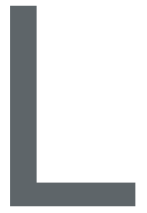


# Archaeology Report





**Archaeological Report for the Eastern Leases Project**

Prepared for Hansen Bailey on behalf of  
South32 Pty Ltd

By

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May 2015

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Figure 7 – Archaeological Sites – Northern Eastern Lease

Figure 8 – Archaeological Sites – Southern Eastern Lease

## Glossary and Abbreviations

AHD	Australian Height Datum
ALC	Anindilyakwa Land Council
Amphora	Shape of an ancient Greek jar or vase with a large oval body and narrow cylindrical neck
Anthropomorph	A stylised human figure
ALRA	Aboriginal Land Rights (Northern Territory) Act 1976
ATSIHP Act	Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)
Burra Charter	Australia ICOMOS Charter for Places of Cultural Significance. The Burra Charter defines the basic principles and procedures to be followed in the conservation of Australian heritage places
Chert	A sedimentary rock consisting entirely of silica. Considered a hard, dark, opaque rock with an amorphous or microscopically fine-grained texture
Cryptocrystalline	Having a rock texture which is made up of minute crystals
Cultural significance	Refers to aesthetic, historic, spiritual, social or scientific value for past, present or future generations. Cultural significance is embodied in the place itself, its meanings, setting, fabric, use and associations.
Debitage	Waste material produced in the making of prehistoric stone implements. Term used to refer to the sharp-edged waste material left over when someone creates a stone tool.
DLPE	NT Department of Lands, Planning and Environment
DotE	Department of the Environment
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)
EL	Eastern Lease
EIS	Environmental Impact Statement
ELR	Exploration Licence in Retention
ICOMOS	International Council on Monuments and Sites
Heritage Act	Northern Territory Heritage Act (NT)
Lenticular	Biconvex in shape
Macassan	Trepang fisherman from Sulawesi who fished north Australia seasonally between 1700 and 1900
Manuport	A natural object which has been moved from its original context by human agency but otherwise remains unmodified
Moiety	Social divisions or 'lodges' in Warnindilyakwa society denoting special obligations and responsibilities for country and ritual.
NT Heritage Branch	Heritage Branch of the NT Department of Lands, Planning and Environment
Palimpsests	A manuscript or piece of writing material on which later writing has been superimposed on effaced earlier writing.
Physiography	Physical geography
Pisolithic	Having small, more or less spherical particles, typically found in limestones and dolomites
RNE	Register of the National Estate provides a list of natural, Indigenous and historic heritage places. Covering all Australian States, Territories and Australian External Territories it provides the best overall picture of heritage listings across Australia.

Taphonomy	Study of the transition of remains, parts, or products of organisms and artefacts, from the biosphere, to the lithosphere
Tor	A Large free standing rock outcrop which rises abruptly from the surrounding landscape
UNESCO	United Nations Educational, Scientific, and Cultural Organization



# 1 Introduction

## 1.1 Background

SHIM Consulting Pty Ltd was commissioned by Hansen Bailey on behalf of BHP Billiton Manganese Australia Pty Ltd to complete an archaeological assessment as part of the Environmental Impact Statement (EIS) for the Eastern Leases Project (the project).

## 1.2 Project Description

The project proponent is the Groote Eylandt Mining Company Pty Ltd (GEMCO), which has two shareholders, namely South32 Pty Ltd (South32) (60%) and Anglo Operations (Australia) Pty Ltd (40%). BHP Billiton Manganese Australia Pty Ltd was previously a shareholder in GEMCO, however its interest is now represented by South32.

The project involves the development of a number of open cut mining areas to the east of the existing GEMCO manganese mine on Groote Eylandt in the Gulf of Carpentaria, approximately 650 km south-east of Darwin (Figure 1). The proposed additional mining areas are located on the Eastern Leases, which are two Exploration Licences in Retention (ELRs). ELR28161 is termed the Northern Eastern Lease (Northern EL) and ELR28162 is termed the Southern Eastern Lease (Southern EL).

The Eastern Leases are located 2 km east of the existing GEMCO mine at the closest point. The township of Angurugu is located approximately 6 km to the north-west of the Eastern Leases, and is the closest residential community. The Eastern Leases are located on Aboriginal land, scheduled under the *Aboriginal Land Rights (Northern Territory) Act 1976*. The land within the Eastern Leases comprises natural bushland, with the Emerald River and a small section of the Amagula River traversing the Northern EL and Southern EL respectively.

The project involves:

- Developing a number of open cut mining areas (termed “quarries”) within the Eastern Leases and mining manganese ore by the same mining methods that are in use at the existing GEMCO mine;
- Constructing limited mine related infrastructure in the Eastern Leases (dams, water fill points, crib hut, truck park up areas and laydown storage areas); and
- Transporting the ore by truck on a new haul road to be constructed between the existing GEMCO mine and the Eastern Leases.

Ore will be processed at the concentrator at the existing GEMCO mine and the concentrate would be transported to market via the existing port (Figure 2). No changes or upgrades to the existing GEMCO mine facilities are required as a result of the project. Ore mined from the Eastern Leases will supplement production from the existing GEMCO mine, but the project will not increase GEMCO’s annual production rate of approximately 5 Million tonnes per annum of product manganese. The EIS does not include any assessment of operations within the existing GEMCO mine, given that these operations are subject to existing environmental approvals, and will not be altered by the project.

The project site for the purposes of the EIS is the Northern and Southern ELs and the new section of haul road linking the Eastern Leases to the existing GEMCO mine. The project site is approximately 4,600 ha.

### 1.3 Study Objectives

This report provides a summary of the Indigenous and non-Indigenous archaeology of the project site, and has been prepared for inclusion into the EIS for the project. This report aims to provide the following:

- A description of the archaeological setting of Groote Eylandt and the project site;
- A summary of the methodology and results of an archaeological survey of the project site;
- An assessment of the significance of the archaeological finds based on the cultural values of the Burra Charter;
- An assessment of the potential direct and indirect impacts of the project on the archaeological finds;
- A summary of potential mitigation and management measures to avoid significant impacts on archaeological finds; and
- Address the requirements of the EIS Terms of Reference (Northern Territory Environment Protection Authority, September 2014), specifically matters of historic and archaeological significance.



## **2 Physical Environment**

### **2.1 Setting**

Situated in the west of the Gulf of Carpentaria with a land area of 2,285km<sup>2</sup>, Groote Eylandt is Australia's fourth and the Northern Territory's second largest island. It is part of an archipelago that is a geological extension of Arnhem Land, with which it shares landscape features as well as faunal and floral assemblages (Pietsch et. al. 1997, Lynch & Wilson 1998).

The physiography of most of the island is rugged, with over half of its area including most of the central and eastern sections dominated by deeply dissected plateaux of sandstone hills up to 120m Australian Height Datum (AHD). The sandstone plateaux largely comprise proterozoic Dalumbu sandstone which has been deeply incised to create valleys and gorges. Even the lower, more western extensions of the formation exhibit differential weathering of bedding planes, leading to the formation of rock shelters and overhangs.

In the west, coastal plains comprise sandy substrates with only rudimentary soil development. The coastal plains extend up to 15km inland at their widest point near Angurugu. These plains rarely exceed an altitude of 17m AHD and are dominated by Eucalypt, Acacia and Melaleuca woodlands.

The southern and eastern coastal margins of Groote Eylandt are lined by extensive dune fields, which are greater than 10km wide in some areas.

### **2.2 Regional Geology**

Groote Eylandt was formed on a stable basement of Proterozoic quartzite. This basement quartzite forms extensive elevated outcrops in the centre of the island.

A blanket of Cretaceous marine sediments was subsequently deposited over the paleosurface of basement and reworked basement materials in the west of the island. The distribution of the Cretaceous marine sediments is generally confined to the western plains and valleys of the island. The upper Cretaceous sediments contain the manganese ore. The manganese ore is a sedimentary layer, consisting of manganese strata occurring between clay and sand beds.

Much of the Cretaceous sediment profile (including some of the manganese ore) has been extensively modified by a long period of tropical weathering (or laterisation) during the Tertiary period. This has resulted in the development of thick laterite profiles up to 25 m thick.

In summary, the surface geology of the project site broadly comprises lateritic deposits between Proterozoic basement outcrops (i.e. exposed quartzite). Localised areas of quaternary sediments are also present at the site. Figure 3 shows the surface geology of the project site.

### **2.3 Landforms**

The broad landscape features of the island include rugged sandstone plateaux and hills, sandy coastal plains with woodland, and large dune fields. These three broad landforms were refined by Lynch and Wilson (1998) using the Land Systems model developed by CSIRO (Christian and Stewart 1953, CSIRO 2014). Lynch and Wilson identified 16 Land Systems on Groote Eylandt characterised by specific associations of slope, soil and vegetation (Figure 4). Of these 16 Land Systems, five fall within the project site boundary (Figure 4), and are described by Lynch and Wilson (1998) as follows:

Bundah	Sandy colluvial footslopes below elevated quartz sandstone plateaux; Leptic and Orthic Tenosols; tall open woodland of <i>E. tetradonta</i> with <i>E. miniata</i> , <i>Callitris intratropica</i> and <i>E. polycarpa</i>
Effington	Level to gently undulating alluvial floodplains; Kandosolic, Tenosolic and Chromosolic Redoxic Hydrosols; mid high open woodland of <i>Melaleuca viridiflora</i> and <i>E. polycarpa</i>
Groote	Rugged dissected plateaux on quartz sandstone; bare rock and Leptic Rudosols; mid high to tall open woodland of <i>E. tetradonta</i> and <i>E. ferruginea</i>
Queue	Gently undulating sandplains; Orthic Tenosols; tall open woodland of <i>E. tetradonta</i> and <i>E. miniata</i> with <i>E. blesseri</i> and <i>Callitris intratropica</i>
Yarrawirrie	Level to gently undulating plains; red Kandosols and Orthic Tenosols; tall sparse shrubland to low open woodland of <i>E. tetradonta</i>

## 2.4 Climate and weather

Groote Eylandt experiences a tropical climate, which is characterised by hot humid summers during which the majority of rainfall occurs (approximately 97% of the annual rainfall), and dry winters. Rainfall on Groote Eylandt is often intense, with significant falls derived from tropical cyclones. The Gulf of Carpentaria typically experiences an average of 3 cyclones per year. The island experiences annual average rainfalls of 1,326.4 mm, with annual average temperatures typically ranging from 32.1°C to 20.7°C.

The prevailing winds in the region are from the east, however, during the active monsoon season (from November to April) north-westerly winds draw in moist air from the ocean, leading to heavy rainfall periods. The island predominantly experiences moderate winds, with these occurring 45.4% of the time, with strong winds occurring for 11.5% of the year.

This strong pattern of weather has influenced land use and occupation patterns of Indigenous Australians for millennia and has implications for the nature and distribution of archaeological sites (Levitus 2009).

## **3 Legislation**

### **3.1 Cultural Heritage**

Several pieces of legislation establish lists or registers which offer protection to places and objects that are considered to have cultural values and are therefore provided statutory protection. The location of the Eastern Leases Project means that it is subject to both Australian and Northern Territory legislation and the registers established therein. The Australian government registers are established in the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Northern Territory *Heritage Act* covers all places and objects of heritage value in the Territory.

#### 3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth EPBC Act provides for the protection of a hierarchy of heritage places and objects in three Registers. These include the World Heritage Register, the National Heritage Register and the Commonwealth Heritage Register.

##### World Heritage Register

The World Heritage Register was established by UNESCO and has enabling legislation in Australia. The EPBC Act took on this function in 1999 and is Australia's mechanism for protecting Australia's places of outstanding universal value. The World Heritage Register is administered by UNESCO with the Australian Government Department of the Environment (DotE) processing nominations for listing or delisting, developing management plans, and monitoring compliance with those plans. An action that will have an impact upon a World Heritage Property triggers the EPBC Acts processes which require the matter be referred to the Minister.

There are no places listed on the World Heritage Register in the vicinity of the project site. The only two places listed on the World Heritage Register within the Northern Territory, are Kakadu (over 400 km from the project site) and Uluru/ Kata-Tjuta National Parks (over 1,300 km from the project site).

##### National Heritage Register

The National Heritage Register provides protection to places of outstanding natural, Indigenous or historic heritage value to Australia. Items nominated to the Register are assessed by the Australian Heritage Council and recommended to the Minister for the Environment for listing. The Register is administered by DotE. Listing on the National Register requires that all matters potentially affecting a place or object be referred to the Minister. There are no places listed on the National Heritage Register on Groote Eylandt.

##### Commonwealth Heritage Register

The Commonwealth Heritage Register is a list of places and objects with natural, Indigenous and historic values which are either entirely within a Commonwealth area, or outside the Australian jurisdiction and owned or leased by the Commonwealth or a Commonwealth Authority. The Register is administered by DotE and any action regarding an item on the Commonwealth Heritage Register triggers the approval process established under the EPBC Act. There are no places listed on the Commonwealth Heritage Register on Groote Eylandt.

### 3.1.2 The Northern Territory Heritage Act

The Northern Territory *Heritage Act* provides protection for the following two classes of cultural heritage:

- All places and objects formally assessed and added to the NT Heritage Register; and
- All Aboriginal and Macassan places and objects (whether previously documented or not), as listed in the Aboriginal and Macassan Sites Database.

The NT Heritage Register and the Aboriginal and Macassan Sites Database are maintained by the Heritage Branch of the NT Department of Lands, Planning and Environment (DLPE). Places on the NT Heritage Register are formally assessed by the Heritage Council and included on the Register by the Minister and may include natural features or places of historic, Aboriginal or Macassan cultural features. To date, 82 sites on Groote Eylandt have been added to the Aboriginal and Macassan Sites Database. None of these sites are located within the project site.

With respect to Aboriginal or Macassan sites, it is an offence to damage or destroy any item that meets the definition of an Aboriginal or Macassan place or object, as provided within the legislation, regardless of whether or not it has been identified and added to the Register. Section 72 of the *Heritage Act* requires that a Work Approval be obtained by DLPE prior to any disturbance of a heritage place or object as declared or protected under the *Heritage Act*. The requirement for any work approval under the *Heritage Act* to be obtained for the project is discussed in Section 10.1.

### 3.1.3 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHP Act) provides protection for areas and objects that are of particular significance to Aboriginal and Torres Strait Islander people. The ATSIHP Act puts in place a system that provides an opportunity for Indigenous Australians to seek the protection of items of cultural heritage that they believe are under immediate threat, including removal, sale or export. The Act does not establish a formal register. The ATSIHP Act allows the Environment Minister, on the application of an Aboriginal person or group of persons, to make a declaration to protect an area, object or class of objects from a threat of injury or desecration.

### 3.1.4 Sacred Sites

Although sacred sites are not the subject of this survey, any archaeological sites found that may be a part of a sacred site, will be protected by the following legislation:

#### *Aboriginal Land Rights (Northern Territory) Act 1976*

The Commonwealth *Aboriginal Land Rights (Northern Territory) Act 1976* (ALRA) provides protection for all sacred sites which are “sacred to Aboriginals or [are] otherwise of significance according to Aboriginal tradition, and includes any land that, under a law of the Northern Territory, is declared to be sacred to Aboriginals or of significance according to Aboriginal tradition”.

#### *Northern Territory Aboriginal Sacred Sites Act 1989*

The *Northern Territory Aboriginal Sacred Sites Act 1989* establishes an Authority and a process for the day to day documentation and management of sacred sites that are protected under the ALRA.

### **3.2 ICOMOS Burra Charter**

The Australia ICOMOS Charter for Places of Cultural Significance, the "Burra Charter", is the national (and internationally recognised) standard of practice for those who provide advice on, make decisions about, or undertake works to places of cultural significance, including owners, managers and custodians. The Charter sets out definitions and processes for making decisions about all of the types of cultural heritage that comprise the Australian heritage estate and is based on the knowledge and experience of Australia ICOMOS members.

Importantly the Burra Charter provides definitions for important concepts such as cultural significance and provides a guide to making decisions which should be based, first on a determination of what the cultural significance of a place is.

The Charter sets out a rationale for the conservation of places of cultural significance; "to enrich people's lives, often providing a deep and inspirational sense of connection to community and landscape... Places of cultural significance reflect the diversity of our communities, telling us about who we are and the past that has formed us and the Australian landscape. They are irreplaceable." This view is consistent with the position of the Anindilyakwa Land Council (ALC) with respect to the cultural heritage of the islands and its people (H. Bland, pers. comm.).

## 4 Cultural Setting

### 4.1 Anindilyakwa Land Council (ALC)

Under ALRA, Land Councils are statutory bodies which represent the interests of Aboriginal persons in relation to their land. The ALC is the Land Council for the Groote Eylandt Archipelago.

The ALC is the principal voice of the Aboriginal community on Groote Eylandt, and is responsible for supporting the protection of sacred sites on the Groote Eylandt Archipelago.

In relation to GEMCO's operations, the ALC is the conduit for the distribution of relevant information between GEMCO and Traditional Owners on Groote Eylandt.

### 4.2 Traditional Owners

The Traditional Owners of the Groote Eylandt Archipelago are an amalgamation of two cultures, the *Warrindilyakwa*, and the *Nunggubuyu* (ALC 2014). The Traditional Owners are made up of 14 clan groups, divided into two moieties, united by a common culture of kinship, ceremony and language. Both cultures speak Anindilyakwa as their first language, and the land, people and culture are also referred to by this term.

Advice from the ALC indicates that the Eastern Leases are located within land belonging to the following five clan groups:

- Maminyamanja;
- Wurrawilya;
- Amagula;
- Wurramara; and
- Mamarika.

In addition, the Lalara clan is the Jungai (spiritual leader) for the area in which the Eastern Leases are located.

The remote location of the Groote Eylandt Archipelago has fostered a strong attachment to traditional culture among the Anindilyakwa people. Almost all Anindilyakwa people speak the language as their first (and sometimes only) language. Ceremony and spirituality play a central role in Anindilyakwa life on the Groote Eylandt Archipelago and traditional practices and cultural norms are still prominent on the Archipelago. Anindilyakwa people are proud and protective of their culture.

## 5 Cultural Context

### 5.1 Search of Cultural Heritage Databases

Searches of cultural heritage databases were conducted to establish a background for this survey, and are provided in Table 1. The databases searched include:

- The World Heritage Register;
- The (Australian) National Heritage Register;
- Commonwealth Heritage Register;
- The NT Heritage Register; and
- The Aboriginal and Macassan Sites Database.

There are no places within the project site boundary that are listed on these cultural heritage registers.

There are no places listed for Groote Eylandt on the World Heritage Register, the Australian National Heritage Register, or the Commonwealth Heritage Register.

The nearest listed places to the project site are the Angurugu Mission House #2 and the Angurugu Heritage Precinct (both listed on the NT Heritage Register). Both sites are located in Angurugu, over 6 km to the north west of the project site (Figure 2).

There are a number of Aboriginal and Macassan sites listed for the island (see below).

**Table 1. Sites on Heritage Registers in force in the Northern Territory**

Register name	Legislation	Administering Authority	Purpose	Number of Sites on Groote Eylandt	Number of Sites in the Eastern Leases
World Heritage Register	EPBC Act	DotE	Identification and protection of outstanding universal value	Nil	Nil
(Australian) National Heritage Register	EPBC Act	DotE	Identification and protection outstanding natural, Indigenous or historic heritage value to the nation.	Nil	Nil
Commonwealth Heritage Register	EPBC Act	DotE	Identification and protection of natural, Indigenous and historic heritage places which are either entirely within a Commonwealth area, or outside the Australian jurisdiction and owned or leased by the Commonwealth or a Commonwealth Authority	Nil	Nil
NT Heritage Register	NT <i>Heritage Act</i>	NT DLPE [Heritage Branch]	Provides details of all declared heritage places and objects, as well as those subject to provisional protection under the NT <i>Heritage Act</i> .	2	Nil



Register name	Legislation	Administering Authority	Purpose	Number of Sites on Groote Eylandt	Number of Sites in the Eastern Leases
Aboriginal or Macassan Sites Database	NT <i>Heritage Act</i>	NT DLPE [Heritage Branch]	Protection of all places and objects that relate to the past human occupation of the Territory by Aboriginal or Macassan people and were modified by that occupation.	82	Nil
Register of the National Estate (discussed further in Section 5.1.1)	No <i>Legislation</i>	DotE	Identification of heritage values. This register has been archived and is only useful as an indicator that a place may have heritage values	5	Nil

### 5.1.1 Register of the National Estate

A search of the Register of the National Estate (RNE) was also conducted. The RNE is a legacy of an earlier national legislative regime, and was closed in 2007. The RNE contains a large number of sites that, although are not afforded any statutory or legal protection, are maintained as a 'flag' for consideration if any action or development is proposed which may impact a significant site. The RNE has since been replaced by the Australian National Heritage Register and the Commonwealth Heritage Register.

There are five sites noted as 'indicative places'<sup>1</sup> on the RNE. These are:

- The Emerald River Mission (now Yedikba Outstation), the Emerald River Sawmill Site and the Emerald River Cemetery (both located in the vicinity of the Emerald River Mission), are all located over 2 km to the west of the project site (Figure 2); and
- Fred Gray's House and the Umbakumba Church. Both sites are located at Umbakumba, over 34 km from the project site (Figure 1).

Angurugu is noted as 'registered'<sup>2</sup> on the RNE, and is located over 6 km to the north west of the project site. As indicated above, these sites do not have any legal status or protection.

## **5.2 Previous Archaeological Work**

### 5.2.1 Overview of Previous Studies

There have been seven studies of the archaeology of the Groote Eylandt Archipelago prior to the current study:

#### Flinders, 1802

Matthew Flinders first documented Aboriginal art in a rock shelter on Chasm Island (Figure 1), off the north coast of Groote Eylandt, in 1802 (Flinders 1814:188).

<sup>1</sup> Indicative Place: A place in which data was provided to or obtained by the Australian Heritage Council or the former Australian Heritage Commission for a particular place, and was entered into the RNE database, however a decision on whether the place should be entered in the RNE itself was not made before the RNE was closed in 2007.

<sup>2</sup> Registered: A place entered in the RNE prior to its closure in 2007. The existence of an entry for a place in the RNE does not in itself create a requirement to protect the place under Commonwealth law. Nevertheless, information in the register may continue to be current and may be relevant to statutory decisions about protection.

Flinders describes the art at some length and sets out an image that is immediately recognisable to us today as a feature that is entirely consistent with images occurring in rock shelters throughout the Groote Eylandt Archipelago.

“In the deep sides of the chasms were deep holes or caverns, undermining the cliffs; upon the walls of which I found rude drawings, made with charcoal and something like red paint upon the white ground of the rock. These drawings represented porpoises, turtle, kanguroos, and a human hand...[the] kangaroo, with a file of thirty-two persons following after it. The third person of the band was twice the height of the others, and held in his hand something resembling the *whaddie* or wooden sword of the natives of Port Jackson; and was probably intended to represent a chief.”

### McCarthy, 1948

Fred McCarthy from the Australian Museum in Sydney was a member of the American Australian Scientific Expedition to Arnhem Land in 1948 (McCarthy and Setzler 1960). As part of a multi-disciplinary team he documented 45 rock shelters with art on Chasm Island and Groote Eylandt, including the 'Cave Paintings' site which is sign posted and interpreted for tourists, near Angurugu. With Frank Setzler from the Smithsonian Institution he excavated a number of sites including Macassan graves on Winchelsea Island (off the northern coast of Groote Eylandt) and a shell midden on Hempel Bay (on the north eastern coast of Groote Eylandt) (McCarthy and Setzler 1960). McCarthy attempted to sequence the art based on the style and nature of the ochres and their colours. While he found that motifs in silhouette and with striped infill tended to be at the bottom of the sequence (oldest) there was no chronological structure in the application of colour.

### Macknight, 1966

Campbell Macknight recorded a suite of sites on the coast of the archipelago as part of his major study into the processing of trepang (sea cucumber) by seasonal Macassan visitors to the north Australian coast (Macknight 1969, 1976). He excavated trepang processing sites on islands he identified as “Yilakwamanja Island”<sup>3</sup> and “Yarranya Island” (Figure 1) to the north of Groote Eylandt in 1966-67.

### Chaloupka, 1988

George Chaloupka from the Northern Territory Museum and Art Gallery in Darwin recorded 169 sites around the coast of the archipelago in 1988 (Chaloupka 1989). Chaloupka's report contains numerous illustrations of art motifs consistent with the marine habitats of the Groote Eylandt Archipelago. Chaloupka's report does not provide map coordinates for sites, but rather general descriptions of their locations.

### Clarke, 1994

In the 1990's a more comprehensive archaeological assessment of Groote Eylandt was undertaken by Annie Clarke (Clarke 1994). Clarke conducted surveys to identify suitable sites containing cultural deposits that might provide an archaeological sequence to better understand the occupation of the region over time.

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<sup>3</sup> It is not clear from Macknight's work as to which island within the Groote Archipelago is “Yilakwamanja Island”, as there is no current island with this name. It is possible Macknight was referring to Connexion Island (Yilikamurra), or Bickerton Island (Yalyukwumanja).

Clarke excavated 18 sites and used the archaeological evidence obtained to develop a tripartite sequence of land use for Groote Eylandt, namely of the Pre-macassan, Macassan and Missions:

- The Pre-macassan Period (Prior to 1700) extends back at least 2000 years and included a:

"broadly based, seasonal subsistence and settlement system. Food was obtained from both terrestrial and marine habitats...with a greater emphasis on terrestrial fauna. Turtles and dugong were hunted on an opportunistic basis...A wide range of shellfish species were collected from all available habitats in the immediate vicinity of campsites. Trips across the sea between Groote Eylandt, Bickerton Island and the mainland were infrequent occurrences, and only occurred when sea conditions were particularly calm." (Clarke 1994; 97-98).

- The Macassan Period (1700 -1921) was associated with the seasonal forays of Indonesian trepang fisherman and led to a change in behaviour of the island's inhabitants:

"There was an increase in exploitation of marine mammals (turtle [sic] and dugong) facilitated by the introduction of the dugout canoe, metal artefacts and harpoons...There was a decrease in the frequency of the occupation of inland sites ... as a result of ... reorientation towards the exploitation of marine resources, both for subsistence purposes and to stockpile commodities for trade with Macassans. ... The introduction of dugout canoes also facilitated an increase in trade with the mainland. This is seen in an increase in imported ochres and stone". (Clarke 1994; 98).

- The Mission Period (1921 – 1966) saw the establishment of an Anglican mission near Yedikba on the Emerald River in 1921. The mission was relocated to Angurugu during the Second World War. An additional mission site was established in Umbakumba following the end of the Second World War. The missions had a significant impact on the Aboriginal people, where subsistence became:

"based on introduced food items, supplemented by bush foods. Staple bush foods, such as cycad, which require a lot of processing are gradually replaced by flour-based products such as damper and bread. In the early mission period there is a greater reliance on bush foods because of the unreliability of the Mission food supplies. The areas of the island most distant from the mission and Umbakumba are abandoned first. In the early days of the Mission settlement people make frequent trips back into their traditional country. With prolonged contact, people become increasingly sedentary and settle permanently at the Mission and Umbakumba. With prolonged contact people make only periodic forays into their country for traditional activities and today camping is restricted to weekends and school holidays." (Clarke 1994;99).

#### Sutton, 2014

In 2013, the ALC initiated a cultural heritage assessment of the southwest of the island. This survey (Sutton 2014) was the first systematic assessment of the archaeology of the interior of Groote Eylandt and resulted in the location of 22 sites. Predominantly rock shelters with art situated in the Groote Land System, this survey also documented two stone arrangements and a number of shell middens.

## Welch, 2013

This study was conducted contemporaneously with Sutton 2014. Welch identified 41 rock art sites in the southwest of the island that consist of naturalistic portraits of humans, plants and animals (2013:11). Welch notes that although much of the art in this survey is located on rock surfaces exposed to the weather, some panels hold superimpositions giving a preliminary impression of a possible art sequence. From this he proposed a four-part sequence of art including Archaic, Pre-Marine, Marine and Contact periods.

### 5.2.2 Location of Known Archaeological Sites

The primary set of archaeology site records for Groote Eylandt are derived from the register of Aboriginal and Macassan sites held by the Northern Territory's Heritage Branch. This register contains a total of 82 sites across the Groote Eylandt Archipelago recorded during the previous archaeological studies discussed above, principally by Clarke and Macknight. None of the sites on this register are within the project site.

This register does not contain sites recorded by Sutton (2014) or Welch (2013) which are yet to be entered into the system, nor as discussed earlier, the sites found by Chaloupka (1989). However, it is known that none of the sites found by Sutton (2014), Welch (2013) or Chaloupka (1989) were within the project site, given that these studies did not include survey of the project site.

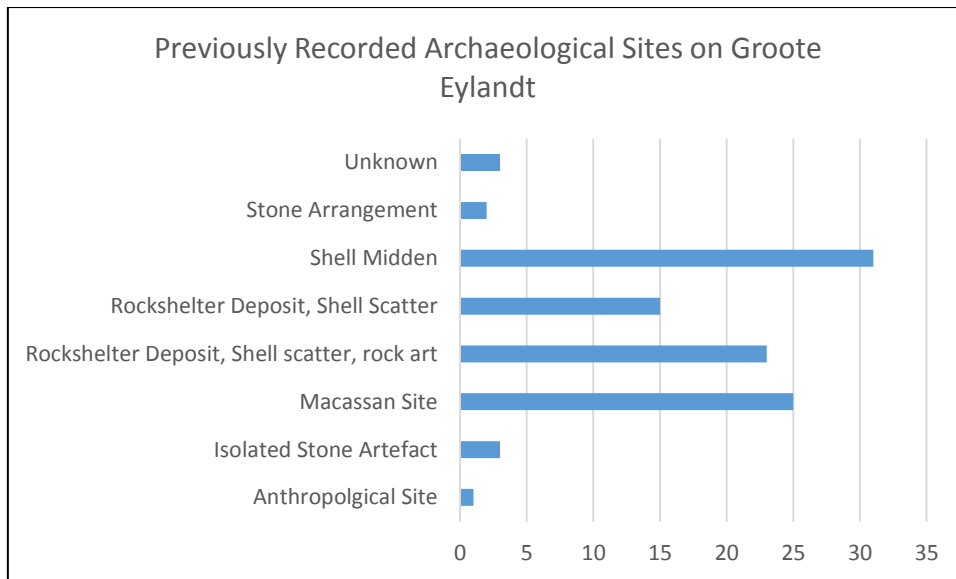
With the exception of sites recorded by Sutton (2014) and Welch (2013), most sites that have been recorded are situated in a coastal context. Prior to 2013, little survey work appears to have been conducted within the interior of the island. Further, such work as has taken place has concentrated on the north and east side of the island. The rocky outcrops of the Groote Land System typically form rock shelters and overhangs that provide the opportunity for the establishment and preservation of archaeological material. Rock shelters are favoured habitats for occupation, lending themselves to modification through art and providing convenient sediment traps for discarded stone artefacts, shell, bone and other material culture. This makes them useful in gaining a temporal understanding of the past occupation of the island.

In the case of Macknight's research, the archaeological survey was specifically targeting the remains of seafarers venturing to the Gulf of Carpentaria on a seasonal basis. Not surprisingly his surveys consistently documented situations and sites on the coast.

Perhaps reflecting the coastal orientation of the archaeological surveys of the archipelago, the range of site types is very limited. Graph 1 charts the range of sites recorded in the Heritage Branch site register and as recorded by Clarke (1994). Macassan sites<sup>4</sup> and shell middens comprise 54 percent of all sites.

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<sup>4</sup> The range of items herein designated "Macassan site" includes stone lines, smokehouse depressions, tamarind trees, burial remains and isolated artefacts; however for the purposes of this report, these distinctions are unnecessary.



**Graph 1 Types of Archaeological Sites Previously Recorded on Grootte Eylandt.**

No previous archaeological work has located any sites within the Eastern Leases project site. The nearest sites are a group of rock shelters with art recorded by Sutton (2014) near the Leske Pools swimming hole on the Amagula River approximately 2.5km south of the Southern EL (Figure 2).

## 6 Methodology

### 6.1 Site Types and Site Boundaries

Many definitions exist for what constitutes an archaeological site, but there is a trend within these to incorporate several key characteristics including i) evidence of past activity ii) preservation of that activity and iii) evidence of human modification of elements of the natural world. Articles falling within the definition are frequently the subject of research into the nature and distribution of people and ways of life in the past.

Archaeological material is legally protected in most of the world's jurisdictions and this protection brings its own set of definitions. In the Northern Territory, the *Heritage Act* provides the following set of terms for the suite of archaeological remains it protects.

In accordance with Section 6 of the *Heritage Act*:

*Meaning of archaeological place and Aboriginal or Macassan archaeological place*

- (1) An **archaeological place** is a place that:
  - (a) relates to the past human occupation of the Territory; and
  - (b) has been modified by the activity of the occupiers.
- (2) An **Aboriginal or Macassan archaeological place** is a place that:
  - (a) relates to the past human occupation of the Territory by Aboriginal or Macassan people; and
  - (b) has been modified by the activity of those people.

In accordance with Section 8 of the *Heritage Act*:

*Meaning of archaeological object and Aboriginal or Macassan archaeological object*

- (1) An **archaeological object** is a relic that:
  - (a) relates to the past human occupation of the Territory; and
  - (b) is in an archaeological place.
- (2) An **Aboriginal or Macassan archaeological object** is a relic that:
  - (a) relates to the past human occupation of the Territory by Aboriginal or Macassan people; and
  - (b) is:
    - (i) in an Aboriginal or Macassan archaeological place; or
    - (ii) stored in a place in accordance with Aboriginal tradition, including, for example, in an Aboriginal keeping place.

These definitions encompass the notion of natural features or objects that have been "modified by the activity of the occupiers." Similarly a contemporary text on Australian archaeological methods defines an archaeological site as "any place that contains the physical evidence of past human activity" which may include an "enormous variety of forms" (Burke and Smith 2004:63). Importantly, archaeologists have developed techniques including ethnographic observation, replication and experiment to categorically identify the key element of human modification of the natural world. For example, more than 100 years of extensive archaeological research into stone artefacts has been able to establish a clear and demonstrable separation of natural and archaeological features, in all their "enormous variety of forms" (Dibble & Whittaker 1981; Shipman & Rose 1988). This is an important consideration in the current study as numerous items appear in the landscape that appear to mimic archaeological material, but are in fact natural features (Sutton 2014:27).

In addition to skill in defining artificial from natural features, archaeologists also make distinctions between dense, localised concentrations of archaeological material and sparsely distributed background materials. Dense localised concentrations of artefacts and artificial features are

nominated as 'sites' while the general distribution of material over a landscape is called 'background scatter'. The definition of a 'site' therefore is a relative concept. The determination of the existence of 'sites' versus 'background scatter' is important in understanding past patterns of land use, human adaptation to climatic variation and cultural change through space and time. Different analytical approaches are applied to sites and background scatters, and efforts to record all traces of archaeology are therefore crucial. (Foley 1981; Burke and Smith 2004:220). Consequently, archaeologists commonly seek to understand the 'background' archaeological material in order to first determine what constitutes a site, and second, to gauge what archaeological sites or features might be considered regionally significant. This context-dependent assessment is particularly relevant for the current survey where archaeological assessment has been limited to coastal areas and virtually no extensive surveys of terrestrial habitats have been undertaken (see Faulkner & Clarke 2004).

As well as variations in the distribution of archaeological remains due to prehistoric human behaviour, variations in geomorphology (the characteristics, origin and development of landforms) and taphonomy (the transition of remains, parts, or products of organisms and artefacts, from the biosphere, to the lithosphere) can both have a direct impact on the distribution of archaeological remains that also needs to be considered in any analysis.

For example, soil type can have a marked impact upon the preservation of sites or background scatters on the land surface. Cracking clays or self-mulching soils that have high internal mobility tend to disaggregate materials deposited on the land surface. Similarly, very sandy soils with high bioturbation<sup>5</sup> (a feature of much of the study area) will tend to distribute archaeological material in the soil profile rather than on the surface. By contrast deflating land surfaces tend to aggregate artefactual material on the surface, amassing materials that may have been deposited over long temporal spans to create extensive scatters of archaeological remains.

Taphonomy is specific to the archaeological, palaeontological and forensic sciences studying of the remains of the past. It is generally defined as the study of the 'laws of burial'. It includes the study of the soil characteristics mentioned above, but also other elements such as soil chemistry, geomorphology as well as the material nature of the archaeological objects themselves. Acidic soils for example tend to be very poor in the preservation of bone and organic material. On the other hand, sites that contain large amounts of shell will have alkaline qualities due to the presence of high levels of calcium carbonate and will tend to preserve bone etc quite well. In some instances the chemistry of the artefacts themselves can lead to their chemical weathering within the soil profile leading to their eventual destruction (Hiscock 1985).

Archaeologists also tend to seek out those geomorphological situations that tend to preserve archaeological material. Caves and rock shelters are the best known examples. These unusual landscape features often create sediment traps that concentrate archaeological material into a small area. The accumulation of sediment preserves artefacts, charcoal and organic remains largely in their primary context. Continuing sediment deposition creates new surfaces that are occupied and the platform for further discarded archaeological materials. The fact that these features provide shelter from the elements means that they are also highly favoured occupation areas for humans and that they are always a priority for archaeological surveys.

In addition to rock shelters, shell middens (for the reasons indicated above) and areas of sediment deposition such as river deltas and confluences are all considered opportune areas for archaeological surveys because of the natural features' propensity to conserve archaeological material.

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<sup>5</sup> Disturbance or turning of soil by biological agents, from microbes and invertebrates to small and medium vertebrates such as lizards and bandicoots.



According to Bird and Hallam (2006:11) there are areas of the Australian environment that should be considered as an integrated cultural landscape where there are local variations in the density of cultural material; but the distribution of cultural material is effectively continuous. The term or concept “site complex” is used in this study to group a number of site features owing to the high density of archaeological materials in particular geomorphologic zones. For instance, around saline and freshwater drainage catchments, the density of archaeological materials may be such that grouping these materials would be a more efficient method to deal with the management of the cultural heritage. A site complex in this report does not necessarily imply a common temporal or occupational linkage between the sites, however it defines sites that are linked by a geomorphologic environment and erosion landscape.

Current best-practice according to McDonald (2005:172), incorporates assessing archaeological traces in the context of a whole-of-landscape approach rather than a series of disconnected and individual sites. This holistic approach recognises that multiple archaeological features will be present in the landscape and that those features will be functionally and temporally related to an ancient landuse patterns imbued with cultural meaning. Previously archaeology and cultural heritage management focussed on the discrete ‘site’, omitting the importance of the landscape context and the scientific value of the ‘background’ to preserve a place’s cultural heritage. This new approach, which considers the importance of a site’s setting and any background material, also conveniently fits with Aboriginal world views which recognise geographic separation, but only within the context of the interconnectedness of the land, the travels and actions of ancestral beings and current human activity (Bird Rose 2000).

In northern Australia, these archaeological traces can be categorised into a range of types, discussed further in Section 6.2.

## 6.2 Archaeological Site Types in Northern Australia and Groote Eylandt

### 6.2.1 Summary of Site Types in Northern Australia

Over the last 200 years of archaeological survey and assessment, a large suite of site types have been documented in northern Australia, and more specifically in the Northern Territory. These site types are listed in Table 2.

**Table 2: Summary of Archaeological Site Types found in Northern Australia**

<b>Site Type</b>
<p><b>Artefact Scatters</b></p> <p>These may contain flaked or ground artefacts and hearthstones. Artefact scatters may occur as surface scatters of material, as stratified deposits where there have been repeated occupations, or as knapping floors (see below). These scatters do not necessarily imply that prehistoric people actually camped on the site; rather, they may only indicate that some type of activity was performed there. The rock that is the source material for the artefacts may be found on-site (in which case the site may be characterised as a quarry or procurement site - below) or may be transported to the site. Rock is usually transported after receiving some modification. These artefacts may be used repeatedly during their transport from the quarry to their final discard site, reducing in size along the way. Sites that are a long way from a source will tend to have small artefacts, few artefacts or both (Byrne 1983).</p>

<p><b>Site Type</b></p>
<p><b>Knapping Locations</b></p> <p>These are discrete scatters of artefacts, anywhere in the landscape, resulting from stone being worked or reduced at that spot. The criteria for a knapping floor are that the original block of stone can be at least partially reconstructed from scattered flaked stone pieces (Hiscock and Mitchell 1993). A knapping floor exists as a feature within the context of an open site or archaeological deposit. However there are certain methodological problems in identifying such features arising from post-depositional processes. High levels of soil disturbance by biological processes can disaggregate knapping locations.</p>
<p><b>Stone Quarries</b></p> <p>These are sites where stone for flaked or edge-ground artefacts has been extracted from an outcropping source of stone. This is a broad definition of a stone quarry and there are further subdivisions of this site type (Hiscock and Mitchell 1993). According to Hiscock and Mitchell (1993) most surface hard stone quarries have associated reduction sites (sites where artefacts were manufactured by knapping). The nature of the material being flaked may vary considerably, ranging from very hard mafic igneous rocks used in the manufacture of hatchets to fine-grained and cryptocrystalline sediments used to create sharp edges for cutting and woodworking. The key requirement these rock types have in common is their predictable conchoidal fracture. These characteristics provide for the rock to be flaked in a controlled fashion to manufacture specific functional edges on stone tools.</p>
<p><b>Stone Arrangements</b></p> <p>These can range from simple cairns (mound of stones) to more elaborate arrangements. Some stone arrangements were used in ceremonial activities and represent sacred or totemic sites. Other stone features were constructed by Aboriginal people as route markers, territory markers, and walls of huts, animal traps, hides, or seed traps. While they may be manufactured by aligning stones carried some distance to the site, more generally they are made by realigning stones strewn naturally on a rock platform or soil surface. Groote Eylandt's Dalumbu sandstone presents numerous suitable locations for the manufacture of stone arrangements.</p>
<p><b>Shell Middens</b></p> <p>These are deposits containing shells, usually in association with a source of shellfish, a beach, estuary or rocky shoreline or inland lake or river. The shells have accumulated through the repeated discard of shell remains following the exploitation of the shellfish by people. The length of time a midden was occupied and the scale of predation will affect the size of the site which ranges from thin veneers of shell or the remains of a few discrete meals, to dense shell mounds many metres thick. Previous archaeological work on the island indicates that shell middens are quite common and can be expected in coastal and riparian settings around the island.</p>
<p><b>Rock Art Sites</b></p> <p>Rock art sites typically include two main types of rock art (Clegg, 1983):</p> <ul style="list-style-type: none"> <li>- engravings and poundings – where the pattern is one of relief and the pictures were apparently produced by removing material from the rock surface; and</li> <li>- drawings, stencils and paintings – where the material was added to the rock surface.</li> </ul> <p>Rock art sites can also include wax designs.</p> <p>The previous archaeological work has focussed on rock art and a relatively large number of sites have been recorded in coastal contexts on Groote Eylandt.</p>

**Site Type****Contact Sites**

Rather than a form of site, this class refers more specifically to sites that contain materials relating to the first period of contact between indigenous Australians and foreigners. The sites contain foreign materials, such as glass, ceramics or metal that exhibit modification by Aboriginal people. Alternatively a contact site may be identified by the presence of European objects which may be unmodified but are the result of transportation to that locality by Aboriginal people. Contact sites represent the interface between Aboriginal, European and others (i.e. South East Asian peoples) during early forays to Northern Australia.

**6.2.2 Archaeological Characteristics of Groote Eylandt**

Typically, any survey for archaeological sites is likely to encounter a subset of the site types that have been identified in the wider region. Based on the studies to date, Groote Eylandt's archaeological characteristics (as outlined in Graph 1) display important differences to the archaeological characteristics of the wider Northern Territory region. Stone artefact scatters appear to be absent, and stone artefacts themselves only occur in the context of other archaeological features, such as rock shelters with art. This is unusual insofar as stone artefact scatters are the most common site type found nationally and internationally (Fagan 2001). The fact that none have been recorded on Groote Eylandt to date warrants more consideration within the context of the past lifestyles of the Anindilyakwa people.

## 7 Field Survey

A field survey was undertaken from 11 to 24 July 2014 across the Northern EL, Southern EL and the haul road corridor (Figure 2). Permission to access the project site for the purpose of undertaking field surveys was obtained from the ALC. The surveys were extensive and non-invasive, and designed to seek and document Indigenous and non-Indigenous archaeological sites and remains, including rock art.

The weather conditions at the time of the survey were dry and clear, providing optimum conditions for the survey. The last significant rains in the region were experienced in early March 2014, and therefore the vegetation was notably sparse, enabling greater visibility of ground features.

The surveys were conducted by SHIM Consulting personnel, with assistance provided by the Traditional Owners of the respective areas in which the transects occurred, including:

- Leonard Amagula;
- Rodson Amagula;
- Innes Wurramura;
- Alviston Wurrawilya;
- Ronald Wurrawilya; and
- Torrence Wurrawilya.

The assistance provided by the Traditional Owners is gratefully acknowledged. The Traditional Owners provided invaluable knowledge regarding the archaeology of the project site, and were able to offer significant insight into the local traditions, the artwork and their connections to dreamtime stories.

All site locations were recorded using a GPS set to the UTM grid and GDA94 coordinate reference system.

### 7.1 Survey Transects

Survey transects were devised prior to the field survey on the basis of the distribution of Land Systems and the location of points of access and tracks within the Exploration Leases. Some modification of the proposed transects was undertaken in the field. The surveys were conducted as pedestrian traverses, with some walking-pace vehicle traverses. Sixteen transects (approximately 100m apart for the length of the transect) were conducted within and across the various Land Systems (Lynch and Wilson, 1998) that are known to occur in the project site (Figure 5), incorporating a combination of purposive and predictive sampling transects.

Purposive sampling transects comprised an intensive assessment of those areas which, on the basis of previous archaeological studies and the experience of the project personnel, are likely to contain archaeological material (in this case, riparian habitats, escarpments and rocky outcrops). The purposive transects took into account past human lifestyles as well as consideration of taphonomy and site preservation.

Predictive sampling transects were based on a stratified random sample, designed to provide sufficient information to allow for the extrapolation of the characteristics of archaeological finds to other areas across the project site within similar Land Systems. The predictive sampling method was utilised in a previous survey of the south western corner of Groote Eylandt (Sutton 2014) which demonstrated strong patterning in the distribution of archaeological material based on Land Systems.

A summary of the transect lengths surveyed across the various Land Systems, are provided in Table 3 and shown on Figure 5.

**Table 3. Summary of Survey Transects by Land System**

Bundah	Yarrowirrie	Groote	Effington	Queue	Total
90.5 km	72.2 km	46.4 km	7.7 km	3.7 km	<b>220.5 km</b>

Approximately 220.5 km of transect alignments were surveyed across the Land Systems over 14 days, providing significant coverage of the project site.

## 8 Results

### 8.1 Overview

In total, 28 sites were located during the survey (Figure 6). These are summarised in Table 4, and described in detail in Section 8.2. There were no archaeological sites found within the proposed haul road corridors.

**Table 4. Archaeological Sites Located within the Project Site**

Archaeological Site Name	Easting	Northing	Land System	Site Description
ELS01	660216	8444073	Effington	Historic (geological survey)
ELS02	662178	8442490	Groote	Rock Shelter with Art
ELS03	662243	8447155	Groote	Rock Shelter with Art, Artefacts and Deposit
ELS04	667300	8441391	Groote	Rock Shelter with Art and Grinding
ELS05	668574	8442814	Groote	Stone Artefact Scatter
ELS06	668901	8443414	Groote	Rock Shelter with Art
ELS07	668883	8443430	Groote	Rock Shelter with Art
ELS08	668907	8443516	Groote	Rock Shelter with Art
ELS09	668960	8443577	Groote	Rock Shelter with Art
ELS10	668964	8443594	Groote	Rock Shelter with Art
ELS11	668932	8443420	Groote	Rock Shelter with Art
ELS12	668946	8443413	Groote	Rock Shelter with Art
ELS13	668964	8443619	Groote	Rock Shelter with Art
ELS14	664055	8441793	Yarrawirrie	Manuport
ELS15	668901	8443414	Groote	Rock Shelter with Art
ELN01	662788	8449590	Groote	Rock Shelter with Art and Deposit
ELN02	662768	8449580	Groote	Rock Shelter with Art
ELN03	666343	8448863	Groote	Rock Shelter with Art and Deposit
ELN04	666224	8448382	Groote	Rock Shelter with Art
ELN05	666213	8448465	Groote	Rock Shelter with Art, Artefacts and Deposit
ELN06	666230	8448368	Groote	Rock Shelter with Art
ELN07	666497	8448954	Groote	Rock Shelter with Art
ELN08	666461	8447692	Groote	Rock Shelter with Art
ELN09	666566	8448237	Groote	Rock Shelter with Art
ELN10	666547	8448259	Groote	Rock Shelter with Art
ELN11	666481	8448379	Groote	Rock Shelter with Art
ELN12	666471	8448374	Groote	Rock Shelter with Art
ELN13	666391	8448325	Groote	Rock Shelter with Art and Deposit

## 8.2 Site Descriptions

### Archaeological Site Details

**Site Name:** ELS01

**Land System:** Effington

**Site Type:** Historic Site (geological survey)

**Co-ordinates:** 660216mE, 8444073mN

#### Site Description:

A semi-circular pit on pisolithic gravel sloping north to the nearby stream. The pit and ring of spoil is 9m x 11m and approximately 30cm deep. Most of the spoil is downslope. The site appears to be the remains of some relatively recent geological sampling. The Traditional Owner accompanying the survey indicated that he had in the past been involved in excavation of similar pits in this general area, although he could not verify that he was involved in the construction of this feature.

#### Representative Photograph:





**Archaeological Site Details****Site Name:** ELS02**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 662178mE, 8442490mN**Site Description:**

A rock shelter facing north-northeast approximately 7m above the sand plain on the margins of a ridge. The shelter is 1.7m high x 3.5m wide with three panels of art. A grove of cycads starts on the lower footslopes and extends out onto the plain. Art is in red and red-orange ochres including stencils and designs with solid outlines (up to 10mm thick). Motifs include hand stencil, a painted 'footprint' (not printed) in solid red ochre and anthropomorphic figures. A prominent motif may be the profile of a bird.

The art is faded and damaged by a range of processes likely to include sheet water wash, salt deposition, insect nests and exfoliation. All art is exposed to direct sunlight at some time throughout the day.

**Representative Photographs:**

### Archaeological Site Details

**Site Name:** ELS03  
**Land System:** Groote  
**Site Type:** Rock Shelter with Art, Artefacts and Deposit  
**Co-ordinates:** 662243mE, 8447155mN

#### Site Description:

Three rock shelters facing east-southeast, situated under a large boulder or tor on a section of sandstone ridge country sloping approximately 30° to the east, and about 10m above the sand plain. The two main rock shelters are 4.5m and 3.5m wide respectively and 1.3m high. A smaller shelter connects via a narrow tunnel under the main boulder from its northern side. The floor of the main shelter is a sediment trap created by smaller boulders at and near the drip-line of the shelter. Sections of the floor of the shelter are sandy and it is likely that this forms an archaeological deposit up to 30cm deep. The site includes 3 stone artefacts of quartzite (38 x 37mm, 37 x 24mm and 22 x 10mm respectively). In addition to the stone artefacts, 7 glass artefacts deriving from at least two different bottles are scattered at the front of the main shelter.

Art is predominantly red-orange ochre and includes marine motifs, a stylised watercraft, crocodile and a series of concentric circles as well as a range of non-specific lines and polygons. Some superimposition occurs in the art.

Inside the main shelter a large round boulder displays polish on its upper surface and a series of small, irregular pits.

The art is being damaged by a range of processes likely to include sheet water wash, salt deposition, root growth, insect nests and exfoliation.

#### Representative Photographs:



Archaeological Site Details





### Archaeological Site Details

**Site Name:** ELS04  
**Land System:** Groote  
**Site Type:** Rock Shelter with Art and Grinding  
**Co-ordinates:** 667300mE, 8441391mN

#### Site Description:

Two archaeological features associated with a large tor of sandstone on a projection of low rock outcrop south of a main ridge. A grove of cypress pine lines an ephemeral creek 50m to the east. The first feature is a shallow rock shelter with some faded art in red ochre. The main art surface is a highly exposed panel of rock on a shallow sloping surface below a narrow overhang possibly caused by an exfoliation. The painting is very faded and may comprise an anthropomorph with a spear or weapon.

On the apex of the tor a small cistern-like water hole is situated in a depression between some projections of sandstone. Immediately adjacent the water hole a projection with a slope of precisely 45° has been abraded consistent with sharpening a stone tool such as a hatchet.

The art at this site is very faint and indistinct. The grinding surface is highly unusual when compared to other surfaces abraded in the course of sharpening stone tools, both in its shape and situation. Grinding surfaces are relatively rare on the western side of Groote Eylandt with only a small number of abraded materials being located in this survey or earlier work (Sutton 2014).

#### Representative Photographs:



**Archaeological Site Details**

**Site Name:** ELS05  
**Land System:** Groote  
**Site Type:** Stone Artefact Scatter  
**Co-ordinates:** 668574mE, 8442814mN

**Site Description:**

A scatter of 3 stone artefacts on an open sandy exposure between two low outcrops of Dalumbu sandstone. The outcrops comprise a low finger or extension of higher ridges of the Groote Land System. This site comprises the only artefact scatter located on the western side of Groote Eylandt. While not spectacular, this site type is rare.

The total area of the site, defined here by exposure, is 121.5m<sup>2</sup>. The maximum density of artefacts is 2/m<sup>2</sup>. All artefacts appear to be made on indurated sandstone, perhaps locally occurring case-hardened margins of angular outcrops. Flakes have clear diagnostic features (ring cracks, bulbs of percussion) (Hiscock 1984), but lack evidence of retouch. An extensive examination of the surrounding outcrop and exposure failed to identify more artefacts, or the source area from which the stones were procured.

**Representative Photographs:**

**Archaeological Site Details**

**Site Name:** ELS06  
**Land System:** Groote  
**Site Type:** Rock Shelter with Art  
**Co-ordinates:** 668901mE, 8443414mN

**Site Description:**

A rock shelter on a large tor that forms a corner of a low plateau of sandstone 70m east of a substantial stream (which contained flowing water at the time of the survey). This site is part of a complex of sites occurring along 300m of the incised margin of the sandstone plateau. The plateau ranges up to 30m above the plain and is in parts highly dissected with cavernous weathering typified by numerous shelters and overhangs.

Art occurs on a panel 2.3m high, 1.7m wide with the lowest section 0.4m above the rocky floor of the shelter. Art is in monochrome red, with different hues used in different motifs, or perhaps faded to different brands of red. The site displays a range of artistic techniques and has some superimposed motifs. The art includes motifs of macropods, animal tracks, 'starbursts', inverted balloons and hand stencils. Some items are simple outlines while others have painted infill, some striped infill and some with irregular daubed 'thumbprints'. Features of the art include particular attention to the ears of the wallabies.

The art is being damaged by a range of processes likely to include sheet water wash, salt deposition, insect nests and exfoliation. The art panel is exposed to direct sunlight.

**Representative Photographs:**



**Archaeological Site Details****Site Name:** ELS07**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 668883mE, 8443430mN**Site Description:**

An overhanging rock shelter consisting of 2 panels with art. Panel 1 motifs include hand stencils of red and orange ochre and hand prints in a pink ochre. Panel 2 motifs include depiction of an emu or large bird in red ochre with simple infill and other superimposed faded motifs requiring further interpretation. The rock shelter itself has a southwestern aspect, with Panel 1 facing south, and Panel 2 facing west. Both panels are located at northern end of the shelter. There is a possible shallow deposit in the shelter, but there is no evidence of artefacts.

Art is being damaged by salt deposition and insect nests.

**Representative Photographs:**



**Archaeological Site Details**

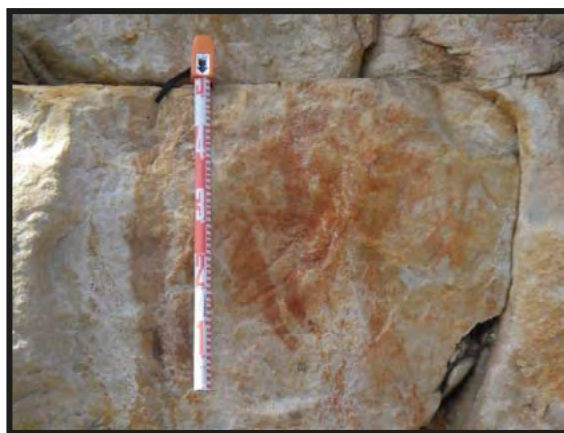
**Site Name:** ELS08  
**Land System:** Groote  
**Site Type:** Rock Shelter with Art  
**Co-ordinates:** 668907mE, 8443516mN

**Site Description:**

A tall rock shelter sloping inward to a low cave at its base with a single panel of art in red ochre. The art is indistinct, but appears to include superimposed simple line work and a stencil. The partial motif indicates that some art has likely exfoliated off the rock face. The overhang has a north-western aspect with a sandy deposit at the level of the plain, but no stone artefacts.

Art is being damaged by salt deposition and exfoliation.

**Representative Photographs:**



**Archaeological Site Details****Site Name:** ELS09**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 668960mE, 8443577mN**Site Description:**

A massive overhanging rock shelter perched some 5m above the plain and accessed through a large boulder field. The shelter faces west and has a shallow deposit at the northern end, but no artefacts.

An art panel on the ceiling of the shelter is approximately 2.5m above the shelter floor and is visible from the plain some 20m away. Art consists of stencils in red and orange with 10 hand stencils and a boomerang stencil.

**Representative Photographs:**

**Archaeological Site Details****Site Name:** ELS10**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 668964mE, 8443594mN**Site Description:**

A series of overhanging shelters facing west-southwest with art occurring on several panels exposed by blocky fracturing of the sandstone. The shelter is at the level of the plain and has a sandy deposit floor. Art is in red and orange-red ochres and displays a variety of techniques dominated by simple sub-parallel striped line work. Motifs include macropods, quadrupeds (possible dogs) and very fat ringtail possums. A series of animal motifs (possibly adult fat possums and their young) of red ochre, red outline with red line infill. The shelter has a western aspect with sandy deposit. Some superimposition occurs on at least one panel.

The art is being damaged by a range of processes which include sheet water flow and the growth of lichen.

**Representative Photographs:**

**Archaeological Site Details****Site Name:** ELS11**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 668932mE, 8443420mN**Site Description:**

A small rock shelter with a single panel of art. The shelter consists of a single animal figure executed with red-orange ochre. The figure as represented below is in profile and has a strong outline and a simple infill wash. The painting is fading due to exfoliation and has marks of mud-nest wasps.

**Representative Photographs:**

**Archaeological Site Details**

**Site Name:** ELS12  
**Land System:** Groote  
**Site Type:** Rock Shelter with Art  
**Co-ordinates:** 668946mE, 8443413mN

**Site Description:**

A small overhang 4m above the sand plain. This site is not an occupation site but has a small protected panel that can be seen from the adjacent plain. The panel contains a single motif that may represent a snake or potentially a stylised boat or maritime craft. The art is in a dark purplish ochre and is very faded in parts.

The art is being damaged by a range of processes which include sheet water wash and deposition of salts on the rock surface.

**Representative Photograph:**





**Archaeological Site Details****Site Name:** ELS13**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 668964mE, 8443619mN**Site Description:**

A large rock shelter on the margins of a low escarpment with massive columnar structure of sandstone and overhangs formed by lintel blockfall along joint fracture lines. Art consists of a range of hand stencils and motifs executed in red ochre. The art motifs appear to be material items (boomerangs) executed with simple red outline and a hatched 'thumbprint' infill. The underlying art surface is white and may have been painted to prepare the substrate. Numerous superimpositions occur, although possibly representing only two major painting episodes.

**Representative Photograph:**

**Archaeological Site Details****Site Name:** ELS14**Land System:** Yarrawirrie**Site Type:** Manuport**Co-ordinates:** 664055mE, 8441793mN**Site Description:**

A sandstone manuport situated on a broad laterite pavement in an area of low-open grassy woodland at the edge of paperbark / grass floodplain. The area is subject to seasonal inundation. The laterite pavement is exposed across an area of approximately 40m x 30m.

The manuport consists of a prominent cubic lump of white sandstone measuring 155mm x 130mm x 100mm. The manuport is likely to have originated from an outcrop of Dalumbu sandstone, with the nearest outcrops occurring to the north, south and east - a distance of between 1km to 1.6km from where it is currently positioned.

The Traditional Owner who accompanied the field survey indicated that this manuport was a 'marker stone' indicating a path or direction through the landscape.

**Representative Photographs:**

**Archaeological Site Details****Site Name:** ELS15**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 668901mE, 8443414mN**Site Description:**

A large, low shelter formed from an apparent separation of a large section of escarpment along a horizontal fault in the nearby rock outcrop. The shelter created is 1.5m high with a sub-parallel floor and ceiling. At the eastern margin of the ceiling, a single faded motif in yellow-gold ochre occurs.

The art is faded and suffering from exfoliation. There appears to be no superimposition.

**Representative Photographs:**



**Archaeological Site Details****Site Name:** ELN01**Land System:** Groote**Site Type:** Rock Shelter with Art and Deposit**Co-ordinates:** 662788mE, 8449590mN**Site Description:**

A rock shelter facing east, located about 100m to the west the Northern EL project site boundary. The rock shelter is less than 5m above the sand plain and is 2.4m deep and 3.7m wide. An archaeological deposit on the floor of the shelter slopes sharply from north to south and may be greater than 30cm deep. Art consists of three motifs including a red line, a red line with brush-like projections, and a possible hand stencil. All motifs are very faded and affected by mineral staining and exfoliation.

**Representative Photographs:**

**Archaeological Site Details****Site Name:** ELN02**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 662768mE, 8449580mN**Site Description:**

A small rock shelter facing east perched 10m above the sand plain west of the main north-south access track to the west of the project site boundary of the Northern Eastern Lease. The shelter sits on a rocky slope with some art visible up to 25m away on the plain.

The main art panel is 80cm wide and 40cm high comprising hand stencils and prints in red ochre. There is some superimposition in the motifs.

A number of larger rock shelters exist high up the slope but these have no archaeological remains.

**Representative Photographs:**

**Archaeological Site Details**

**Site Name:** ELN03  
**Land System:** Groote  
**Site Type:** Rock Shelter with Art and Deposit  
**Co-ordinates:** 666343mE, 8448863mN

**Site Description:**

A large and impressive series of rock shelters facing north west, situated 10m above the sandplain woodland. Several shelters with inter-connected platforms and deeper crevices running back into the escarpment contain areas of extensive sandy deposit, but are devoid of artefactual material or charcoal.

One small art surface contains a deranged curvilinear motif (ie. characterised by a curved line) in dark monochrome red.

**Representative Photographs:**



**Archaeological Site Details****Site Name:** ELN04**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 666224mE, 8448382mN**Site Description:**

A small rock shelter facing east-southeast in a narrow box canyon on the southern side of a ridge of Dalumbu sandstone. The rock shelter sits 6m above the sandplain and contains a range of motifs in red ochre. The art panel is 65cm wide and 40cm high and includes a hand stencil, a macropod and simple linear anthropomorph. At least two layers of superimposition occur in art that has been damaged by water wash and mineral deposition.

**Representative Photographs:**



### Archaeological Site Details

**Site Name:** ELN05  
**Land System:** Groote  
**Site Type:** Rock Shelter with Art, Artefacts and Deposit  
**Co-ordinates:** 666213mE, 8448465mN

#### Site Description:

Two large rock shelters 8m apart with rock art facing north. Both shelters are at the level of the sand plain and contain deposit, probably greater than 50cm deep.

The eastern shelter occurs at a 'corner' in the cliff face, which folds back in to the east. A range of simple, primarily red-orange ochre motifs appear in a narrow band nearly 2m wide, comprising line motifs, sets of parallel bars (approximately 3cm high), tracks and prints. This art is faded and has been impacted by mineral deposition and lichen growth.

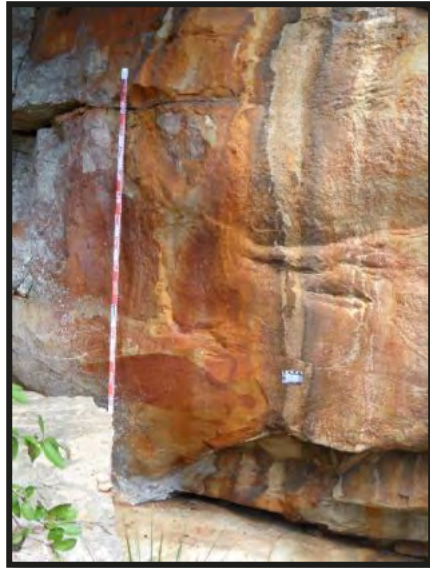
The western shelter is dominated by a large motif comprising a large anthropomorphic figure with an amphora shape, lying on its side depicted in solid red infill. This design is striking and uses the topography of the rock surface to emphasise and delimit the margins of the motif, which has a marked marine mammal 'feel', although the detail of the tail or base is covered with mineralisation and lichen. This main artwork can be seen from the sandplain and appears to overlay a very faint series of red linear designs.

Two artefacts were located at the drip-line of the western shelter. Both are essentially debitage from the artefact manufacturing process. One is a small flaked piece of pink quartzite. The second artefact, located at the margin of the western shelter is a larger flaked piece of cryptocrystalline material, possibly chert, with indications of heat fracturing.

#### Representative Photographs:



Archaeological Site Details



**Archaeological Site Details****Site Name:** ELN06**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 666230mE, 8448368mN**Site Description:**

A rock shelter in a small box canyon on the southern side of a sandstone ridge. The shelter faces north with an overhang some 3m long containing two major art surfaces and some minor areas with painting. The most prominent art surface contains an anthropomorphic figure holding a stick or spear on an angle in front of him, superimposed on a hand stencil. The figure is unusual having a large abdomen and long thin legs painted to give a rotated, slightly 3/4 perspective to the figure. The figure also has a large nose and an apparent forelock or hair dressing. This art panel also has a number of hand stencils made with different colour ochres and at least one stencil with fingers together in a symbolic gesture. Another stencil has a particularly large spatter pattern with overspray in what are relatively large 'blobs' extending well beyond the immediate motif.

Other panels of art include a solid red infill motif reminiscent of a wallaby pelt, more hand stencils as well as hand prints and numerous features that were heavily faded and not able to be identified.

The floor of the shelter is bedrock.

**Representative Photographs:**

**Archaeological Site Details**





**Archaeological Site Details**

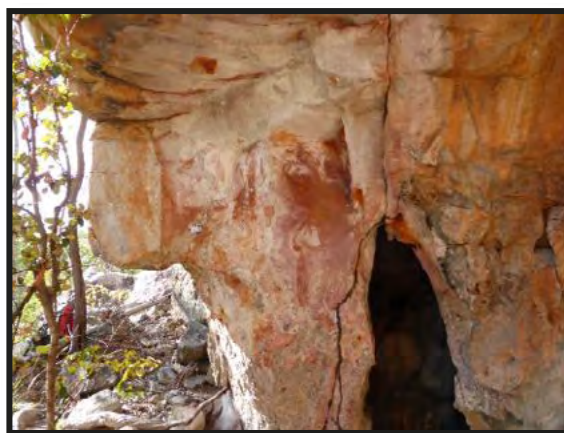
**Site Name:** ELN07  
**Land System:** Groote  
**Site Type:** Rock Shelter with Art  
**Co-ordinates:** 666497mE, 8448954mN

**Site Description:**

An uneven art panel located at the side of the entrance to a narrow cleft in a tall cliff on a prominent outlier of Dalumbu sandstone. The site is located 17m above the sand plain.

Two clefts in the rock face open into large dissolution caverns which are stained black. The art consists of bird motifs, anthropomorphic and yam figures as well as lozenge-shaped patches of ochre. All are very faded, suffering from mineral salt deposition and exfoliation.

**Representative Photographs:**



**Archaeological Site Details****Site Name:** ELN08**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 666461mE, 8447692mN**Site Description:**

Two panels of art in a wide shallow rock shelter facing west-northwest. The shelter is 12m wide, up to 60cm deep and 2.5m high. The principal motifs are a line of four "dancing" anthropomorphic figures and a large faded marine mammal. This large faded marine mammal was described by the Traditional Owners accompanying the survey as a dugong. This was considered to represent the protagonists of a well-documented dreaming story regarding the dugong and the echidna.

There is no evidence of superimposition in the art which is faded and damaged by water wash, salt mineralisation and exfoliation.

**Representative Photographs:**

**Archaeological Site Details**

**Site Name:** ELN09  
**Land System:** Groote  
**Site Type:** Rock Shelter with Art  
**Co-ordinates:** 666566mE, 8448237mN

**Site Description:**

Four smaller rock shelter art panels along a section of escarpment 23m long, and 7m above the sand plain. One panel consists of a very faded anthropomorphic figure in monochrome red and a "belt buckle" design together with a bird design and a very faded possum motif. The possum is faint with a yellow tinge to the ochre and is depicted as very overweight.

A second panel has indistinct line art features and a possible marine animal in monochrome red.

A very faint lenticular motif in red with striped infill is present on a third panel, whilst the fourth panel has a range of motifs finely drawn in monochrome red including a crocodile, turtle, anthropomorph with feather headdress, a dolphin upside down and a row of 8 bird images. Five of the bird figures are formed by a red outline and a 'thumbprint' hatched infill, while three are in simple red-orange infill. There is also a line stretching the length of the art panel with a perpendicular branch extending vertically above the birds.

The Traditional Owners testified to a connection between the paintings and a well documented Dreaming story regarding the origins of the echidna and the dugong (Moyle & Stokes 1981).

The Traditional Owners stated the bird motifs were the oystercatchers (*Haematopus longirostris*) that were part of a major Dreaming songline passing through this part of the island and down to the Amagula River.

**Representative Photographs:**



**Archaeological Site Details**





**Archaeological Site Details****Site Name:** ELN10**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 666547mE, 8448259mN**Site Description:**

Two very shallow rock shelters located on a sandstone promontory.

The rock forms a structure which can be described as being similar to that of the bow of a ship with art found on both sides. The rocky outcrop is at the level of the sand plain, but no archaeological material appears in the deposit. Art consists of a single stick figure together with fragments of a faded turtle-like feature, perhaps attached to a spear. The art panel on the other side has a fragment of a motif with remarkably square cornered compartments, possibly depicting divisions within a boat or ship.

**Representative Photographs:**

**Archaeological Site Details****Site Name:** ELN11**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 666481mE, 8448379mN**Site Description:**

A single art panel on a shelter under a prominent sandstone tor 5m above the sand plain. The art comprises a single hand stencil in red ochre with a large circle in faded black ochre (the only black ochre seen during the survey). Several faded fine outline drawings of semicircular motifs (identified by the Traditional Owner as stingray designs) also occur.

**Representative Photographs:**

**Archaeological Site Details****Site Name:** ELN12**Land System:** Groote**Site Type:** Rock Shelter with Art**Co-ordinates:** 666471mE, 8448374mN**Site Description:**

A single hand stencil in orange ochre on a sheltered panel high up on a prominent sandstone tor, 10m above the sand plain. The shelter faces north and is located away from the sand plain. The painted surface itself is protected from the elements with evidence of sheetwash and mineral deposits at the margins of the art panel. The art is considered to be faded at its distal end which is exposed to direct sunlight at certain times of the day.

**Representative Photographs:**



**Archaeological Site Details****Site Name:** ELN13**Land System:** Groote**Site Type:** Rock Shelter with Art and Deposit**Co-ordinates:** 666391mE, 8448325mN**Site Description:**

A series of shelters and overhangs along 75m of cliff on the southern side of a sandstone ridge.

Shelters range from rocky floored overhangs 7m above the sand plain with art visible from up to 50m away, to low shallow shelters at the level of the sand plain.

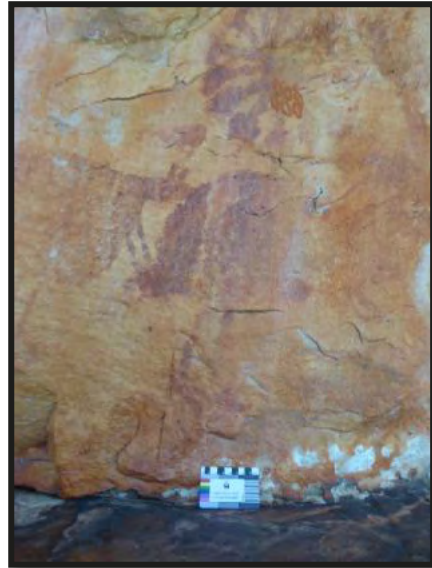
Art is distributed throughout the site and includes a wide range of terrestrial and marine motifs. Marine motifs include rays and skates, dolphin and turtle. Terrestrial images include wallaby and echidna as well as plants such as yams. The fruiting body of the edible native plant "arndenungkunungkwa" (*Smilax australis* or Barbed Wire Vine) (Groote Eylandt Linguistics 1993:53) also appears to be visible.

Shelters that occur at the level of the sandplain may have a deposit greater than 1m deep, although no artefacts were located, some pieces of razor shell (*Pinna sp.*) were found on the surface.

**Representative Photographs:**



**Archaeological Site Details**



### 8.3 Discussion of Results

The results of the archaeological survey confirm that there is a clear pattern in the distribution of archaeological material and site types based on Land Systems at a broad scale. In effect, 93% of sites documented for this survey were found within the Groote Land System, with only two sites found outside this system (ELS01 located in the Effington Land System, and ELS14 in the Yarrowirrie Land System) (Figure 6).

This result is consistent with the predictive model described in Sutton (2014), who found that 74% of the sites studied in the southwest of the island (17 out of a total of 23 sites) were located in the Groote Land System, with the remaining six sites located during that survey being found in coastal conditions with no presentation or analogue within the current project site.

An additional important feature to note about this suite of sites is the fact that they are overwhelmingly dominated by rock shelters with art. This is a rare situation in terms of archaeological assessment in Australia. While there are important outlier art provinces, by far the most common site type nationally is the stone artefact scatter. In the interior of Groote Eylandt, and certainly within the project site, stone artefact scatters are rare, and rock shelters with art tend to dominate the archaeological record.

Given the preponderance of the occurrence of these sites found in the Groote Land System, and the fact that this Land System is widespread on the island, it is likely that other as yet undocumented rock art sites may be found within this Land System in other areas across the island. Taken in context of the recent survey work by Sutton (2014) and Welch (2013), who found a relatively high number of sites, this rock art province may in time prove to be as rich and diverse as other major regions in Australia such as west Arnhem Land and the Kimberley.

In addition to what is considered to be a relatively large group of art sites, the art itself holds significance to the Traditional Owners. The paintings occur in a variety of colours, mostly variants of red ochre, but also yellows and some small amounts of white. They include a wide range of motifs reflecting terrestrial and marine vertebrates, plants, boats (perhaps Macassan, as well as canoes), anthropomorphic figures as well as a range of symbols that are not readily classified. This variety is reflective of the economic and social world of the artists and the site's inhabitants. Specific meaning may be difficult to glean from the art but patterns are detectable and may in themselves reflect some deeper social or cultural norms in Warnandilyakwa society. As an example, all of the macropods illustrated in rock art (including that recorded by Chaloupka (1989) face to the right. This may be a convention in art or perhaps a reflection of the moiety of the totemic spirit of the animal depicted, or more prosaically, a reflection of the handedness of the artists (cf Gunn 2007). It is notable that, in contrast to the wallabies, that all possums seen painted on the island face to the left.

The art is also varied in its style and technique, including solid infill, delicate painted line work, stripes, coarse single lines perhaps painted with a finger, rough hatching infill - potentially with a brush or finger and stencils. Hand stencils, where ochre is sprayed over a hand placed against the rock surface, are common. A 'normal' hand with splayed fingers is the most common, but other forms also occur. These include a closed flat hand (i.e. all fingers are placed together), a closed fist, or fingers that are unevenly spread to form a 'W'. Some sites have stencils of objects including boomerangs but also other material culture items that are unidentifiable.

In addition, some art panels display superimposition, the overlaying of one or more art motifs over another. This depth of art provides the potential to identify a serial chronology of art styles and is a key area of investigation for rock art studies internationally. Welch (2013) has made a first attempt to characterise this sequence of art styles.

It is also worthy to note that a small percentage of the rock shelters contained archaeological material additional to the rock art. Several sites are located on the level of the coastal sand plain and contain archaeological deposits, perhaps to depths exceeding one metre. These deposits provide the potential for excavation and the identification of temporal patterns and changes in the occupation of the island.

Another important feature of the distribution of the archaeological material is its tight spatial patterning. Of the 28 sites located during the survey, 18 occur in two relatively small areas. In the northeast of the Southern EL, nine sites (i.e., sites ELS06 to ELS13 and ELS15) occur within an area just over 3 hectares while along the eastern margin of the Northern EL, nine sites (i.e. ELN04 to ELN06 and ELN08 to ELN13) were located within approximately 5 hectares (Figure 6).

These tight clusters of sites almost present as 'villages'. The individual sites are within hailing distance of each other with people camped at one site able to hear, and potentially even converse with others domiciled only a few hundred metres away. It might be speculated that this distribution reflects the particular social arrangements of Warnindilyakwa people, especially the practice of establishing separate men's and women's camps (Turner 1974).

The two clusters are about 5km apart, and what is considered to be an easy day's walk albeit over the watershed between the Amagula and Emerald Rivers. The proximity of these two clusters would enable the site clusters to be part of a route or 'pilgrimage' conducted on an annual or semi-regular basis and the archaeological material within individual sites lends an opportunity to investigate the possibility of confirming this type of connection.

The sites when represented as clusters and considered in their entirety have the potential to provide information about the social relations which are portrayed by the extensive array of art motifs and the existence of archaeological deposits. This contributes to their significance beyond the values of the individual sites.

## 9 Assessments of Significance

The assessment of cultural significance presented below is based on the results of the survey and consideration of the character of the sites collectively and individually. The assessment was guided by the Burra Charter (described in Section 3.2).

### 9.1 Defining Cultural Significance

The Burra Charter provides the following definition for cultural significance: "Aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the *place* itself, its *fabric, setting, use, associations, meanings, records, related places* and *related objects*. Places may have a range of values for different individuals or groups."

The concept of cultural significance is nuanced and complex. Australia's cultural diversity and the very different cultural traditions displayed across the continent and through time have created a national heritage that is diverse and complex. This does not merely mean the varying sub-cultures or mores within the dominant modern 'western' European-based culture, but also the fundamentally different values held by Aboriginal people whose vital relationship with both natural and artificial features in a landscape is well documented (Povinelli 1993; Bird Rose 2000). The assessment of cultural significance often requires comparison of very different sorts of places and objects and the establishment of a 'conclusion' regarding significance.

#### 9.1.1 Aesthetic Value (Places and Objects)

Aesthetic Value includes aspects of a person's sensory perception towards a place or object. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric, and the smells and sounds associated with the place and its use. The assessment of aesthetic value undertaken for the purposes of this study considered both the aesthetic values of the site in its entirety and, where appropriate, the values of any objects or features within the site itself. Aesthetic value was attributed to separate categories of 'community', including the wider or general community, the Anindilyakwa Aboriginal community and specialists including researchers and artists. While it may seem presumptuous to speculate on what the wider community may consider aesthetic, in practice these matters are settled in popular culture. Sunsets, ocean views, cliffs and waterfalls all comfortably match wider community conceptions of aesthetic value.

#### 9.1.2 Historic Value

Historic Value encompasses the history of society and its many subcomponents. A place may have historic value because it has influenced, or has been influenced by an historic figure, event, phase, or activity. It will commonly be the case that there will be one or more historic themes attaching to a place (Australian Heritage Commission 2001).

#### 9.1.3 Scientific Value

Scientific Value or research potential of a place will depend upon the importance of the data involved, its rarity, quality or representativeness, and the degree to which the place may contribute further substantial information.

Generally speaking archaeological assessment of significance revolves around a refinement of consideration of scientific value as it relates to archaeological sites. According to Sullivan and Bowdler (1984) archaeological significance means that it has scientific, archaeological or research value. That is, it has the potential to assist current or future research into events of human history or other areas of enquiry. The ability of a site to do this relates to two key characteristics. The first is the extent to which

the archaeological material in a particular site is representative of other sites of the same type in the region. Sites that are unusual or unique are defined as having higher archaeological significance than sites that are common Bowdler (1984:2). The second characteristic used to assess significance is research potential, which refers to a site's capacity to provide information which may contribute to archaeological research questions. Well preserved sites with structural integrity that incorporate a range of well-preserved cultural materials contextually arranged to provide for their (potential) interpretation to explain past human activities.

Gregory (1996), who conducted an assessment of shell middens in the Darwin harbour area, composed the following set of criteria for assessing the scientific significance of those sites:

- little or no disturbance;
- unusual size;
- presence of stratified deposit;
- presence of other cultural materials such as stone artefacts, bones, and charcoal;
- unusual species composition i.e. *Anadara granosa* not the dominant species;
- high densities of cultural materials;
- unusual structure;
- unusual environmental location i.e. some distance from mangrove areas; and
- location within the wider region.

These criteria have been adapted and modified in order to apply to a wider range of archaeological features and incorporated into the scientific assessment that is presented in Section 9.2.

#### 9.1.4 Social Value

Social Value embraces the qualities for which a place has a sense of attachment to a community for recreational, sporting, entertainment, political or other activities over a period. Commonly these values will be manifested by a sentiment of admiration or pleasurable reflection.

#### 9.1.5 Spiritual Value

Spiritual value refers to the transcendent or immanent significance that heritage places have that give individuals a sense of connection with a reality that is greater than themselves, that also establishes feelings of reverence and inspiration that may give meaning and vitality to their lives. Often spiritual values are culturally-based, deriving from a specific cultural association with a place or object.

#### 9.1.6 Future Generations

A future generations assessment, which involves the potential for future change in cultural significance is of course a risky business; "prediction is very difficult, especially about the future" and this applies equally to cultural significance. However, given that future generations are canvassed in the Burra Charter definition, some effort is made here for completeness.

It is argued that some parameters can be placed around the future cultural significance of a place. The poor condition or deleterious context of a site or object can obviously lead to its deterioration and destruction that its future cultural significance can at least be considered unlikely to improve. In contrast, a prominent and well liked feature might be expected to continue to accrue social value by the community into the future. In this sense then enhancement of opportunities for the community to appreciate the nature and aesthetics of a place, such as through the development of interpretive material is likely to lead to an increase in the place's social value.

## 9.2 Assessing Significance of the Identified Archaeological Sites

The 28 sites located during the survey were reviewed and assessed against the cultural significance values (aesthetic, historic, scientific, social and spiritual) as discussed in Section 9.1. These values are as defined in the Burra Charter (Australia ICOMOS 2013), with refinements of consideration of these matters by Bowdler (1984), Sullivan and Bowdler (1984) and Gregory (1996).

Attribute criteria as listed in Table 5, were derived from the discussion of significance as provided in Section 9.1. These criteria establish different values based on both the site and any objects within the site.

**Table 5. Cultural Values and Attributes Assessed for Cultural Significance of Sites Located on the Eastern Leases**

<b>Cultural Value</b>	<b>Attributes Assessed for Cultural Value</b>
<b>Aesthetic Values of Place</b>	<ul style="list-style-type: none"> <li>- Wider community</li> <li>- Aboriginal community</li> <li>- Specialists</li> <li>- Potential for changed future value</li> </ul>
<b>Aesthetic Values of Objects</b>	<ul style="list-style-type: none"> <li>- Wider community</li> <li>- Aboriginal community</li> <li>- Specialists</li> <li>- Potential for changed future value</li> </ul>
<b>Historic Value</b>	<ul style="list-style-type: none"> <li>- Local</li> <li>- Regional</li> <li>- State</li> <li>- National</li> <li>- International</li> <li>- Potential for changed future value</li> </ul>
<b>Social Value</b>	<ul style="list-style-type: none"> <li>- Wider community</li> <li>- Aboriginal community</li> <li>- Specialists</li> <li>- Potential for changed future value</li> </ul>
<b>Spiritual Value</b>	<ul style="list-style-type: none"> <li>- Wider community</li> <li>- Aboriginal community</li> <li>- Specialists</li> <li>- Potential for changed future value</li> </ul>
<b>Scientific Significance</b>	<ul style="list-style-type: none"> <li>- Intact or pristine (no disturbance)</li> <li>- Presence of rare cultural materials</li> <li>- Unusual size</li> <li>- Presence of stratified deposit</li> <li>- Presence of diverse cultural materials</li> <li>- Unusual composition of materials</li> <li>- Palimpsests of cultural material</li> <li>- Large amounts of cultural materials</li> <li>- High densities of cultural materials</li> <li>- Unusual structure</li> <li>- Unusual environmental location</li> </ul>



An assessment of significance was then undertaken for each site by evaluating the significance of each cultural value by the attribute criteria provided in Table 5. At each site an ongoing dialogue about the site, its location in the landscape, and the connection of the Traditional Owners was conducted. At times this communication was informal while at others it was formally conducted as an interview. The degree of connection of Traditional Owners, their expressed knowledge of the sites, and any Dreaming associations was noted and used as a guide to the significance assessment.

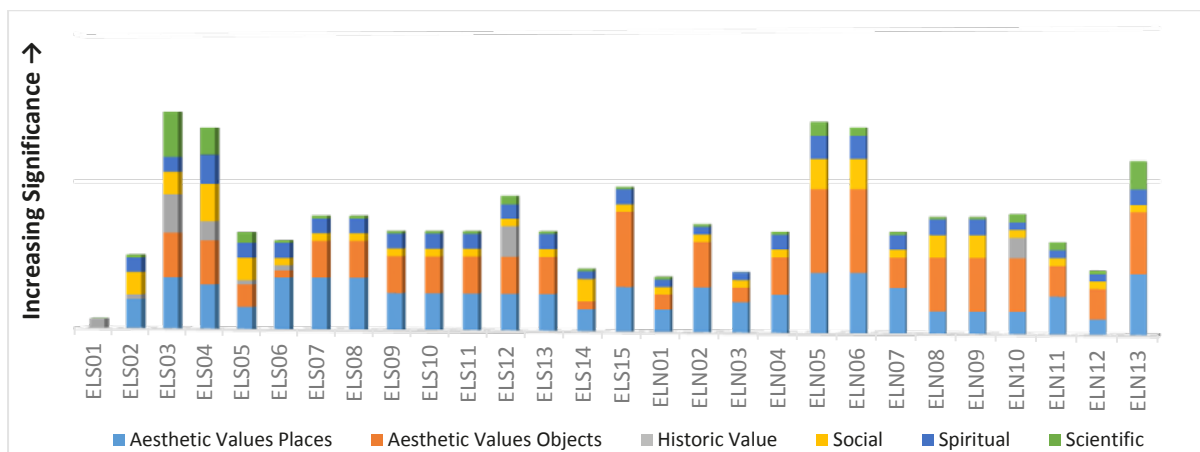
Each attribute for each cultural value was rated and scored using a nominal four point rating, ranging from "None" (score of 0), meaning no value for that particular attribute, through to "Low Value" (score of 1), "Moderate Value" (score of 2) and "High Value" (score of 3). The scored ratings for each attribute were then summed and averaged for each cultural value, to provide a total accumulated score for that cultural value for that site. The results of this assessment are provided in Table 6, and Graph 2 shows the relative significance of the cultural values across the 28 sites.

**Table 6. Results of Significance Assessment of the Cultural Values of the Archaeological Sites Found in the Eastern Leases**

Cultural Significance Element	ELS01	ELS02	ELS03	ELS04	ELS05	ELS06	ELS07	ELS08	ELS09	ELS10	ELS11	ELS12	ELS13	ELS14	ELS15	ELN01	ELN02	ELN03	ELN04	ELN05	ELN06	ELN07	ELN08	ELN09	ELN10	ELN11	ELN12	ELN13	
<b>Accumulated Significance</b>	-	L	H	H	M	M	M	M	M	M	M	M	M	L	M	L	M	L	M	H	H	M	M	M	M	M	L	H	
<b>Aesthetic Values of Place:</b>																													
Wider community	-	L	M	L	-	M	M	M	L	L	L	L	L	L	M	L	M	M	L	M	M	M	L	L	L	M	L	M	
Aboriginal community	-	L	M	M	L	M	M	M	M	M	M	M	M	M	M	L	M	M	M	M	M	M	L	L	L	M	L	M	
Specialists	-	L	M	M	L	M	M	M	L	L	L	L	L	L	L	-	L	-	L	M	M	L	-	-	-	-	-	M	
Potential for changed future value	-	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	M	M	L	L	L	L	L	L	M	
<b>Aesthetic Values of Objects:</b>																													
Wider community	-	-	L	L	-	L	L	L	L	L	L	L	L	L	M	-	M	L	L	H	H	L	M	M	L	L	L	M	
Aboriginal community	-	-	M	M	L	-	M	M	M	M	M	M	M	L	H	L	M	L	M	H	H	L	M	M	M	L	L	M	
Specialists	-	-	M	M	L	-	L	L	L	L	L	L	L	L	H	L	L	-	L	H	H	L	M	M	H	L	L	M	
Potential for changed future value	-	-	L	L	L	-	L	L	L	L	L	L	L	L	M	-	L	-	L	M	M	L	L	L	L	L	L	M	
<b>Historic Value:</b>																													
Local	L	L	H	M	L	L	-	-	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	M	-	-		
Regional	-	-	M	L	-	-	-	-	-	-	-	L	-	-	-	-	-	-	-	-	-	-	-	-	L	-	-		
State	-	-	L	-	-	-	-	-	-	-	-	L	-	-	-	-	-	-	-	-	-	-	-	-	L	-	-		
National	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
International	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Potential for changed future value	L	-	M	L	-	-	-	-	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
<b>Social Value:</b>																													
Wider community	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	L	L	-	-	-	-	-	-		
Aboriginal community	-	L	L	M	L	L	L	L	L	L	L	L	L	M	L	L	L	L	M	M	L	M	M	L	L	L	L		
Specialists	-	L	L	M	L	-	-	-	-	-	-	-	-	L	-	-	-	-	-	-	-	-	-	-	-	-	-		
Potential for changed future value	-	L	L	L	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	L	L	-	L	L	-	-	-		
<b>Spiritual Value:</b>																													
Wider community	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Aboriginal community	-	L	L	M	L	L	L	L	L	L	L	L	L	L	M	L	L	L	M	M	L	M	M	L	L	L	M		
Specialists	-	-	-	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Potential for changed future value	-	L	L	L	L	L	L	L	L	L	L	L	L	L	-	-	-	-	-	L	L	L	L	-	-	-	-		
<b>Scientific Significance:</b>																													
Intact or pristine (no disturbance)	-	L	M	M	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	M	
Presence of rare cultural materials	-	-	H	H	H	-	-	-	-	-	-	M	-	-	-	-	-	-	M	M	-	-	-	M	M	-	L		
Unusual size	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	M		
Presence of stratified deposit	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	M	-	-	-	-	-	-	-	H		
Presence of diverse cultural materials	-	-	M	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	L		
Unusual composition of materials	-	-	M	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Palimpsests of cultural material	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Large amounts of cultural materials	-	-	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	L		
High densities of cultural materials	-	-	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Unusual structure	-	-	L	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Unusual environmental location	-	-	L	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Table Key: - No Significance  
 L Low Significance  
 M Moderate Significance  
 H High Significance

**Graph 2: Relative Significance of the Cultural Values across the Archaeological Sites Found in the Eastern Leases**



As can be seen in Table 6 and Graph 2, many sites have relatively high significance for aesthetic values. These values are shown in the photographs and discussions for each particular site (Section 8.2).

Five sites in particular, ELS03, ELS04, ELN05, ELN06 and ELN13 display a relatively higher significance in comparison to the other sites within the project site. This is due to the wide range of cultural values noted at those sites.

ELS03 was assessed as having high significance for scientific and historic values (in addition to high significance for aesthetic values places and objects) due to the presence of a range of different archaeological features at the site. This included the polished and ground surface of rocks on the floor of the shelter, the presence of artefacts made of glass and a substantial area of sandy floor that is likely to contain datable archaeological material. This range of material means that the site has enhanced historic values compared to many of the other sites as well as the potential to provide information for archaeological scientific purposes.

ELS04 was assessed with high significance for its social and scientific values and is considered unique for two reasons relating primarily to the presence of a grinding groove. The first element is the presence of grinding. This is the only known example of a grinding groove in bedrock recorded on the island to date. Grindstones have been recorded elsewhere on Groote Eylandt (Sutton 2014) but were of the portable type and were manuports relocated to sedimentary contexts away from the source of the bedrock. At ELS04 the grinding groove is situated on top of a prominent sandstone tor and is part of the rock. The second element of the site’s significance relates to the unique nature of the groove itself. Most grinding grooves are sub-horizontal, often on nearly level outcrops of rock in stream beds. There are also many instances where individual pieces of rock are used for grinding and these are commonly placed upon a relatively flat surface for use and storage. The grinding groove at ELS04 is inclined at 45° exactly. While the precise geometric angle is likely to be a consequence of the nature of the outcrop, the fact of a steeply inclined grinding groove in a locality with very little evidence of grinding adds to the site’s significance.

The groove is situated immediately adjacent to a small cistern or water hole that retained >20cm of water, which may have been used to assist the grinding operation. ELS04 also has high aesthetic values.

ELN05 was assessed with high significance for aesthetic and social values, primarily because of the presence of a variety of unusual art motifs and artefacts, and the prospect of considerable

archaeological deposit. The large motif comprising a large anthropomorphic figure with an amphora shape is striking and uses the topography of the rock surface to emphasise and delimit the margins of the motif, which has a marked marine mammal 'feel'. Two artefacts were also found at this site and have been assumed to be debitage from the artefact manufacturing process.

ELN06 was assessed with high significance for aesthetic and social values because of the variety, clarity and unusual subject matter of the rock art. The art also displays clear superimposition, and has the prospect of contribution to the sequencing of rockart styles on Groote Eylandt. The hunter figure displayed is quite stylised and unusual.

ELN13 was assessed with high significance for a number of reasons. It is a very large site with a range of settings starting at the sand plain, leading up to shelters with art perched 8m above the sand plain. The art shows a wide range of motifs ranging from marine to terrestrial animals, but also unusually, strong motifs that appear to be of plants. The site has archaeological deposit which may extend to some depth, and therefore has the prospect of providing information for scientific research. The Traditional Owners accompanying the survey remarked that the art material found at ELN13 provides evidence of a connection with the dreaming story at ELN09 (discussed in Section 8.2), given ELN13 has similar suite of motifs.

The majority of the other art sites did not display the same wide range of cultural values, but were considered to have high or moderate aesthetic value.

Despite this, it should be noted that there are also individual sites that have local significance due to their rarity. While stone artefact scatters are the most common site type in mainland Australia, they have proven to be very rare on Groote Eylandt. As such any site with stone artefacts must be considered to have elevated significance in the context of the island. Only one stone artefact scatter (ELS05) was located during this survey (and none were identified during the previous survey of the southwest of the island by Sutton 2014). Despite the fact that the scatter was small, it is unique or rare according to Bowdler's (1984) scheme and therefore has an elevated level of significance.

The manuport at site ELS14 is also unique in the context of this survey. Other manuports have been identified on the island (Sutton 2014; 22 & 44) all comprising sandstone blocks or cobbles. At ELS14 the sandstone block has been placed on a raised section of laterite making it a prominent feature in the low flat grassy plain in which it occurs. Testimony provided by the Traditional Owner accompanying the survey indicated that the manuport was a 'marker stone' indicating a path or direction through the landscape.

## 10 Impact Assessment

This section discusses the potential impacts that the project may have on the culturally significant sites identified within the project site.

### 10.1 Direct Impacts

Figures 7 and 8 provide the location of the archaeological sites in relation to the proposed project disturbance footprint (i.e., areas to be disturbed by mining, haul roads, dams and other infrastructure).

Only one archaeological site (ELS14 – the manuport) is within the disturbance footprint of the project. A proposed management approach for this site will involve relocating the manuport beyond the mine disturbance footprint. Given the social value of the site, agreement with the ALC would need to be sought in order to relocate the manuport, and the ALC would need to agree to its altered location.

Following mining, the manuport could potentially be repositioned back in its original location. This is likely to be an acceptable approach in terms of its low scientific value.

Under the *Heritage Act*, relocation of this site would be considered to be disturbing or destroying a site and therefore approval under Section 72 of this Act will be required in order for this to occur.

The remaining 27 identified archaeological sites will not be directly impacted by project activities (refer to Figures 7 and 8).

### 10.2 Indirect Impacts

A range of indirect impacts have the potential to affect the long term conservation of the archaeological sites found within the project site. These include increased visitor access, dust, and blasting. Appropriate mitigation measures are therefore required to be considered and put in place to avoid indirect impacts.

#### 10.2.1 Access

Increased access or visitation to sites often leads to a deterioration in the key cultural features. Art is rubbed or touched or dampened (for photographs) leading to increased fading and loss of clarity and colour. Artefacts are 'sampled' and removed from site. Archaeological deposit is trampled and in the worst of cases, sections of the site removed.

The proponent will place restrictions on access to the areas where archaeological sites occur. Regular monitoring of the art sites to assess the compliance with these restrictions will also be implemented.

#### 10.2.2 Dust

The impact of dust from mining activities may indirectly impact a number of sites, particularly art. Dust emissions from mining activities is a recognised problem for rock art conservation (Lau et al 2007; Cole and Buhrich 2012). Whilst management measures are proposed to control dust emissions (refer to the EIS Air Quality Report), there is a possibility that dust caused by mining may settle on the rock art and add to existing natural factors leading to its deterioration (such as exfoliation of the art surface).

The following two-stage process will be adopted in relation to these potential impacts:

- Stage 1 is the establishment of a record of the art, including a baseline assessment of the colour and condition of the art. This would establish a detailed database of the rock art at each of the sites located to date, with specific attention to the state of preservation, visibility, vibrancy and

colour of the art (which can be measured using electronic colour measurement devices). This baseline will be established prior to the commencement of construction activities.

- Stage 2 involves documenting any discernible rate of change or dust deposition through an annual monitoring program, assessing the visibility, vibrancy and colour of a set of art datums representative to the art as a whole. Monitoring data will be reviewed annually and additional dust control measures will be implemented if found to be necessary based on the results of this monitoring work. This may include additional dust control measures within the project site, or measures at the art site/s (e.g. cleaning using a suitable method such as a puffer brush). Any work at the arts site/s would be undertaken in consultation with the ALC, and in accordance with any necessary permits under the *Heritage Act*.

### 10.2.3 Blasting

Blasting is another aspect of mining that may potentially impact any nearby archaeological sites occurring in rock shelters. Ground vibration due to blasting could cause disaggregation of the substrate of the rock shelters and art. The proponent has committed to preparing a Blast Management Plan which will include:

- Survey of the rock shelters that contain art to determine a ground vibration limit for the individual sites that would minimise the risk of damage to the sites. The survey would be undertaken prior to blasting, and would be conducted by a suitably qualified and experienced person such as a geotechnical engineer.
- Designing blasts in close proximity to the rock shelters to ensure compliance with the nominated ground vibration limits for individual sites.
- Monitoring the rock shelters periodically to confirm the integrity of the sites.

Blasting is discussed further in the EIS Noise and Vibration Section.



## 11 Mitigation Measures

This section describes the proposed mitigation measures, including methods to manage any unexpected cultural heritage finds discovered during mining operations.

### 11.1 Relocation of the Manuport

As discussed in Section 10.1, only one site, the manuport at ELS14, will be directly impacted by the project. The proponent will work with the ALC to reach an agreement for this site. It may be that the manuport is temporarily relocated beyond the mine disturbance footprint, and the ALC would need to agree to its altered location. The proponent will obtain the necessary approval under the *Heritage Act* to allow for the relocation of the manuport.

### 11.2 Further Site Survey

As noted in Section 7, the survey achieved good coverage of the site, met all of the objectives of the study, and was suitable for EIS purposes. The survey revealed two areas where there are intense clusters of archaeological sites, namely:

- Southern EL cluster, being sites ELS06 to ELS13 and ELS15; and
- Northern EL cluster, being sites ELN04 to ELN06 and ELN08 to ELN13.

The sites in these clusters were surveyed and recorded in line with the requirements of the EIS Terms of Reference for the project. However, the area in which the clustered sites are located is an extensive cavernous landscape, containing a high density of archaeological material. It is therefore possible that not all of the archaeological features in the vicinity of these clusters were recorded during the EIS survey. In order to ensure that mitigation measures conserve all of the archaeological resources in the vicinity of the clusters, further archaeological surveys of these two clusters will be undertaken.

It should be noted that the clusters of sites are outside the project disturbance footprint, and will therefore not experience any direct impacts as a result of the project. The additional survey of these sites is required to ensure that all appropriate mitigation measures for potential indirect impacts can be implemented for the sites at these two locations.

### 11.3 Management Plans

A Cultural Heritage Management Plan will be prepared that will:

- Document the restrictions that are to be placed on access to archaeological sites;
- Document a program of awareness training, including employee inductions, to ensure all of the mine employees and contractors are informed of their obligations in relation to archaeological items. These obligations include complying with the access restrictions described in Section 10.2.1, as well as the procedures to be adopted in relation to any unexpected finds (Section 11.4);
- Prepare a detailed record of the characteristics of the art (including any additional art located during the further survey described in Section 11.2). The baseline characteristics to be recorded include vibrancy, visibility and colour; and
- Outline a program of annual monitoring of the art for changes that may be due mine related dust.

In addition, the proponent will prepare a Blast Management Plan ensuring blasting activities are appropriately managed so as not to cause harm to rock shelters and art during the life of the operations.

#### **11.4 Unexpected Finds**

As can be seen in Figures 7 and 8, the proposed disturbance footprint encompasses areas within the Bundah Land System (sandy colluvial footslopes) and Yarrowirrie Land System (level to gently undulating plains). This is consistent with the provenance of the Manganese Ore described by Pietsch et al (1997). The outcrops of Dalumbu sandstone that comprise the Groote Land System do not have overlying layers of manganese and consequently there is no proposal to extract minerals from those areas. Mine plans have been developed ensuring that areas of disturbance will avoid the large rocky escarpments and outcropping that are a component of the Groote Land System which is where all but one of the archaeological sites are located. Based upon this very strong patterning in both the mineralisation and the archaeology (i.e. archaeological finds exclusively occurring within the Groote Land System), it is extremely unlikely that any other archaeological material (i.e. material not located during this survey) will be directly impacted upon by the project.

In the event that any GEMCO staff or contractors suspect that they have uncovered an archaeological object or place that may constitute an important source of information about an aspect of the Northern Territory's history, the following measures will apply:

- Immediately cease disturbance of any areas surrounding the find;
- If it is considered that the find is at risk of being inadvertently damaged by mining activities, a temporary fence/barricade will be erected around the find;
- The ALC will be notified of the discovery of areas of potential archaeological significance immediately following the discovery and prior to any disturbance;
- The ALC, and if necessary, a suitably qualified archaeologist, will be requested to inspect the find and determine its significance; and
- Should the find be of archaeological significance, the NT Heritage Branch will be notified, and appropriate mitigation strategies will be developed in consultation with the ALC and the NT Heritage Branch.

These measures will help mitigate impacts in the unlikely event that previously unrecorded sites of cultural heritage significance are located during disturbance associated with the project.

## 12 Conclusions

This archaeological survey of the project site identified 28 sites of varying levels of cultural significance. The majority of sites found were rock shelters containing art located within the Groote Land System.

Only one site, the manuport at ELS14, will be directly impacted by the project. The proponent is committed to working with the ALC to reach an agreement for this site. It may be that the manuport is temporarily relocated beyond the mine disturbance footprint, and the ALC would need to agree to its altered location.

The remaining sites are located outside the project disturbance footprint, and therefore will not be directly impacted by mining activities. However, there is potential for these sites to be indirectly impacted by the project, and the proponent has committed to the following to ensure the archaeological integrity of the project site is protected and maintained:

- A management plan be put in place for the conservation of all sites located during the survey that:
  - Restricts access to the sites;
  - Establishes a monitoring regime; and
- A review of the likely impact of dust from mining and related activities shall be undertaken that:
  - Establishes a baseline with datums of art vibrancy, visibility and colour;
  - Monitors natural changes in visibility and colour prior to mining commencing; and
  - Monitors the art for changes due to dust.

A Blast Management Plan will be developed with the aim of minimising potential impacts on surrounding rock shelters and art. The will be re-surveyed to ensure a detailed documentation of the rock art is completed. Further survey work will be conducted in the vicinity of the intense cluster of archaeological sites (i.e., ELS06 to ELS13, and ELN05 to ELN13) to determine the presence of more sites. In the event of additional sites being located, they will be managed as per the requirements of the Blast Management Plan.

It is also possible (although unlikely) that additional archaeological sites are found during the progression of the mining operations. In the event that archaeological sites are found, the following measures will apply:

- Disturbance of any areas immediately surrounding the find will cease immediately;
- If it is considered that the find is at risk of being inadvertently damaged by mining activities, a temporary fence/barricade will be erected around the find;
- The ALC will be notified of the discovery of areas of archaeological significance immediately following their discovery and prior to any disturbance;
- The ALC, and if necessary, a suitably qualified archaeologist, will be requested to inspect the find and determine its significance; and
- Should the find be of archaeological significance, the NT Heritage Branch will be notified, and appropriate mitigation strategies will be developed in consultation with the ALC and the NT Heritage Branch.

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## Figures



Figure 1 – Location Plan

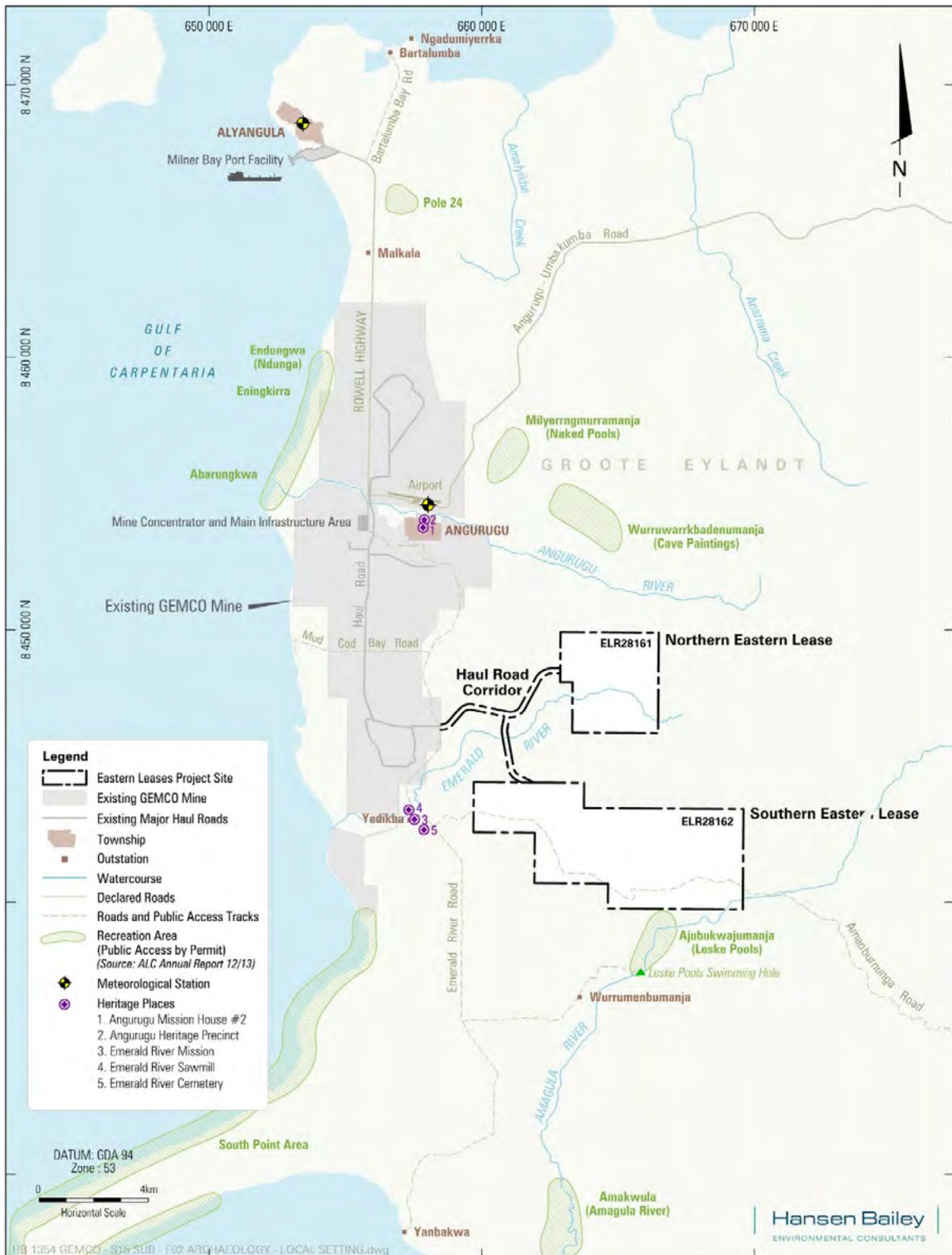


Figure 2 – Local Setting

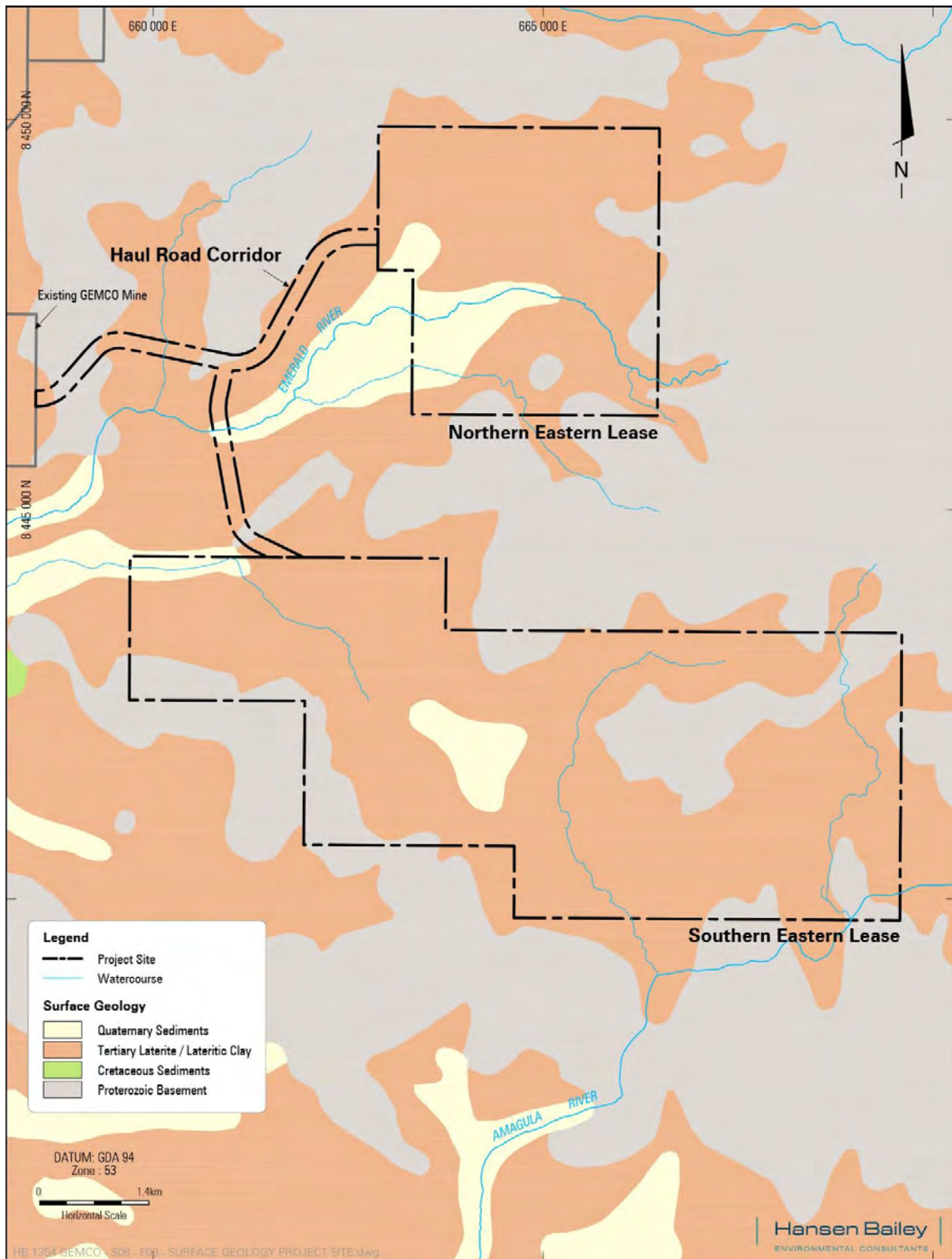


Figure 3 – Surface Geology



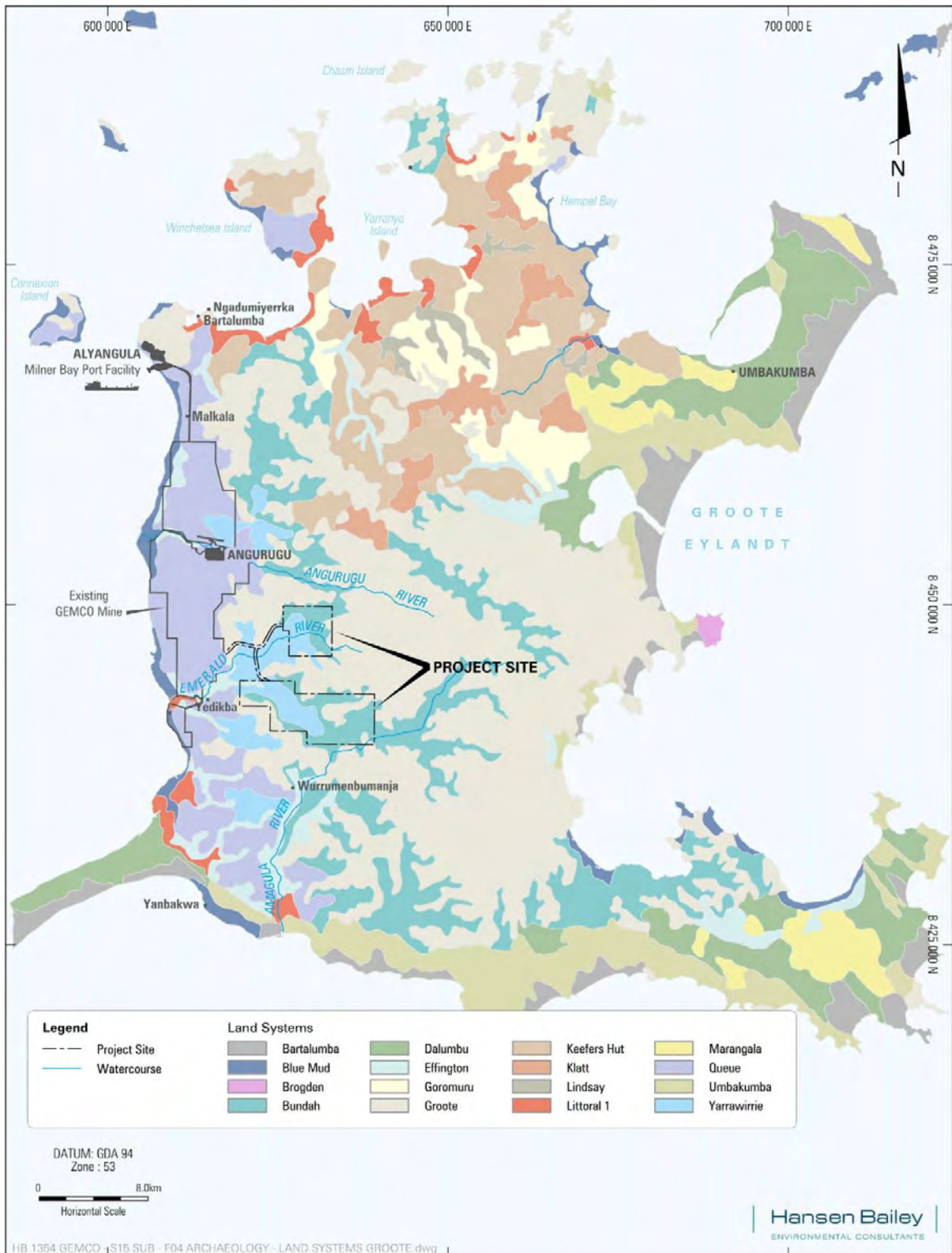


Figure 4 – Land Systems of Groote Eylandt

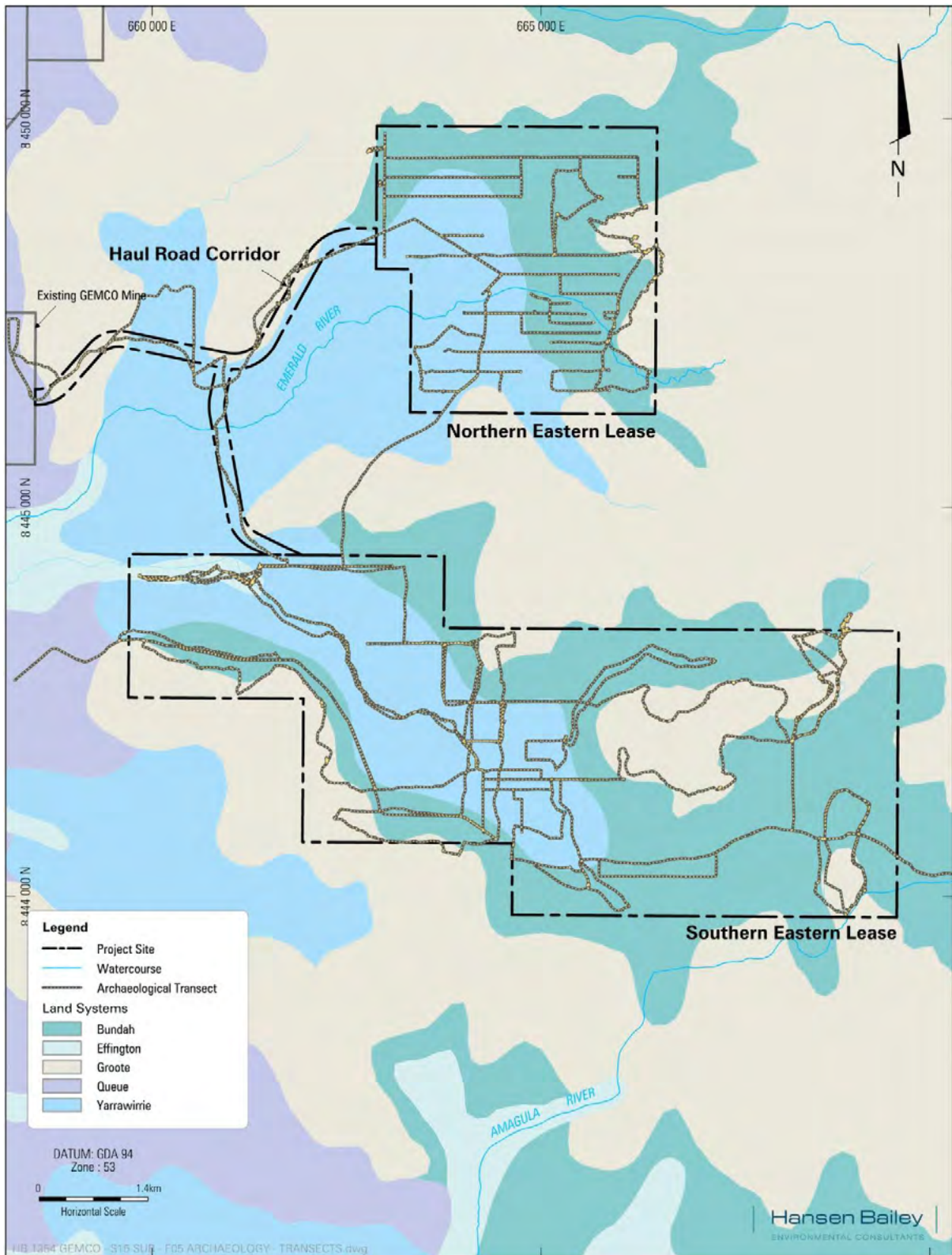


Figure 5 – Location of Survey Transects



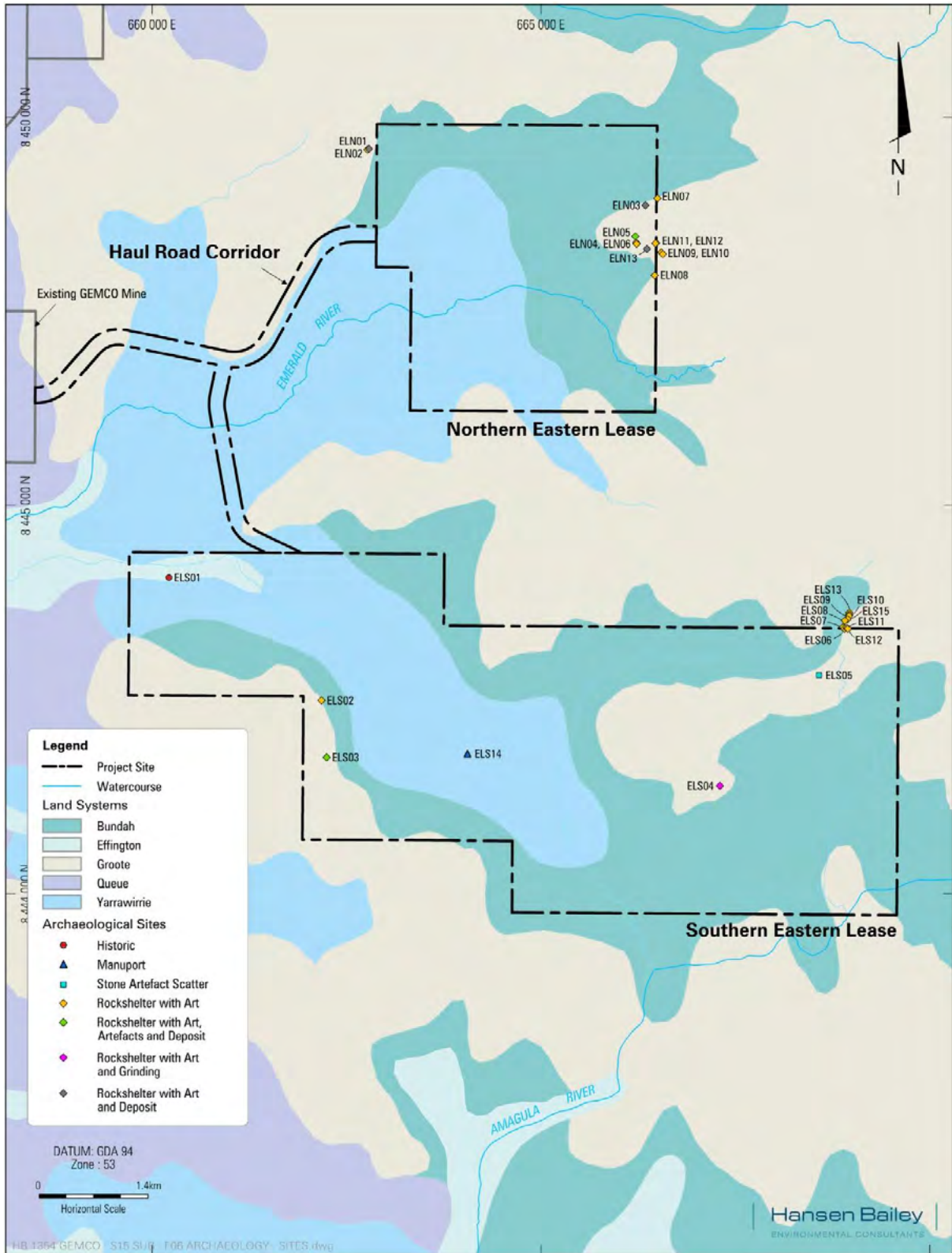


Figure 6 – Location of Archaeological Sites

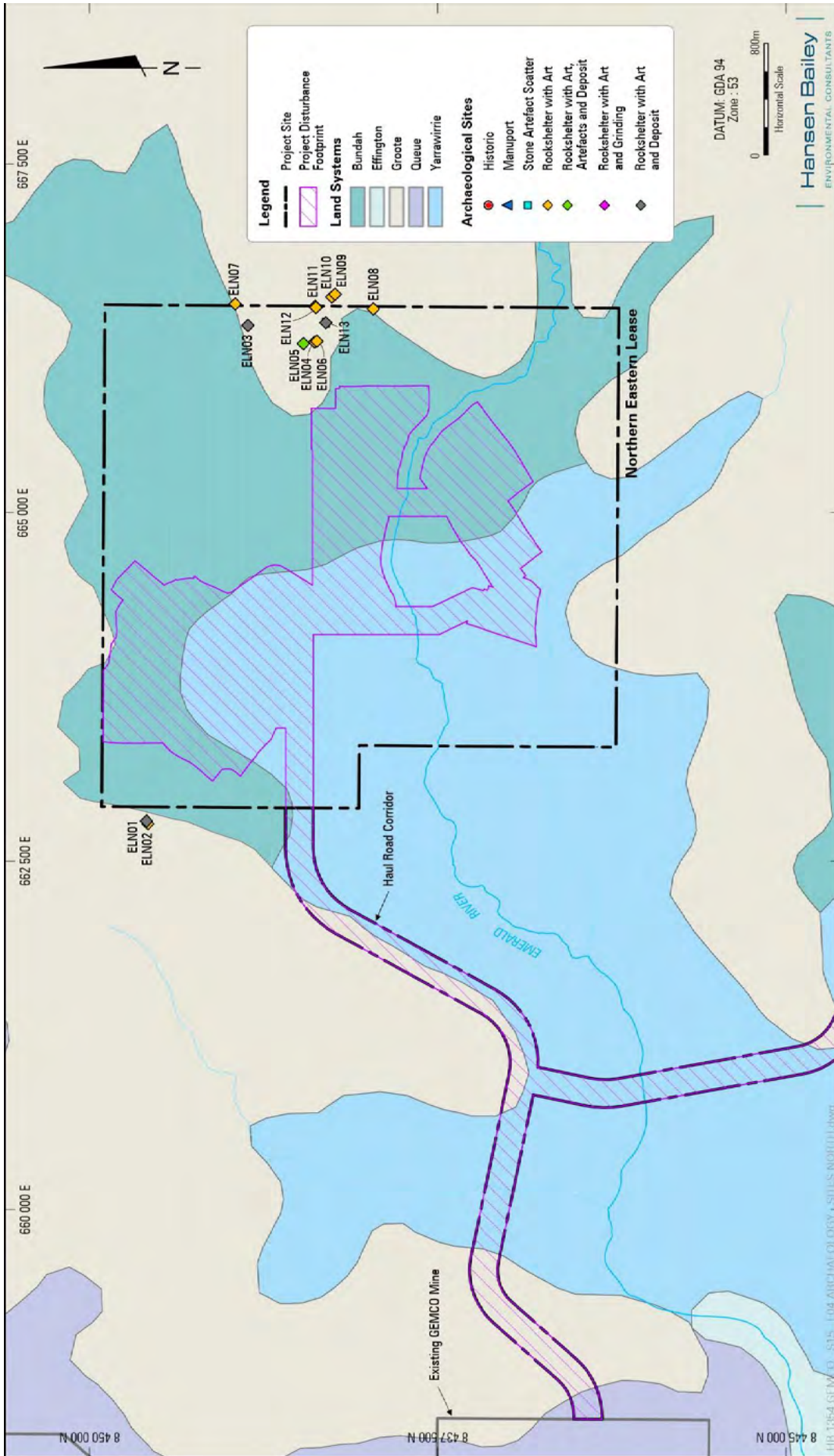


Figure 7 – Location of Archaeological Sites and Project Disturbance Footprint – Northern Eastern Lease



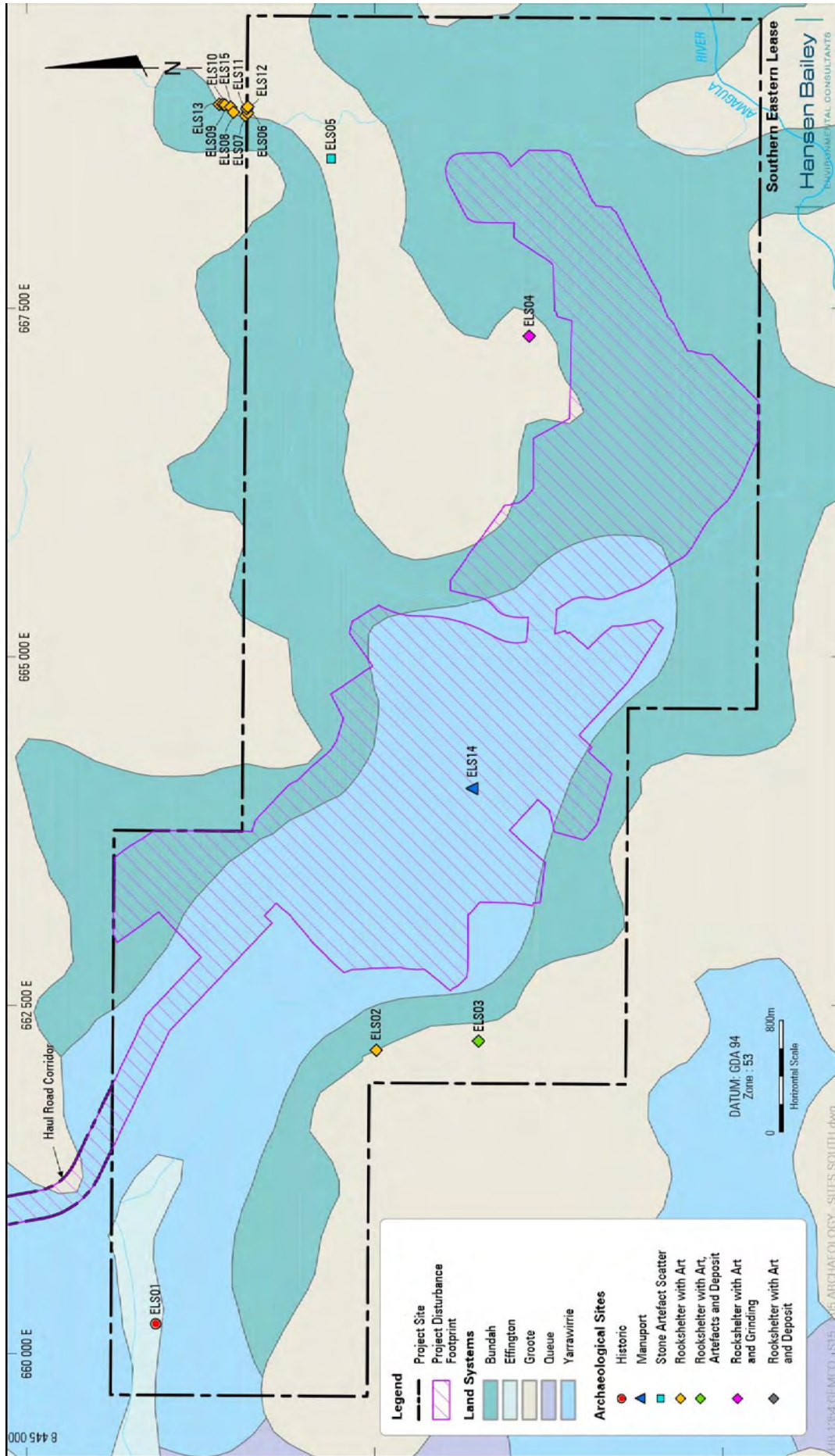


Figure 8 – Location of Archaeological Sites and Project Disturbance Footprint – Southern Eastern Lease