Appendix J
Archaeological Survey

Supplementary

Archaeological and Historic Surveys

for the

Open Cut Pit Project

McArthur River Mine, NT

Draft report

A report for URS on behalf of McArthur River Mines

Prepared by: Begnaze Pty. Ltd.

Christine Crassweller
Begnaze Pty Ltd
8 Wanguri Tce
Wanguri NT 0810

September 2005

SUMMARY

The Draft Environmental Impact Statement for the project stated that McArthur River Mine (MRM) would undertake further archaeological surveys to identify areas where there is a higher potential for the presence of archaeological and historic heritage and that recommendations are made to mitigate any loss. This report by Begnaze Pty Ltd describes the archaeological surveys over areas that will be disturbed by the proposed open cut pit at MRM and the subsequent recommendations that were based on the survey and prior archaeological work carried out at the mine.

The survey located one archaeological site, MRM4, and forty two background scatters of isolated artefacts that will be disturbed by the development. Two other archaeological sites MRM1 and MRM2 located during the archaeological surveys for Test Pit Project will also be destroyed. The results of the survey indicate that there is a very low potential for locating further sites in the areas to be disturbed by the Open Cut Project. While there is a high potential for the presence of unidentified isolated artefacts on and under the areas to be disturbed, their archaeological significance is deemed to be very low. Therefore it is recommended that the presence of an archaeologist during the clearing operations for the Open Cut Project will not mitigate the loss of any significant archaeological knowledge.

Therefore, before construction begins for the Open Cut Mine commences it is recommended that permission should be sought from the Minister of the Environment and Heritage to destroy the archaeological sites MRM1, MRM2, MRM4, and the background scatters listed below. This permission should only be given with the following conditions:

	Easting *	**Northing**	**Recommended conditions**
MRM1	53 617553	8183239	Detailed surface recording including a collection of artefacts.
MRM2	53 617621	8183247	Detailed surface recording including a sample collection of artefacts and a test pit excavation of the site
MRM4	53 618364	8184969	Detailed surface recording including a sample collection of artefacts and a test pit excavation of the site
Background scatters	Various		No further action

*Map Sheet 1:100,000 Borroloola 6185 WGS84

TABLE OF CONTENTS

SUMMARY 2.
1.0. INTRODUCTION 4.
2.0. METHODOLOGY 4.
2.1. The survey 4.
2.2. Types of archaeological material 5.
2.3. Site definition 5.
2.4.Artefact identification 5.
2.5. Assessment of significance and heritage management principles. 6.
3.0. RESULTS 6.
3.1. Archaeological sites 8.
3.2. Background scatters 11.
3.3. Historical heritage 12.
3.4. Discussion 13.
4.0. CONCLUSIONS 14.
5.0. RECOMMENDATIONS 15.
5.1. Specific recommendations 15.
REFERENCES 17.

TABLES
Table 1. Details of pedestrian and vehicular transects 4.
Table 2. Summary of findings in different sections of the Open Cut Project 7.
Table 3. Summary of artefact types in the background scatters 11
Table 4. Location of background scatters 16.

FIGURES
Figure 1. Map of areas to be disturbed with sites and background scatters 18.
Figure 2. Map of pedestrian and vehicular transects, open cut area 19.
Figure 3. Map of pedestrian and vehicular transects, OEF area 20.

PHOTOS
Photo 1. McArthur River levee banks 21
Photo 2 McArthur River levee banks 21
Photo 3. Weed cover adjacent to river corridor 21
Photo 4. Cracking clay plains 21
Photo 5. Stony rises on plain 22
Photo 6. MRM3, facing south 22
Photo 7. MRM4, facing north 22
Photo 8. MRM5, facing west 22
Photo 9. MRMH1, facing east 23
Photo10. MRMH1, largest concrete floor 23
Photo 11. MRMH1, rubbish dump 23
Photo 12. MRM2, largest concrete floor 23

Appendix 1
Details of background scatters

1. INTRODUCTION

In the Draft Environmental Impact Assessment for the proposed Mc Arthur River Open Cut Project commitments were made by McArthur River Mine (MRM) to undertake further archaeological surveys over areas that will be disturbed by the project. This report describes the archaeological surveys carried out by Begnaze Pty Ltd and includes recommendations to ensure that archaeological and historic sites and objects are not damaged or destroyed during the proposed development and are protected within the terms of the *NT Heritage Conservation Act 1991*: The survey was also carried out to ascertain whether there are any areas that are likely to contain significant sub-surface archaeological material so that an archaeologist can be present when these areas are being cleared to ensure their protection and future management.

The survey consisted of both purposive and random transects. The selected survey areas included the banks of McArthur River, Barney Creek and the lengths of the McArthur River and Barney Creek diversions (See Figure 1). Targeted areas within the proposed open cut pit and bund wall and the overburden emplacement facility (OEF) consisted of landscape features such as gullies, creek beds and rocky outcrops as these locations have a higher potential for the presence of archaeological material. The surveys were carried out by Christine Crassweller and Daryl Guse over seven days.

Environmental and cultural background information for the McArthur River Mine area has not been included in this report and can be found in Crassweller (2005b and 2005c). Included in the report is a CD with photos of all the archaeological and historic sites and the majority of background scatters located during this survey

2.0. METHODOLOGY

2.1 The Survey.

Both pedestrian and vehicular transects were carried out over the areas that will be disturbed by the proposed project. The routes of the pedestrian transects are shown in Figures 3 and 4.

The pedestrian transects included walking the full length of the proposed McArthur River Diversion, the Barney Creek Diversion and the bund wall. Random transects were made in the open cut pit and within and outside the bund wall to help in assessing the potential for the presence of archaeological material in various land systems.

The majority of the routes for the pedestrian transects in the OEF were selected randomly as aerial photos of this area indicated that it consists of alluvial back plains of cracking clays which contain with very few landscape features such as creeks or rock outcrops where there is a higher potential for the presence of archaeological material. To assist in determining the distribution pattern of archaeological material on these back plains, an area approximately three times the size of the OEF was surveyed and consisted of areas to the north and east of the OEF footprint. Areas purposely selected consisted of the higher ground around a flood plain and along creek beds and gullied areas.

Vehicular transects were carried out along all the tracks within the area to be disturbed at a speed less than 5 kilometres per hour. Table 1 shows the total distances surveyed by both pedestrian and vehicular transects and the general location of those transects.

Table 1. Details of pedestrian and vehicular transects

Survey regions	Pedestrian Transects (km)	Vehicular transects (km)
Barney Creek diversion	26.73	16.239
McArthur River diversion	26.38	
Bund Wall	8.08	
Open cut pit	12.74	10.203
OEF	40 06	27.115
Total	113 99	53.557

2.2. Types of archaeological material.

There are five types of Aboriginal sites previously recorded in this area of the Northern Territory and can broadly be defined as follows:

- *Artefact scatters*. These may contain flaked or ground artefacts and hearthstones. They occur as surface scatters of materials or as stratified deposits when there has been repeated occupations.
- *Stone arrangements.* These can range from simple cairn to more elaborate arrangements. These stone arrangements were used in ceremonial activities and represent sacred or totemic sites. Other stone arrangements were constructed for route or territory markers, the walls of huts, fish traps or small walls to stop water from entering a rock shelter or retain the floor.
- *Art sites* include stencils and paintings where material was added to the rock surfaces or engravings or poundings where the pictures or designs are produced by the removal of material from the rock surface (Clegg 1983).
- *Rockshelter sites* contain a deposit of cultural material that has built up over time and contain flaked or ground stone artefacts, faunal material and other Aboriginal cultural remains.
- *Stone quarries* are generally sites where stone for flaked or edge ground artefacts have been extracted from an outcropping source of rock (Hiscock and Mitchell 1993).

2.3. Site definition.

An archaeological site is defined for this survey as a concentration of artefactual material with an average density that is 5 times greater than the average density of the background scatter and there are more than ten artefacts which cover an area of at least $2m^2$. A site will have an identifiable boundary where either artefact densities decrease to the extent as to be classified as background scatter or environmental features determine the boundary.

Background scatter is generally a very low density, more or less continuous distribution of artefacts over the landscape. Although these artefacts do not constitute a site they will be given location details for research purposes.

2.4. Artefact identification.

A requirement for a successful archaeological project involves the accurate identification of archaeological materials. For an object to be identified as a flaked object it needs to possess one or more of the following:

- a positive or negative ring crack.
- a distinct positive or negative bulb of percussion.
- a distinct eraillure scar in an appropriate position below the platform.
- definite remnants of flake scars on dorsal surface or ridges.

Stone artefacts are divided into four main technological types consisting of cores, unretouched flakes, retouched flakes and flaked pieces (Hiscock 1984:128-129). They are defined as follows:

- *cores* are pieces of stone that have one or more negative scars and the absence of positive flake scars.
- *unretouched flakes* are pieces of stone that have been struck off another piece of stone and ideally possess platforms, positive bulbs of percussion, concentric ripples, ring cracks and /or eraillure scars on the ventral surface.
- *retouched flakes* are flaked flakes. They are identified by the presence of negative scars that must have been created after the ventral surface of the flake had been created. There will be either negative scars on the ventral surface or negative scars on the dorsal surface, which have been formed by the flake being hit on the ventral surface.
- *flaked piece*s are stone artefacts that have been formed by knapping but cannot be identified as either a core or a flake.

Other artefact and implement types that have been identified in the region are listed below following characteristics outlined by McCarthy (1976).

- *Unifacial points* are flakes that have been retouched along the margins from one surface, either ventral or dorsal to give or enhance its pointed shape. They are sometimes symmetrical or leaf shaped.
- *Bifacial points* are retouched along both ventral and dorsal surfaces of a flake to enhance or give the artefact its pointed shape. They may have the platform removed and the proximal end rounded.
- *Edge ground axes* have been shaped by the process of flaking, pecking and polishing. They generally have only one working edge that has been ground to a sharp margin although occasionally they may have two leading edges.
- *Grindstones* are characterized by a worn and abraded surface or surfaces. There also may be a concave surface.
- *Hammerstones* have use-wear on the surface in the form of the abrasion, pitting, edge fracturing with some negative scarring.
- *Manuports* are stone material that are not found naturally in an area and must have been carried in by humans.
- *Backed blades* are flakes or blades that have been retouched partially or completely along the thick margin of the flake to blunt the tool to facilitate hafting.

2.5. Assessment of significance and heritage management principles.

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 problems of human history or other areas of enquiry. The Australian ICIMOS Charter for the Conservation of Places of Cultural Significance, otherwise known as the Burra Charter (Maquis-Kyle and Walker 1992:73) states that the scientific value or research potential of a place depends upon the importance of the data involved, on its rarity, quality or representativeness, and on the degree to which the place or object may contribute to further substantial information.

Therefore the significance of a site is firstly related to the intactness or integrity of a site, that is the state of preservation as well as the stratigraphic reliability of the cultural material. Secondly, the representativeness of a site is important either because a site is unusual or because the site has research potential when taken in conjunction with other sites. Thirdly a site may provide chronology extending back into the past

3.0. RESULTS

The survey located three archaeological sites and sixty four background scatters of isolated stone artefacts. Of these, forty two of the background scatters and one of the sites MRM3, are located in areas that will be disturbed by the proposed Open Cut Project. Two other archaeological sites MRM1 and MRM2 identified during the survey for the Test Pit Project (Crassweller 2005b) are also located in areas that will be disturbed. Two sites MRMH1 and MRMH2 that contained the remains of

mining camps of the 1960s and 70s have also been documented. Details of the sites are described below and details of the background scatters are found in Appendix 1.

The majority of the surface outside the mine site has been disturbed by cattle and the area within the proposed bund wall has been disturbed by past mining exploration and activities related to the current mining activities. The area on the western side of the river and adjacent to the mine site has been highly disturbed by current activities Average surface visibility was good at above 60% on the cracking clay surface which made up the majority of the surveyed area**.**

Visibility however decreased to less than 5% over a 200-300 metre wide corridor along the McArthur River and over a narrower corridor along small sections Barney Creek. The surface along the river corridor consisted of alluvial levees, steep gullies and terraces covered in either a mat of low grasses or more commonly Noogoora Burr and another woody weed that made access difficult. The majority of transects on the eastern side of the McArthur River used the numerous vehicular tracks that exist along the edge of the river to identify areas where access and visibility were slightly better for pedestrian transects. The survey is estimated to have had an effective surface coverage of 15% of the total area to be disturbed by the open cut mine and 20% of the total surface of the OEF.

The following section describes each section of the survey in detail and is summarised in Table 2. The sites and background scatters highlighted in the table indicate that they will be disturbed by the proposed Open Cut Project.

Table 2. Summary of findings in different sections of the Open Cut Project

Section	**Transect No.**		**Sites**	**No. of background scatters**	**Background scatters**
A	1-4	McArthur River diversion, and bund wall eastern side of river		17	**1-16**
B	5 –7, 27	Eastern side of the McArthur River	**MRMH1 MRMH2**	17	**17-29, 60-63**
C	8-11	Barney Creek Diversion		5	**30-34**
D	17,18,24	OEF	**MRM4**	3	**48, 49, 50**
E	19-21	Barney Creek and proposed industrial area		0	-
F	22,23	Western side of McArthur River south of mine site		0	-
G	12-15,17	North of OEF	MRM3	9	35-41, 46,47
H	16,25,26	West of OEF	MRM5	12	42-45,51-59

Section A

This section is situated on the eastern side of the McArthur River that includes a section of the open cut pit, the bund wall and the McArthur River diversion. The river corridor consists of steep levee banks of fine sandy clay loams. Away from the river the surface consists of the cracking clay back plain with small gravely eroded areas in the southeast section of the river diversion. The river diversion follows a small streamline which separates the back plain from the undulating terrain to the west (URS 2005:10-7). Ground visibility along the river corridor was less than 5% and increased to between 60-90% on the cracking clays of the back plain. No stone artefacts were found on the river corridor where the occurrence of any stone was rare. The densest distribution of artefacts (seven background scatters) was located within approximately one kilometre of the southern section of the river corridor. The majority of stone artefacts were unretouched chert flakes and there was one grindstone. No artefacts were located along the northern two kilometre of the river diversion and there was a scarcity of non-artefactual stone at all in this section of the diversion.

Section B

The majority of the open cut pit will be located on the levee banks of the river where there is a low potential for the presence of stone artefacts. No stone artefacts were located in this area. The

area between the open cut pit and the vicinity of the bund wall consists of a cracking clay plain with some areas greatly dissected by gullies and small streamlines where most of the artefacts were located. Sixty five percent of the background scatters occurred within 1 kilometre of river corridor. Again the majority of artefacts were unretouched chert flakes. One hammerstone and three small grinding slab fragments were also located in the region

Section C

The eastern section of the Barney Creek diversion consisted of alluvial levees up to 400 metres from the McArthur River and open woodlands on cracking clays. Ground visibility was low at an average of 50%. The central section of the Barney Creek diversion consists of undulating cracking clays and one area where there are deeply dissected red soils. Visibility was 80% in this area. Disturbance by mining activities became more frequent in the western section of the diversion where there are areas of sheet wash and gully erosion. Average ground visibility ranged from 50-70%. Six isolated artefacts were located in this area, the majority of which were unretouched chert flakes located in gullies and eroded surfaces.

Section D

The majority of the Overburden Emplacement Facility (OEF) is located on a cracking clay back plain that is covered in sparse vegetation and heavily grazed by cattle. The southeast section is covered in open woodland and there are eroded gullies leading down to the lower surfaces of the McArthur River corridor. There are several gently undulating stony sandstone hills in the northern portion and another stony outcrop in the cracking clay where MRM4 is located. Ground visibility ranged from 70-90%. Three background scatters were identified and consisted of six artefacts, four of which were cores from similar raw material as that found on the quarries MRM3, MRM4 and MRM5.

Section E

The surveys over the proposed industrial areas in the vicinity of Barney Creek encountered quite dense vegetation along the banks of Barney Creek. Consequently the survey consisted of either pedestrian transects every 200 metres from a track running parallel to the creek or from the creek itself and then up gullies that ran into the creek. The surface consisted of alluvial banks that were quite steep in sections. Further transects were made across the back plains between the loops in the creek. The area south of the creek is highly disturbed by previous surface clearing and mining activities. No stone artefacts were located in this section.

Section F

The western side of the McArthur River south of the existing mine area is highly disturbed in parts by an underground vent, powerlines and tracks. Visibility on the cracking clays ranged from 60-90% and less than 5% on the levee banks. No stone artefacts were identified in this area.

Section G

The terrain north of the Overburden Emplacement Facility (OEF) was a continuation of the back plains and cracking clay surfaces and had a ground visibility of over 70%. The area north west of the OEF consisted of small flood plains surrounded by a gently undulating plain of medium deep red earths with low gravely rises. The survey identified archaeological site MRM3 and three isolated artefacts adjacent to the floodplain. Other isolated artefacts were unretouched flakes and cores manufactured from chert, silcrete, mudstone and siltstone. One grindstone was also identified in the area

Section H.

The area west of the OEF and south of the track had been recently burnt and the cracking clay plain was covered in open woodland with several small gravel rises near a small ephemeral creek. Visibility was greater than 90% and the artefacts included two grinding slabs, two retouched flakes, one of which was a bifacial silcrete point. The area north of the track consisted of cracking clays and long low gravel rises surrounding a large billabong that was dry at the time of the survey. Ground visibility was hampered by grass around the billabong but increased to 60% and more on the gravel

surfaces and the cracking clays. The majority of artefacts consisted of light grey siltstone flakes located on the low stony rises. Also identified were a grindstone and one chert adze.

3.1. Archaeological Sites

MRM3

Stone artefact quarry

Location: 53 617571E 8187081N WGS84 1:100,000 Map Sheet Borroloola 6185
53 617444E 8186886N AUS84

Ground visibility: 65-80%

Dimensions: 32m N-S and 10m E-W

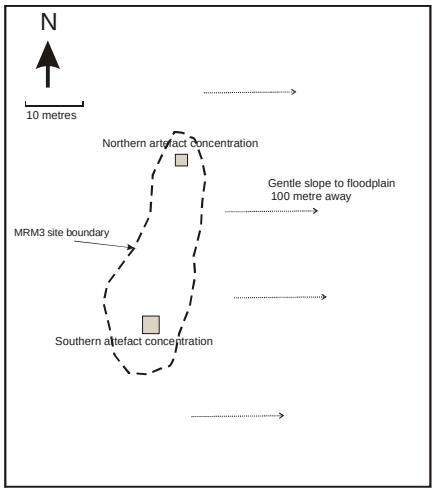
The site is located on the top of a gentle rise that runs along the side of a floodplain that is approximately 100 metres east of the site It is in an area of red termite mounds and low woodlands and the site itself is situated over a low and stony outcrop of very dark grey siltstone and a laminate sandstone with a sandy, silty soil.

There are two main concentrations of artefacts. The northern concentration has a density of 8 artefacts per square metre in an area of 2 x 2 metres. The southern concentration measures 3 x 3 metres and has a density estimated to be 6 artefacts per square metre. The density of artefacts between the two is approximately 0.5 artefacts per square metre. There are several discrete knapping floors in both areas. The density of the non-artefactual stone on the surface is approximately 15 per square metre

All artefacts identified were manufactured from the dark grey siltstone and consisted of 70% flakes and 30% cores. No retouched artefacts were found.

Site's relationship to the development. This site is located outside the boundaries of the OEF and will not be disturbed by the proposed development.

Archaeological significance: This site appears to be undisturbed and has the remains of discrete knapping events. As the site has the potential to generate information regarding stone tool technologies used in the region, the site has been assessed as having medium archaeological significance.



MRM4
Stone artefact quarry
Location: 53 618364E 8184969N WGS84 1:100,000 Map Sheet Borroloola 6185
53 618245E 8184809N AUS84
Ground visibility: 90-95%
Dimensions: 240m N-S and 110m E-W

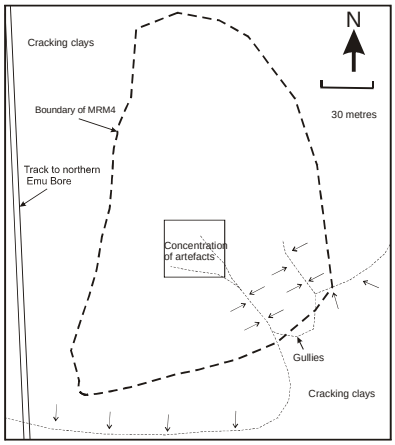
This site is situated on the eastern side of the road that goes to Emu Bore North on a gently undulating hill covered in a fine grained sandstone and siltstone cobbles that are floating in cracking clay soils. No areas of bedrock were observed. The density of the non-artefactual stone is approximately 30 per square metre. The area is covered by clumping grasses and isolated scrub that has been disturbed by cattle**.** The southern section of the site has been disturbed by shallow gully erosion.

The quarried material consisted of a light brown siltstone. The greatest concentration of artefacts is located on the top of the rise in an area of 35 x 35 metres. Where the stone used as the raw material becomes less suitable for knapping the density of artefacts decreased. The average density in the main section is 10 artefacts per square metre and decrease to less than 0.5 near the northern boundaries of the site.

The fracture planes on the majority of the artefacts manufactured from the local siltstone appeared quite fresh. This appearance is probably related more to the nature of the rock rather than any evidence that the artefacts were manufactured recently. There was evidence of a small proportion of the artefacts and non-artefactual stone being damaged by cattle trampling. The artefacts consisted of cores, that ranged in length from 40-170cm in length, with an average length of 70cm, and flakes that ranged from less than 10cm to 90cm in length with an average length of 60cm. There were very few small flakes, which was possibly caused by these artefacts falling between the cracks in the clays during the annual dry seasons. Only two artefacts were located from non–local rock. They were two unretouched dark grey siltstone flakes that appeared to be manufactured from a similar raw material to that identified in the quarries MRM3 and MRM4

Site's relationship to the development. This site is located within the boundaries of OEF and will be destroyed by the proposed development.

Archaeological significance: The size and concentration of artefacts identified at MRM4 suggest that this site was an important location for the procurement of the raw material used in the manufacture of stone artefacts. While cattle and the possible movement of smaller stone artefacts through the clay deposit have disturbed the site, it does have the potential to answer questions regarding stone reduction sequences and procurement methods for the region and has been assessed as having medium to high archaeological significance



MRM5
Stone artefact scatter and quarry
Location: 53 615922E 8185597 N WGS84 1:100,000 Map Sheet Borroloola 6185
53 615798E 8185431N AUS84
Ground visibility: 30-60%
Dimensions: 10m N-S and 10m E-W

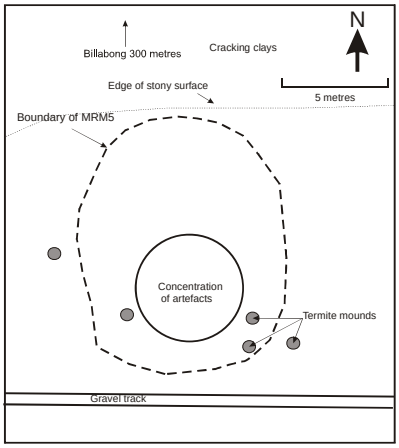
This small site is situated on a low gravely and stony rise located on a cracking clay plain covered in open scrub and clumping grasses. There are termite mounds in the vicinity. It is adjacent to the northern side of a track that goes to a water bore used by cattle and is 460 metre from the Carpentaria Highway. The main concentration of artefacts has not been disturbed by any road construction or maintenance. A relatively large billabong, that was dry at the time of the survey, is located 300 metres to the north.

The quarry is located over a low stone outcrop on a gravely rise that has an average of 80 non-artefactual stones per square metre that range in size from gravel to cobbles. The outcrop consists of sandstone through to siltstone and quartzite. The artefacts are manufactured from a very dark grey siltstone that weathers to a light grey colour and is similar in appearance to artefacts found in the quarry MRM3

The main concentration of artefacts are located in a 5 x 5 metre area in a density of approximately 5 artefacts per square metres and consist of cores to flakes in a ratio of 1:6. Outside this area the density of artefacts is less than one artefact per metre. Average length of the flakes is 50-60cm and the average core is 100cm long.

Site's relationship to the development. This site is located outside the boundaries of the OEF and will not be disturbed by the proposed development.

Archaeological significance: This small site has been assessed as having low to medium archaeological significance. The main research potential for this site is that the contents of this site can be used as a comparison with MRM3 where a similar raw material has been quarried.



3.2. Background scatters

One hundred and ten isolated artefacts were found within sixty two background scatters. The number of individual artefacts in each background scatter ranged from one to eight, with 70% having only one artefact. Detailed descriptions of the background scatters are located in Appendix 1

The distribution and frequency of the background scatters in the areas surveyed indicate that there is a relatively high density of isolated artefacts located on the cracking clay back plains away

from the McArthur River corridor. Seventy of these background scatters were situated in areas of the plain that were dissected by gullies. No artefacts were located on the banks and levees of the McArthur River or Barney Creek. In the area of the OEF the majority of background scatters were in the vicinity of a floodplain and billabong located northwest and west of the OEF, and the three quarries located in the area.

Only two formal types of flaked artefatcs were identified during the survey and they were a silcrete bifacial point and a chert adze, both located west of the OEF. Other artefacts besides unretouched flakes, retouched flakes and cores were grinding slabs, grindstones, flaked pieces and one hammerstone.

When the background scatters are considered as a whole assemblage there are differences in type and raw material located in different areas. On the back plains along the McArthur River south of Barney Creek the dominant raw material is chert, while north of Barney Creek the most common raw material is either the dark grey siltstone similar to that found in quarries MRM3 and MRM5 or the light yellow/ brown coloured siltstone quarried in MRM4. Table 3 summarises the different proportions of the most common artefact types from north and south of Barney Creek. There seems to be a trend for a higher frequency of cores and retouched flakes north of Barney Creek. These figures were based on 74 artefacts south of Barney Creek and 36 north of the creek and the patterns may be the product of the smaller sample size north of Barney Creek.

Table 3. Summary of artefact types in the background scatters

	Unretouched flakes	Retouched flakes	Cores	Grindstones or grinding slabs
Barney Creek and south	47%	16%	22%	11
North of Barney Creek	36%	21%	29%	8%

3.3. Historical Heritage.

The survey located isolated articles left by mining exploration and pastoral activities in the 1960s and 1970s. These objects included small bore holes, bottles, soft drink cans, 44-gallon drums, galvanised iron sheets, and numerous star pickets and wire. The majority of this material was located on the eastern side the McArthur River. Other items included three Australian survey markers on the eastern side of the river with bronze labels screwed onto a concrete block, where the concrete had been set in a bucket and a clear three piece mould glass bottle marked ‘E81’ ‘Iso27’ located adjacent to Barney Creek.

Two areas that appeared to be semi permanent mining camps from the 1960 and / or 1970s have been called MRMH1 and MRMH2. While these sites may be less than 30 years old they are located within the bund wall and will most likely be destroyed. Consequently they have been briefly documented below. One interesting borehole at AGD64 618957E 8182081N had written onto the concrete base the date ‘March 196?’ and ‘Barry’. There was also an arrow pointing towards ‘Home’, which was in the direction of MRMH1 and MRMH2.

A brief visit was made to the Old McArthur River Homestead to verify that the proposed Open Cut Project will not disturb it. Three stone arrangements that may be the remains of grave sites were located approximately 300 metres east of the homestead and 5-10 metres north of the track to the homestead at grid reference of 53-616203E 818041N WGS84. Further research is required to confirm whether they are grave sites.

The details of the two historic sites are shown below. They are both located between the proposed open cut pit and the bund wall, east of the McArthur River and have been assessed as having low historic significance as the remains are disturbed and are of a recent age.

Historic Site MRMH1

Location: 53 618349E 8182639N WGS84 1:100,000 Map Sheet Borroloola 6185

This mining campsite consists of three concrete floors and a rubbish dump located around the intersection of two tracks. The concrete floors consisted a larger floor, possibly the living quarters, a smaller toilet block floor (identified by the presence of a broken toilet bowl) and a generator floor (identified by the presence of metal bolts used to attach the generator to the floor). Other items scattered around the area included the remains of a refrigerator, wooden palettes, galvanised pipes, the rubber base of a shoe, a mattock head and beer stubby bottles. The rubbish dump contained mostly the remains of tins of food. Other items included 'Tarax' aluminium orange drink cans, a 'Castelmaine XXXX' beer can with '13 fluid oz' of beer, a Union Carbide battery, a tube of toothpaste labelled 'Colgate dental cream with gardal' and the remains of crockery manufactured in Australia marked 'Bristile' 'Hotel China'. One unusual item was a chain made from the ring-pull tabs on soft drink cans.

Historic Site MRMH2

Location: WGS84 53 618470 8182269 WGS84N 1:100,000 Map Sheet Borroloola 6185

The remains of this mining campsite are approximately 400 metres southeast of MRMH1 and located on the southern side of a track that goes to MRMH1. It is adjacent to a small ephemeral creek. The remains include a broken concrete slab floor, a stone arrangement that is possibly the remains of a camp fire, a smaller concrete floor, 2 x 2m, that slopes slightly in one direction and is possibly the remains of a toilet block, and seven aligned areas that have been levelled and covered in small stones. These may represent areas that were covered by small tents possibly for sleeping. There were several large tent pegs still implanted in the ground next to the cleared areas. Other smaller items in the area were a man's metal watchband, sections of core drills, metal tools and bits, 44-gallon drums, galvanised sheets, star pickets and car tyres.

3.4. Discussion

The findings from the archaeological survey indicate that the McArthur River and the back plains were a focal point in past Aboriginal use of the landscape. This interpretation is based on the high frequency of backgrounds scatters rather than a high number of archaeological sites However the distribution and frequency of artefacts in the area may be a sign of changes to the surface by flooding and wet season erosion than on the past Aboriginal use. The lack of artefacts along the river corridor suggests that the regular flooding of the river has removed any artefacts that may have been present. The majority of artefacts were found in dissected gullies on the cracking clay plains that are also prone to changes over relatively short periods. For example one of the Australian survey markers has now been disturbed by a shallow gully crossing the plain.

There are now six archaeological sites that have been recorded in the area of the mine site and consist of three stone artefact scatters and three quarries. The Barney Hill site described by Hughes (2002:4) as a base camp as there was a high diversity of artefacts types and raw material probably used to process food and to manufacture and repair their tools. MRM2 appears to be a similar site as it also has diverse stone tool assemblage and MRM1, which is only twenty metres from MRM2, is smaller in size and in the density and diversity of artefacts. The quarries MRM3 and MRM5 are relatively small and appear to have extracted a similar raw material, a dark grey siltstone that is outcropping over a small area in both locations. The MRM4 is a large quarry with a high density of artefacts made from a light brown siltstone.

Hughes (2002:6) reported that the majority of artefacts located during his surveys were manufactured from locally available raw material except for perhaps some of the chert. A brief examination of the isolated artefacts located in this survey indicates that north of the river there was less chert and more siltstone artefacts indicating a preference for the locally available raw material in this area. There was also a trend towards a higher proportion of retouched artefacts and cores the majority of which were manufactured from the locally available siltstone. One unusual finding was the low proportion of formal types of knapped stone tools, such as points, in the background scatters

whereas they were more prevalent in MRM2 and the Barney Hill site. There was also a relatively high proportion of grindstones and grinding slabs in the background scatters over all areas.

4.0. CONCLUSIONS.

The archaeological surveys carried out at the McArthur River Mine (Crassweller 2005a and b) indicate that there is a relationship between the frequency of artefacts and local environmental conditions. There are two land systems that make up the areas to be disturbed. The most unstable is the McArthur River corridor where the alluvial levee banks are seasonally flooded resulting in scouring and undercutting of the banks and re-deposition of alluvium. The scarcity of any stone on the alluvial banks suggests that flooding also scours away any non-artefactual stone. Consequently this unstable surface has a very low potential for the presence of archaeological objects or sites.

The second land system is the cracking clay back plains, where there are occasional low gravel rises or low rock outcrops, and more frequently, areas dissected by gullies and creek lines. The survey found that ground surface visibility was quite high in the back plains areas and most isolated artefacts were identified in the eroded areas or on small gravely rises near small flood plains, ephemeral creeks or billabongs. Consequently there is a higher potential for isolated artefacts in these eroded areas.

While the cracking clays are more stable than the levee banks there will be a local and less dramatic movement of these isolated artefacts through the clays caused by the swelling of the clays in the wet season and the cracking of the clays in the dry season. As a result the stratigraphic integrity of any sites located on the cracking clay would decrease the archaeological research potential and significance of these sites. While no sites were located on the cracking clay plains, the high frequency of isolated artefacts that were identified during the survey on the cracking clay indicated that the survey was intense enough to locate any archaeological sites if they were present. Therefore the potential for the presence of significant archaeological sites located on the cracking clays is low

Three of the archaeological sites that were identified during the present survey were located either on gravely or stony low rises on the plains where there was an outcrop of a raw material suitable for knapping. The two archaeological sites identified during the surveys carried out for the Test Pit Project (Crassweller 2005a and b) were located on the boundary between the levee bank and the cracking clay plains on the upper limits of a stony deep gully that flows into Barney Creek. This suggests that if any intact sites are still present along the river they would be located away from the main flow of the flooded river on the cracking clays adjacent to the levee banks.

During the survey the pedestrian transects detoured over the plains to target any low rises or rock outcrops. Transects in the vicinity of the McArthur River and Barney Creek targeted the gullies leading into these waterways. As no further sites were located, it is considered that there is a low potential for the presence of unidentified sites in these areas.

One of the undertakings of this survey was to nominate areas where there is a potential for the presence of archaeological material that may be disturbed during the construction of the open cut mine and associated structures. As the above discussion suggests, there is a low potential for unidentified archaeological sites to be located in the areas to be disturbed. The findings from this and previous surveys (Crassweller 2005a and b, Hughes 2002) have identified 199 separate stone artefacts in the background scatters that include the sub-surface artefacts located during the clearing operations for the test pit project. This suggests that there is a high potential for the presence of isolated stone artefacts in the areas to be disturbed by the open cut project. However, given the large number of these artefacts identified so far in the area, the input of more information obtained from any unidentified isolated artefacts would be minimal. Consequently, as the archaeological research value of the unidentified isolated artefacts is very low it is considered that the presence of an archaeologist during the clearing operations is not necessary to mitigate the loss of any archaeological knowledge.

5.O. RECOMMENDATIONS

There are three archaeological sites and forty two background scatters of stone artefacts that will be disturbed by the Open Cut Project. The archaeological sites consist of MRM1 and MRM2 that were located and assessed during the Test Pit Project (Crassweller 2005b). MRM4 and the forty two background scatters were located during the current survey and are assessed above.

The current survey also located a further two archaeological sites MRM3 and MRM5, and twenty one background scatters that are outside the areas that will be disturbed as shown in the Draft Environmental Impact Statement for the Open Cut Project. No further action is required for these sites and background scatters at this time.

Two historic sites were also located during the survey. As these sites have been assessed as having low historic significance and they are not protected under the *Heritage Conservation Act, 1991,* no further actions is required

As it has been assessed that there is a low potential for the presence of any significant unidentified archaeological material in the areas to be disturbed it is recommended that no further archaeological surveys are needed.

5.1.Specific Recommendations

- MRM1.
  Location: 53 617553E 8183239N (datum WGS84)
  This site has been assessed as having moderate archaeological significance and will be destroyed by the proposed Open Cut Project. Therefore it is recommended that before the Open Cut Project commences, permission be sought to destroy the site from the Minister for the Environment and Heritage, with the proviso that a detailed surface recording that includes a collection of the artefacts is made by a qualified archaeologist before the site is destroyed.

- MRM 2.
  Location: 53 617621E 8183247N (datum WGS84)
  This site has been assessed as having moderate to high archaeological significance and will be destroyed by the proposed Open Cut Project. Therefore it is recommended that before the Open Cut Project commences, permission should be sought to destroy the site from the Minister for the Environment and Heritage, with the proviso that a qualified archaeologist makes a detailed surface recording, a sample collection of surface artefacts and a test pit excavation before the site is destroyed.

- MRM4
  Location: 53 618364E 8184969N (datum WGS84)
  The site has been assessed as having moderate to high archaeological significance. If the area for the proposed Overburden Emplacement Facility cannot be moved to avoid this site it is recommended that before the Open Cut Project commences, permission should be sought from the Minister of the Environment and Heritage to destroy the site with the proviso that there is a detailed surface recording including a sample collection of artefacts and test pit excavation at the site.

- Background scatters
  All the background scatters have been assessed as having low archaeological significance. Therefore it is recommended that before the Open Cut Project commences, permission should be sought from the Minister for the Environment and Heritage to destroy the background scatters as described below.

Table 4. Location of background scatters that will be destroyed by the project

B/S No.	Easting AUS84	Northing AUS84	Easting WGS84	Northing WGS 84
1	616504	8181317	617627	8181287
2	617633	8181287	616714	8181169
3	616715	8181168	616955	8181331
4	617083	8181215	617228	8181382
5	617107	8181239	617269	8181417
6	617357	8181200	617472	8181364
7	617467	8181175	617595	8181340
8	618075	8181287	617798	8181407
9	618075	8181289	618203	8181453
10	618179	8181233	618377	8181477
11	618856	8181478	618728	8181314
12	619253	8181890	619380	8182054
13	619117	8181586	619247	8181754
14	619035	8181593	619158	8181761
14a	619035	8181593	619322	8182044
15	618191	8182469	618327	8182633
16	618470	8192269	618321	8182634
17	617778	8181855	617778	8181855
18	617501	8181591	617629	8181758
19	617528	8181513	617659	8181679
20	617588	8181497	617717	8181647
21	617868	8181621	617996	8181788
22	617886	8181684	618010	818150
23	617953	8181781	618080	8181948
24	618462	8182608	618590	8182774
25	618406	8182082	618534	8182248
26	618407	8182083	618535	8182249
27	618260	8182082	618388	8182249
28	618828	8182191	618956	8182358
29	618731	8182008	618862	8182188
30	618239	8183666	618375	8183846
31	617187	8183810	617312	8183974
32	616868	8183841	616990	8184000
33	616824	8183733	616954	8183903
34	616859	8183645	616986	8183811
48	618379	8185128	618507	8185294
49			618245	8184898
50	617934	8184748	618063	8184915
60	618063	8181292	618190	8181460
61	618244	8181416	618387	8181559
62	618357	8181477	618498	8181650
63	618837	8181685	618965	8181853

REFERENCES

Clegg, J. 1983. Recording prehistoric art. In ed. G. Connah's *Australian Field Archaeology: A Guide to Techniques*. Australian Institute of Aboriginal Studies, Canberra.

Crassweller, C. 2005a Interim archaeological report for the McArthur River mine Test Pit Project, NT. A report for McArthur River Mine

Crassweller, C. 2005b. An archaeological survey for the proposed Test Pit Project, McArthur River Mine, NT. A report for McArthur River Mine.

Crassweller, C. 2005c Archaeology and Historic Heritage Assessment for the open cut pit at the McArthur River Mine, NT. A draft report .A report for McArthur River Mine

Hiscock, P. 1984. A preliminary report on the stone artefacts from Colless Creek Cave, Northwest Queensland. *Queensland Archaeological Research*, 1:120-151.

Hiscock, P. and Mitchell, S, 1993. *Stone Artefact Quarries and Reduction Sites in Australia: Towards a Type Profile*. Technical Publications Series Number 4. Australian Heritage Commission, Canberra.

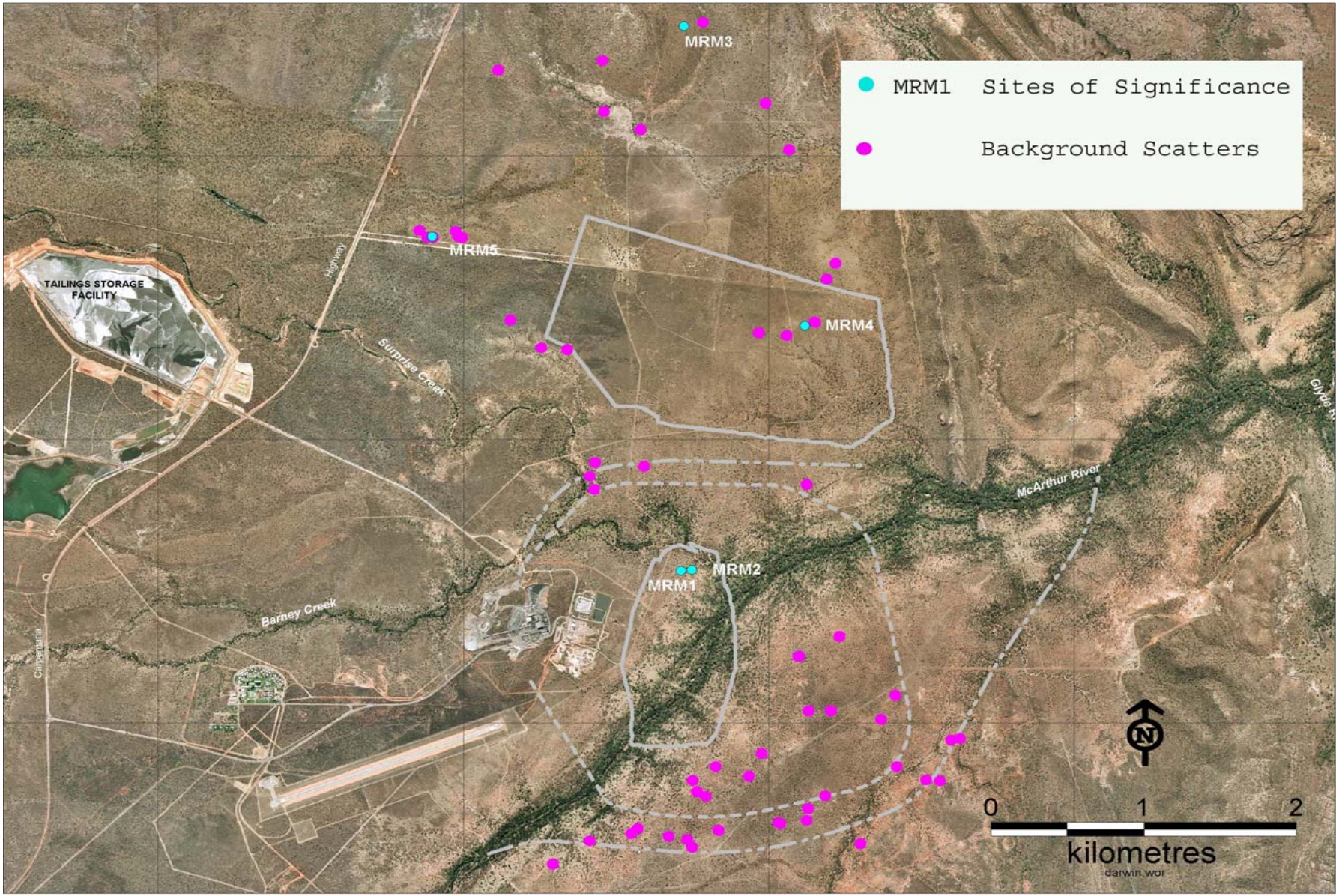
Hughes, P. 2202 An archaeological investigation of the proposed McArthur River Mine expansion area, Northern Territory. A report to MIM Holdings.

McCarthy, FD 1976. *Australian Aboriginal Stone Implements*. The Australian Museum Trust, Canberra.

Maquis-Kyle, P. and M. Walker, 1992. *The Illustrated Burra Charter: Making good decisions about the care of important places*. Australian Heritage Commission, Canberra.

Sullivan, M.E. and S. Bowdler 1984. *Site Surveys and Significance Assessment in Australian Archaeology*. Dept of Prehistory, Research School of Pacific Studies, ANU, Canberra Guse, D and Collis, A. 1998. Archaeological Survey of proposed Nabre Seismic Line, McArthur River Region, NT. An unpublished report for the North Australian Basins Resource Evaluation. Australian Geological Survey Organization.

URS 2005. McArthur River Mine Open Cut Project. Draft Environmental Impact Statement. Volume 1 - Main Report. A report for McArthur River Mine



	Job No.	42213683		Archeaological Sites
	Prep. By	JC		
	Chk'd By	CC		
	Revision No.	1		

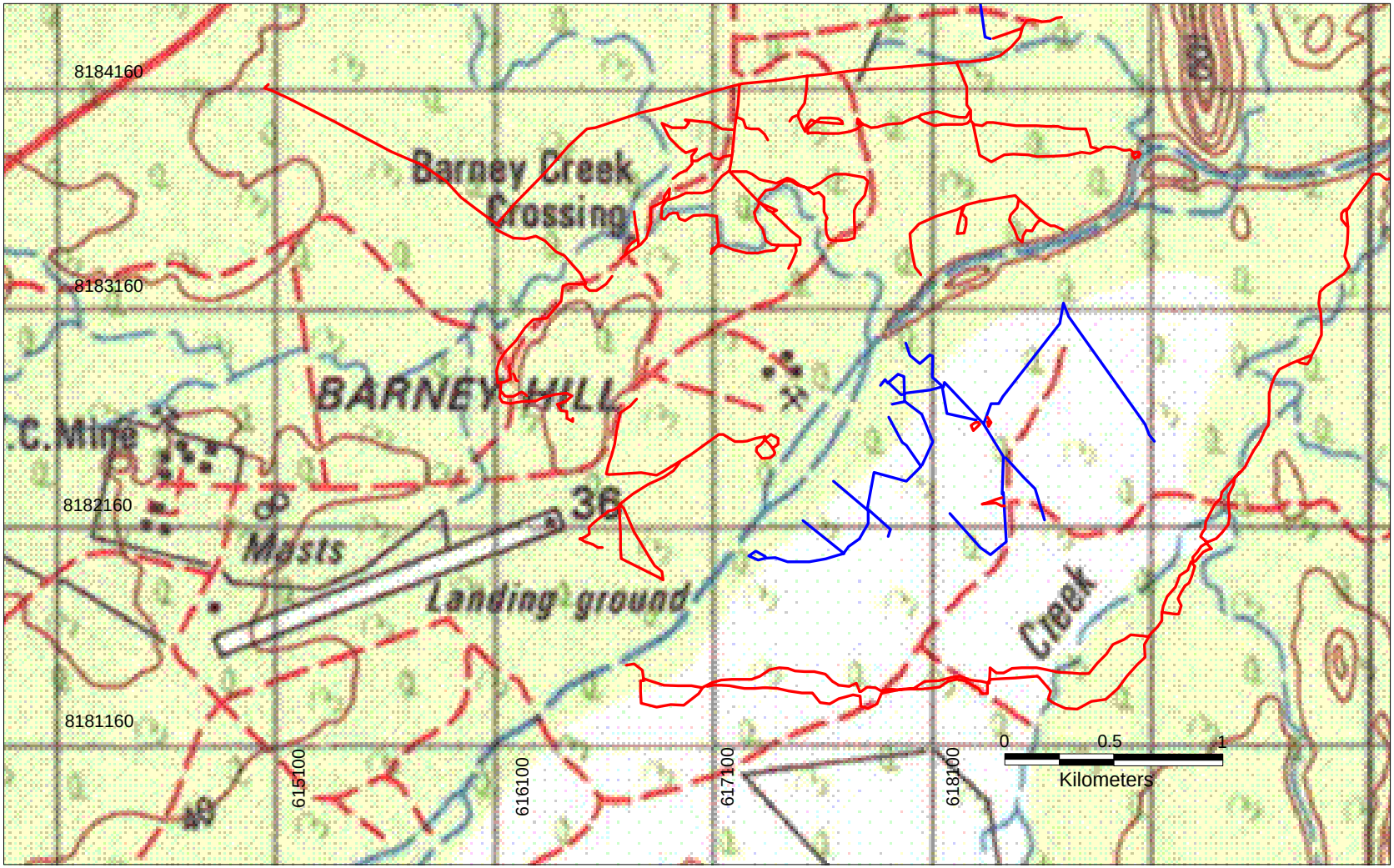
Figure 1

URS

Archaeological Survey McArthur River Mine Expansion, Map 2.

Transect areas surveyed, Southern zone, September 2005.

Begnaze Pty Ltd.



Pedestrian Transects

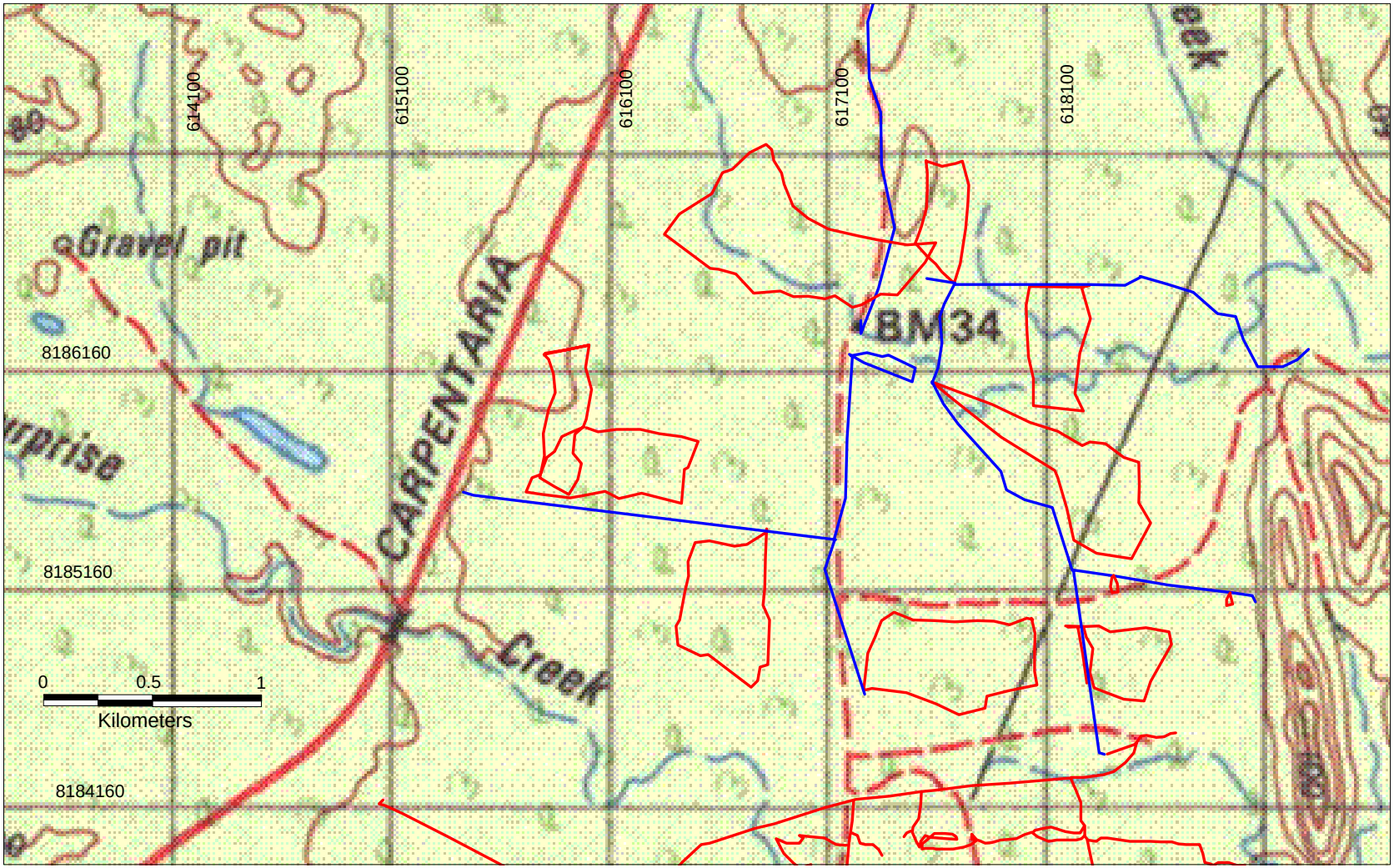
Vehicle Transects

Mapping by Earth Sea Heritage Surveys.
Sept 2005.
Base Map: 1:100,000 scale
Borroloola 6165
Datum: GDA94
Mapgrid: MGA 94

Archaeological Survey McArthur River Mine Expansion, Map 1.

Transect areas surveyed, Northern zone, September 2005.

Begnaze Pty Ltd.



Pedestrian Transects

Vehicle Transects

Mapping by Earth Sea Heritage Surveys.
Sept 2005.
Base Map: 1:100,000 scale
Borroloola 6165
Datum: GDA94
Mapgrid: MGA 94

Photo 1 McArthur River levee banks.

Photo 2. McArthur River levee banks.

Photo 3. Weed cover adjacent to river

Photo 4. Cracking clay plains

Photo 5. Stony rises on cracking clay plains

Photo 6. MRM3, facing south.

Photo 7. MRM4, facing north.

Photo 8. MRM5, facing west.

Photo 9. MRMH1, facing east

Photo 10. MRMH1, largest concrete floor

Photo 11. MRMH1, rubbish dump.

Photo 12. MRMH2, largest concrete floor

APPENDIX 1

Details of background scatters

B/S No.	Easting WGS84	Northing WGS 84	Environment	Vis. li%	Artefact type	Raw material	Dimensions	Comments	Photo No.
1	617627	8181287	gully near creek	70	unretouched flake	chert	40 x 25 x 17	Edge damage, trampling	
2	616714	8181169	undulating cracking clays	70	grinding stone	meta s/stone /quartzite	106 x 29 x 77	With percussion marks	3331-32
3	616955	8181331	top of high bank along deep gully	85	unretouched flake	red mudstone	38 x 42 x 17		3333-36
					core	orange mudstone	32 x 29 x 15	Single platform	
					unretouched flake	orange silcrete	23 x 17 x 14		
					flake piece	chert	22 x 13 x 8	Heat damage	
4	617228	8181382	shallow gully in cracking clays	80	core	chert	122 x 136 x 79	Multi-platform, heat damaged	3337-39
5	617269	8181417	shallow gully in cracking clays	80	unretouched flake	orange siltstone	50 x 60 x 55	From nodule	3340-41
				80	unretouched flake	chert	27 x 23 x 15	Dorsal 100% cortex	
6	617472	8181364	shallow gully in cracking clays	80	retouched flake	silcrete	41 x 64 x 18		3342-43
7	617595	8181340	shallow gully in cracking clays	80	core	red mudstone	54 x 88 x 28	Multi-platform	3344-45
8	617798	8181407	shallow gully in cracking clays	80	core	chert	25 x 17 x 14		3346-47
9	618203	8181453	shallow gully in cracking clays	90	grindstone	sandstone	79 x 75 x 47	Broken	3348-53
					unretouched flake	chert	78 x 104 x 36		
					core	chert as above	200 x 130 x 85		
10	618377	8181477	stony outcrop top of undulating hill	95	cores & unret. flakes			Density of 1/400m2	
11	618728	8181314	eroded area / shallow gully	80	unretouched flake	orange chert	34 x 62 x 21		3354-55
					core	white chert	68 x 55 x 33		
12	619380	8182054	gravely eroded area on small rise	90-95	retouched flake	chert	29 x 20 x 7	Proximal flake, use wear on lateral and heat damage	3356-62
					retouched flake	chert	30 x 29 x 9	Distal break heat damage	
					unretouched flake	chert	28 x 31 x 12	Heat damage and edge damage, trampling	
					retouched flake	black chert	32 x 28 x 14	Lateral retouch	
					retouched flake	white chert	25 x 17 x 7	Retouch from ventral cortical platform, overhang removal	
13	619247	8181754	eroded and gullied gravely soils	90	retouched flake	beige chert	36 x 29 x 8	Retouched from dorsal, 20%cortex on dorsal	3363-65
14	619158	8181761	eroded and gullied gravely soils	90	unretouched flake	white chert	31 x 30 x 6	5%cortex on dorsal	3366
14a	619322	8182044	gravely area on cracking clays	85	retouched flake	chert	57 x 46 x 10	Broken, medial flake	
					unretouched flake	chert	28 x 26 x 6	Broken, distal flake	
15	618327	8182633	Located on rubbish dump of MRM Historic Site1	95	unretouched flake	chert	44 x 24 x 9	50% cortex, hinge termination	
16	618321	8182634	Gully near MRM Historic Site 2	95	core	orange siltstone	100 x 97 x ?	Proximal flake	3367-71
17	617778	8181855		75	unretouched flake	chert breccia	20 x 20 x 5		
18	617629	8181758	dissected gully	75	retouched flake	red chert	28 x 21 x 11	Distal break, heat treated	3423
			dissected gully	90	retouched flake	red quartzite	72 x 46 x 2		
19	617659	8181679	dissected gully	90	unretouched flake	silcrete	46 x 26 x 11		
					core	quartzite	30 x 41 x 36	Single platform, one -ve scar	
20	617717	8181647	dissected gully	90	retouched flake	chert	56 x 55 x 26	Over hang removal retouch on lateral from ventral	

21	617996	8181788	eroded gully	70	unretouched flake	chert	25 x 17 x 9	Proximal break, heat treated	
22	618010	8181500	400 metre transect over gullies	75-85	unretouched flake	chert	39 x 13 x 12		
					unretouched flake	chert	12 x 36 x 11		
					unretouched flake	quartzite	36 x 62 x 18		
					unretouched flake	quartzite, fine grained	48 x 42 x 12		
					core	quartzite, fine grained	48 x 40 x 42		
					core	quartzite	31 x 46 x 20	One -ve scar	
					unretouched flake	quartzite	61 x 46 x 19	50% cortex on dorsal	
					hammerstone	quartzite	101 x 47 x 36	Peck marks both ends	
23	618080	8181948	eroded gully	75	grinding stone fragment	sandstone	110 x 75 x 23		3424
24	618590	8182774	eroded gully	50	retouched flake	chert	40 x 70 x 28		
25	618534	8182248	eroded gully	65	unretouched flake	chert	25 x 30 x 4		
26	618535	8182249	undulating cracking clays	90	unretouched flake	chert	39 x 41 x 15	Broken lengthways	
27	618388	8182249	small gullies	70	unretouched flake	chert	35 x 41 x 10	Some cortex	3425-26
				85	core	chert	32 x 32 x 19		
					unretouched flake	chert	40 x 26 x 18		
					unretouched flake	chert	36 x 28 x 14		
					grinding slab	sandstone	128 x 11 x 26		
					unretouched flake	light brown siltstone	36 x 38 x 12		
28	618956	8182358	undulating cracking clay		unretouched flake	chert	26 x 18 x 8		
					unretouched flake	chert	18 x 19 x 10	Proximal flake	
29	618862	8182188	undulating cracking clay	85	unretouched flake	red chert	18 x 21 x 2		3427-31
					grinding slab fragment	sandstone	55 x 55 x 18		
					grinding slab fragment	sandstone	78 x 55 x 21		
					grindstone	sandstone	140 x 120		
					grinding slab fragment	sandstone	68 x 47 x 18		
					unretouched flake	black chert	12 x 8 x 2		
30	618375	8183846	undulating cracking clay	15	unretouched flake	chert	34 x 35 x 10		3432-33
31	617312	8183974	top of eroded gully	80	core	light brown siltstone	38 x 42 x 42	5% cortex, multi-platform	3434-37
32	616990	8184000	sheet wash erosion	80	unretouched flake	black chert	12 x 18 x 7	Proximal flake	
33	616954	8183903	gully leading into Barney Creek	50	unretouched flake	red chert	38 x 20 x 4		3438-41
34	616986	8183811	series of gullies	20	unretouched flake	chert	29 x 15 x 4		
35	618260	8186207			unretouched flake	mudstone	65 x 45 x 22	>50% cortex	
36	618107	8186535	undulating cracking clay	60	unretouched flake	chert	22 x 28 x 6	OHR, transverse distal break	
37	617697	8187107	gentle rise (red soil), areas of gravel	60	core	silcrete	71 x 78 x 64	Multi-platform, 5%cortex	3442-44
38	617289	8186349	gentle rise (red soil) with areas of gravel	50	retouched flake	light brown siltstone			3453
					core	silcrete	29 x 43 x 22		
39	617039	8186836	near small dry waterhole	80	unretouched flake	red silcrete	45 x 31 x 15		3456-57
40	616356	8186769	undulating with red soil and gravels	85-90	retouched flake	light brown siltstone	50 x 25 x 8	Use wear both laterals	3458-62
					unretouched flake		26 x 18 x 5		
					core	chert	109 x 111 50		
41	617048	8186477			unretouched flake	silcrete			
					unretouched flake	silcrete			
42	616819	8155330	on plain, burnt	95	retouched flake	dark grey siltstone	45 x 48 x 18		3463-65
43	616808	8184799	gravely rise, burnt	85	bifacial point	orange silcrete	50 x 29 x 9		3465-69
44	616638	8184809	near small creek in sandy stony surface	85	grinding slab fragment	sandstone	108 x 100 x 32		3470-72
45	616435	8185006	cracking clay plain, burnt	90	core	silcrete	68 x 66 x 3		3473-74
46	618314	818583	undulating cracking clays	80	core	pale brown orange silcrete	98 x 81 x 30	cortex, multi-platform	3475-77
47	618565	8185407	undulating cracking clays	70	grinding slab	sandstone	200 x 78 x 17		3478-80
48	618507	8185294	undulating cracking clays	70	core	silcrete	100 x 81 x 42	Multi-platform, very weathered	3481-87
					core	silcrete	86 x 98 x 36	River cobble, single platform	
					core	quartzite	72 x 76 x 38	Multi-platform	
49	618245	8184898	undulating hills with occasional stony surface	70	unretouched flake	silcrete	82 x 41 x 22		3495-97
					core	silcrete	145 x 68 x 30	Large and small -ve	

								scars, multi-platform	
50	618063	8184915	undulating cracking clays	80	retouched flake	dark grey siltstone	70 x 55 x 24	Hinge termination	
51	616120	8185587	low stony rise near flood plain and dry billabong	<15	unretouched flake	dark grey siltstone	30 x 22 x 8		3498-3504
					flake piece	dark grey siltstone	10 x 18 x 3		
					flake piece	dark grey siltstone	21 x 9 x 2		
					adze	white chert	28 x 34 x 8		
52	616092	8185597	low stony rise near flood plain/ billabong	30-50	unretouched flake	sandstone	51 x 44 x 14		
53	616076	8185630		30-50	unretouched flake	dark grey siltstone	32 x 14 x 4	Cortex 20% on dorsal	3508-10
54	616076	8185630		30-50	unretouched flake	dark grey siltstone	28 x 16 x 4		3508-10
55	615929	8185590		30-50	retouched flake	dark grey siltstone	16 x 15 x 3		3508-10
56	618429	8184989	undulating cracking clay	30-50		dark grey siltstone	19 x 14 x 4		3508-10
57	618428	8184992	undulating cracking clay	30-50	grinding stone	sandstone	142 x 122 x 40	Percussion marks on both sides of one end	3505-07
58	615840	8185636	cracking clays in vicinity of billabong	30	unretouched flake	dark grey siltstone			
					unretouched flake	dark grey siltstone			
59	615890	8185590	30 metres from MRM5 on low stony rise	60	core	orange silcrete	122 x 99 x 55	Single platform, with 8 small –ve flake scars	
60	618190	8181460	undulating cracking clay	95	core	grey/white banded chert		Single platform cortical	
61	618387	8181559	shallow gully in cracking clay	90	unretouched flake	orange chert	32 x 32 x 15		3563-68
					core	orange chert	58 x 40 x 24	Multi-platform	
					core	cream chert	32 x 29 x 18	Multi-platform	
62	618498	8181650	series of gullies	80	unretouched flake	chert	38 x 35 x 9		3569-3570
63	618965	8181853	series of gullies	85	core	red chert	28 x 48 x 48	Heat damage –ve flakes in one small area only	3571