety of other raw materials also utilised but in smaller proportions (siliceous volcanics, quartzite and chert);
- sites in proximity to ephemeral water sources or located in the vicinity of headwaters of upper tributaries (1<sup>st</sup> order streams) have a sparse distribution and density and contain little more than a background scatter;
- sites located in the vicinity of the upper reaches of minor tributaries (2<sup>nd</sup> order streams) also have a relatively sparse distribution and density and may represent evidence of localised one-off behaviour;
- sites located in the vicinity of the lower reaches of tributaries (3<sup>rd</sup> order creeks) have an increased distribution and density and contain evidence that may represent repeated occupation or concentration of activity;
- sites located in the vicinity of major tributaries (4<sup>th</sup> and 5<sup>th</sup> order streams/rivers) have the highest distribution and densities. These sites tend to be extensive and complex in landscapes with permanent and reliable water and contain evidence representative of concentrated activity;
- sites located within close vicinity at the confluence of any order stream may be a focus of activity and may contain a relatively higher artefact distribution and density; and
- all identified sites to date have been disturbed through both human and natural processes.

These findings are consistent with models developed for the area.

### 2.3 PREVIOUS ASSESSMENTS OF THE SUBJECT SITE

Appleton (1992) undertook an assessment of the Subject Site for the extension to the then existing sand and gravel quarry. Appleton noted that sites were likely to be located in close proximity to water sources, artefact sites will be detectable on eroded or exposed surfaces, the majority of artefacts will be larger than 15mm (attributing this to the abundant availability of quartz) and the majority of artefacts will consist of unmodified flakes and flake pieces. It was predicted that open camp sites may be present along the ridges and spurs and creek banks (especially the confluence of creeks), on crests and low ridges and spurs overlooking creeks. Additionally, scarred or carved trees, if present, were expected to be located along the banks of the major creek in the Subject Site. No sites were identified during the survey and it was concluded that the Subject Site was likely suitable for hunting and gathering activities rather than long-term camping which is evident in the archaeological record as a background scatter of discarded artefacts.

A number of expert heritage reports relating to the Subject Site in relation to EMGA Mitchell McLennan v Byron Shire Council Land and Environment Court Proceedings 10218/2015 detail the findings (Everick 2015, ACHM 2015, ACHM & Everick 2015). Dr Shaun Canning visited the Broken Head quarry site on the 23<sup>rd</sup> September 2015 and no sites were identified in the proposed development footprint. Specifically, it was documented that:

- An archaeological survey of the quarry was undertaken by Appleton (1992) as part of the original application to extend the quarry (DA 92/455). No Aboriginal sites were located and no mitigation measures were proposed.
- The area scheduled for rehabilitation and development had been subjected to extensive and significant ground disturbance, permanently removing any traces of archaeological material from the consent area. There is a very remote likelihood of any Aboriginal cultural material being present within the disturbance zone(s) of the quarry.

According to the report by Dr Cannings in 2015, the proponent conducted various investigations as part of the statement of environmental effects process. One aspect of these investigations involved examining the AHIMS database to determine if there were any Aboriginal sites within the proposed development boundaries. The findings indicated that there were no Aboriginal sites present within the proposed development area. It is worth noting that an Aboriginal Place known as Ti Tree (Taylor's) Lake has been identified but is located at a significant distance from the development area and would not be affected by the proposed project.

In addition to this, it was also noted that the proposed development will be confined to 100% of the disturbed quarry, where there is no likelihood of any Aboriginal cultural heritage sites having survived past quarrying activities.

Everick (2015) reports that much of the Subject Site had seen extensive surface and subsurface ground disturbance from quarrying activities and these areas hold no potential for significant archaeological remains to exist. Two site visits were undertaken and again, no sites were identified in the proposed development footprint.

### 2.4 SYNTHESIS OF ENVIRONMENTAL AND ARCHAEOLOGICAL CONTEXTS

When assessing sites in terms of distance to water, in the region there is a clear pattern of past land uses whereby the majority of high-density sites are situated within 50 metres of reliable fresh water (high order) and reduce in both numbers and densities with a decrease in stream order. Thus, it is apparent that open campsites/isolated finds are most concentrated in number and size within 50 metres of reliable fresh water.

As is to be expected, the majority of sites within 50 metres of water are present on elevated landforms in association with creek lines whilst slopes and crest/ridge formations are also common site locations, although with an absence of reliable fresh water, were used for more transitory activities. The frequent presence of sites on crest/ridges and slopes is also noticeable for sites located over 50 metres from 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. Based on information gained from previous studies, both regionally and locally, and the environmental context, within a two-kilometre radius of our Subject Site, it can be expected that:

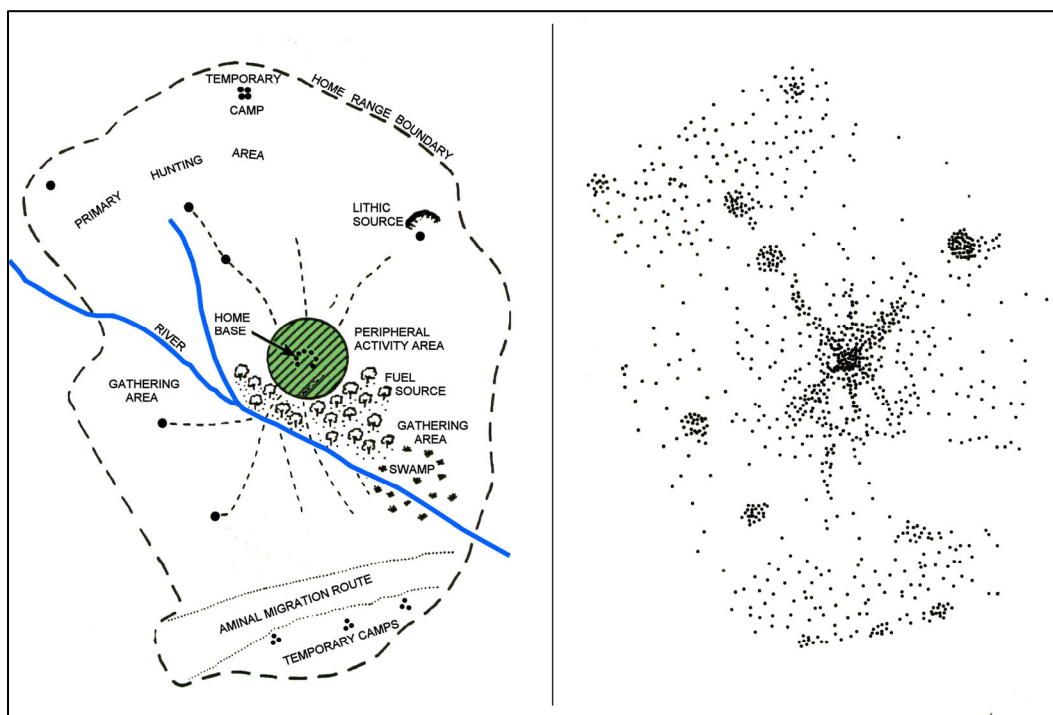
- the likelihood of locating sites increases with proximity to available water;
- the likelihood of finding large sites of high densities increases markedly with proximity to reliable water and decreases with a reduction in stream order;
- grinding grooves may be located along or near water sources within sandstone formations;
- a variety of stone artefact types will be located though the majority will be flakes, flaked pieces and debitage;
- a variety of raw materials utilised in stone tool manufacture will be represented, but quartz will be the most dominant;
- the likelihood of finding scarred trees is dependent on the level of clearing in an area; and
- the majority of sites will be subject to disturbances including human and natural.

## 2.5 MODELS OF PAST ABORIGINAL LAND USE

The main aim of this report is to attempt to define both the nature and extent of occupation across the area. As a result, the nature of the analysis will focus on both the landform units and sites. The purpose of this strategy is to highlight any variations between sites and associated assemblages, landforms and resources across the area treating assemblages as a continuous scatter of cultural material across the landscape. In doing this, it is possible to identify variation across the landscape, landforms and assemblages that correspond with variation in the general patterns of landscape use and occupation. Thus, the nature of activities and occupation can be identified through the analysis of stone artefact distributions across a landscape. A general model of forager settlement patterning in the archaeological record has been established by Foley (1981). This model distinguishes the residential 'home base' site with peripheral "activity locations".

Basically, the home base is the focus of attention and many activities and the activity locations are situated away from the home base and are the focus of specific activities (such as tool manufacturing). This pattern is illustrated in Figure 2.13. Home base sites generally occur in areas with good access to a wide range of resources (reliable water, raw materials etc). The degree of environmental reliability, such as reliable water and subsistence resources, may influence the rate of return to sites and hence the complexity of evidence. Home base sites generally show a greater diversity of artefacts and raw material types (which represent a greater array of activities performed at the site and immediate area). Activity locations occur within the foraging radius of a home base camp (approximately 10 km); (Renfrew and Bahn 1991).

Figure 2.14 Foley's model (L) and its manifestation in the archaeological record (R), (Foley 1981).



Based on the premise that these sites served as a focus of a specific activity, they will show a low diversity in artefacts and are not likely to contain features reflecting a base camp (such as hearths). However, it is also possible that the location of certain activities cannot be predicted or identified, adding to the increased dispersal of cultural material across the landscape. If people were opting to carry stone tools during hunting and gathering journeys throughout the area rather than manufacturing tools at task locations, an increased number of used tools should be recovered from low density and dispersed assemblages.

## 2.6 MODEL OF OCCUPATION FOR THE LOCAL AREA

Work throughout NSW has aimed to understand the nature of Aboriginal occupation and to identify the nature of past Aboriginal land uses. This theme often aims to identify and explain archaeological patterning in site type, content and distribution. General theories have been developed outlining the relationship between land use patterns and the resulting archaeological evidence. A number of models developed for the region have been reviewed (McBryde 1976; Koettig 1994; Dean-Jones and Mitchell 1993; Rich 1995; Kuskie and Kamminga 2000). All models state that the primary requirements for repeated, concentrated or permanent occupation is access to reliable fresh water. Brief and possible repeated occupation may be represented in areas that have unreliable access to ephemeral water sources, however, these areas will not contain high archaeological evidence or potential (Goodwin 1999).

Kuskie and Kamminga (2000) established a general model of occupation strategies based primarily upon ethnographic research. Used as a starting point, it makes a general set of factors that are consistent with other studies (e.g., McDonald and White 2010, Nelson 1991). The model distinguishes between short-term or extended long-term occupation and makes some predictions about the likely location of different foraging and settlement activities. Combining this information with a review of assemblage contents from a sample of excavated sites within the region, a baseline of settlement activities may be determined (Barton 2001). The model provides a number of archaeological expectations that may be tested. For example, the presence of features requiring a considerable

labour investment (e.g., stone-lined ovens or heat-treatment pits) are likely to occur at places where occupation occurred for extended periods of time. The presence of grindstones is also a reliable indicator of low mobility and extended occupation as seed grinding requires a large investment of time and effort (Cane 1989). In most ethnographic examples, seed grinding is an activity that takes place over an entire day to provide adequate energetic returns (Cane 1989; Edwards and O'Connell 1995).

Where group mobility was high and campsites frequently shifted throughout the landscape, artefact assemblages are not expected to contain elements such as grindstones, heat-treatment pits, ovens and the diversity of implements frequently discarded at places of extended residential occupation. It may also have been the case that the location of particular activities could not be predicted by tool users, adding to the increased low-density scattering of artefacts over the landscape. Also, if individuals were opting to carry a number of stone tools during hunting and gathering activities and maintaining these tools rather than manufacturing new tools at each task location, the ratio of used tools to unworn flakes in these assemblages should be high. Table 2.2 has been adapted from Kuskie and Kamminga (2000).

Table 2.2 Site descriptions (Kuskie & Kamminga 2000).

Occupation Pattern	Activity Location	Proximity to water	Proximity to food	Archaeological expectations
Transitory movement	all landscape zones	not important	not important	<ul style="list-style-type: none"> <li>assemblages of low density &amp; diversity</li> <li>evidence of tool maintenance &amp; repair</li> <li>evidence for stone knapping</li> </ul>
Hunting &/or gathering without camping	all landscape zones	not important	near food resources	<ul style="list-style-type: none"> <li>assemblages of low density &amp; diversity</li> <li>evidence of tool maintenance &amp; repair</li> <li>evidence for stone knapping</li> <li>high frequency of used tools</li> </ul>
Camping by small groups	associated with permanent & temporary water	near (within 100m)	near food resources	<ul style="list-style-type: none"> <li>assemblages of moderate density &amp; diversity</li> <li>evidence of tool maintenance &amp; repair</li> <li>evidence for stone knapping &amp; hearths</li> </ul>
Nuclear family base camp	level or gently undulating ground	near reliable source (within 50m)	near food resources	<ul style="list-style-type: none"> <li>assemblages of high density &amp; diversity</li> <li>evidence of tool maintenance, repair, casual knapping</li> <li>evidence for stone knapping</li> <li>heat treatment pits, stone lined ovens</li> <li>grindstones</li> </ul>
Community base camp	level or gently undulating ground	near reliable source (within 50m)	near food resources	<ul style="list-style-type: none"> <li>assemblages of high density &amp; diversity</li> <li>evidence of tool maintenance, repair, casual knapping</li> <li>evidence for stone knapping</li> <li>heat treatment pits, stone lined ovens</li> <li>grindstones &amp; ochre</li> <li>large area &gt;100sqm with isolated camp sites</li> </ul>

## 2.7 PREDICTIVE MODEL FOR THE SUBJECT SITE

An archaeological predictive model is established to identify areas of archaeological sensitivity so it can be used as a basis for the planning and management of Aboriginal heritage. It involves reviewing existing literature to identify basic site distribution patterns. These patterns are then modified

according to the specific environment of the Subject Site to form a predictive model for site location within the current Subject Site. A sampling strategy is then used to test the model and the results of the survey used to confirm, refute or modify the model.

Land-systems and environmental factors are commonly used factors in predictive modelling based on the assumption that they provide distinctive sets of constraints and opportunities that influenced past Aboriginal land use patterns. As land use patterns may differ between zones (due to different environmental conditions), this may result in the physical manifestation of different spatial distributions and forms of archaeological evidence. The predictive model presented here is based on landform units, previous archaeological assessments conducted within the region, distribution of known sites and site densities and traditional Aboriginal land use patterns. Also taken into consideration are land use impacts (both natural and anthropomorphic) that may have resulted in a disturbed landscape and associated archaeological record.

Considering the AHIMS results, local and regional archaeological investigations as well as the environmental context, given that fresh water was necessary for survival and the Subject Site is located 840 metres from an un-named 4<sup>th</sup> order creek in the south west and Tallow Creek (4<sup>th</sup> order) located 640 metres north east, and only a 2<sup>nd</sup> order creek is located in the Subject Site offering semi reliable fresh water only, the absence of reliable of fresh water indicates the Subject Site and immediate surrounds may have been used no more than hunting and gathering opportunities rather than large-scale long-term camping. Evidence of such past Aboriginal land uses manifest in the archaeological record as low-density artefact scatters and isolated artefacts.

However, non-indigenous settlement and land uses are expected to have impacted the Proposed Rezoning Area, most noticeably from complete clearing, and quarrying activities along with rehabilitation works. These land uses have significantly impacted on the archaeological record by redistributing and removing any cultural materials across the Proposed Rezoning Area (where these activities have occurred). No sites are expected to remain within the Proposed Rezoning Area. This conclusion has been reached by four independent archaeologists, all of whom arrived at the same finding.

The site types that may be present within the wider, undisturbed Subject Site (excluding the Proposed Rezoning Area) include low-density artefact scatters and, or isolated artefacts, along with grinding grooves on exposed sandstone, rock shelters and art, also on exposed sandstone surfaces.



### 3 CONCLUSIONS

#### 3.1 CONCLUSIONS

The lack of accessible and reliable fresh water in the Subject Site and its immediate surroundings suggest that this area was mainly utilised for hunting and gathering, rather than being a site for large-scale, long-term camping. It is important to note that the Subject Site has been significantly affected by almost complete land clearing, quarrying, and subsequent rehabilitation activities. These activities have disturbed the archaeological record by redistributing and removing cultural materials throughout the Subject Site where such activities have occurred. No sites are expected to be present within the Proposed Rezoning Area.

## REFERENCES

- Appleton, J. 1992. A report of the archaeological investigation of the site of the proposed extensions to existing sand and gravel quarries near Suffolk Park, Northern Coast, NSW. Report to R. W. Corkery & Co. Pty Limited.
- Balek, C. 2002. Buried Artefacts in stable upland sites and the role of bioturbation: a review. *Geoarchaeology: An International Journal*, 17(1):41-51.
- Cane, S. 1989. Australian Aboriginal seed grinding and its archaeological record: a case study from the Western Desert. In *Foraging and Farming*, D. R. Harris and G. C. Hillman (eds.), 99-119. London: Unwin Hyman.
- Canning, S. (ACHM). 2015. Aboriginal cultural heritage expert witness report. EMGA Mitchell McLennan v Byron Shire Council Land and Environment Court Proceedings 10218/2015.
- Canning, S. (ACHM) and Piper, A. (Everick) 2015. Joint report of cultural heritage experts. Land & Environment Court of NSW Case Number 10218 of 2015.
- Collins, J. 1990. Aboriginal and European heritage study, Broken head, NSW. Report to Byron Shire Council.
- Collins, J. 1996. Archaeological Investigation of Lot 3 & portion 4 Oceanside Place, Suffolk Park, Northeastern NSW.
- Collins, J. 2001. Proposed subdivision at Broken Head, Byron Shire Northern NSW. Aboriginal archaeological assessment. Report to Geolink.
- Collins, J. 2003. Lot 282 DP 1018663 Bottlebrush Crescent, Suffolk Park NSW far north coast. Aboriginal heritage assessment. Report to Lonergan and Associates.
- Collins, J. 2007. Proposed community title subdivision Lot 2 DP631285 Hayters drive West Suffolk Park, NSW far north coats. Report to Petrac Pty Ltd, South Brisbane.
- Dean-Jones, P. and P. B. Mitchell. 1993. Hunter Valley Aboriginal sites assessment project. Environmental modelling for archaeological site potential in the Central Lowlands of the Hunter Valley. Report to NSW National Parks and Wildlife Service.
- DeBloois, Evan I.; Green, D.F.; Wylie, H.G. 1974. A test of the impact of pinyon-juniper chaining on archaeological sites. Ogden, Utah: Intermountain Region, Forest Serv., U.S. Dep. Agric.: *Archaeological Reports*.
- Department of Environment, Climate Change and Water (DECCW). 2010b. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. Department of Environment, Climate Change and Water NSW, Sydney.
- Department of Environment, Climate Change and Water (DECCW). 2010c. *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW*. Department of Environment, Climate Change and Water NSW, Sydney.



- Edwards, D. and J. F. O'Connell 1995. Broad Spectrum Diets in Arid Australia. *Antiquity*, 69: 769-783.
- Everick Heritage Consultants. 2011. Broken Head eco lodge, Broken Head, NSW. Cultural heritage assessment. Report to M. MacPherson.
- Everick Heritage Consultants. 2015. Aboriginal cultural heritage expert evidence. Land and Environment court proceedings 10218 of 2015. Prepared for Byron Shire Council.
- Broken Head eco lodge, Broken Head, NSW. Cultural heritage assessment. Report to M. MacPherson.
- Foley, R. 1981. A Model of regional archaeological structure. *Proceedings of the Prehistoric Society*. 47: 1-17.
- Fowler, K.D, H.J. Greenfield and L.O. van Schalkwyk. 2004. The effects of burrowing activity on archaeological sites: Ndongondwane, South Africa. *Geoarchaeology*, 19(5):441-470.
- Gallagher, J. G. 1978. Scarification and cultural resources: an experiment to evaluate serotinous lodgepole pine forest regeneration techniques. *Plains Anthropologist* 23-82, Pt. 1: 289-299.
- Kuskie, P.J., and J. Kamminga. 2000. Salvage of Aboriginal archaeological sites in relation to the F3 Freeway near Lenaghans Drive, Black Hill, New South Wales. Report to Roads and traffic Authority New South Wales.
- McBryde, I. 1976. Subsistence patterns in New England prehistory. *University of Queensland Occasional Papers in Anthropology*, 6:48-68.
- McDonald, J and White, B. 2010. Lithic Artefact Distribution in the Rouse Hill Development Area, Cumberland Plain, New South Wales. *Australian Archaeology* 70: 29-38.
- Mulvaney, J., and J. Kamminga. 1999. *Prehistory of Australia*. Allen and Unwin, Australia.
- Nelson, M. 1991. The study of technological organisation. In Schiffer, M. (ed.) *Archaeological Method and Theory*. Tuscon: University of Arizona Press. pp. 57-100.
- Office of Environment and Heritage (OEH), 2011. *Guide to Investigating, Assessing and reporting on Aboriginal Cultural Heritage in NSW*. Department of Environment, Climate Change and Water NSW, Sydney.
- Peacock, E. and D. Fant. 2002. Biomantle Formation and Artifact Translocation in Upland Sandy Soils: An Example from the Holly Springs National Forest, North-Central Mississippi, U.S.A. *Geoarchaeology* 17(1):91-114.
- Piper, A. 2007. South Byron sewerage treatment works, Byron Bay. Cultural heritage assessment. Report to Landpartners Ltd, Lismore.
- Renfrew, C., and Bahn, P. 1991. *Archaeology: theories, methods and practice*. Thames & Hudson.
- Starling, J. 1974. A survey of Aboriginal sites on the north coast of NSW. Report to NPWS.

Stein, J. 1983. Earthworm activity: A source of potential disturbance of archaeological sediments. *American Antiquity* 48(2):277-289.

Waters, M. 2000. Alluvial Stratigraphy and Geoarchaeology in the American Southwest. *Geoarchaeology: An International Journal* 15(6):537-557.

Waters, M. and D. Kuehn. 1996. The Geoarchaeology of Place: The Effect of Geological Processes on the Preservation and Interpretation of the Archaeological Record. *American Antiquity* 61(3):483-496.

Wood, S. 1982. Mechanical treatment impacts to cultural resources in Central Arizona: The marden brush cutter. *Presented at the Symposium on Dynamics and Management of Mediterranean-Type Ecosystems*, June 22-26, 1981, San Diego, California.

## APPENDIX A

### AHIMS Search Results

Penny Mccardle

Date: 25 June 2024

Po Box 166

Adamstown New South Wales 2289

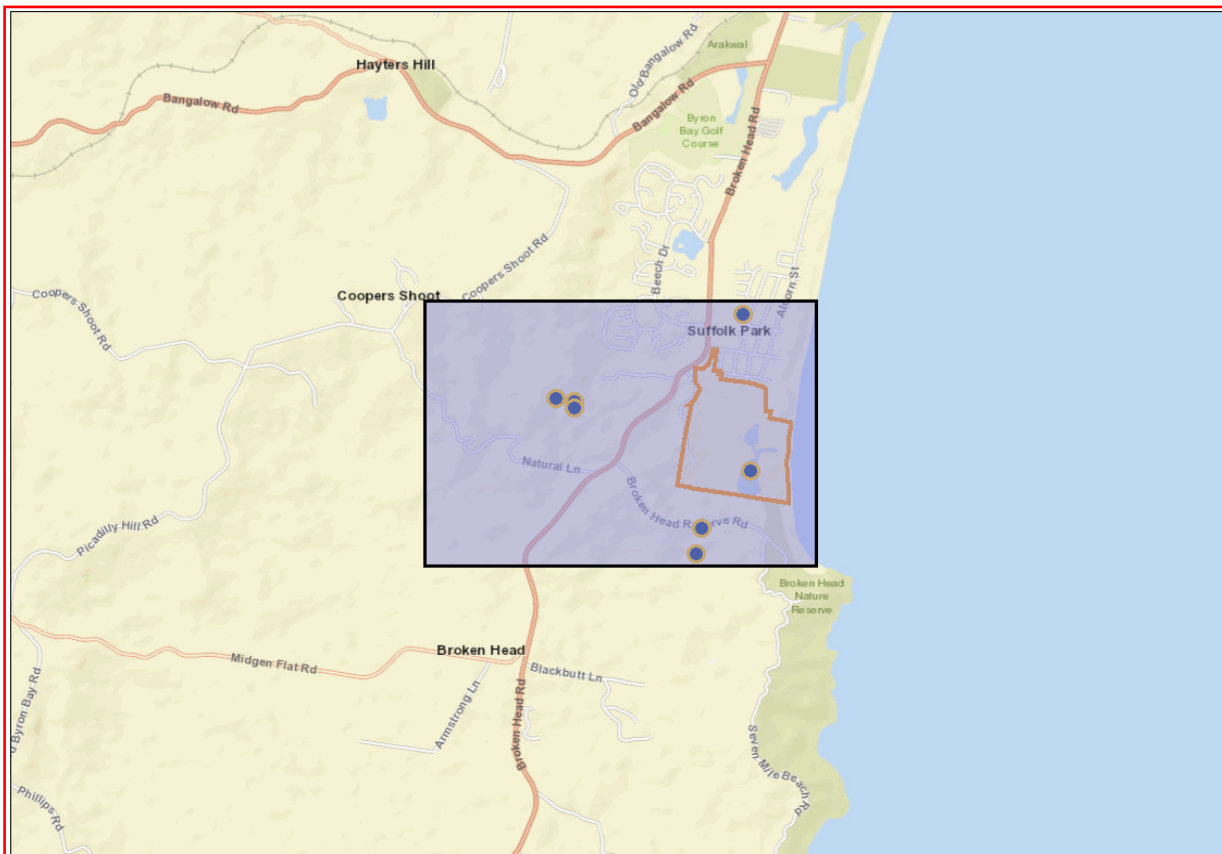
Attention: Penny Mccardle

Email: penny@mchheritage.com.au

Dear Sir or Madam:

**AHIMS Web Service search for the following area at Lat, Long From : -28.705, 153.5855 - Lat, Long To : -28.6862, 153.6164, conducted by Penny Mccardle on 25 June 2024.**

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

<b>7</b>	<b>Aboriginal sites are recorded in or near the above location.</b>
<b>1</b>	<b>Aboriginal places have been declared in or near the above location. *</b>

<u>ID</u>	<u>Aboriginal Place Name</u>
129	Ti Tree (Taylors) Lake

**If your search shows Aboriginal sites or places what should you do?**

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(https://www.legislation.nsw.gov.au/gazette\)](https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

**Important information about your AHIMS search**

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref/PO Number : Suffolk

Client Service ID : 904204

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
04-5-0079	B.H. 5;	AGD	56	559220	6824650	Open site	Valid	Artefact : -	Isolated Find	1980,102417,104488
	<u>Contact</u>	<u>Recorders</u>	Ms.Jacqueline Collins					<u>Permits</u>		
04-5-0113	Stone Circles;	AGD	56	558110	6825680	Open site	Valid	Stone Arrangement : -	Stone Arrangement	98714,102417
	<u>Contact</u>	<u>Recorders</u>	M Wheeler					<u>Permits</u>		
04-5-0141	Oceanside Place;	AGD	56	559550	6826330	Open site	Valid	Artefact : -	Restricted Site	97556,98714
	<u>Contact</u>	<u>Recorders</u>	Ms.Jacqueline Collins					<u>Permits</u>	1141	
04-5-0115	Caves;	AGD	56	558250	6825650	Closed site	Valid	Artefact : -	Shelter with Deposit	98714,102417
	<u>Contact</u>	<u>Recorders</u>	M Wheeler					<u>Permits</u>		
04-5-0076	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			1980,97554,98714
	<u>Contact</u>	<u>Recorders</u>	Ms.Jacqueline Collins					<u>Permits</u>		
04-5-0080	B.H. 6;	AGD	56	559180	6824450	Open site	Valid	Artefact : -	Open Camp Site	1980,102417,104488
	<u>Contact</u>	<u>Recorders</u>	Ms.Jacqueline Collins					<u>Permits</u>		
04-5-0114	Grooves in rocks	AGD	56	558250	6825600	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	98714,102417
	<u>Contact</u>	<u>Recorders</u>	M Wheeler					<u>Permits</u>		

### \*\* Site Status

**Valid** - The site has been recorded and accepted onto the system as valid

**Destroyed** - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.

**Partially Destroyed** - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground

**Not a site** - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

Report generated by AHIMS Web Service on 25/06/2024 for Penny Mccardle for the following area at Lat, Long From : -28.705, 153.5855 - Lat, Long To : -28.6862, 153.6164. Number of Aboriginal sites and Aboriginal objects found is 7

This information is not guaranteed to be free from error omission. Heritage NSW and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

