AN ARCHAEOLOGICAL SURVEY OF THE PROPOSED MAUD CREEK MINING PROSPECT, NORTHERN TERRITORY

by

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CONTENTS

TABLES **Page No.**

FIGURES **Page No.**

PLATES

SUMMARY

NTUAS was commissioned by Dames and Moore in October 1994 to undertake an archaeological survey of proposed Maud Creek mining lease. The Maud Creek mining lease is located 24 kilometres east of Katherine, Northern Territory. The consultants were required to identify and record any "archaeological objects or places" likely to be impacted by the proposed development, assess their significance and make recommendations regarding mitigative procedures. A total of six archaeological sites and a stone artefact background scatter were found within the proposed development area.

The following recommendations arise from this study;

1. Background scatters of artefacts were located within the proposed Maud Creek mining prospect. Densities of stone artefact materials were low in the study area. **It is recommended that permission to disturb artefacts located in the background scatter is granted under the *Northern Territory of Australia Heritage Conservation Act 1991.***

2. Site 1 is not sufficiently archaeologically significant to warrant change to the proposed development plans. However Site 1 is intact and since little is known or recorded about this particular site type in the region it therefore has some archaeological value. **It is recommended that permission to disturb Site 1 under the *Northern Territory of Australia Heritage Conservation Act 1991* be granted following the surface collection of the artefacts. Collected artefacts should be lodged in the Northern Territory Museum and Art Gallery.**

3. Sites 2, 3, 4 and 5 are not located within the immediate development area. Sites 2 to 5 consist of a significant cluster of sites within a small area. These sites are an interrelated group which have significant archaeological value about past Aboriginal lifeways. **It is recommended that Sites 2, 3, 4, 5 and 6 be protected unless there is further development within the area. A fence should be erected around the area of Sites 2, 3, 4 and 5. Warning signs should also accompany the fence.**

4. Site 6, historic gold mine, is located outside of the immediate impact area. Site 6 should be protected as it has significant heritage value. **It is recommended that Site 6 be protected unless there is further development within the area. Warning signs should be placed around Site 6. If further development will cause an impact on Site 6, more detailed recording will be required before permission to disturb is granted.**

1.0 INTRODUCTION

1.1 Consultancy brief

This report details an archaeological assessment of the Maud Creek mining prospect. The aims of the study were to identify and record any "archaeological objects or places" likely to be impacted by the proposed development, assess their significance and make recommendations regarding mitigative procedures. Fieldwork was undertaken by Daryl Guse and Robin Gregory.

1.2 Location and size of the proposed development area

Maud Creek mining prospect is located 19 kilometres east of Katherine and lies immediately south of the Katherine River National Park Reserve (Figure 1). The area under impact is 2.3 kilometres east-west and 1 kilometre north-south (Figure 2). The study area is divided into the five mining lease sub-divisions MCN 4135, 4136, 4138, 4137 and 4143. Each mining lease subdivision is 800 metres by 500 metres in size. Within the proposed development area, impact on the environment will occur mainly within leases MCN 4136, 4137 and 4138 (Figure 2). The study area and surrounds has been used for both pastoral and mining activities at various times in the past. The proposed development area has also been extensively disturbed by activities associated with core sampling/drilling (Plate 1).

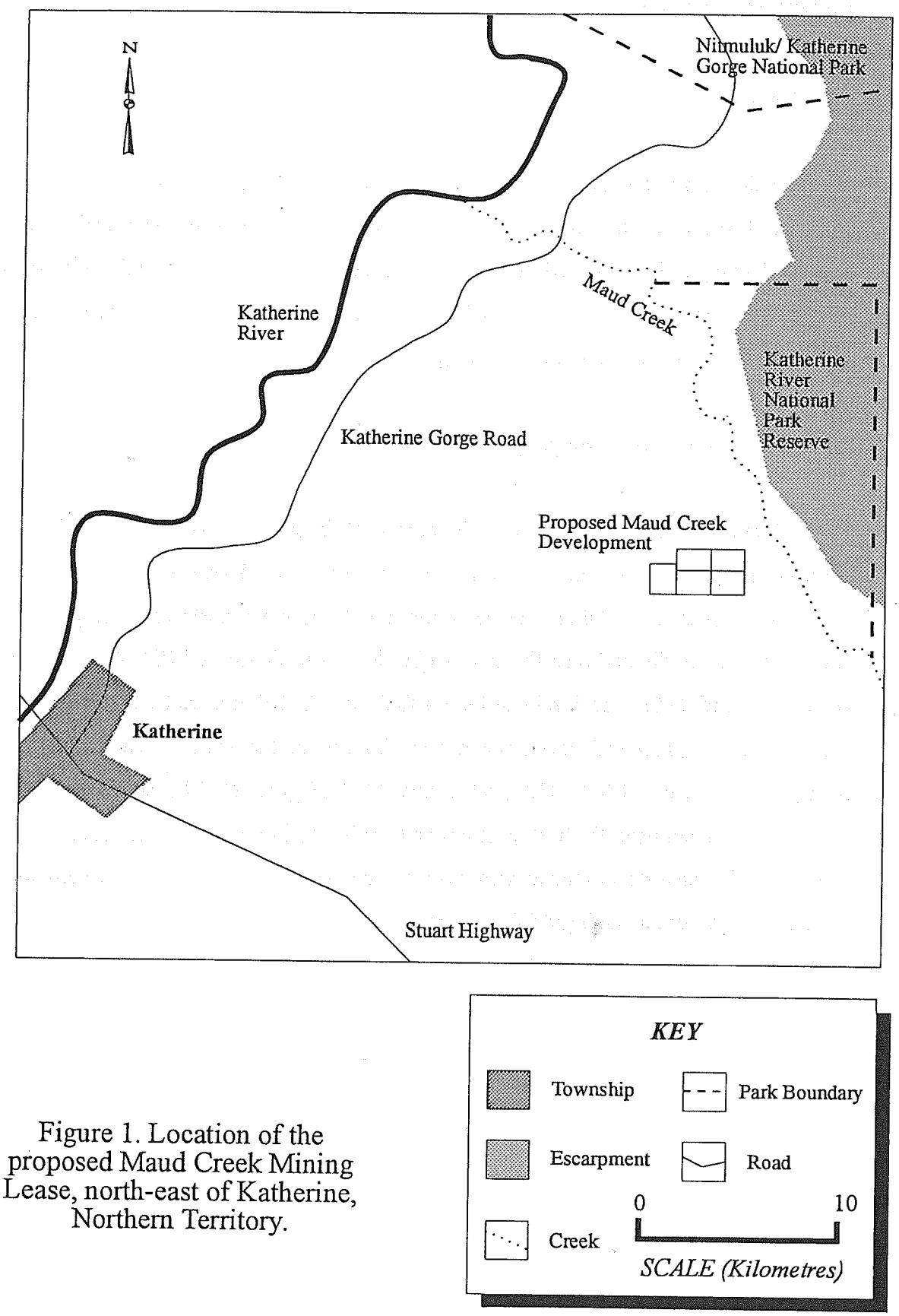

Figure 1. Location of the proposed Maud Creek Mining Lease, north-east of Katherine, Northern Territory.

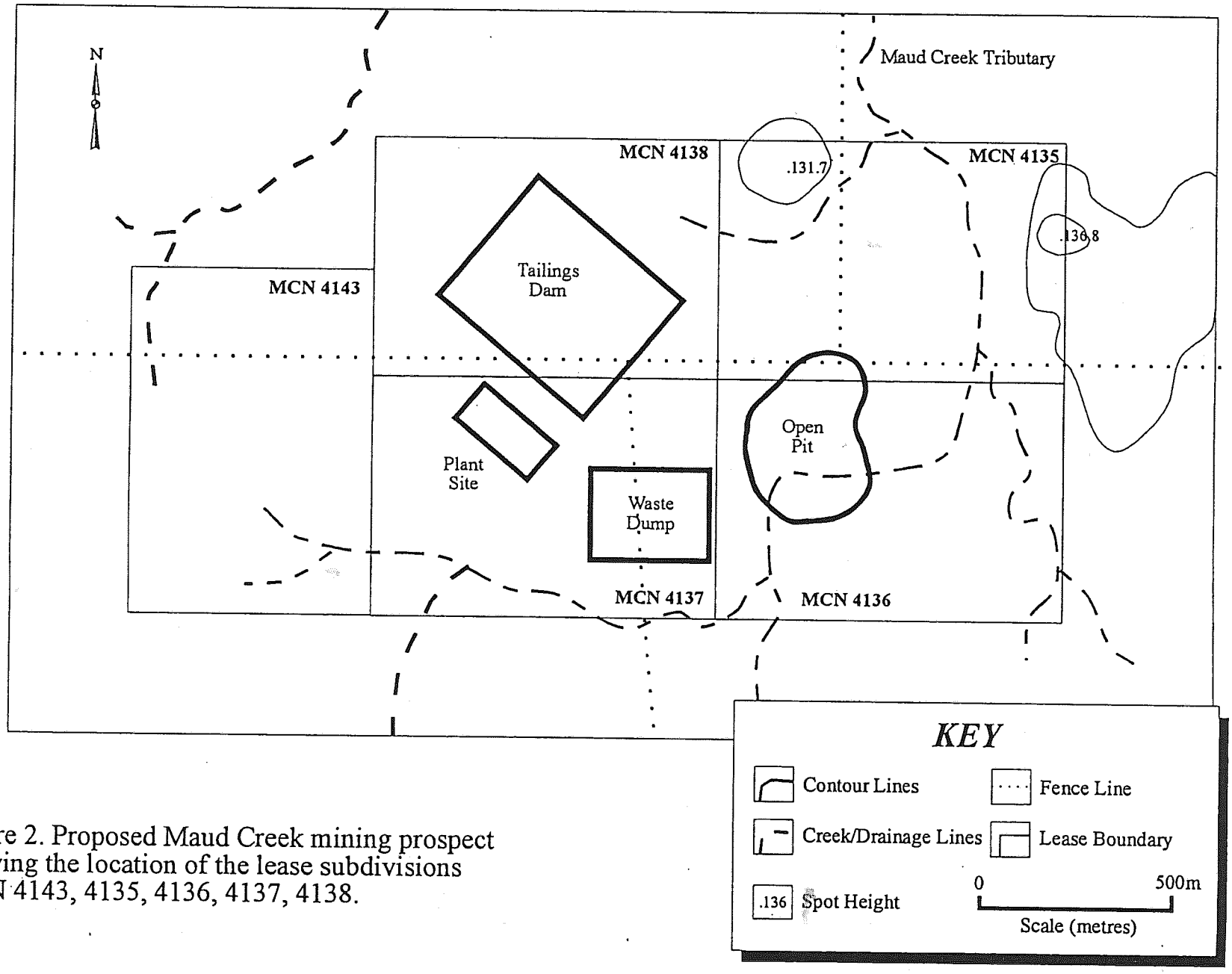

Figure 2. Proposed Maud Creek mining prospect showing the location of the lease subdivisions MCN 4143, 4135, 4136, 4137, 4138.

2.0 PHYSICAL SETTING

2.1 Geomorphology and Geology

The study area is located on the boundary of two geomorphological units, the Elevated Backbone Country and the Daly River Basin. The Elevated Backbone country geomorphological unit is an extensive area of eroding upland country which extends over the eastern and central parts of the Katherine-Darwin region and extends southwards across the Daly River in the western section (Christian and Stewart 1953:36). The Daly River Basin includes most of the area drained by the Daly River and its tributaries, many of which originate in the Elevated Backbone Country. This area is characterised by mixed low hills and undulating plains with irregular outcrops of sandstones and low hills and boulders of outcropping limestone. Small areas of alluvial plains are present along the lower Katherine, Flora and Daly Rivers (Christian and Stewart 1953:37).

The geology of the study area consists of Basic Volcanics which are represented by minor outcrops (Christian and Stewart 1953:32), together with sandstones, limestones and shales of the Daly River Group which outcrop over the majority of the Daly River Basin (Christian and Stewart 1953:32-33).

2.2 Land systems and vegetation

The study area appears to cover the boundary of two land systems - Volcanics and Tipperary. The Volcanics land system is characterised by low hills and gentle slopes with skeletal and deep Heavy Grey Pedocal soils respectively (Christian and Stewart 1953:99). The Tipperary land surface is primarily undulating and gently undulating with some low, rough, rocky hills which have very little soil. Stony soils form on both sandstone and limestone and occur on areas of undulating topography. On gently undulating areas, Limestone Red soils, Sandstone Lateritic Podsols, and Elliott Creek soils are most extensive (Christian and Stewart 1953:100-101). A *E.tectifica* (Northern box), *E.latifolia* (Round-leaved bloodwood) woodland with

Sorghum grassland understorey is the dominant vegetation suite in the area (Wilson *et al.* 1990:50). The area is drained by several small creeks which are tributaries of Maud Creek which in turn flows into the Katherine river.

In terms of resource availability in the study area it appears that sources of permanent surface water are limited to major rivers such as the Katherine, together with ephemeral creeks and pools. Sources of stone are relatively abundant on the hills. Within the study area itself quartzite crops out in some areas and chert nodules are present on the laterite and alluvial soils. Such a distribution of resources across the landscape would have influenced the land use strategies practiced by people in this area in the prehistoric past.

3.0 HISTORIC BACKGROUND

Historic evidence suggests that material associated with goldfields and copper mines may be located in the proposed development area. It was necessary to identify historic sites within the study region. A historic site or places comes from the historical period in the Northern Territory. Historic sites or places are may be recognised on the basis of containing structural remains, together with scatters of metal, glass, ceramic and earthenware artefacts. Within the Katherine River area there are several small gold and copper occurrences of the which the Maud Creek field has been the most important. Other leases include Cemetery, Dalhonzie, Golden Creek, Golden Tree, Hibernia, Lady Maud, Maud Hill and Mystery. Historic workings consist primarily of shallow shafts and open cuts and total recorded production is in the order of 540 oz of gold, obtained mainly in 1890-92 and 1932-40 (Crohn 1966:59). A brief overview of the history of the field is provided below.

The discovery of a gold bearing reef at Maud Creek first occurred in July 1887 by Mr AJ Giles (NTTG 9/7/1887). By August of that year several claims had been taken up north and south of the prospector's claim as news of this large and well-defined reef spread (NTTG 13/8/1887) and there was talk of a gentleman establishing a battery on the field (NTTG 20/8/1887). By mid October 1887 claim-owners were

engaged in sinking shafts, raising stone and constructing huts for the wet season. Several new reefs were located (NTTG 15/10/1887). Throughout February and March of the following year arrangements were made to establish batteries at Maud creek (NTTG 18/2/88, 25/2/88, 3/3/88). Mining continued in a sporadic fashion throughout the years 1888-1893 owing to a number of factors including a shortage of European labour, the absence of a stamp battery, and later the dissatisfaction on the part of the miners and mine owners with the general management of the battery (NTTG 2/6/88, 24/11/88, 4/5/89, 11/10/89). The shortage of European workers led to the arrival of the Chinese on the goldfields by 1889 (NTTG 15/11/89). By 1894 the leases at Maud Creek were abandoned and the battery was put up for sale (NTTG 26/1/1894). In 1891 copper and silver were discovered (NTTG 20/3/1891) but it was not until 1902 that work begun at the Maud Creek copper mine, located about 3 miles northwest of the old Maud Creek goldfields (NTTG 26/9/1902).

4.0 PREVIOUS ARCHAEOLOGICAL AND ETHNOGRAPHIC RESEARCH

4.1 Ethnographic Background

Given the lack of previous archaeological research conducted in the study area to date, ethnographic information may provide data concerning the nature and distribution of sites likely to be found in the proposed development area.

According to Tindale the study area is part of the country occupied by the *Djuanan*, whose tribal territory covered the Katherine river and headwaters, south to Maranboy and west to Katherine (Tindale 1974:223).

Little ethnographic data is available for the area. Dahl observed a number of paintings on some large boulders in the area around Katherine, consisting of drawings of men, kangaroos, stencilled hands, and fish in 1895 (1927:251). Dahl and his party also travelled up Maud Creek. He observed a lack of bamboo and commented that this

was reflected in the absence of bamboo spear shafts around Katherine which were all made of "lancewood".

It is likely that food resources such as fish, freshwater mussels, turtles, crocodiles, kangaroos, wallabies, goannas and other small game were exploited in the study area and surrounds (Dahl 1927:17-18, Mathews 1901:76-78). Plant food likely to have been exploited include yams, water lilies, pandanus, and fruit such as that from *Terminalia* and *Eugenia* sp (Dahl 1927:17, Mathews 1901:78).

In terms of settlement patterns is it probable that prior to the arrival of Europeans the traditional land use pattern consisted of cycles of aggregation and dispersal linked to seasonal changes in resource abundance and accessibility (Dahl 1927:16, Rose 1992:6). Research conducted by Davidson further to the west suggests that low hills and rises were favoured camping areas in the wet, while stream terraces were occupied in the dry season (Davidson 1935:151).

As the area is little known archaeologically, information from the wider region may be combined with the environment and ethnographic data to formulate a predictive model concerning the nature and distribution of archaeological sites in the proposed impact area. The ethnographic material indicates that Aboriginal peoples were targeting certain floral and floral resources, water sources and localities of knappable stone raw materials. Localities of high archaeological potential will be those areas nearby resources such as surface water (creeks and billabongs) and sources of raw materials (ridges and hills with outcropping sources of stone suitable for artefact manufacture).

4.2 Site Definition

For the purposes of this study a distinction was made between relatively dense, localised concentrations of archaeological material and the sparsely distributed materials that surrounds them. The relatively sparse stone artefact scatters may be termed the 'background scatter", while concentrations of material are called 'sites".

Such a distinction has been frequently used in surveys of the wider region (eg. Hiscock and Mitchell 1992), and is useful when investigating the nature and intensity of prehistoric land use strategies. For example, large dense scatters of artefacts may have resulted from several visits to a particular location or long term use of that location, whereas a single artefact may represent only a fleeting use of an area. The geomorphic context of artefacts also affects their visibility and the relationship they have with past activities; for example, artefacts moved by erosion processes have a distorted relationship with the past.

In previous studies, definition of a site has usually followed the following format. For the purposes of this study, clusters of stone artefacts were defined as a site when the following criteria were met (after Hiscock 1991a:178)

1. More than 5 artefacts in an area of 2 square metres.
2. Artefact densities are 5 x greater than the background density.

A number of different types of site have been documented in the Katherine region and a brief definition of these is listed below:

Quarries, from which stone for flaked or edge-ground artefacts have been extracted (Hiscock 1991b:6)

Knapping locations, consisting of one or more knapping floors, which are discrete scatters of artefacts, anywhere in the landscape, resulting from stone being worked at that spot. The criteria for a knapping floor is that the original block of stone can be at least partially reconstructed from the scattered pieces of flaked stone (Hiscock 1991b:6).

General artefact scatters, which may contain flaked or ground artefacts and hearth stones. Generalised artefact scatters may occur as surface scatters of material or as stratified deposits where there have been repeated occupations. These scatters do not necessarily imply that prehistoric people actually camped at the site; rather, they indicate only that some type of activity was performed there (Hiscock 1991b:6).

4.3 Regional site patterns

While many consultancy's have been conducted in and around the Katherine region, little systematic research has been carried out to date. In 1963 D.J. Mulvaney excavated Kintore Cave to the north of the study area, but little published information is available concerning either this site, or the shelter at Katherine which was excavated by Golson in the same year (Mulvaney 1975:189-90, 279).

A total of 67 sites have been previously recorded within 15 kilometres of the proposed development area, lying primarily to the south-west of the study area. These sites have been recorded by Chaloupka, Baker and Devensen, and others. Details of these sites are provided in Tables 1-4 below.

A survey of a repeater facility adjacent to Maude Creek to the north of the study area failed to locate any sites (Kinhill 1992a:5-1). Three isolated stone artefacts were observed, consistent with Hiscock and Mitchell's (1992) predictive model, which indicated that the density of the background scatter in the Tindall Plains near Katherine is in the order of 1/1300m^2 (Kinhill 1992a:5-1, Hiscock and Mitchell 1992:21).

Art sites in the region primarily contain paintings with a few engravings. Paintings include anthropomorphs and zoomorphs in x-ray style. Engravings include geometric and other non-figurative designs. These art sites may be found in shelters and on boulders and outcrops and may be associated with artefacts, grinding holes and shallow deposits.

All of the knapping floors recorded in the area to date are quartzite knapping floors, where local sources of quartzite have been used to produce blades. See Table 2 for further details. One of the quarries also contained an area of blade manufacture, while the other is described as a massive quartzite quarry with dense concentrations of waste flakes situated on top of an outcrop (Table 3).

Table 1
Summary data of previously recorded sites within 15 kilometres of the study area.

Site type	Context	Number	Artefact Densities
Art sites	rockshelter, unknown	3	?
Art with campsite scatter	rockshelter	1	?
Art, artefact scatter and grinding holes	open	1	3/m²
Artefact scatter	mainly open, some in rock shelters	27	0.005/m² - 3/m²
Knapping floors	open, unknown	9	1.2/m² - 100/m²
Quarries	open	2	100/m² - 200/m²
Shelter with deposit	rock shelters	7	1/m² - 30/m²
Shelter with deposit and art	rock shelters	3	4.5/m² - 10/m²
WWII site	rockshelter	1	?
Isolated finds	open	15	-
No information	?	11	?

?= no information.

Table 2.
Characteristics of knapping floors in the area.

Site	Situation	Size	Density	Raw Materials
53690017	sandy top of outcrop	15m x 15m	20/4m²	quartzite
53690019	outcrop	5m x 5m	30/25m²	quartzite
53690020	?	2m x 4m	50/m²	quartzite
53690023	around outcrops	4m x 10m	15/m²	quartzite
53690125	?	?	?	quartzite
53680021	sandy top of outcrop	2m x 2m	52/4m²	quartzite
53680023	sandstone outcrops	2m x 2m	100/m²	quartzite
53680024	around boulders	10m x 8m	30/4m²	quartzite
53680028	sandstone outcrops	15m x 15m	15/m²	quartzite

?= no information.

Artefact scatters are located in open contexts, especially in erosion features such as along creek lines, slopes, tracks or in rock shelters. Generally these are low density scatters containing flakes, cores, and blades. Some sites also contained

grindstones, hammerstones and points. Artefacts are made primarily on quartzites, but also on cherts, and less frequently silcrete, chalcedony and sandstone. Details of site sizes and artefact densities are provided in Table 4.

Shelters with deposit also contained artefacts. One shelter also contained grinding holes, while another contained ash, bone, grinding holes and artefacts. Post-contact material was present at one of these sites. A stone fireplace which may have been used for heat treatment of stone was observed in another (Northern Territory Museum site register).

Baker (1983) observed that sites tended to cluster around sandstone outcrops and creek lines. According to Baker these sandstone outcrops were occupied in the wet season while during the early dry season people move to creek lines and plains where water collected in shallow depressions. As the dry season progresses people fall back on large waterholes and Katherine River itself. A preference for opportunistic use of locally occurring raw materials for stone artefact manufacture and use is apparent. The density and distribution of archaeological background materials across the landscape suggests that all parts of the landscape were used (Baker 1983:16).

Surveys of the Katherine-Kununurra and Katherine-Darwin optic fibre cables also provides relevant information regarding the distribution of sites west and north of Katherine (Hiscock and Mitchell 1991, 1992, Kinhill 1992b). As a result of these surveys site distribution patterns across different land systems have been characterised. Overall the results of both these surveys indicated that sites tend to be associated with certain landforms such as floodplains, water sources, outcrops of fine-grained stone and cliffs along escarpment margins (Kinhill 1992a:3-1).

Table 3.
Summary characteristics of previously recorded quarries within 15 kilometres of the study area.

Site	Situation	Size	Density	Raw Materials
53690021	rocky slope	10m x 15m	100/m²	quartzite
53690025	outcrop	40m x 20m	100-200/m²	quartzite

Table 4.
Summary characteristics of previously recorded artefact scatters within 15 kilometres of the study area

Site	Situation	Size	Density	Raw Materials
53690013	eroded area	150m x 500m	?	?
53690014	eroded area	300m x 500m	?	?
53690029	rock shelter	?	30/16m²	ch, qtz, sl,
53690032	rock shelter	?	?	qtz, glass
53690126	cleared area	10m x 10m	25/100m²	ch, qtz
53690127	slightly eroded sandy soil	10m x 10m	8/100m²	qzt
53690128	rock shelter	5m x 10m	15/50m²	ch, qtz
53680008	eroded area adj to creek	100m x 200m	30/1000m²	ch, qtz
53680009	eroded area adj to depressions	60m x 20m	20/100m²	ch, qtz, ss
53680018	bank of depression adj to creek	30m x 20m	30/600m²	ch, qtz
53680019	eroded creek bank	20m x 20m	50/100m²	ch, sl,
53680020	creek bank	20m x 10m	60/100m²	ch, sl,
53680025	near outcrops	?	30/10m²	ch, qtz
53680026	outcrop	3m x 6m	25/6m²	ch, qtz
53680027	near outcrop	10m x 3m	30/10m²	ch, qtz
53680029	eroded area adj to	40m x 30m	1/m²	ch, qtz, sl,
53680030	laterite soil	20m x 10m	3/10m²	ch, qtz, sl
53680040	eroded area	100m x 50m	?	ch
53680043	creek bank	?	?	qtz
53680044	disturbed area	?	?	ch, qtz
53680046	eroded gully area	?	?	ch, qtz, sl
53680050	creek line	10m x 5m	?	ch, sl
53680051	hill slope	4m x 5m	19/20m²	ch
53680058	road verge	?	?	ch, qtz,
53680061	vehicle track	3m x 3m	4/9m²	ch
53680062	road verge	?	?	ch, qtz
53680064	exposure on slight rise	300mx 2m	1/200m²	ch, sl

ch= chert, qtz = quartzite, sl=silcrete, ss=sandstone
?= no information.

4.4 Discussion

No sites have been previously recorded within the immediate project area. This absence may be a function of a lack of archaeological surveys within the study area rather than being an accurate reflection of Aboriginal land use patterns which constitutes an absence of archaeological material. In many cases development provides the impetus for archaeological survey work. In such cases the distribution of archaeological sites in any one area will be a reflection of survey patterns. The available literature indicates that research has been conducted in the areas surrounding the study area to the south and south-east, east and west. The absence of sites in the project location may well be a result of a lack of previous archaeological research,.

Given the lack of archaeological research in the study area, the most immediate research questions relate to determining the nature and intensity of the archaeological record in the area. Sites in the area may have the potential to address issues relating to the procurement and use of raw materials across the landscape. At a more general level, sites in the project area may aid in the identification of regional land use strategies. Historic sites in the region may contain features and artefacts that can contribute to the interpretation of the existing scanty historical data regarding mining activities at Maud Creek. These types of regional research questions provide a useful framework for assessing the scientific significance and representativeness of any sites that may be located in the study area and also aid in the formulation of recommendations and management strategies for such sites.

Ethnographic, environmental and archaeological data from the wider region can be combined with the ethnographic and environmental data to formulate a predictive model concerning the nature and distribution of archaeological sites in the study area. Areas of high archaeological potential will be those areas nearby resources such as surface water and sources of raw materials, located along creek lines and on ridges and hills with outcropping sources of stone suitable for artefact manufacture.

Site types likely to be most frequently encountered include artefact scatters, knapping floors and quarries. On the basis of the historical data it is also possible that sites associated with early mining activities may be located in the area.

5.0 METHODOLOGY

5.1 Introduction

This section contains information about the fieldwork methods employed in this study, including the identification and recording of archaeological materials.

5.2 Survey Procedure

The total area to be surveyed within the mining prospect is approximately 2 square kilometres. A series of east-west drilling tracks spaced approximately 100 metres apart traversed the study area (Plate 1). It was decided that these drilling tracks would allow access over the entire study area and provide a basis for survey transects in between them. Therefore a number of transects were selected to cover the development area in a systematic fashion. These allowed a systematic inspection across most of the study area. Areas of moderate - high ground surface visibility (>65%) allowed each archaeologist to inspect an area about 5 metres either side of the ground surface during the survey.

Following the predictive model outlined above, creek lines and rocky outcrops were targeted as areas likely to contain archaeological materials and were closely inspected. Erosion scours and creek banks were inspected for any subsurface archaeological material. As most of the development is located within MCN 4136, 4137 and 4138, these lease prospects were surveyed more intensively than MCN 4135 and 4143 (Figure 2).

The approximate total area surveyed was 620,000 square metres. Approximately 40% of the undisturbed surface was surveyed. The survey of the

proposed Maud Creek mining prospect was conducted on foot. Two archaeologists walked along the selected transects and other areas with a 20 metre interval between them at an average speed of 1.5 kilometres per hour.

At the time of the current study in mid October, parts of the proposed development area were covered by a lush understorey of grasses. Ground visibility in the study area ranged from 80% on areas of low gravelly exposures to 5% or less in grassy locations adjacent to creek lines (Plate 2). The visibility of archaeological material was also affected by the geomorphology of the study area. Low lying areas around drainage lines comprised silty alluvium deposits. This accretion of alluvium over time generally obscures any artefactual material that may have been deposited in the past. Very little archaeological material was located on the low lying alluvial plains. Areas of higher visibility such as burnt sections, rocky slopes and erosion features were targeted for close inspection.

5.3 Artefact Identification

The information recorded about archaeological sites is similar to that suggested by Hiscock (1989). This includes the location, environmental and geomorphic context of the sites, the size and density of the archaeological material, raw material and types of artefacts.

The classification of artefacts in this survey was based on identifiable characteristics outlined by Hiscock (1984,1989). Through using this classification system non-artefactual material was distinguished from artefactual material. For an object to be classed as a flaked artefact, it needed to possess one or more of the following characteristics:

1. A positive or negative ring crack.
2. A distinct positive or negative bulb of percussion.
3. A definite eraillure scar in an appropriate position beneath a platform.
4. Definite remnants of flake scars (eg, dorsal scars and ridges)

Hiscock (1984:129) states that it is necessary to subdivide artefacts into further categories, including flake, core, retouched flake and flaked piece, as each group is technologically different and consequently provides a great deal of information about the human behaviour that created the assemblage. Artefact types were described by using the four artefact categories defined by Hiscock (1984:128-129):

> *Flake*: This is the piece of rock struck off a core. It exhibits a set of characteristics that indicate it has been struck. The most indicative of these are ringcracks that show where the hammer hit the core. The ventral surface may also be deformed in particular ways, for example a bulb or errailure scar.
>
> *Core*: A piece of stone with one or more negative flake scars but no positive flake scars.
>
> *Retouched Flake*: A flake that has had flakes removed from it, identified by flake scars onto the ventral and/or deriving from the ventral surface.
>
> *Flaked Piece*: This is a chipped artefact that cannot be classified as a flake, core, or retouched flake. This category is used only when an artefact was definitely chipped but could not be placed in another group.

Table 5 below lists the attributes recorded for artefacts located within the impact area. Certain attributes were not recorded for some artefacts, depending on their type and breakage.

Table 5.

Attributes of artefacts recorded in the field.

ATTRIBUTE	CHARACTERISTICS RECORDED
Type	flake, retouched flake, core, flaked piece, unifacial & bifacial point, axe, grindstone, cylindro-conical stone
Raw material	tuff, quartz, dolerite, chert, quartzite, fine grained sedimentary rock, glass, porcelain
Breakage	(recorded for flakes), complete, proximal, distal, medial, longitudinal cone split
Weight	weight of artefact in grams
Length	measured from proximal to distal ends of artefact
Width	measured at widest point of artefact at right angles to the axis from the proximal to the distal end of the artefact
Thickness	measured from the ventral surface to the dorsal surface
Platform width	width of the platform on the proximal end of flakes
Platform Thickness	thickness of the platform on the proximal end of flakes
Cortex	presence or absence
Overhang removal	presence or absence
Platform faceting	presence or absence
Flake termination	feather, step, hinge, outrepasse
Heat treatment	potlid, crenated, crazed

6.0 RESULTS

6.1 Introduction

As a result of the survey five prehistoric sites, one historic mining site and a continuous background scatter of stone artefacts were located within the study area (Figure 3). As mentioned earlier, the study area was divided into the five mining lease sub-divisions MCN 4135, 4136, 4138, 4137 and 4143 for the purposes of describing the broad localities of the archaeological material (Figure 2). Each mining lease subdivision is 800 metres x 500 metres is size. Four prehistoric sites are located within MCN 4143 and one prehistoric site within MCN 4137 (Figure 3). The historic mine site is located in MCN 4135. Sites were not located elsewhere within the study area which is discussed later. The background scatter of stone artefacts are concentrated in MCN 4143, 4137, 4136 and 4138.

Ground surface visibility in the study area at the time of the survey varied greatly from 80% in less vegetated and disturbed areas to less than 5% in densely vegetated sections. Large portions of the study area had been disturbed by present mine prospecting and drilling activities. Long test drilling transects were found across the area. These test drilling transects were positioned east-west and left a 100 metre wide area of disturbance and some were up to 2 kilometres in length. An estimated area of about 0.3 square kilometres was disturbed by this prospecting activity. Owing to the disturbance, surface archaeological material was very difficult to detect within this area. Presence of subsurface archaeological material might be gauged by the amount of archaeological material after being brought to the surface in disturbed areas. Graded tracks and areas were inspected and only a few artefacts were found on these disturbed surfaces. Therefore subsurface archaeological material is likely to be rare.

Visibility of archaeological material was also affected by the geomorphology of the study area. Low lying areas around drainage lines were mainly black soil alluvium deposits. This accretion of alluvium over time generally obscures any artefactual material that may have been deposited in the past. Very little archaeological material

was located on the low lying alluvial plains around the creek lines. Most archaeological material was located on the stony rises and in eroded areas. Areas of higher visibility such as burnt sections, rocky slopes, erosion features and disturbed areas were therefore targeted for close inspection.

6.2 Background Scatter

An extensive background scatter of stone artefacts was located in the study area (Plate 3). A total of 162 isolated artefacts were recorded during the survey and each given a number between 1 and 162. Artefacts 1-52 had all attributes recorded and artefacts 53-162 had only some morphological attributes recorded. (See Appendix). Background scatter densities varied greatly over the area. Table 6 lists the numbers of artefacts found in each mining lease subdivision with the grid reference for each south east corner.

Table 6
Location of individual artefacts located in the background scatter.

Lease Subdivision	Artefact Number	Grid Reference* S-E Corner	Environmental Description	Average Background Artefact Density (m^2)	Total no. of artefacts
MCN 4136	36-52	260010	extensive creek lines, silty alluvium, chert, siltstone and laterite, open woodland.	0.00004/m^2	17
MCN 4135	120-139	260015	creek lines and extensive erosion and gullys, large hills, doleritic outcrops, laterite surfaces, open woodland	0.000044/m^2	20
MCN 4137	2-35 69-119	252010	low undulating area, drainage lines, erosion gullys, alluvial soils, quartzite, chert nodules and laterite surface, open woodland.	0.0002/m^2	85
MCN 4138	140-162	252015	flat alluvial soils, some laterite & chert nodule surfaces, drainage lines, open woodland.	0.00005/m^2	23
MCN 4143	1 53-68	244010	extensive erosion and gullys, open woodland, quartzite outcrops.	0.00004/m^2	17

* : Katherine Map Sheet (5369II) 1:50 000

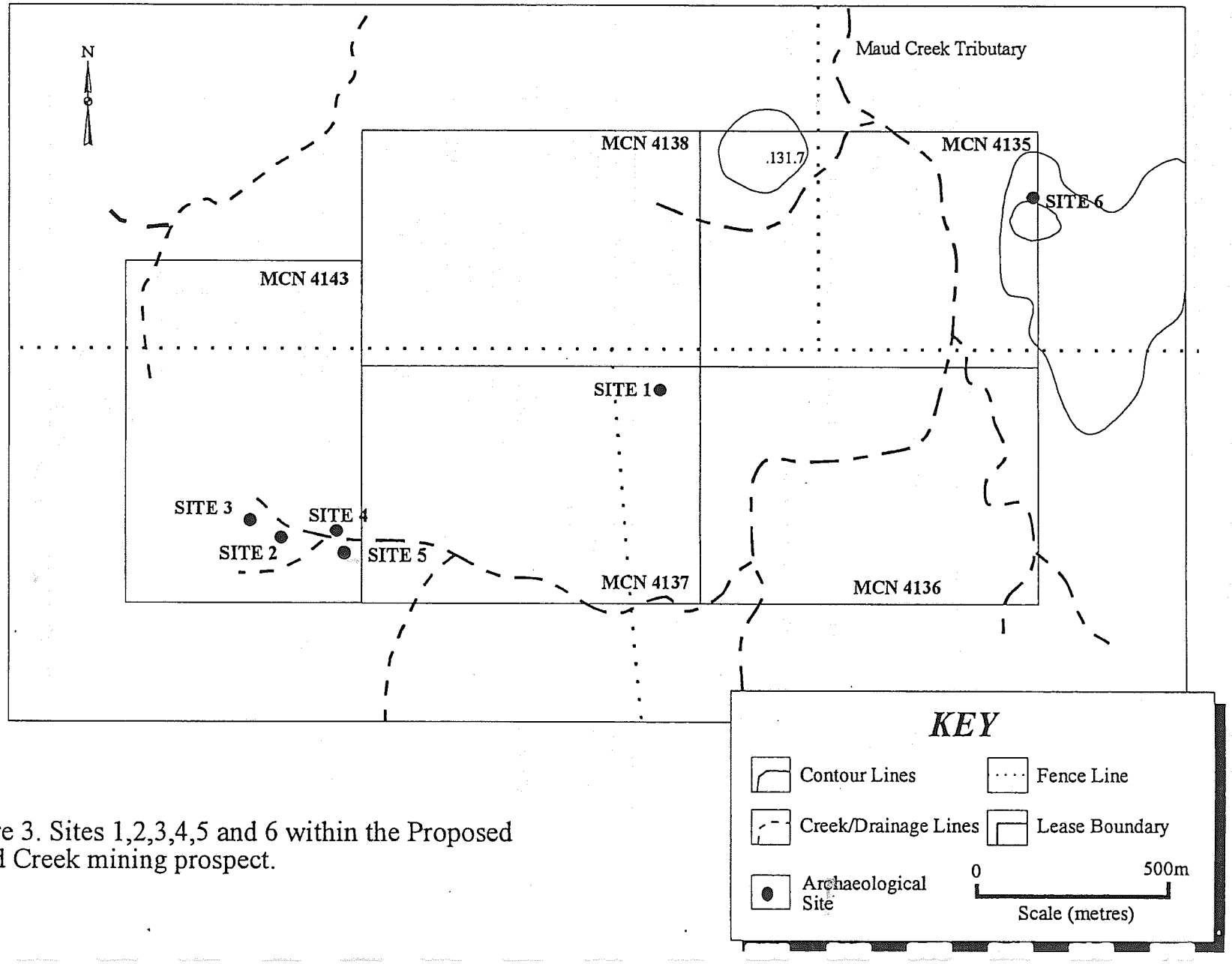

Figure 3. Sites 1,2,3,4,5 and 6 within the Proposed Maud Creek mining prospect.

Most artefacts are located in MCN 4137 and the remainder are evenly distributed throughout the remainder of the lease subdivisions. Ground surface visibility averaged around 75% within MCN 4137. Exposure of artefacts in erosion areas along the creek line in MCN 4137 was good. The background scatter is calculated on the number of artefacts found divided by the area surveyed. The average artefact background density for the study area is 0.00026/m^2. An estimate of the total number of artefacts that would be located in the background scatter is approximately 520 in the entire study area.

6.2.1 Artefact Characteristics

Artefact types found in the background scatter included flakes, cores, retouched flakes (including points), flaked pieces. Raw materials that these artefacts were made on included chert, quartzite, fine grained sedimentary, tuff and quartz. Table 7 shows the distribution of artefact types according to raw material types.

Table 7.
Distribution of artefact and raw material types from the background scatter

Artefact Types	Chert	Quartzite	FGS*	Quartz	Tuff	Total
Flakes	26	29	6	1	1	63
Cores	23	11	4	1	0	39
Retouched Flakes	28	15	7	1	0	48
Flaked Pieces	4	4	1	0	0	9
Total	81	59	18	3	1	162

* FGS= Fine Grained Sedimentary

Chert is the predominant raw material type constituting 50% of the background scatter. Quartzite makes up a further 36.4% and fine grained sedimentary artefacts comprise 11% of the assemblage. Flakes (38.8%), cores (24%) and retouched flakes

(29.6%) constitute the majority of the artefact assemblage. Only 2 bifacial points and one unifacial point were found within the study area.

Table 8.
Distribution of raw material types within the study area by subdivisions

MCN No.	CHERT	QUARTZITE	FGS*
4136	5	9	4
4135	19	10	0
4137	39	24	10
4138	13	7	3
4143	6	9	3

* FGS= Fine Grained Sedimentary

Table 8 shows the distribution of raw materials across the study area according to the lease subdivisions the artefacts were located in. The number of quartzite artefacts are higher closer to the quartzite raw material sources in the western portion of the study area. Numbers of chert and fine grained sedimentary artefacts are closer to the siltstone sources. MCN 4137 is located on the boundary of the quartzite and siltstone sources and also has a considerable portion of the creek tributary in it. The further away from the stone sources and to a lesser extent the creek line, artefact densities drop.

Descriptive statistics of the mean, maximum and minimum metrical characteristics of chert flakes, cores and retouched flakes are listed in Tables 9, 10 and 11. Descriptive statistics of the mean, maximum and minimum metrical characteristics of quartzite flakes and retouched flakes are listed in Tables 12 and 13. Quartzite flakes and retouched flakes tended to be slightly larger than chert flakes and retouched flakes.

Table 9.
Descriptive statistics for chert flakes from artefacts 1-52 of the background scatter (n=7)

	Weight	Length	Width	Thickness	Platform Width	Platform Thickness
Mean	13.2	28.5	27.7	9.1	14.2	7.1
Maximum	52	72.4	40.3	19.4	23.9	15.3
Minimum	1	15.3	20.3	6.1	5.1	3.9

Table 10.
Descriptive statistics for chert cores from artefacts 1-52 of the background scatter (n=4)

	Weight	Length	Width	Thickness
Mean	39	29.7	35.7	30.4
Maximum	66	36.6	42.4	36.9
Minimum	24	21.7	25.3	25.8

Table 11.
Descriptive statistics for chert retouched flakes from artefacts 1-52 of the background scatter (n=10)

	Weight	Length	Width	Thickness	Platform Width	Platform Thickness
Mean	6	30.98	23.7	8.9	11.5	6.02
Maximum	14	46.7	40.6	14.3	21.6	12.1
Minimum	1	15.5	13.3	3.8	1.7	3.9

Table 12.
Descriptive statistics for quartzite flakes from artefacts 1-52 of the background scatter (n=10)

	Weight	Length	Width	Thickness	Platform Width	Platform Thickness
Mean	15.4	33.9	29.3	11.8	17.0	9.9
Maximum	52	72.4	41.9	27.6	23.9	15.3
Minimum	1	11	14.3	3.2	9.5	2.2

Table 13.
Descriptive statistics for quartzite retouched flakes from artefacts 1-52 of the background scatter (n=5)

	Weight	Length	Width	Thickness	Platform Width	Platform Thickness
Mean	10.8	36.6	28.2	8.5	17.7	6.9
Maximum	23	48.7	36.4	10.7	23.1	9.0
Minimum	1	15.3	15.2	3.4	7.2	3.5

6.3 Archaeological Sites

Four prehistoric stone artefact scatters, one prehistoric stone artefact quarry/knapping location and one historic mining site were located on the Maud Creek Prospect. A summary of site location, content, size and average artefact density is listed in Table 14. Figure 3 shows the location of these sites within the study area.

Table 14.
Summary of sites located on the Maud Creek Prospect

Site No.	Site Location* Grid Reference	MCN No.	Site Type	Size Length x width	Average Artefact Density
1	249014	4137	Artefact Scatter	4m x 2m	1.8/m^2
2	242012	4143	Artefact Scatter	3m x 3m	6.2/m^2
3	241012	4143	Artefact Scatter	2m x 2m	3.2/m^2
4	243012	4143	Quarry/Knapping floor	28m x 20m	34/m^2
5	244011	4143	Artefact Scatter	23m x 8m	10.75/m^2
6	259018	4135	Historic Mine Diggings	100m x 150m	-

* : Katherine Map Sheet (5369II) 1:50 000

6.3.1 Site 1 Artefact Scatter

Location

Map: Katherine (5369II); 1:50000; Grid Reference 249014

Site 1 is located in square MCN 4137 (Figure 3). It is positioned 50 metres south of a fenceline that runs east-west through the study area. The Maud Creek tributary is approximately 400 metres south east of Site 1. A drilling track is positioned 5 metres to the north of Site 1.

Site Description

Site 1 is a small artefact scatter that occurs at the junction of the stony rise and the black soil alluvial flats (Plate 5). Vegetation around the site is open eucalypt woodland consisting of sparse densities of small trees and grass. The ground surface is a lateritic/stony soil with small siltstone, fine grain sedimentary and chert pebbles and cobbles. Sheet erosion appears to be altering the landsurface. Erosion has been

exacerbated by the current mine prospecting activities and past pastoral activities. Ground surface visibility on Site 1 was high at 80%. Some areas surrounding the site were covered in grass.

A total of 15 stone artefacts were located in an area of 4 metres by 2 metres. An average artefact density for Site 1 is 1.8/m^2. Artefacts found included 6 flakes, 4 cores, 3 retouched flakes and 2 flaked pieces (Plate 6). Only two stone raw materials were present, chert and other fine grained sedimentary raw material. Artefact types, raw material distributions and attributes can be seen in Table 15. All 15 artefacts were recorded in detail with metrical attributes and can be found in the Appendices. A large percentage of artefacts (80%) had cortex on the dorsal surface. Almost half of the flakes and retouched flakes were broken (44%), with 75% having feather terminations

Table 15.
Artefact types and raw material distribution for Site 1.

Artefact Type	Chert	Fine Grained Sedimentary	TOTAL
Flake	4	2	6
Core	2	2	4
Retouched Flake	2	1	3
Flaked Piece	0	2	2
TOTAL	8	7	15

6.3.2 Site 2 Artefact Scatter

Location

Map: Katherine (5369II); 1:50000; Grid Reference 242012

Site 2 is located on a dissected land surface within MCN 4143 (Figure 3). The main Maud Creek tributary is approximately 900 metres due east from Site 2. A mine drilling track ends approximately 5 metres from the site.

Site Description

Site 2 is a small localised artefact scatter positioned on a stony rise (Figure 4). Multiple erosion gullys occur in the vicinity of Site 2 (Plate 7). Vegetation in the gully is medium to sparse open woodland with grass and scrub understorey. Ground surface visibility was varied. In areas where there was no grass the ground surface visibility was high (75%). Other areas where grass occurred the ground surface visibility was negligible (5%). The ground surface had a localised outcrop of quartzite cobbles surrounded by laterite and siltstone pisolith. Surface and gullying erosion appeared to be extensive within the local area. This erosion may have been exacerbated by past pastoral activities.

Artefact densities averaged 9.2/m^2 within a 3 metre by 3 metre area (Plate 8). The maximum artefact density for this area was 56/m^2. Artefact types located within this site included flakes, cores, retouched flakes and flaked pieces. Quartzite was the only raw material found on the site. This was also the same type of quartzite outcropping at the site and within the immediate area. A 0.5 metre by 0.5 metre square was selected in the high density part of the site for artefact recording. A total of 14 artefacts were recorded in detail. Measurements of these artefacts can be found in the Appendix. Artefact type distribution, amount of cortex and breakage patterns can be seen in Table 16 and 17. A high percentage of artefacts displayed some cortex (71%). Of the artefacts recorded, 50% were broken. Also 50% of the artefacts displayed overhang removal.

Table 16.
Distribution of artefact types and amount of cortex.

Artefact Type	Number	Cortex All	Cortex Some	Cortex None
Flake	8	0	8	0
Core	3	0	1	2
Retouched Flake	2	0	1	1
Flaked Piece	1	0	0	1
TOTAL	14	0	10	4

Table 17.
Distribution of artefact types and breakage pattern for Site 2.

Artefact Type	Number	Complete	Proximal	Distal	LCS
Flake	8	3	0	4	1
Retouched Flake	2	2	0	0	0

LCS= Longitudinal cone split

6.3.3 Site 3 Artefact Scatter

Location

Map: Katherine (5369II); 1:50000; Grid Reference 241012

Site 3 is located on the top of a ridge overlooking the dissected land surface within MCN 4143 (Figure 3). The main Maud Creek tributary is approximately 1 kilometre east from Site 3. A mine drilling track ends approximately 50 metres from the site.

Site Description

Site 3 is a small localised artefact scatter positioned on top of a stony ridge overlooking the extensive gullys in the immediate area (Plate 9). Vegetation on top of the ridge is medium to sparse open woodland with grass and scrub understorey. Ground surface visibility was varied. In areas where there was no grass the ground surface visibility was high (75%). Other areas where grass occurred the ground surface visibility was negligible (5%). The ground surface had a combination of quartzite cobbles with laterite and siltstone pisolite. Surface and gullying erosion appears to be extensive within the local area. This erosion may have been exacerbated by past pastoral activities.

A total of 13 artefacts were found within a 2 metre by 2 metre open area. All the artefacts were made on quartzite (Plate 10). Artefact types present on the site

included flakes (1), retouched flakes (7), cores (3) and flaked pieces (2). A large percentage of the assemblage were retouched flakes (50%). All artefacts had no cortex and two retouched flakes displayed overhang removal. All flakes and retouched flakes were broken.

6.3.4 Site 4 Stone Artefact Quarry/Knapping Floor

Location

Map: Katherine (5369II); 1:50000; Grid Reference 241012

Site 4 is located on the crest of a slope in the dissected land surface within MCN 4143 (Figure 3). The main Maud Creek tributary is approximately 800 metres due east from Site 4. A mine drilling track is located to the south approximately 20 metres from the site.

Site Description

Site 4 is a quartzite quarry and knapping area located on an outcrop of quartzite cobbles (Plate 11). High densities of artefacts were found within a 28.3 metre (east-west) by 20.2 metre (north-south) area (Plate 12). Vegetation on the stony rise is sparse open woodland with grass and scrub understorey. Ground surface visibility was varied. In areas where there was no grass the ground surface visibility was high (95%). Other areas where grass occurred the ground surface visibility was negligible (5%). The ground surface had a combination of outcropping quartzite with laterite and siltstone pisolite. Surface and gullying erosion appears to be extensive within the local area. This erosion may have been facilitated by past pastoral activities.

Artefact types in the assemblage included flakes, cores, retouched flakes and flaked pieces. Quartzite was the only raw material type on the site. The average artefact density for the site is 34/m^2. The maximum artefact density was 100/m^2. Artefact densities were highest on top of the crest where quartzite cobbles appeared to

be outcropping. This area appears to be a knapping floor where artefacts where produced. Towards the edge of the slope and the gully, artefact densities are lower.

6.3.5 Site 5 Stone Artefact Scatter

Location

Map: Katherine (5369II); 1:50000; Grid Reference 244011

Site 5 is located on the crest of a slope in the dissected land surface next to the eastern boundary of MCN 4143 (Figure 3). The main Maud Creek tributary is approximately 800 metres due east from Site 5. A mine drilling track is located to the north approximately 20 metres from the site.

Site Description

Site 5 is a moderate density stone artefact scatter located on a stony rise (Plate 13). Moderate densities of artefacts were found within a 23 metre (east-west) by 8 metre (north-south) area (Plate 14). Vegetation on the stony rise is sparse open woodland with grass and scrub understorey. Ground surface visibility was varied. In areas where there was no grass the ground surface visibility was high (95%). Other areas where grass occurred the ground surface visibility was negligible (5%). The ground surface had a combination of quartzite cobbles with laterite and siltstone pisolith. Surface and gullying erosion appears to be extensive within the local area. This erosion may have been exacerbated by past pastoral activities.

Artefact types in the assemblage included flakes, cores, retouched flakes and flaked pieces. Raw materials on the site included both quartzite and some minimal amounts of chert. The average artefact density for the site is 10.75/m^2. The maximum artefact density was 18/m^2. Artefact densities were highest towards the top of the stony rise where quartzite cobbles appeared to be outcropping. Towards the edge of the slope and the gully, artefact densities are lower. Very few artefacts could be located on the alluvial deposit in the erosion gullys.

6.3.6 Site 6 Historical Mine (Diggings)

Location

Map: Katherine (5369II); 1:50000; Grid Reference 259018

A series of historic mine diggings are located on a stony hill in the north-east corner of the study area within MCN 4135. The Maud Creek tributary that is in the development area is approximately 300 metres west of the hill top.

Site Description

Site 6 is a collection of gold mine alluvial workings on the main hill within the development area. These diggings are spread over a 200 metre by 200 metre area on the north-eastern slope of the hill. Vegetation on the site consists of open woodland with savanna grass understorey. Ground surface visibility was generally low (20%). The area has been greatly disturbed by both past and present prospecting and mining. Approximately 25 to 30 pits were observed ranging in size from 2 metres in diameter up to 4 metres. A long 4 metre trench was also located. Several stone walls were observed in association with the diggings. A scatter of old metal, glass and porcelain is located in higher densities on top of the hill. A long narrow and shallow trench is positioned north-south through the diggings.

7.0 DISCUSSION

Results of this archaeological survey appear to be consistent with the archaeological patterns found in previous surveys within the region. Four stone artefact scatters and a small stone quarry were located within the study area. Moderate background densities of stone artefacts were also observed in the proposed development area.

The ground surface around creeks and outcropping stone tend to be modified by erosion, therefore exposing archaeological material. Visibility and detection of archaeological material is consequently higher in these areas as opposed to areas of alluvial deposits and dense vegetation. Ground surface visibility tended to be varied over the study area from 80% to less than 5% in grassy locations. On the alluvial soils some archaeological material was found, especially in eroded areas near the Maud Creek tributary. High concentrations of archaeological material are on the stony rises to the west in the study area where the quartzite, chert and fine grained sedimentary nodules abundant. Ground surface visibility in these areas tended to be high, averaging around 70%. Where suitable stone raw materials for flaking became absent, artefact densities diminished despite good ground surface visibility. Therefore the absence of archaeological remains in sections of the study area is likely to reflect the true archaeological pattern.

Sites are located in areas with specific available resources. Chert and quartzite were the main raw material types located in the study area, comprising 86% of the background scatter artefact assemblage. Quartzite outcrops and chert nodules were readily available in some sections of the study area and this availability is reflected in the archaeological record. Sites 2, 3, 4 and 5 are located in an area where quartzite crops out in abundance. These sites reflect the procurement and working of quartzite from this particular area. Site 1 is a small concentrated artefact scatter which has a chert assemblage. Chert nodules are available in this particular area near the alluvial soils and on the laterite surfaces.

Concentrations of sites and the background scatter were centred on raw material outcrops, creek line and alluvial soil plain within the proposed development area. Sites 1,2,3,4 and 5 and most of the background scatter are concentrated mainly within MCN 4143 and 4137. Much of the proposed mining development will be located within MCN 4138, 4137 and 4136. Sites 2,3,4,5 and 6 are outside of the main proposed impact areas. Site 1 is located within the main development area in MCN 4137.

8.0 SUMMARY AND RECOMMENDATIONS

NTUAS was commissioned by Dames and Moore in October 1994 to undertake an archaeological survey of proposed Maud Creek mining lease. The Maud Creek mining lease is located 24 kilometres east of Katherine, Northern Territory. The consultants were required to identify and record any "archaeological objects or places" likely to be impacted by the proposed development, assess their significance and make recommendations regarding mitigative procedures. A total of six archaeological sites and a stone artefact background scatter were found within the proposed development area.

The following recommendations arise from this study;

1. Background scatters of artefacts were located within the proposed Maud Creek mining prospect. Densities of stone artefact materials were low in the study area. **It is recommended that permission to disturb artefacts located in the background scatter is granted under the *Northern Territory of Australia Heritage Conservation Act 1991.***

2. Site 1 is not sufficiently archaeologically significant to warrant change to the proposed development plans. However Site 1 is intact and since little is known or recorded about this particular site type in the region it therefore has some archaeological value. **It is recommended that permission to disturb Site 1 under the *Northern Territory of Australia Heritage Conservation Act 1991* be granted following the surface collection of the artefacts. Collected artefacts should be lodged in the Northern Territory Museum and Art Gallery.**

3. Sites 2, 3, 4 and 5 are not located within the immediate development area. Sites 2 to 5 consist of a significant cluster of sites within a small area. These sites are an interrelated group which have significant archaeological value about past Aboriginal lifeways. **It is recommended that Sites 2, 3, 4, 5 and 6 be protected unless there is**

further development within the area. A fence should be erected around the area of Sites 2, 3, 4 and 5. Warning signs should also accompany the fence.

4. Site 6, historic gold mine, is located outside of the immediate impact area. Site 6 should be protected as it has significant heritage value. **It is recommended that Site 6 be protected unless there is further development within the area. Warning signs should be placed around Site 6. If further development will cause an impact on Site 6, more detailed recording will be required before permission to disturb is granted.**

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APPENDIX

Table A .

Attributes including metrical measurements recorded on artefacts 1 -52 from the background scatter.

Art No	Type	Raw Mat	Break	Wgt gm	Lth	Wth	Thick	Cortex	OHR	Facet	Term	Location
1	flake	qtze	comp	52	72.4	40.5	19.4	some	no	no	feather	4143
2	core	qtze	-	185.7	109.2	131.1	97.9	some	-	-	-	4137
3	core	quartz	-	139	34.1	60.9	54.3	some	-	-	-	4137
4	flake	qtze	lcs	9	33.9	23.5	11.5	some	no	no	feather	4137
5	flake	chert	comp	4	24.8	22.4	8.4	all	no	no	hinge	4137
6	flake	qtze	distal	13	42.7	32.3	11.7	some	no	no	-	4137
7	ret fl	fgs	comp	7	31.3	25.6	14.7	none	no	no	feather	4137
8	core	chert	-	31	21.7	42.4	28.5	some	-	-	-	4137
9	core	chert	-	66	31.8	37.5	36.9	some	-	-	-	4137
10	ret fl	chert	lcs	4	33.2	19.1	8.9	none	yes	no	feather	4137
11	retfl	chert	comp	4	29.5	21.7	11.7	some	no	no	feather	4137
12	ret fl	chert	comp	1	41.1	25.2	6.4	some	no	yes	hinge	4137
13	flake	chert	comp	1	23.3	30.1	6.1	none	yes	no	feather	4137
14	flake	qtze	distal	1	11.0	14.3	3.2	none	no	no	-	4137
15	ret fl	qtze	prox	1	15.3	15.2	3.4	none	no	no	feather	4137
16	ret fl	chert	comp	7	36.6	21.2	9.6	some	no	no	feather	4137
17	ret fl	chert	distal	12	27.0	40.6	11.2	none	no	no	-	4137
18	flake	fgs	comp	15	29.6	40.9	15.6	some	no	no	feather	4137
19	ret fl	fgs	medial	31	49.7	45.7	15.5	some	yes	no	feather	4137
20	ret fl	fgs	comp	5	35.5	28.5	11.4	some	no	no	feather	4137
21	ret fl	qtze	distal	10	48.7	14.3	9.9	none	yes	no	-	4137
22	flake	fgs	distal	6	38.7	37.3	6.4	some	yes	no	-	4137
23	core	chert	-	35	29.4	37.7	25.8	some	-	-	-	4137
24	ret fl	chert	comp	1	15.5	13.4	3.8	none	yes	no	hinge	4137
25	ret fl	qtze	comp	23	48.4	32.9	9.6	none	no	no	hinge	4137
26	fl piece	fgs	-	2	22.8	11.6	3.6	none	-	-	-	4137
27	ret fl	chert	chert	6	20	27.9	7.5	none	yes	no	hinge	4137
28	core	qtze	-	56	31.5	41.6	32.8	some	-	-	-	4137
29	core	fgs	-	105	39.4	46.0	43.3	some	-	-	-	4137
30	ret fl	chert	medial	4	25.4	13.3	7.0	none	no	no	hinge	4137
31	flake	quartz	comp	1	19.7	4.8	3.1	none	no	bo	hinge	4137
32	flake	qtze	distal	31	42.8	39.4	15.9	none	yes	no	-	4137
33	ret fl	chert	distal	14	46.7	27.4	14.3	some	no	no	-	4137
34	core	chert	-	24	36.6	25.3	30.6	some	-	-	-	4137
35	flake	chert	comp	1	21.9	20.3	5.6	some	no	no	feather	4137
36	flake	qtze	comp	32	53.7	27.1	27.6	none	no	no	feather	4137
37	bipoint	qtze	distal	3	44.2	18.7	7.9	none	yes	no	-	4134
38	unipoint	fgs	comp	2	5.8	14.7	9.6	none	yes	no	feather	4134
39	flake	chert	distal	6	18.9	20.5	7.7	lnone	yes	no	-	4134
40	ret fl	qtze	dist/lcs	15	41.8	36.4	10.7	none	no	no	-	4134
41	flake	qtze	prox/dist	17	26.5	41.9	9.3	no	-	-	-	4134
42	flake	chert	comp	28	23.5	38.1	8.5	some	no	no	feather	4134
43	fl piece	chert	-	4	32.9	14.1	11.8	none	-	-	-	4134
44	ret fl	fgs	comp	19	39.6	38.2	15.9	some	yes	no	feather	4134
45	ret fl	qtze	comp	5	29.0	32.2	9.2	none	yes	no	feather	4134
46	ret fl	chert	comp	6	34.8	32.4	9.1	none	yes	no	hinge	4134
47	flake	qtze	prox	2	22.1	29.3	6.1	none	-	-	feather	4134
48	flake	qtze	medial	1	18.5	20.1	7.6	none	no	no	-	4134
49	flake	qtze	prox/dist	1	15.8	24.9	5.8	none	-	-	-	4134
50	flake	chert	comp	1	15.3	22.3	8.2	none	yes	no	feather	4134
51	core	fgs	-	15	41.4	34.6	12.1	some	-	-	-	4134
52	ret fl	fgs	comp	12	51.5	33.1						

Table B.

Attributes recorded on artefacts 53 -162 from the background scatter

Art No	Art Type	Raw Mat	Break	Heat	Cortex	OHR	Facet	Term	Location
53	core	quartzite	-	-	none	-	-	-	4143
54	flake	chert	complete	-	some	no	no	step	4143
55	flake	chert	medial	-	some	yes	no	feather	4143
56	flake	quartzite	medial	-	some	no	no	hinge	4143
57	ret fl	chert	medial	potlid	none	no	no	feather	4143
58	flake	fgs	proximal	-	some	no	no	feather	4143
59	core	chert	-	-	some	-	-	-	4143
60	core	chert	-	-	some	-	-	-	4143
61	flake	quartzite	distal	-	some	yes	no	-	4143
62	flake	quartzite	complete	-	none	yes	no	outrep	4143
63	flake	quartzite	distal	-	some	no	no	-	4143
64	flake	quartzite	prox/distal	-	none	-	-	-	4143
65	core	quartzite	-	-	none	-	-	-	4143
66	flake	quartzite	distal	-	none	no	no	-	4143
67	flake	quartzite	complete	-	none	no	no	feather	4143
68	flake	chert	complete	-	none	no	no	feather	4143
69	core	quartzite	-	-	some	-	-	-	4137
70	core	quartzite	-	-	some	-	-	-	4137
71	flake	quartzite	complete	-	none	yes	no	feather	4137
72	flake piece	quartzite	-	-	none	-	-	-	4137
73	core	chert	-	-	some	-	-	-	4137
74	flake	chert	complete	-	some	no	no	feather	4137
75	ret fl	fgs	complete	-	none	no	yes	feather	4137
76	flake	quartzite	complete	-	none	yes	no	feather	4137
77	flake	quartzite	proximal	-	some	no	no	feather	4137
78	flake	chert	complete	-	none	no	yes	feather	4137
79	flake	chert	lcs	-	none	yes	no	feather	4137
80	core	chert	-	-	some	-	-	-	4137
81	flake	fgs	comp	-	all	no	no	hinge	4137
82	ret fl	chert	complete	-	some	no	no	hinge	4137
83	ret fl	chert	complete	-	none	yes	no	feather	4137
84	flake	fgs	distal	-	none	yes	no	-	4137
85	flake	chert	complete	-	all	no	no	feather	4137
86	flake	chert	complete	-	none	yes	no	feather	4137
87	ret fl	chert	medial	-	none	yes	no	hinge	4137
88	flake	chert	complete	-	none	no	no	hinge	4137
89	flake	chert	complete	-	some	yes	no	hinge	4137
90	core	chert	-	-	some	-	-	-	4137
91	core	quartzite	-	-	some	-	-	-	4137
92	core	chert	-	-	some	-	-	-	4137
93	flake piece	chert	-	-	some	-	-	-	4137
94	core	chert	-	-	some	-	-	-	4137
95	flake	chert	complete	-	none	yes	no	feather	4137
96	ret fl	quartzite	distal	-	some	yes	no	-	4137
97	ret fl	chert	medial	-	none	yes	no	feather	4137
98	ret fl	chert	medial	-	none	yes	no	feather	4137
99	ret fl	quartzite	distal	-	none	no	no	-	4137
100	flake	chert	lcs	-	none	no	no	feather	4137
101	ret fl	quartzite	distal	-	none	yes	no	-	4137
102	ret fl	quartzite	complete	-	-	yes	no	feather	4137
103	core	chert	-	-	some	-	-	-	4137
104	flake	quartzite	proximal /distal	-	none	no	no	-	4137
105	ret fl	chert	proximal	-	none	yes	yes	feather	4137
106	ret fl	chert	proximal	-	some	yes	yes	feather	4137
107	ret fl	quartzite	proximal	-	none	no	no	feather	4137
108	core	chert	-	-	some	-	-	-	4137
109	flake	quartzite	proximal/distal	-	none	no	no	-	4137
110	flake	tuff	proximal/distal	-	none	no	no	-	4137
111	core	chert	-	-	some	-	-	-	4137
112	core	quartzite	-	-	none	-	-	-	4137
113	core	chert	-	-	some	-	-	-	4137

Table B Continued.

Art No	Art Type	Raw Mat	Break	Heat	Cortex	OHR	Facet	Term	Location
114	ret fl	chert	complete	-	none	no	no	hinge	4137
115	?	quartzite	distal	-	nonoe	yes	no	-	4137
116	flake	chert	medial/distal	-	some	yes	no	-	4137
117	flake	chert	medial	crazed	none	yes	no	hinge	4137
118	flake	quartzite	proximal	-	none	no	no	feather	4137
119	core	chert	-	-	none	-	-	-	4137
120	flake	quartzite	distal	-	none	no	yes	-	4135
121	ret fl	chert	distal	-	none	yes	no	-	4135
122	flake piece	quartzite	-	-	none	no	no	-	4135
123	flake	chert	complete	-	some	yes	no	hinge	4135
124	core	chert	-	-	some	-	-	-	4135
125	flake	chert	-	-	none	no	no	-	4135
126	flake	quartzite	distal	-	-	no	no	-	4135
127	flake piece	chert	-	-	none	no	no	-	4135
128	flake	chert	medial/lcs	-	some	no	no	hinge	4135
129	flake piece	chert	-	-	none	no	no	-	4135
130	flake	quartzite	distal/lcs	-	none	yes	no	-	4135
131	core	chert	-	-	some	no	no	-	4135
132	ret fl	chert	complete	-	some	no	no	hinge	4135
133	ret fl	chert	complete	-	some	no	no	feather	4135
134	flake	quartzite	proximal/distal	-	none	no	no	-	4135
135	core	chert	-	-	none	-	-	-	4135
136	ret fl	chert	complete	-	none	yes	yes	feather	4135
137	core	quartzite	-	-	none	-	-	-	4135
138	flake	quartzite	distal	-	none	no	no	-	4135
139	flake	chert	distal/lcs	-	some	no	no	-	4135
140	flake	fgs	medial	-	some	no	no	hinge	4138
141	core	fgs	-	-	some	-	-	-	4138
142	flake	chert	complete	-	some	no	no	feather	4138
143	ret fl	chert	complete	-	some	no	no	feather	4138
144	ret fl	chert	proximal	-	none	no	no	feather	4138
145	ret fl	chert	complete	-	some	no	no	feather	4138
146	core	chert	-	-	some	-	-	-	4138
147	core	chert	-	-	some	-	-	-	4138
148	ret fl	quartzite	distal	-	none	no	no	-	4138
149	ret fl	quartzite	proximal/distal	-	some	no	no	-	4138
150	flake	chert	complete	-	some	no	no	feather	4138
151	ret fl	quartzite	lcs	-	some	yes	no	feather	4138
152	ret fl	chert	complete	-	some	no	no	feather	4138
153	ret fl	quartzite	complete	-	none	yes	no	feather	4138
154	ret fl	chert	complete	-	some	no	no	feather	4138
155	core	quartzite	-	-	some	-	-	-	4138
156	core	rhy'te	-	-	some	-	-	-	4138
157	flake piece	quartzite	-	-	some	no	no	-	4138
158	core	chert	-	-	some	no	no	-	4138
159	core	chert	-	-	some	-	-	-	4138
160	core	chert	-	-	none	-	-	-	4138
161	flake	quartzite	medial/distal	-	none	yes	yes	-	4138
162	flake	chert	distal	-	some	no	no	-	4138

Table C.

Attributes including metrical measurements recorded on artefacts from Site 1.

Art No	Type	Raw Mat	Break	Wgt gm	Lth	Wth	Thick	Cortex	OHR	Facet	Term
1	core	fgs	-	40	38.2	26.7	39.93	some	-	-	-
2	core	chert	-	24	32.1	34.5	18.1	some	-	-	-
3	core	chert	-	8	22.3	25.5	9.4	some	-	-	-
4	core	fgs	-	2	26.1	20.7	9.6	some	-	-	-
5	flake piece	fgs	-	<1	17.5	9.1	5.1	some	no	no	-
6	flake piece	fgs	-	<1	11.4	11.4	4.2	none	no	no	-
7	ret fl	chert	complete	3	31.1	16.3	5.7	some	no	yes	feather
8	ret fl	fgs	complete	6	23	26.8	7.7	some	no	no	step
9	flake	chert	complete	40	50.9	35.7	22.2	some	no	no	feather
10	flake	fgs	proximal	2	22.8	25.7	6.3	none	no	no	feather
11	ret fl	chert	complete	3	34.1	19.6	7.5	some	yes	no	feather
12	flake	chert	proximal	4	20.8	29	10.9	all	no	no	feather
13	flake	chert	proximal	<1	14.1	9.2	2.7	none	no	no	hinge
14	flake	fgs	distal	<1	13.9	11.3	4.4	some	no	no	-
15	flake	chert	complete	<1	15.6	14.3	3.2	some	no	no	feather

Table D.

Attributes including metrical measurements recorded on artefacts from Site 2.

Art No	Type	Raw Mat	Break	Wgt gm	Lth	Wth	Thick	Cortex	OHR	Facet	Term
1	flake	quartzite	complete	11	69.8	21.8	9.7	some	yes	no	hinge
2	flake	quartzite	medial/ distal	<1	27.8	25.3	5.9	some	no	no	-
3	flake	quartzite	medial/ distal	7	49.9	31.2	6.8	some	yes	no	-
4	flake	quartzite	complete	6	41.3	275	9.8	some	no	no	step
5	core	quartzite	-	29	50.1	30.5	19.4	some	-	-	-
6	core	quartzite	-	101	50.7	49.7	41.4	none	-	-	-
7	flake	quartzite	complete	89	71.2	45	16.4	some	yes	no	hinge
8	flake	quartzite	lcs	34	90	18.1	15.2	some	no	no	hinge
9	flake piece	quartzite	-	20	45.5	26.2	14.9	some	no	no	-
10	flake	quartzite	medial/ distal	177	102.2	61	19.2	some	yes	no	-
11	core	quartzite	-	180	68.1	55.6	36.8	some	no	no	-
12	ret fl	quartzite	complete	53	83.3	38.6	17.3	some	yes	no	hinge
13	ret fl	quartzite	complete	19	72.2	29.6	10.1	none	yes	no	hinge
14	flake	quartzite	medial/ distal	25	56.1	25.1	5.9	some	yes	no	-

Table E.

Attributes including metrical measurements recorded on artefacts from Site 3.

Art No	Type	Raw Mat	Break	Wgt gm	Lth	Wth	Thick	Cortex	OHR	Facet	Term
1	ret fl	quartzite	distal	8	26.7	30.6	7	none	no	no	-
2	flake	quartzite	distal/lcs	21	23.7	18	3.3	none	no	no	-
3	ret fl	quartzite	proximal/ distal	16	39.9	38	9.2	none	no	no	-
4	ret fl	quartzite	proximal/ distal	22	58.3	38.3	9	none	no	no	-
5	ret fl	quartzite	medial/ distal	12	32.6	37.2	11.1	none	yes	no	-
6	ret fl	quartzite	medial	1	44.5	17.8	8.9	none	yes	no	-
7	flake piece	quartzite	-	<1	26.1	17.7	7.7	none	no	no	-
8	ret fl	quartzite	proximal	32	59.9	30.2	15.1	none	no	no	-
9	core	quartzite	-	28	55.3	32.8	16.6	none	-	-	-
10	core	quartzite	-	158	76.5	53.5	46.6	none	-	-	-
11	ret fl	quartzite	proximal	43	55.9	39.8	16.6	none	no	no	hinge
12	flake piece	quartzite	-	15	59.7	21.6	6.9	none	no	no	-
13	core	quartzite	-	120	76.5	52	26.6	none	-	-	-

Glossary of Tables A-E:

Art No: Individual number of each artefact

Art Type: Artefact type; flake, core, ret.fl: retouched flake, fl piece: flaked piece, unipoint: unifacial point, bipoint: Bifacial point

Raw Mat: Raw Material; Chert, Quartzite, fgs: Fine Grained Sedimentary

Break: Breakage: Comp: Complete, Distal, Prox: Proximal, Medial, LCS: longitudinal cone split

Heat: heat treated: crenated, crazed, potlid

Wgt: weight (gm)

Lth: length (mm)

Wth: width (mm)

Thick: thickness (mm)

Cortex: presence or absence of cortex (all/some/none)

OHR: presence or absence of overhang removal (yes/no)

Facet: presence or absence of platform faceting (yes/no)

Term: Termination: Feather, Hinge, Step, Outrepasse