The Report of an Aboriginal Archaeological Survey of the Jasper and Hinge Iron Ore Projects, Morawa, Western Australia.

For Karara Mining Limited

November 2011 | Patricia Thom, Christine Martin and Ryan Coughlan

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The results, conclusions and recommendations within this report are based on information available at the time of its preparation.

CO-ORDINATE CAPTURE

The authors advise that all co-ordinates for newly recorded sites quoted in this document were obtained with a Garmin hand held GPS unit using the GDA 94 Datum (Zone 50).

ACKNOWLEDGEMENTS

The authors would like to acknowledge and thank the following people for their contribution to the work which has resulted in this report:

- Desmond Mongoo of Karara Mining Ltd who assisted with the organisation and logistics of the Survey.

EXECUTIVE SUMMARY

This document details the results of an Aboriginal archaeological survey (the Survey) of the Jasper and Hinge Iron Ore Projects (the Project Area), where Karara Mining Limited (KML) propose to undertake resource delineation drilling. The Jasper and Hinge Project Area is located approximately 90 km east of Morawa, Midwest region, Western Australia.

The Jasper and Hinge Project Area falls within KML tenements E59/1170 and E59/817 and covers a total area of 3.97 km^2.

The Survey focused on three objectives:

- examine the designated survey areas to identify any Aboriginal archaeological sites, as defined by section 5 of the *Aboriginal Heritage Act 1972* (the Act);
- provide a recording of any sites identified to a standard consistent with a site identification level, including significance assessments, details of the locations and extents of each site; and
- assist in the development of site avoidance and management strategies, where necessary.

The field work was undertaken over a single field trip. The field work was undertaken with the full cooperation and assistance of members of the *Binyardi* people and *Widi* Mob native title claimants (WC97/72) (the Aboriginal Consultants).

A total of **two** newly identified Aboriginal archaeological sites were located as a result of the Survey (see Map 1).

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INTRODUCTION

This document details the results of an Aboriginal archaeological survey (the Survey) of the Jasper and Hinge Iron Ore Projects (the Project Area), where Karara Mining Limited (KML) propose to undertake resource delineation drilling. The Jasper and Hinge Project Area is located approximately 90 km east of Morawa, Midwest region, Western Australia.

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- assist in the development of site avoidance and management strategies, where necessary.

The field work was undertaken by Ryan Coughlan and Ben Pentz of Gavin Jackson CRM from the 3rd to the 9th of September 2011 inclusive.

The Survey area is located in *Binyardi* people and *Widi* Mob native title claim area. The *Binyardi* people and *Widi* Mob Consultants that participated in the Surveys were chosen after discussions between members of the native title claimant group.

A total of **two** newly identified Aboriginal archaeological sites were located as a result of the Survey (see Map 1).

Recommendations

It is **recommended** that KML ensure their employees and contractors, as appropriate, are:

1. advised of the existence and location of Aboriginal archaeological sites KAR 11-01 and KAR 11-02;

2. informed that these locations constitute Aboriginal archaeological sites to which section 5 of the *Aboriginal Heritage Act 1972* applies and should, therefore, be avoided; and

It is advised that it is the preference of the *Binyardi* people and *Widi* Mob native title claimants for all Aboriginal heritage sites to remain *in situ* and be avoided and protected by KML. However, should it prove necessary, at some time in the future, to disturb these sites, it is further **recommended** that an application, seeking consent to do so, be made to the Minister for Indigenous Affairs under section 18 of the *Aboriginal Heritage Act 1972*, on condition that:

1. such an application is acceptable to members of the *Binyardi* people and *Widi* Mob native title claimant groups; and

2. the *Binyardi* people and *Widi* Mob native title claimants be provided the opportunity to salvage archaeological material from sites KAR 11-01 and KAR 11-02 in a culturally appropriate manner and with the assistance of a suitably qualified archaeologist if they so wish.

REPORT FORMAT

The format and contents of this report follow those suggested by the *Draft Guidelines for Aboriginal Heritage Assessment in Western Australia* (DAS 1993; DIA 2005).

This report is divided into three sections:

Section One contains the introduction, providing details of the Project itself, the regional environmental background, and a discussion of previous archaeological research from the area. The methods employed for the site recording are also outlined here.

Section Two provides individual descriptions of the two (2) Aboriginal sites recorded during the Survey, as well as significance assessments for both sites recorded.

Section Three includes a brief comparison of the sites, offers some general interpretations of the archaeology of the project area and includes the conclusions and recommendations of the report, the bibliography and appendices.

PERSONNEL

The following people and organisations participated in the Survey.

GAVIN JACKSON CRM

Ryan Coughlan

Ben Pentz

***BINYARDI* PEOPLE**

Arnold Yarran

Travis Jones

WIDI MOB

Rodney Lewis

Clifton James-Lewis

KARARA MINING LIMITED

Desmond Mongoo

BACKGROUND, CONTEXT AND METHOD

INTRODUCTION

The environmental and archaeological context of Aboriginal archaeological heritage surveys influences the methods archaeologists use to survey for and record archaeological sites and also provides a framework within which to interpret archaeological sites, particularly when assessing archaeological significance.

The following review of environmental context focuses on identifying aspects of the natural environment of the Project Area that would have influenced Aboriginal occupation of the area in the past. Similarly, the review of regional archaeological research questions outlines what is known about the archaeology of the region and the main theoretical frameworks used by archaeologists to interpret this data.

ENVIRONMENTAL CONTEXT

An understanding of the natural environment of areas surveyed during archaeological surveys provides a context within which to develop predictions about the location and range of archaeological site types that are likely to be found in an area. A range of resources are known from ethnographic and ethno-historic sources to have been utilised by the indigenous occupants of the arid region in the past. The distribution of these resources was determined by the natural environment. The location of archaeological sites across the landscape is therefore likely to be strongly influenced by the distribution of these resources. This information may also provide a context within which to interpret the significance of an archaeological site.

Archaeological site formation processes are also strongly influenced by a range of environmental factors. This means that the form and structure of an archaeological site or even the fact that a site has survived at all might be strongly influenced by a range of environmental factors. The most obvious example of this is the movement of water over an archaeological site, a process that may completely destroy a site by moving artefacts to a totally new context or cover a site with alluvial sediment. Alternatively, the artefact assemblage of a site may be sorted into artefacts of similar size by the movement of water.

The following review of environmental context focuses on five environmental characteristics that structure the landscape. These four environmental characteristics are:

- Geology
- Climate
- Topography and Vegetation
- Topography and Drainage

GEOLOGY

The surface geology of the Survey Area is typically sand-sheet plains derived from the erosion of sandstone formations (Beard 1976: 19-24). The Jasper and Hinge Project Area is located across a sandy plain with occasional granite outcrops and areas of gravel dominated by ironstone with some quartz, basalt and banded iron formation. All of these materials are well suited for stone artefact manufacture and

have been recorded in assemblages of stone artefacts in the wider area (e.g. Fordyce and Lafrentz 2009c).

The brief review of the locally occurring geology outlined above suggests that a range of sources of stone suitable for stone artefact manufacture were available in the Survey Area. It is therefore considered likely that an archaeological survey of the area would locate artefact scatters associated with the sourcing and primary flaking of these materials.

CLIMATE

The Jasper and Hinge Survey Area is located on the southwestern margin of the Austin Botanical District. The Yalgoo sub-region of the Austin Botanical District has been classified by Beard (1976:66) as having a semi-desert Mediterranean climate with rainfall occurring mostly in the winter. Winter rainfall in the Yalgoo region is partially reliable with occasional additional rain from summer storms (Beard 1976: 18). Rainfall records from Mullewa (located approximately 130 km northwest of the Survey Area) suggest that the average annual rainfall is around 333.9 mm (see Table 1).

A review of the mean monthly temperatures at Mullewa between 1925 and 2011 indicates a wide range of temperatures over the year with the average winter minima dropping to approximately 7°C in July and August and average summer maxima rising to approximately 38°C in January and February (see Table 2).

Table 1: Mean monthly rainfall (mm) for Mullewa from 1896 – 2011 (source: Bureau of Meteorology, www.bom.gov.au)

Place	*Mean Rainfall (mm)*												
	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Annual*
Mullewa	13.1	18.6	18.8	21.2	47.2	64.6	60.4	42.2	21.7	13.2	8.7	8.5	333.9

Table 2: Mean maximum and minimum temperatures for Mullewa from 1925 – 2011 (source: Bureau of Meteorology, www.bom.gov.au)

Place		*Mean Temperature (°C)*												
		Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Annual*
Mullewa	*Max*	36.8	36.4	33.7	28.7	23.7	19.9	18.7	20.1	23.4	27.1	31.1	34.4	27.9
	Min	19.4	20.0	18.3	15.0	11.1	8.5	6.9	7.0	8.5	11.0	14.3	16.9	13.1

TOPOGRAPHY AND DRAINAGE

The absence of external river systems in the southern half of the Yalgoo sub-region has resulted in the formation of numerous salt lakes (Beard 1976: 66). The Jasper and Hinge Survey Area is located 41 km northeast of one such lake, Lake Weelhamby. The regional geography is dominated by gently undulating sand plains bordered by low scarps and ridges.

Comparisons with similar regions of Australia, for example, the Western Desert (particularly Veth 1993), suggests that the archaeological signature of Aboriginal occupation in the Survey Area will be strongly influenced by the permanence of water. This is discussed further in the section on archaeological research in the region, below.

VEGETATION

The Survey Area is located in an area of low plains dominated by dense mixed *Acacia* spp. shrubs and scattered *Eucalyptus* spp. (Beard 1976:66-70). The occasional hills and ridges of the region are characterised by similar vegetation.

Many of the most important economic plant species known to have been exploited by Aboriginal people in the area before European settlement, such as Beefwood (*Grevillea striata*, used to make spear throwers and shields), and a range of fruit bearing trees and shrubs, such as the native pear (*Marsdenia australis*) and quondong (*Santalum acuminatum*), are more common in more open woodland than that recorded in the Survey Area. The seeds of both *Acacia aneura* and several species of spinifex (*Triodia* spp.) were collected and eaten elsewhere in the state and constituted a major part of the subsistence economy in the Pilbara in particular (Bindon 1996, Brown 1987). The absence of significant water courses and associated alluvial sediments, however, means that the range of other seasonal plant foods, such as the roots and tubers that constitute an important element of the diet in other sandy desert regions of Western Australia such as the Western Desert (Veth 1993:12), would not be present in the area.

The Survey Area is generally densely vegetated with a ground surface visibility of approximately 50%.

FAUNA

The low open acacia shrublands of the Survey Area are dominated by a range of small birds and lizards with a range of large and small macropods also present. The arboreal skink (*Egernia depressa*) and the gecko (*Gehyra variegata*) are the most abundant small lizards. Relatively common mammals include the Euro (*Macropus robustus*), Red Kangaroo (*Macropus rufus*), Echidna (*Tachyglossus aculeatus*) and the Sandy Inland Mouse (*Pseudomys hermannsburgensis*) (Dames and Moore 1994). Emus (*Dromaius novaehollandiae)* were noted during the survey as well as large monitor lizards, probably Gould's Goanna (*Varanus gouldii*), and dingos (*Canis lupus dingo*). Several of the above species were utilised by Aboriginal hunter gatherers in the past (Bindon 1986).

ENVIRONMENTAL CONTEXT: PREDICTIONS

A range of resources known to have been used by Aboriginal people both locally and elsewhere in the state are present in the Survey Area. There are ample sources of stone for artefact manufacture, a small range of edible plant foods (although the seeds of *Acacia* spp. and *Santalum acuminatum* may have been staples of the diet), and a range of faunal species known to have been important part of the diet of Aboriginal people elsewhere in arid Australia. There are, however, few sources of fresh water in the Survey Area. This suggests that the most common archaeological sites in the area would be associated with the sourcing of raw material for the manufacture of stone artefacts rather than other economic and subsistence activities.

ARCHAEOLOGICAL BACKGROUND

PREVIOUSLY RECORDED ABORIGINAL SITES

The Register of Aboriginal Sites, maintained by the DIA, is a gazette of recorded places of importance to Aboriginal people as defined under section 5 of the *Aboriginal Heritage Act 1972*. A search of the register was conducted in August 2011 to identify the number of previous archaeological and ethnographic surveys that have been undertaken in the Project Area and the number of archaeological sites recorded within a nominal area of 20 km (north/south) by 10 km (east/west) focused on the Survey Area (see Appendix 4).

The object of this archival research was to:

1. ensure that any previously recorded Aboriginal sites which may be located within, or in close proximity to, the Survey Areas were identified in advance;

2. gain an appreciation of the type of Aboriginal sites previously recorded in the region to provide an indication of the site types likely to be encountered during the Survey; and

3. gain an appreciation of site patterning throughout the region to provide an indication of the general distribution of sites and identify areas of high and low potential for sites in the region.

A total of nine archaeological and ethnographic surveys (Australian Interaction Consultants 2005a, 2005b, 2006, 2007a, 2007b, 2007c, 2008, Hames 2003, 2004 and Fordyce and Lafrentz 2009a, 2009b and 2009c) are recorded as having been undertaken in the wider Project Area. There are no previously recorded Aboriginal sites located within the 20 km by 10 km area centred on the survey areas. Two previously identified Aboriginal heritage places are, however, located within this search area (see Table 3).

Table 3. Previously recorded Aboriginal heritage places within a 10 km by 20 km area centred around the survey areas

DIA Site Number	DIA Site Name	Site Type
24146	Midwest Gnamma Hole	Mythological, Artefacts / Scatter, Water Source
24150	Midwest Artefact Scatter 3	Artefacts / Scatter

These sites were recorded during Aboriginal heritage surveys of mining and exploration projects (e.g. AIC 2007a).

OTHER RESEARCH IN THE REGION

As noted above, there has been very little previous heritage work carried out within or immediately surrounding the Jasper and Hinge Survey Area. A number of archaeological surveys have, however, been conducted in the wider region as part of the Mungada Iron Ore Project and Karara Iron Ore Project. These surveys were undertaken by Australian Interaction Consultants (AIC) from 2004 to 2008 (AIC 2005a, 2005b, 2006a, 2006b, 2007a, 2007b, 2007c, 2009a, 2009b, 2010, Chisolm 2008, Fordyce and Lafrentz 2009a, 2009b and 2009c and Villiers 2008a and 2008b).

The clearest results available from these surveys are in Fordyce and Lafrentz 2009c and a summary of the sites in this report are presented in Table 4 below.

Table 4: Types of Aboriginal heritage sites identified by AIC in the Mungada Iron Ore Project areas

Site Type	n	%
Artefact Scatter	9	28.1
Artefact Scatter/Quarry	8	25
Artefact Scatter/Gnamma Hole	5	15.6
Grinding Patches/Gnamma Hole/Artefact Scatter	3	9.4
Artefact Scatter/Rock Shelter/Quarry/Gnamma Hole	2	6.3
Artefact Scatter/Gnamma Hole/Camp	1	3.1
Mythological/Gnamma Hole	1	3.1
Gnamma Hole	1	3.1
Artefact Scatter/Gnamma Hole/PAD/Rock Shelter	1	3.1
Artefact Scatter/Grinding Patches	1	3.1

The most commonly recorded site type within the Mungada Iron Ore Project is artefact scatters which comprise 28.1% of all sites recorded in the Project Area. The second most commonly recorded site type is artefact scatter/quarry sites, comprising 25% of Aboriginal heritage sites recorded in the Mungada Iron Ore Project Area. The third most commonly recorded site type within the Mungada Iron Ore Project is artefact scatter/gnamma holes. Gnamma holes are a component of more than 42% of the sites recorded.

Based on the results from these previous surveys within the general area surrounding the Jasper and Hinge Project Area (especially the AIC Mungada results) it seems likely that the most frequently encountered site types during the survey will also be artefact scatters and quarries. It also seems likely that gnamma holes will form a component of sites identified during the Survey.

PREVIOUS RESEARCH IN THE REGION

The Aboriginal heritage surveys discussed above generally focus on relatively small areas directly impacted by exploration, mining and associated infrastructure and yield little by way of regional context. A variety of archaeological research projects have, however, been undertaken in the Murchison area, including: research at the Wilgie Mia ochre mine in the Weld Range (Davidson 1952; Clarke 1976; Crawford 1980); excavations at Billibilong Spring and Walga Rock, near Cue (Bordes *et al*. 1983); and Byrne's (1980) study on artefact assemblages and the dispersal of lithic material from a silcrete quarry near the mouth of the Murchison River.

A regional archaeological research project conducted by Webb (1996) investigated Aboriginal usage of the Murchison Basin. Six sites, Billibilong I, Madoonga, Meeberrie, Mullewa, Twin Peaks and Wurarga were excavated, all returned basal dates of mid to late Holocene age.

A number of other sites have been excavated in the wider area (Rossi 2010; Bowdler *et al*. 1989; Webb 2008; Bordes *et al.* 1983) with occupation generally dated to the mid to late Holocene, with the exception of Walga Rock, which dates to the early Holocene (Bordes *et al*. 1983). Similar dates have been returned for archaeological

sequences in the Goldfields region (Mattner 2000; O'Connor and Veth 1996; Bindon 1986; Leiberman *et al.* 1977); a single Pleistocene date was returned from Katampul Shelter, in the northeastern Goldfields (21,170 ± 190 BP; O'Connor and Veth 1996). Pleistocene dates have been recorded on the nearby Gascoyne coast (Morse 1999; Bowdler 1999; Przywolnik 2005).

Kirkby's (1977) regional archaeological study examined Aboriginal site distribution and prehistoric settlement patterns in the northern Morawa district. He found that most sites were located in thicket formation and that all sites were located within 1 km of gneissic or granitic outcrops. Kirkby (1977: 40) citing Keefe's research on the Aboriginal group living south of Mullewa during the early 1860's, suggests subsistence patterns involved the use of ephemeral water sources in the "harsher country" to the east during winter, "allowing them to conserve the game and food around the permanent water for the long summer".

Elsewhere in the arid zone Gould (1977; cf. Gould 1980; Veth 1989; Veth *et al.* 1990) has described a "rain-chasing" settlement pattern, also involving opportunistic movement towards areas of local rainfall and the structured use of available water sources (c.f. Cane, 1984).

A deliberate strategy of targeting networks of ephemeral water sources immediately following rain, leaving the few larger and more permanent waters to last, produced an initial period of high residential mobility followed by more extended periods of reliance on permanent waters. The net archaeological imprint of this strategy is a higher ratio of ephemeral 'satellite' occupation sites to 'core' habitation base camps resulting in numerous small artefact scatters across a range of arid environments within this non-seasonal zone. In general, it is to be expected that the archaeological signature of this region would, therefore, be characterised by many small sites associated with ephemeral water sources; a smaller number of larger sites, adjacent to more permanent water sources; and special purpose, task specific sites, such as stone quarries, located where conditions permit, such as outcrops and ridges of banded iron formation (Veth *et al.* 1990).

SURVEY METHODS

The Survey involved the use of the following methods:

1. Archival research; and
2. A formal field survey for Aboriginal archaeological sites within the designated Survey Area.

ARCHIVAL RESEARCH

The archival research involved a Register search conducted at the Department of Indigenous Affairs (DIA) in order to access Aboriginal site files pertaining to previously recorded sites within the Survey Area and heritage survey reports detailing heritage surveys conducted in the region. The results of the archival research were used to inform the heritage survey team as to the nature and type of Aboriginal sites which may be encountered during the Surveys, and also to alert the heritage survey team to the presence of those sites that have already been recorded within or in close proximity to the Survey Area. There were no previously registered Aboriginal sites within the Survey area. There was one previously recorded site, not yet registered, within the survey area.

SURVEY AND RECORDING METHODS

The archaeological survey method was designed to provide total coverage of the Survey Areas. The Survey Areas were investigated using a series of parallel pedestrian transects spaced at a maximum of 30 m intervals. The pedestrian transects were generally walked at an angle parallel to one side of the Survey Area polygon. It is estimated that 100% of the Survey Areas were investigated for archaeological sites in this manner.

Site Identification Recording

In accordance with the Project Brief issued to Gavin Jackson CRM by KML, all of the Aboriginal archaeological sites located within the Survey Area were to be recorded to a standard consistent with a site identification method. The recording method was designed to provide a level of site recording consistent with site identification recording as described in the *Draft Guidelines for Aboriginal Heritage Assessment in Western Australia* (DAS 1993; DIA 2003). The site recording method used during the survey aimed to record sufficient information to characterise each site and to enable an assessment to be made of the significance of each of the sites.

As a minimum the following environmental details were also recorded for all Aboriginal archaeological sites identified during the course of the Survey: land-system, landscape character type, vegetation community, ground surface visibility, distance to the nearest water source and type of water source if known. A Mapping Grid Australia (MGA) reference (or series of references) was recorded for each site using a hand-held Garmin GPS unit, employing the GDA 94 Datum. Newly recorded Aboriginal sites were documented using a standard nomenclature for sites (e.g. KAR 11-01). Each Aboriginal archaeological site located during the Survey was flagged in the field with pink and black striped flagging tape for ease of identification in the future.

SITE TYPES

On the basis of previous archaeological studies in the region, a number of different types of Aboriginal sites were expected to be encountered within the Survey Area. Definitions of these sites are as follows:

Artefact scatter refers to locations where a range of activities have occurred, such as the manufacture and maintenance of tools and the processing of foods. These sites will often contain a wider range of lithic materials than quarries and knapping floors.

Gnamma hole/water source refers to a natural or artificial rock cavity, which holds water after rain or is linked to the water table.

Modified tree refers to a tree, which has trunks and/or limbs that have been modified by the removal of bark and/or wood. Aboriginal people removed wood and bark for material items such as shields and baskets or to access native honey inside hollows in the tree.

Quarry refers to a location from which stone used to manufacture flaked or ground stone artefacts has been extracted.

Reduction Area refers to a cluster of stone artefacts, which represent the remains of an episode (or episodes) of stone artefact manufacture. Artefacts within a knapping floor can usually be conjoined back together.

Rock art refers to art placed on a rock surface that may be created by additive (such as painting or drawing) or subtractive (such as abrading or engraving) processes.

Rock shelter refers to an overhang, cave or cliff face which contains evidence of human occupation in the form of stone artefacts, charcoal, faunal material or rock art.

DEFINITION OF BACKGROUND SCATTER AND ARTEFACT SCATTERS

A distinction is often drawn between relatively dense, localised concentrations of archaeological material and the sparsely distributed archaeological materials which usually surround them. The relatively sparse scatter of stone artefacts is usually known as the 'background scatter' or isolated artefacts, while concentrations of artefacts are termed 'sites'.

For the purposes of this Survey, *generally*, an artefact scatter was termed an archaeological 'site' as any concentration consisting of:

1. more than five artefacts within a 5 m by 5 m sample square;
2. the minimum average artefact density of 0.04 artefacts per m²; and
3. the average artefact density is more than four times the average density of background scatter.

STONE ARTEFACT RECORDING

Specific details concerning the identification and recording methods for individual stone artefacts within both the background scatter and site contexts are provided in Appendix 1 to this report.

The codes employed in the recording of artefacts and utilised in the tables listing the artefacts recorded during this Survey are also summarised in Appendix 1.

PARTICIPATION OF THE ABORIGINAL CONSULTANTS

The *Widi Binyardi* and *Widi* Mob Consultants that participated in the Survey were chosen after discussions between members of the native title claimant group. The Aboriginal Consultants participated in all aspects of the Survey including the location and subsequent recording of Aboriginal archaeological sites.

Site Classifications

In the descriptions of Aboriginal archaeological sites outlined here, the size, density and diversity of raw materials and artefact types at sites were classified using definitions outlined below. These definitions were initially developed by Hiscock and Hughes for the Olympic Dam Project in South Australia (Kinhill-Stearns Roger 1982:5-13, Kinhill 1987).

Sites that have a surface area of:

1. ≤999 m^2 are classified as small
2. 1,000 m^2 – 9,999 m^2 are classified as medium
3. ≥10,000 m^2 are classified as large.

Sites with average artefact densities of:

1. <0.15/m^2 are classified as low density
2. 0.15-1/m^2 are classified as medium density
3. 1 - 10 /m^2 and a maximum artefact density of ≥1/m^2 are classified as high density
4. >10 /m^2 are classified as very high density

Sites where:

1. >90% of artefacts are manufactured from one raw material are classified as having low raw material variability
2. Artefacts manufactured from two raw material types which comprise more than 10% each are classified as medium raw material variability; and
3. Artefacts manufactured from three or more raw materials each comprise more than 10% are classified as having high raw material variability.

Assemblage diversity is much more difficult to quantify with small samples and/or small populations than, for example, diversity of raw material types and is therefore not rigidly defined in the following discussion of archaeological sites recorded in these areas.

ASSESSMENT OF ARCHAEOLOGICAL SIGNIFICANCE

One of the reasons archaeological resources are regarded as significant is because 'they constitute a unique, non-renewable data base for reconstructing the cultural past and for testing propositions about human behaviour' (Moratto and Kelly 1978: 5). As such, archaeological site significance can be gauged principally in terms of the representativeness of a site and the potential of site to address research questions.

1. Representativeness

This criterion concerns the extent to which the archaeological remains within a particular site are represented at other localities within the region. Unusual or unique sites are normally accorded a higher archaeological significance than sites that are very common. Given that all sites are in a sense unique (Bowdler 1984: 2), they are normally considered in terms of categories such as those defined above, i.e. 'quarry' or 'artefact scatter', when determining how common they are.

2. Archaeological research potential

This criterion concerns the potential of a site to contribute to timely and specific research questions (Bowdler 1981, 1984; Schiffer and Gummerman 1977). The potential of a site to contribute to research questions depends on a number of factors such as its state of preservation and the range of past human activities reflected at that site. A general guideline in assessing archaeological significance has been suggested by Bowdler (1984: 2), as illustrated in the following three questions:

1. Can this site contribute knowledge which no other site can?
2. Can this site contribute knowledge which no other resource, such as documents or oral history or previous research, can?
3. Is this knowledge relevant to specific or general questions about human history or behaviour or some other substantive subject?

A number of timely and relevant research questions, which are pertinent to the Project Area and which frame the context within which the archaeological significance of sites can be assessed, are outlined below. Most of these research questions have been discussed in the above review of regional archaeological knowledge.

Questions that can be addressed by stratified sites

1. What is the antiquity of Aboriginal habitation in the Midwest?
2. Did people occupy the Midwest throughout the last glacial maximum?
3. What are the dates for the appearance of the "Small Tool Tradition" (Gould 1969: 235) (including backed artefacts and tula adzes) in the Midwest region? Additionally, is there a decline in the use of backed artefacts in the region during the late Holocene, as noted elsewhere (Hiscock and O'Connor 2005) and is this associated with any markers of decreased mobility (c.f. Hiscock 1994)?
4. Is there any evidence for population growth, social intensification and a changing economy on a regional scale during the last 1,500 years in terms of increased initial use of sites and accelerated rates of material discard (Marwick 2003)?

Questions that can be addressed by the examination of surface assemblages

5. Is there a relationship between the rejuvenation and reduction of flaked stone artefacts and proximity to more permanent water sources and/or quarries (e.g. Hiscock 1988, c.f. Brown 1987, Veth 1989a and b, 1993)?
6. Are backed artefacts found in a range of contexts or are they limited in distribution and can any observed patterns of distribution illuminate the use or uses of these artefacts in the Midwest region?
7. Is variability within artefact assemblages on sites largely the result of clearly different site function? Specifically;
    a. Do sites with evidence of quarrying activity have assemblages which contain a retouch/utilisation proportion of 10% or less (c.f. Veth 1984a: 13)?

b. Do sites with evidence of plant food processing all have artefact assemblages with a retouch/utilisation proportion of 10% or more (c.f. Veth 1984a: 13)? Or alternatively;

8. Does the surface archaeological material, specifically the patterning of habitation sites, assemblage variation and artefact attributes support a risk-minimisation, 'rain chasing' adaptation within an arid to semi-arid settlement/subsistence system in which residential mobility is closely tethered to localised rainfall as described by Veth e.g. 1984b, 1993)? Or alternatively;
9. Is there any evidence to support Ryan and Morse's (2009) settlement model of the inland Midwest in which high levels of assemblage and raw material diversity are linked with residential and logistical mobility?

It was anticipated that most of the sites located during the surveys would be open surface sites and, therefore, not amenable to addressing questions concerning the antiquity of human occupation of the region (i.e. questions 1 to 4, above). Questions relating to surface assemblages (questions 5 to 9) will be able to be addressed to varying degrees by any open context artefact scatters identified during the Survey.

It should be noted that the archaeological significance assessments of Aboriginal archaeological sites contained in this report are, in accordance with the above discussion, based solely on archaeological principles. It should not be construed that this report contains cultural significance assessments about Aboriginal sites. The *Binyardi people* and *Widi* Mob native title claimants reserve the right to determine the cultural significance of all of the sites recorded and described in this report. Such cultural significance assessments can, and often do, differ markedly from any archaeological significance that may be attributed to such sites. The *Binyardi people* and *Widi* Mob native title claimant group, therefore, should be consulted about the cultural significance of these sites post the production of this report.

SECTION TWO RESULTS

RESULTS

JASPER AND HINGE SURVEY AREAS

Location

The Survey Areas are located approximately 90 km east of Morawa and 440 km northeast of Perth, in the Midwest region of Western Australia. The names and surface areas of each polygon are contained in the Table 5 below.

Table 5: Jasper and Hinge Survey Areas

Survey Area Name	Size (km²)
Jasper Survey Area	1.35
Hinge Survey Area	2.6

Environment

The Survey Areas are located in the Yalgoo sub-region of the Austin Botanical District, which forms part of the broader Murchison and Eremaean botanical provinces (Beard 1976). The Yalgoo sub-region comprises the Murchison and Greenough rivers in the north and a series of salt lakes, including Lake Monger and Lake Moore, in the south (Beard 1976: 66). The Yalgoo sub-region is generally undulating with low ranges of metamorphic rocks (Beard 1976: 66).

The Survey Area is located across a gently undulating plain with occasional large outcrops of granite. The ground surface is characterised by mixed gravels, dominated by ironstone, overlying sands. There are no coordinated drainage systems within the Survey Area.

The vegetation of the Survey Area is characterised by dense *Acacia* spp. scrub with scattered *Eucalyptus* spp. trees.

Ground surface visibility at the time of the Survey was approximately 50%.

Archaeological Survey Results

The Jasper Hill and Hinge Survey Areas have been surveyed in their entirety. **Two** newly identified Aboriginal archaeological sites were identified during the Survey (see Table 6 and Map 1). These sites were recorded to a site identification standard. Detailed site descriptions are provided below.

Thirteen isolated artefacts were also recorded during the Survey (see Appendix 3).

Table 6: Newly identified Aboriginal archaeological site in the Survey area

Site Name	Central Grid Reference	Site Type	Maximum Dimensions (N/S x E/W)
KAR 11-01	487015 mE 6788150 mN	Artefact Scatter	145 m x 160 m
KAR 11-02	487318.5 mE 6788077 mN	Artefact Scatter	12 m x 11 m

Gavin Jackson
Cultural Resource Management

Jasper and Hinge Survey Area

Job ID: Jasper and Hinge
Map Scale: 1:125000
Date: 14/12/2011
Author: PT
Projection: GDA94, MGA50

0 0.4 0.8 1.6 Km

N
S

ABORIGINAL SITE RECORDED DURING THE SURVEY

KAR 11-01 – ARTEFACT SCATTER

Grid References

50K	487005 mE	6788270 mN	50K	487043 mE	6788125 mN
	487010 mE	6788235 mN		487015 mE	6788125 mN
	487027 mE	6788212 mN		487005 mE	6788137 mN
	487040 mE	6788200 mN		486993 mE	6788150 mN
	487053 mE	6788187 mN		486967 mE	6788145 mN
	487068 mE	6788170 mN		486945 mE	6788150 mN
	487080 mE	6788137 mN		486920 mE	6788150 mN
	487067 mE	6788125 mN			

The site boundary has only been partially recorded. The above boundary points correspond only to the portion of the site area located *within* the Hinge survey area and the site extends for an unknown distance to the northwest of these boundary points (see Map 1).

Location

Site KAR 11-01 is located in the southern portion of the Hinge Survey Area (see Map 1).

Site Environment

Site KAR 11-01 is located at the base of a low ironstone hill. There are large metamorphosed sedimentary exposures with quartz seams outcropping at the base of the hill. The ground surface is characterised by mixed cobbles and gravels of ironstone and quartz.

Small hollows have formed in the outcropping metamorphosed sedimentary stone as a result of erosion and a number of these hollows contained water at the time of Survey. These hollows, or *gnamma* holes, provide a potential source of water following seasonal rains.

The area around site KAR 11-01 is vegetated by dense mixed *Acacia* spp. thickets, small shrubs and scattered eucalypts (*Eucalyptus* spp.).

At the time of site recording dense leaf litter from the surrounding vegetation limited ground surface visibility to approximately 50% (see Plate 1).

Site Recording and Sampling

Site KAR 11-01 was recorded using a site identification method. A series of 25m^2 (5 m by 5 m) sample squares were placed at 25 m intervals across an area of known artefact concentration to establish the site boundary. When artefact densities had decreased to background scatter levels a boundary was established. The boundary of the site was left open to the northwest where the site extends beyond the Survey Area.

Eleven 25m^2 (5 m by 5 m) sample squares were placed within the site boundary and these were used to sample the assemblage of the site. A total of 275 m^2 of the site was sampled in this way, representing a sample of 2.6% of the surface area of the

site within the Survey Area. Full metric details were recorded for all artefacts located within the sample squares.

Site Description

Site KAR 11-01 is a large, medium density artefact scatter. The maximum dimensions of the site with the Survey Area are 145 m (north/south) by 160 m (east/west). It is estimated that the portion of the site recorded during the survey covers an area of approximately 10,560 m².

Artefact Assemblage

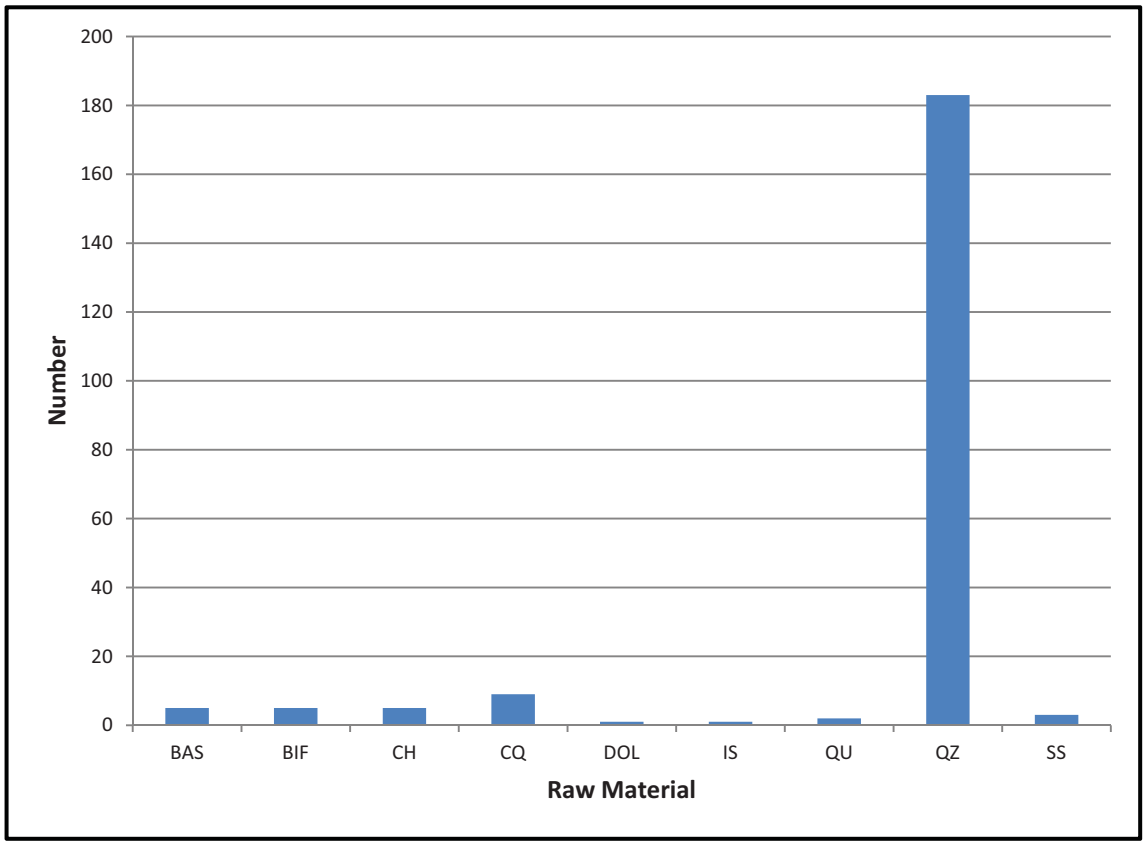
A total of 214 artefacts were recorded in the 11 sample squares. The maximum artefact density from the recorded squares was 5.32/m^2 and the average artefact density across the site was 0.778/m^2. This suggests a total assemblage of 8,128 artefacts (see Appendix 2).

Artefacts are primarily concentrated in the western section of site KAR 11-01 where the outcropping metamorphosed sedimentary stone is replaced by gravels lying on red sediments.

Raw Materials

The most commonly recorded raw material in the sample of artefacts recorded at KAR 11-01 was quartz. Small numbers of crystal quartz, basalt, banded iron formation, chert, siliceous sediment, quartzite, dolerite and ironstone were also recorded (see Graph 1). Most of these raw materials are relatively common in the Survey Area and were probably sourced from the local sources.

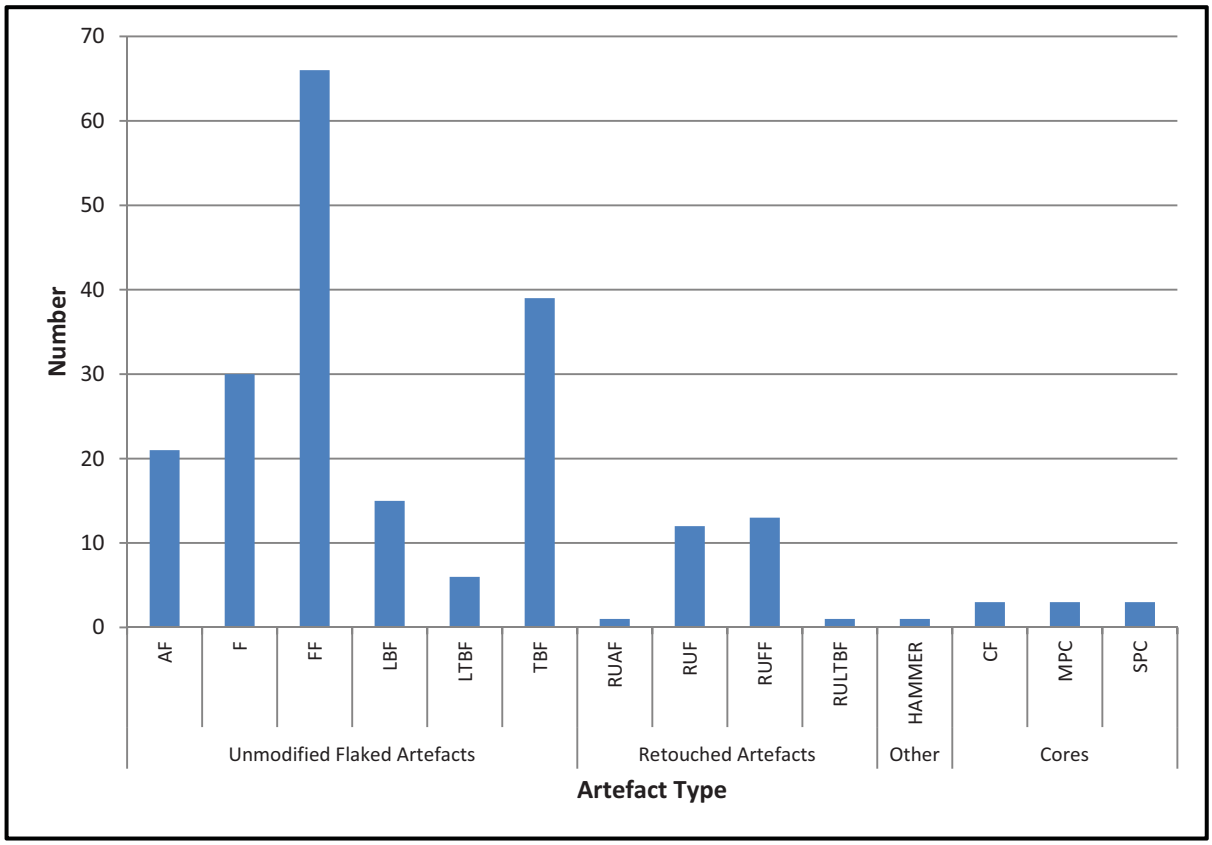
Graph 1: Site KAR 11-01, raw materials within recorded sample



Artefact Types

The sample of artefacts recorded at KAR 11-01 is dominated by flake fragments with a large number of transversely broken flakes, complete flakes and angular fragments also present. The recorded assemblage also includes a number of other unmodified flaked artefacts, a high proportion of retouched artefacts (13%), a small number of cores and a single hammerstone (see Graph 2 and Appendix 2). One of the complete flakes recorded is a blade.

Graph 2: Site KAR 11-01, artefact types within the recorded sample



Preliminary Artefact Analysis

A preliminary and cursory analysis of the sample of unmodified complete flakes recorded at KAR 11-01 indicates that these artefacts are characterised by a moderate level of platform preparation, with 65% of platforms either flat, flaked or facetted (see Table 7). The complete flakes recorded at this site also appear to derive from cores that had already been heavily flaked, with more than 65% of flakes featuring less than 50% dorsal cortex (see Table 7). The general absence of cortex in the sample of assemblage recorded may, however, reflect the nature of the raw material, as quartz largely lacks easily discernible weathered surfaces. This range of attributes suggests that these flakes originate from the middle to late section of the stone working reduction sequence.

The high proportion (57%) of flake fragments and other broken flakes within the recorded assemblage suggests that some post-depositional trampling may have taken place at the site. It is also possible that some fragmentation occurred during the flaking process, a characteristic of the dominant raw material, quartz.

Table 7: Site KAR 11-01, platform and dorsal attributes of unmodified complete flakes

KAR 11-01						
Variable	Unmodified Complete Flakes n = 27		**Variable**		Unmodified Complete Flakes n = 27	
	n	%			n	%
Cortical	4	14.8	Dorsal Cortex	No Cortex	7	25.9
Flat	9	33.3		1-25%	10	37.0
Flaked	6	22.2		26-50%	2	7.4
Facetted	3	11.1		51-75%	2	7.4
Focal	3	11.1		76-100%	6	22.2
Collapsed	2	7.4	# Dorsal Scars	100% Cortex	5	18.5
Heat Fractured	-	-		1-2 scars	9	33.3
Retouched	-	-		3-4 scars	9	33.3
Error	-	-		5+ scars	4	14.8
Overhang Removal	-	-		Error	-	-

Table 8: Site KAR 11-01, metrics of unmodified complete flakes and other unmodified flakes

KAR 11-01					
Variable		Unmodified Complete Flakes n = 27	Variable		Other Unmodified Flakes n = 150
Oriented Length	Mean	20.8	Max. Length	Mean	20.2
	Max	43.0		Max	52.0
	Min	11.5		Min	7.0
	St Dv	7.7		St Dv	7.9
Oriented Width	Mean	14.2	Max. Width	Mean	14.9
	Max	22.0		Max	50.0
	Min	9.0		Min	5.0
	St Dv	4.1		St Dv	6.7
Oriented Thickness	Mean	5.3	Max. Thickness	Mean	6.5
	Max	9.5		Max	36.0
	Min	2.0		Min	2.0
	St Dv	1.9		St Dv	4.3

Archaeological Significance

Site KAR 11-01 is a large, medium density artefact scatter. The recorded assemblage is characterised by a limited range of raw materials and moderate range of artefact types. This site features a high proportion of retouched artefacts.

We suggest that site KAR 11-01, with its medium artefact density and moderately large and diverse population could be used to address research questions 5 through 9 (outlined above). From the data collected during this and other Aboriginal archaeological surveys, and from previous research conducted in the wider Midwest, it can be concluded that artefact scatters similar to KAR 11-01 are relatively *common* in the region (AIC 2006, Chisolm 2008, Fordyce and Lafrentz 2009b, Villiers 2008a and 2008b). As representativeness is one aspect by which the significance of a site is assessed, we consider that KAR 11-02 has limited value in the context of the archaeology of the Midwest region.

Site KAR 11-01 is, therefore, assessed as having a **low** degree of archaeological significance.

Recommendations

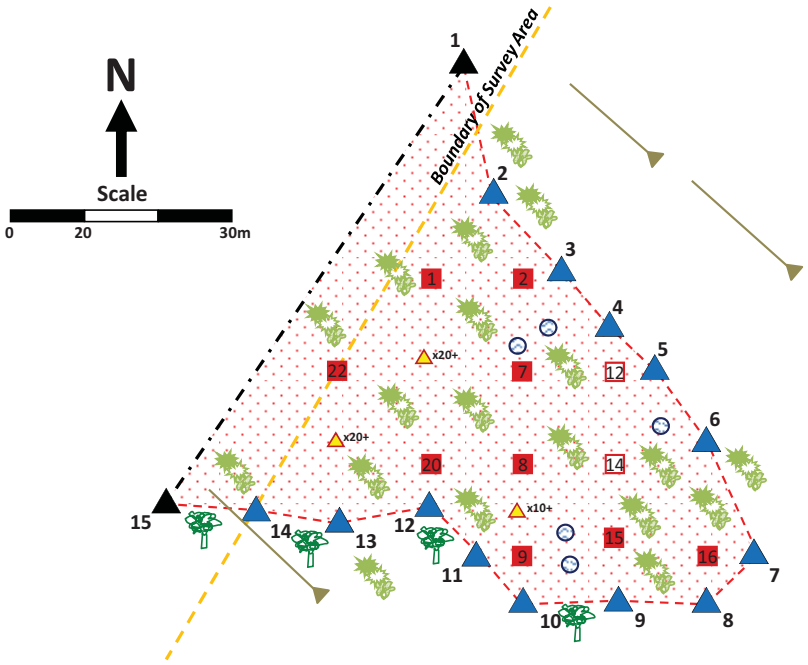
It is **recommended** that KML ensure its employees and contractors, as appropriate, are:

1. advised of the existence and location of Aboriginal archaeological site KAR 11-01; and
2. informed that this location constitutes an Aboriginal site under section 5 of the *Aboriginal Heritage Act 1972* and should, therefore, be avoided.

It is advised that it is the preference of the *Binyardi people* and *Widi* Mob Aboriginal native title claimants for all Aboriginal sites to remain *in situ* and be avoided and protected by KML. However, should it prove necessary, at some time in the future, to disturb this site, it is further **recommended** that an application, seeking consent to do so, be made to the Minister for Indigenous Affairs under section 18 of the *Aboriginal Heritage Act 1972*, on condition that:

1. such an application is acceptable to members of the *Binyardi people* and *Widi* Mob Aboriginal native title claimants; and
2. the *Binyardi people* and *Widi* Mob native title claimants be provided the opportunity to salvage archaeological material from site KAR 11-01 in a culturally appropriate manner and with the assistance of a suitably qualified archaeologist if they so wish.

Figure 1: Site KAR 11-01, site plan



KEY

- = 5m x 5m Recording Square
- = 5m x 5m Recording Square - Void
- = Extent of Site
- = Artefact
- = Open Boundary Node
- = Open Boundary
- = Boundary of Hinge Survey Area
- = Direction of Slope
- = Gnamma Hole
- = Acacia *spp.*
- = Eucalyptus *spp.*

Boundary Nodes

	Easting (mE)	Northing (mN)
1	487005	6788270
2	487010	6788235
3	487027	6788212
4	487040	6788200
5	487053	6788187
6	487068	6788170
7	487080	6788137
8	487067	6788125
9	487043	6788125
10	487015	6788125
11	487005	6788137
12	486993	6788150
13	486967	6788145
14	486945	6788150
15	486920	6788150

Plate 1: Site KAR 11-01, view west

Plate 2: Site KAR 11-01, artefacts *in situ* (Scale = 10 cm)

Plate 3: Site KAR 11-01, detail of gnamma hole with capstone (Scale = 10 cm)

Plate 4: Site KAR 11-01, detail of gnamma holes (Scale = 10 cm)

KAR 11-02 – ARTEFACT SCATTER

Grid References

50K	487313 mE	6788078 mN	50K	487324 mE	6788076 mN
	487316 mE	6788072 mN		487321 mE	6788084 mN

Location

Site KAR 11-02 is located in the southern portion of the Hinge Survey Area (see Map 1).

Site Environment

Site KAR 11-02 is located on the flat top of a low northeast/southwest ironstone hill. There is a low quartz outcrop located in the eastern section of the site. The ground surface is characterised by mixed gravels dominated by ironstone, lying on red sandy sediment. The nearest known water sources are the gnamma holes within site KAR 11-02, located approximately 250 m to the northwest.

The area around site KAR 11-02 is vegetated by dense mixed *Acacia* spp. thickets, small shrubs and scattered eucalypts (*Eucalyptus* spp.).

At the time of site recording ground surface visibility was approximately 60% (see Plate 1).

Site Recording and Sampling

Site KAR 11-02 was recorded using a site identification method. The boundaries of the site were established by walking a series of transects around an area of known artefact concentration. When artefact densities had decreased to background scatter levels a boundary was established. As artefacts were discrete distributed across the site, full metric details were recorded for all identified artefacts. It is therefore considered that 100% of the identified assemblage was recorded.

Site Description

Site KAR 11-02 is a small, discrete, medium density artefact scatter. The maximum dimensions of the site are 12 m (north/south) by 11 m (east/west). The site has a total surface area of 71 m².

Artefact Assemblage

A total of 22 artefacts were recorded within the site boundary. The observed artefact density of the site was 0.3099/m² (see Appendix 2). Because of the small number of artefacts recorded at the site no descriptive statistics are provided for this site.

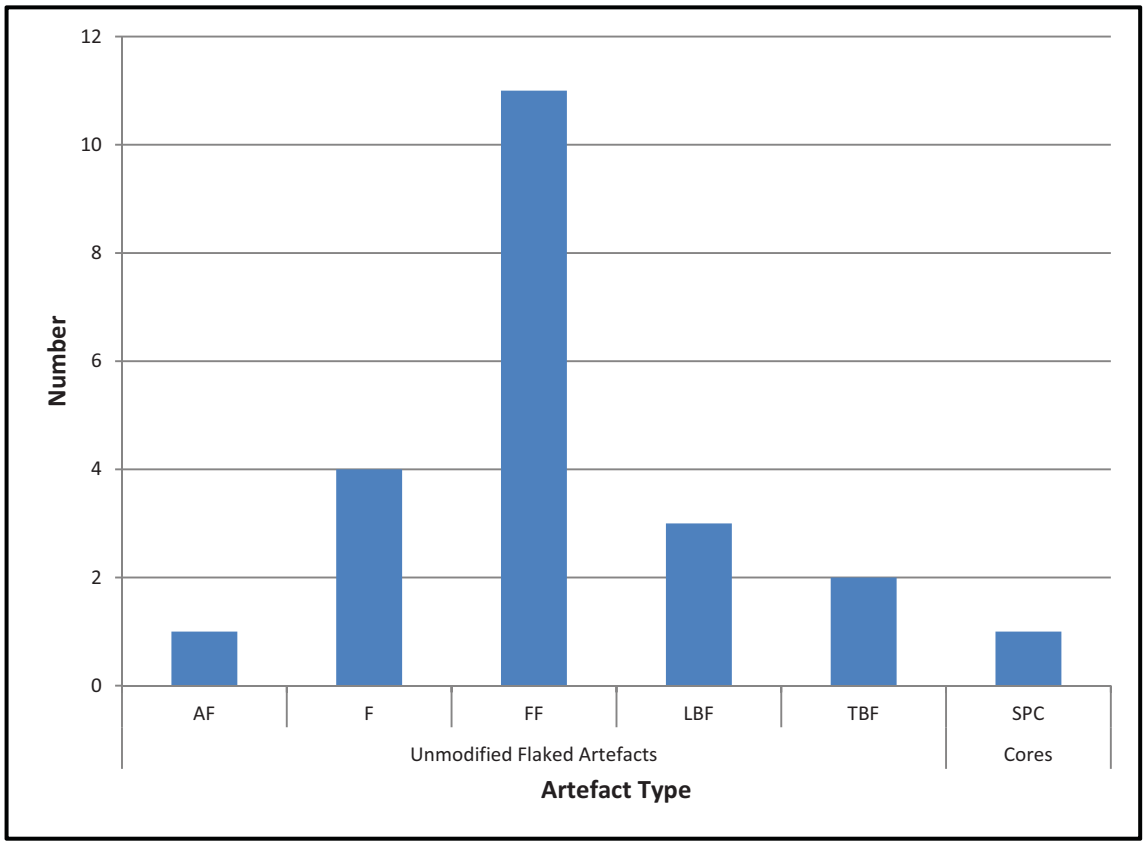
Raw Materials

Most of the artefacts recorded at KAR 11-02 were manufactured from the locally outcropping quartz. A single example of quartzite was also noted within the recorded assemblage (see Appendix 2). .

Artefact Types

The sample of artefacts recorded at KAR 11-02 is dominated by flake fragments with a small numbers of complete flakes, longitudinally broken flakes, and transversely broken flakes also present. The recorded assemblage also includes single examples of an angular fragment and a single platform core (see Graph 3 and Appendix 2).

Graph 3: Site KAR 11-02, artefact types within the recorded sample



Archaeological Significance

Site KAR 11-02 is a small, discrete artefact scatter based around an outcrop of quartz. The site appears to be characterised by a small artefact population, a single dominant raw material and a limited range of artefact types. We suggest the assemblage at the site may have resulted from the testing and evaluation of this source of the quartz raw material for stone artefact manufacture.

We suggest that KAR 11-02, with its small artefact population and small range of artefact types, is limited in its potential to contribute to archaeological research in the Midwest region. Furthermore, from the data collected during this and other Aboriginal archaeological surveys, and from previous research conducted in the wider Midwest, it can be concluded that artefact scatters similar to KAR 11-02 are relatively *common* in the region (AIC 2006, Chisolm 2008, Fordyce and Lafrentz 2009b, Villiers 2008a and 2008b). As representativeness is one aspect by which the significance of a site is assessed, we consider that KAR 11-02 has limited value in the context of the archaeology of the Midwest region.

Site KAR 11-02 is, therefore, assessed as having a **low** degree of archaeological significance.

Recommendations

It is **recommended** that KML ensure its employees and contractors, as appropriate, are:

1. advised of the existence and location of Aboriginal archaeological site KAR 11-02; and
2. informed that this location constitutes an Aboriginal site under section 5 of the *Aboriginal Heritage Act 1972* and should, therefore, be avoided.

It is advised that it is the preference of the *Binyardi* people and *Widi* Mob Aboriginal native title claimants for all Aboriginal sites to remain *in situ* and be avoided and protected by KML. However, should it prove necessary, at some time in the future, to disturb this site, it is further **recommended** that an application, seeking consent to do so, be made to the Minister for Indigenous Affairs under section 18 of the *Aboriginal Heritage Act 1972*, on condition that:

1. such an application is acceptable to members of the *Binyardi* people and *Widi* Mob Aboriginal native title claimants; and
2. the *Binyardi* people and *Widi* Mob native title claimants be provided the opportunity to salvage archaeological material from site KAR 11-02 in a culturally appropriate manner and with the assistance of a suitably qualified archaeologist if they so wish.

Figure 2: Site KAR 11-02, site plan

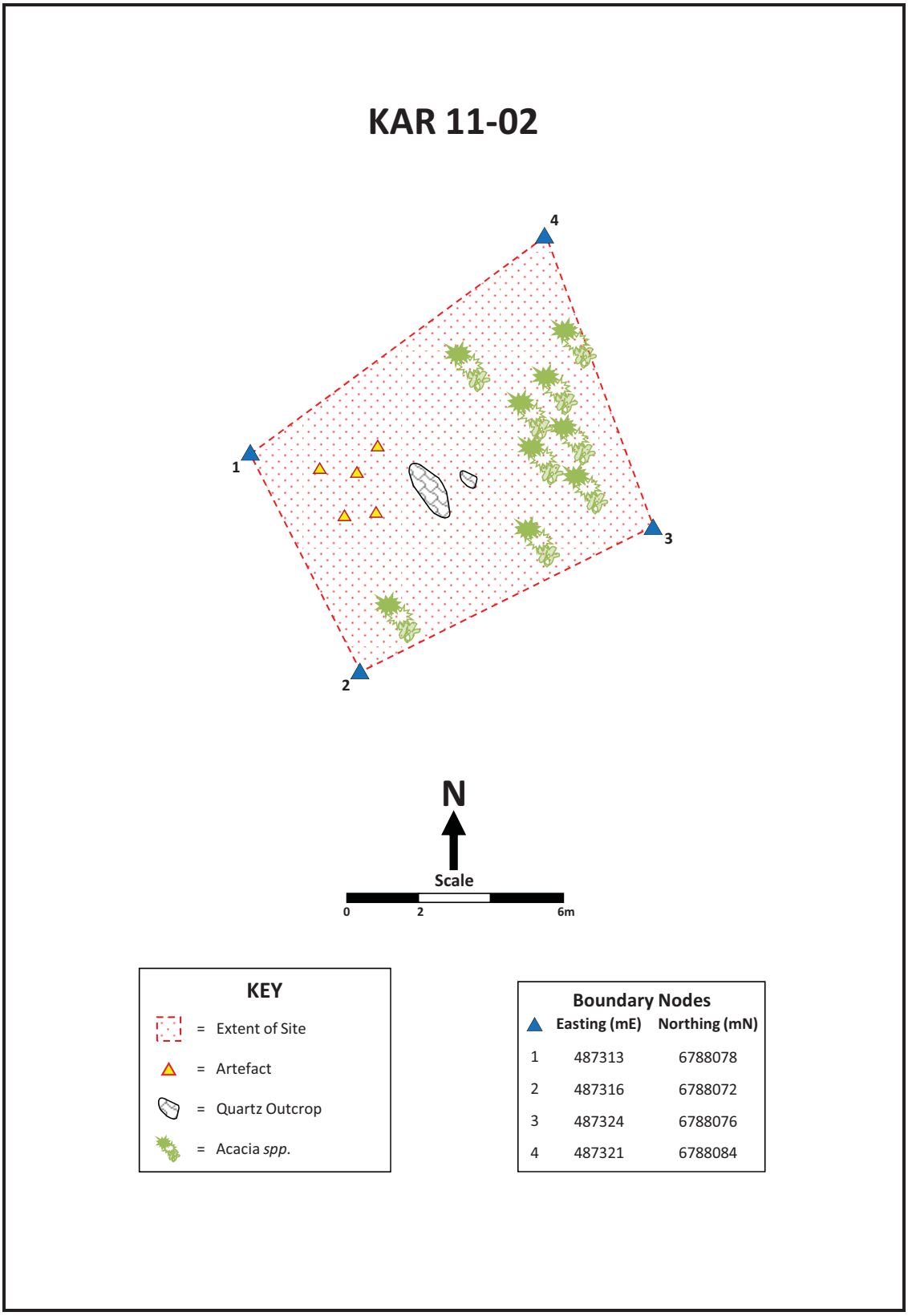


Plate 5: Site KAR 11-02, view south

Plate 6: Site KAR 11-02, artefacts *in situ* (Scale = 10 cm)

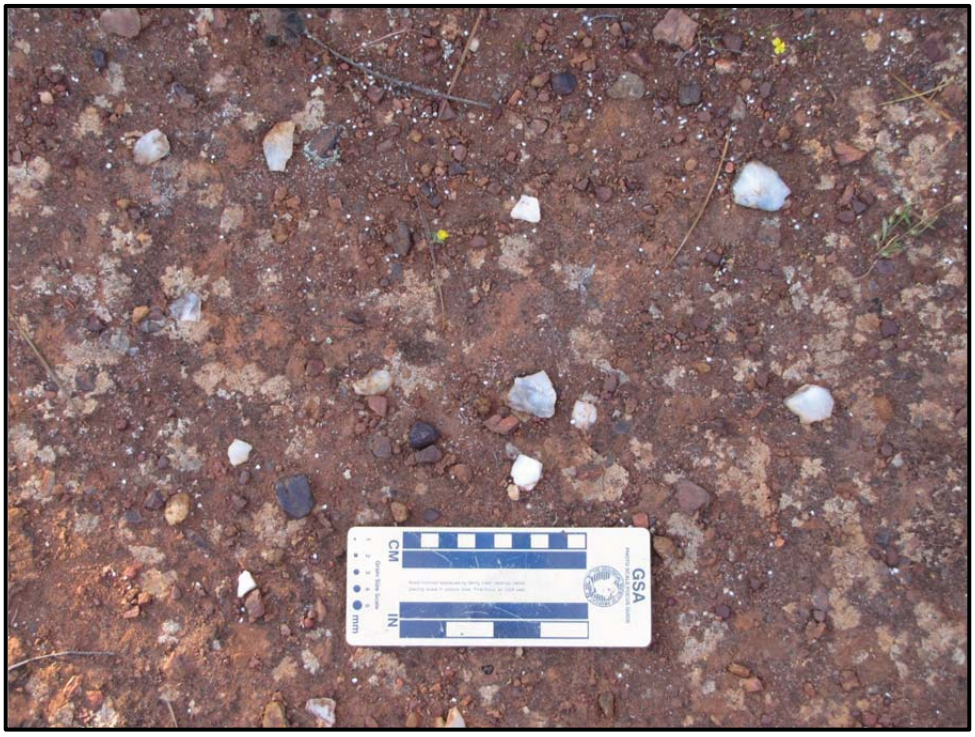


Plate 7: Site KAR 11-02, detail of quartz outcrop (Scale = 10 cm)

SECTION THREE – DISCUSSION, SUMMARY AND CONCLUSIONS

As a result of the Survey, a total of **two** archaeological sites were identified within the Jasper and Hinge Project Area and have been recorded to site identification standard and are described in this report.

As outlined above, archaeological resources are often regarded as significant because they form a non-renewable record that can be used to reconstruct past human societies and test proposed research questions about these societies (Moratto and Kelly 1978: 5). Archaeological site significance is therefore often defined in terms the potential of sites to address research questions. In the following discussion the sites described in this report are reviewed in terms of their representativeness and the insight they may provide into Aboriginal occupation of the Midwest region in the past in the context of previous archaeological research in the region.

SITE TYPES

There is essentially one basic sites type in the survey areas described in this report; artefact scatters.

Artefact Scatters: Two artefact scatters were recorded to site identification standard for this report. Site KAR 11-02 is a small, medium density scatter of quartz artefacts possibly associated with an outcrop of quartz. Site KAR 11-01 is a much larger, but also medium density, artefact scatter dominated by quartz. Site KAR 11-01 also contains a series of *gnamma* holes and these are the only known reliable water source in the immediate area.

INTERPRETATION AND POTENTIAL TO CONTRIBUTE TO RESEARCH

In the following brief discussion of artefact assemblages from the sites described here we explore how these sites might contribute to archaeological research in the Midwest region and how this may contribute to establishing the significance of these sites. An attempt is made to provide an interpretation of the sites in the broader context of other sites found within the wider region. We discuss ways in which the sites may contribute to answering some of the research questions outlined earlier in this report. We suggest that Midwest archaeology generally, and these sites in particular, are perhaps best understood when interpretation focuses on explaining surface artefact scatter variation in a local context.

Site KAR 11-01 is characterised by a moderately dense assemblage of low raw material variability and a moderate range of the reduction sequence (i.e. high proportion of retouched artefacts and low number of cores). We suggest that this site represents a location where people intermittently returned from a range of other places in the landscape over relatively long periods of time, possibly to take advantage of the short term water source (the *gnamma* holes).

Site KAR 11-02 is characterised by a small, medium density assemblage dominated by a single raw material, quartz, and a limited range of the reduction sequence (i.e. no retouched artefacts and a single core). We suggest that this site was visited on a single occasion and may represent the testing and evaluation of a source of quartz raw material for stone artefact manufacture.

We suggest that the similarity of sites KAR 11-01 and KAR 11-02 to sites identified during other surveys (e.g. Fordyce and Lafrentz 2009b), and the complete absence of formal tools at these two sites, limits the potential for these sites to contribute to research questions. The location of these sites in the local environment may, however, provide some insight into the settlement system of the Aboriginal occupants of the area before European occupation. Firstly, as noted above, the Survey Area is lacking in any significant sources of water. Secondly, evidence for any large scale processing of plant foods is completely absent. This suggests that visits to the area were brief and short term and focused on sourcing raw material for making stone tools and on making use of the water source offered by the *gnamma* holes.

Given the limited potential of these sites to contribute to research questions, sites KAR 11-01 and KAR 11-02 are considered to have a **low** degree of archaeological significance.

RECOMMENDATIONS

It is **recommended** that KML ensure their employees and contractors, as appropriate, are:

1. advised of the existence and location of Aboriginal archaeological sites KAR 11-01 and KAR 11-02;

2. informed that these locations constitute Aboriginal archaeological sites to which section 5 of the *Aboriginal Heritage Act 1972* applies and should, therefore, be avoided; and

It is advised that it is the preference of the *Binyardi* people and *Widi* Mob native title claimants for all Aboriginal heritage sites to remain *in situ* and be avoided and protected by KML. However, should it prove necessary, at some time in the future, to disturb these sites, it is further **recommended** that an application, seeking consent to do so, be made to the Minister for Indigenous Affairs under section 18 of the *Aboriginal Heritage Act 1972*, on condition that:

1. such an application is acceptable to members of the *Binyardi* people and *Widi* Mob native title claimant groups; and
2. the *Binyardi* people and *Widi* Mob native title claimants be provided the opportunity to salvage archaeological material from sites KAR 11-01 and KAR 11-02 in a culturally appropriate manner and with the assistance of a suitably qualified archaeologist if they so wish.

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APPENDIX 1

ARTEFACT RECORDING METHODS AND CODES

ARTEFACT RECORDING METHODS

Stone Artefact Identification

Flaked stone artefacts

Flaked stone objects are identified as *artefacts* if one or more of the following characteristics are present (after Hiscock 1984: 128):

1. A positive or negative ring crack;
2. A distinct negative or positive bulb of percussion;
3. A definite eraillure scar beneath a striking platform; and
4. Definite remnants of flake scars (e.g. dorsal scars and ridges).

Three types of stone artefacts, flakes, cores and retouched flakes, are identifiable (after Hiscock 1984: 129).

A *flake* exhibits one or more of the following characteristics:

1. A ring crack where the percussor struck the core;
2. A positive bulb of percussion; and
3. An eraillure scar beneath a striking platform.

A *core* displays one or more complete negative flake scars and no positive flake scars. There are two types of cores:

1. *Single-platform cores*, defined as artefacts from which flakes have been detached from a single platform.
2. A *multi-platform core*, by contrast, is an object from which flakes have been detached from several different striking platforms.

A *retouched flake* exhibits flake scars extending onto the ventral surface and/or deriving from the ventral surface. Since such flake scars may form during use or treadage, as well as during knapping, strict criteria must be applied. Only those flake scars longer than approximately 3 mm and which displayed a distinct ring crack, are recorded as retouch.

In addition, two types of formal implements have been identified from this region:

1. A *tula*, defined as a flake with a prominent bulb, large striking platform and a platform/ventral surface angle of approximately 130°. Tulas are retouched at the distal end (Hiscock 1988: 331).
2. A *backed artefact* is a thin flake with steep, bipolar retouch on one lateral margin and a sharp edge on the opposite margin.

Artefacts, which cannot be identified as cores, retouched flakes or flakes owing to the absence of the above diagnostic attributes are usually classed as '*debris*'.

Manuports are unmodified humanly transported stone.

Ground stone artefacts

The following types of ground stone artefacts have been identified from the region (after Smith 1985: 33):

1. Muller: A triangular/oval shaped hand-sized pebble or rock. The grinding area can occur on one or both end surfaces;
2. Pestle: is a fist sized pebble with one abraded flat or convex surface;
3. Millstone: a movable large flat slab with one or two long shallow grooves worn through the process of abrasion. Such artefacts can have flaked margins; and
4. Mortar: A flat surfaced slab/pebble with an oval or round abraded area on one or two faces.

Stone Artefact Recording Procedures

Stone artefacts within the background scatter (isolated artefacts) were recorded individually in order to characterise spatial variation in the range and types of archaeological materials across the landscape.

Flakes and Retouched Flakes

The following morphological attributes were measured and recorded for flakes and retouched flakes:

1. Length, or the distance along the percussion axis from the ring crack to the distal margin;
2. Width, or the distance between the lateral margins measured at right angles to the percussion axis half way between the ring crack and distal margin;
3. Thickness, or the maximum distance between the ventral and dorsal surface of the flake half way between the ring crack and the distal margin;
4. Platform width, or the distance along the striking platform from one lateral margin to the other;
5. Platform thickness, or the distance across the striking platform from the centre of the ring crack to the dorsal surface;
6. Type of striking platform. Five types of platforms were recognised on flakes:
   a) cortical (unmodified platform consisting entirely of the outer surface of the parent rock);
   b) flat (platform where it is not possible to determine whether it has a partial single flake scar, or if it has been heat fractured);
   c) flaked (striking platform formed by one flake scar);
   d) faceted (striking platform has a number of flake scars resulting from rotation of the core); and
   e) crushed (the proximal end of the flake is constituted by a sharp edge lacking a distinct platform);

7. Number of dorsal flake scars;
8. Number of parallel dorsal flake scar arrises;
9. The proportion of cortex on the dorsal surface of flakes was measured to the nearest 5%;
10. Overhang removal. The presence or absence of this form of platform preparation, which is "accomplished when the knapper strikes or brushes the edge of the platform and removes small flakes from the edge" (Hiscock 1986: 49), was noted; and
11. Retouch/Usewear. The presence of edge modification by the removal of small flakes is measured and the location is noted.

Cores

The following attributes were recorded for cores:

1. Length, or the size of the core along its maximum dimension;
2. Width, or the size of the core measured at a perpendicular angle to the length;
3. Thickness, or the size of the core measured at 90° to the both the width and the length;
4. Number of platforms;
5. Number of flake scars;
6. The length and width of each complete flake scar. These are measured in the same way as complete flakes (see above).
7. Proportion of cortex measured to the nearest 5%; and
8. Presence of Retouch/Utilisation.

Ground Stone Artefacts

For all ground stone artefacts the following morphological attributes are noted:

1. Length, width and thickness of the artefact.
2. Number of grinding surfaces.
3. Length and width of the grinding surface(s).

Archaeological Site Classifications

The size, density and raw material diversity of assemblages at sites were classified using definitions detailed below. These definitions were initially developed by Hiscock and Hughes for the Olympic Dam Project in South Australia (Kinhill-Stearns Roger 1982: 5-13) and subsequently used elsewhere on the Hamersley Plateau (e.g. Hook *et al.* 2000: 27-28; Jackson *et al.* 2004).

Archaeological sites that measure:

1. <999 m² are classified as small;
2. 1,000-9,999 m² are classified as medium; and
3. >10,000 m² are classified as very large.

Archaeological sites with artefact densities of:

1. <0.15/m² are classified as low density;
2. 0.15-1/m² are classified as medium density;
3. 1-10/m² are classified as high density; and
4. >10/m² are classified as very high density.

Sites with artefacts manufactured from:

1. >90% of one raw material are classified as low diversity;
2. two raw material types (each type comprising more than 10%) are classified as medium diversity; and
3. three or more raw material types (each type comprising more than 10%) are classified as high diversity.

ARTEFACT RECORDING CODES

Artefact Type:

Artefacts were identified in accordance with the methodology outlined above. The following abbreviations have been employed in this report.

AF	Flake	**MPC**	Multi Platform Core
F	Flake	**RUAF**	Retouched/Utilised Angular Fragment
FF	Flake Fragment	**RUF**	Retouched/Utilised Flake
HAMMER	Hammerstone	**RUFF**	Retouched/Utilised Flake Fragment
LBF	Longitudinally Broken Flake	**RULTBF**	Retouched/Utilised Longitudinally and Transversely Broken Flake
LTBF	Longitudinally and Transversely Broken Flake	**SPC**	Single Platform Core
		TBF	Transversely Broken Flake

Lithology:

Lithology is the raw material from which the artefact was manufactured. The following abbreviations have been employed in this report.

BAS	Basalt	**IS**	Ironstone
BIF	Banded Iron Formation	**QTE**	Quartzite
CH	Chert	**QZ**	Quartz
CQ	Crystal Quartz	**SS**	Siliceous Sediment
DOL	Dolerite		

Number of Scars:

The number of scars caused by the removal of flakes was recorded. In the case of flakes, the number of scars on the dorsal surface was recorded.

Cortical Index:

Cortex is the weathered, chemically altered surface of a rock. The amount of cortex on the dorsal surface of flakes was recorded to the nearest 5%.

Overhang removal:

For all flakes that retain their striking platform, the presence or absence of overhang removal was recorded.

Location of Retouch:

Records the location and length of retouch on the margins of an artefact. The following abbreviations have been used in this report:

DM	Distal Margin	**RLM**	Right Lateral Margin
LLM	Left Lateral Margin	**AM**	All Margins
PLAT	Platform		

APPENDIX 2

ARCHAEOLOGICAL SITE ASSEMBLAGE DATA

SITE KAR 11-02 FLAKES

Sample Square #	Artefact Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)	Platform width (mm)	Platform thickness (mm)	Platform Surface	# Dorsal Scars	% Dorsal Cortex	OHR	Retouch Location	Retouch Length (mm)	Retouch % of chord	Comments
100% Recording	F	QZ	28	18	7	9	5	FL	2	50					
100% Recording	FF	QZ	12	13	5				0	100					
100% Recording	FF	QZ	18	18	4				2	30					
100% Recording	FF	QZ	19	16	8				1	45					
100% Recording	FF	QZ	26	18	3				0	100					
100% Recording	FF	QZ	30	25	11				0	100					
100% Recording	LBF	QZ	29	26	6	6.5	4	FAC	1	80					
100% Recording	LBF	QZ	35	20	9	6	3	FL	2	25					
100% Recording	FF	QZ	42	27	12				4	10					
100% Recording	FF	QZ	42	25	15				4	0					
100% Recording	TBF	QZ	28	33	8			COL	5	0					
100% Recording	AF	QZ	65	36	20				3	65					
100% Recording	FF	QZ	28	25	7				2	25					
100% Recording	F	QZ	18	14	4	10	3	FL	0	100					
100% Recording	FF	QZ	18	11	5				1	70					
100% Recording	F	QZ	20	18	4			COL	3	20					
100% Recording	FF	QZ	14	12	3				3	15					
100% Recording	FF	QZ	20	19	7				1	20					
100% Recording	TBF	QZ	14	18	4	6	4	FL	1	60					
100% Recording	F	QZ	17	20	6	10	6	FL	2	0					
100% Recording	LBF	QZ	26	22	65	15	5	FK	3	55					

SITE KAR 11-02 CORES

Sample Square #	Artefact Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)	Platform #	Platform width (mm)	Platform thickness (mm)	Platform Type	# Negative Flake Scars (complete)	Flake Scar Length (mm)	Flake Scar Width (mm)	# Negative Flake Scars (Incomplete)	Total # Negative Flake Scars	% Cortex	% Heat Fracture	OHR	Comments
100% Recording	SPC	QZ	40	32	15	1	6	16	FL	1	20	9	4	5	75			

SITE KAR 11-01 FLAKES

Sample Square #	Artefact Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)	Platform width (mm)	Platform thickness (mm)	Platform Surface	# Dorsal Scars	% Dorsal Cortex	OHR	Retouch Location	Retouch Length (mm)	Retouch % of chord	Comments
1	RUF	BIF	37	23	23	13	5	FL	13	20		DM	26	30	
1	AF	QZ	33	27	25				4	30					
1	FF	QZ	51	31	13				2	20					
1	F	BIF	31	20	9	15	5	FL	4	15					
1	RUF	BAS	24	11	7	3	3	FK	3	0	Y	DM, RLM	11, 19	65	
1	AF	BAS	27	21	13				12	20					2 parallel arris
1	F	SS	34	16	7	32	7	FK	0	100					
1	FF	QU	28	25	11					100					
1	RULTBF	QZ	16	16	6	5	4	FAC	2	30		LLM, RLM	13, 13		
1	TBF	BAS	9	10	2	2.5	1.5	FAC	4	0		RLM	5		Cojoins below. 2 p arris
1	FF	BAS	12	9	3				3	0		RLM	9		Cojoins above. 2 p arris
1	FF	QZ	19	15	4				3	0					
1	AF	QZ	26	45	11				11	0					
1	TBF	QZ	18	12	4	9.5	4	FAC	4	0					
1	FF	QZ	16	12	4				1	0					
1	FF	QZ	21.5	13.5	5				2	0					
1	LTBF	QZ	27	14	7.5	3.5	2	FL	2	0					
1	F	QZ	17	17	6.5	8	5	CO	3	0					
1	FF	QZ	30.5	20	8				2	40					
1	LTBF	QZ	23	17	5.5	6	3	FL	4	20					
1	F	QZ	22	21.5	7	4.5	2	FOC	5	10					
1	FF	QZ	21	12	4				2	0					
1	FF	QZ	19	14	5				3	0					
1	TBF	QZ	18.5	15	3				2	0					
1	F	DOL	16	12	3	5.5	1.5	CO	1	0					
1	FF	QZ	22	12	7				6	0					
1	LBF	QZ	26	13	7	4	4	FL	3	0					
1	TBF	QZ	17	12.5	3	6	2.5	FL	3	0					
1	AF	QZ	18	14	6				5	0					
1	LTBF	QZ	18	12	14	6	3	FL	5	0	Y				
1	TBF	QZ	17.5	11	4	6	2.5	FL	3	0					
1	LTBF	CQ	20	8.5	4			COL	4	20					
1	FF	QZ	17	13	6			COL	3	0					
1	TBF	QZ	23	16.5	10	17	7	FL	1	30		LLM	10		
1	RUF	QZ	18.5	10	3.5	4	2.5	CO	3	30					2 parallel arris
1	FF	QZ	31	21	12				3	40					
1	FF	BIF	19	16	5				1	40					
1	FF	QZ	17.5	12.5	4				2	0					
1	TBF	QZ	20	20	8	16	7	CO	2	15					
1	RUF	QZ	22	28	11			COL	1	15		DM, RLM	46		
1	RUF	CH	16	12.5	2	4	1.5	FL	2	0		RLM	14		
1	FF	CH	15	12	3				1	40					
1	TBF	QZ	19	10	4				3	20					

SITE KAR 11-01 FLAKES

Sample Square #	Artefact Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)	Platform width (mm)	Platform thickness (mm)	Platform Surface	# Dorsal Scars	% Dorsal Cortex	OHR	Retouch Location	Retouch Length (mm)	Retouch % of chord	Comments
1	RUF	CQ	19	13	4				3	10		DM	15		
1	TBF	QZ	17	13	3	4	2	CO	3	10					
1	TBF	BAS	12	13	3	6	3	FL	4	0					
1	RUFF	QZ	9	15	3				2	0			8	30	
1	FF	QZ	17	15	5				4	0					
1	FF	QZ	15	12	5				2	20					
1	RUFF	CQ	19	13	3				3	10			25	50	
1	TBF	QZ	19	16	7	9	6	FL	1	60					
1	RUFF	QZ	19	9	4				2	15			18	40	
1	TBF	QZ	18	10	4			COL	6	15					
1	FF	QZ	16	10	4				3	25					
1	RUFF	QZ	11	10	3				2	10			8	40	
1	FF	CQ	17	11	4				3	0					
1	RUFF	CQ	21	13	5.5				7	20			20	45	
1	FF	QZ	16	15	4				3	10					
1	TBF	QZ	16	13	6	6.5	4	FL	3	35					
1	TBF	QZ	13	17	4	13	3	FAC	2	40					
1	F	CQ	13	12	2.5			COL	3	15					
1	F	QZ	11.5	9	2	1	1	FOC	1	0					
1	LBF	QZ	26	19	7	3.5	2	CO	5	15					
1	FF	QZ	16	12	4				3	0					
1	FF	QZ	15	10	5				1	50					
1	FF	QZ	15	15.5	3				1	40					
1	LTBF	QZ	18.5	11	4.5	5	2.5	FL	6	15					
1	FF	QZ	15	10	4				3	0					
1	FF	QZ	24	17.5	6				3	30					
1	FF	QZ	14	8.5	6				2	0					
1	AF	QZ	18	11	7.5				4	40					
1	FF	QZ	24	20	8.5				1	60					
1	FF	QZ	16	16	5				3	0					
1	F	QZ	16.5	14.5	4			COL	3	10					
1	F	QZ	17.5	13	6	2	1	FOC	6	15					
1	AF	QZ	15	9	7.5				3	40					
1	LBF	QZ	18	12	9	11	7	FL	1	80					
1	FF	QZ	18	12	4				3	0					
1	FF	QZ	11	11	2.5				1	10					
1	TBF	QZ	24	12	6	9	5	FK	5	0					
1	TBF	QZ	17.5	10	3.5			COL	3	0					
1	FF	QZ	12.5	12.5	2				1	0					
1	FF	QZ	15	13	3.5				4	0					
1	AF	QZ	13	13	4				5	0					
1	FF	QZ	13	7	3.5				1	0					

SITE KAR 11-01 FLAKES

Sample Square #	Artefact Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)	Platform width (mm)	Platform thickness (mm)	Platform Surface	# Dorsal Scars	% Dorsal Cortex	OHR	Retouch Location	Retouch Length (mm)	Retouch % of chord	Comments
1	F	QZ	21	11	4	3.5	4	FL	5	20					
1	FF	QZ	14.5	12	4				2	0					
1	TBF	QZ	18	15	4.5	10	4.5	FAC	2	0					
1	LBF	QZ	18.5	9	3.5	7	2.5	CO	3	0					
1	FF	QZ	11	9	4				2	0					
1	FF	QZ	21	13.5	9				3	60					
1	FF	QZ	14	8	3				2	10					
1	LBF	QZ	16.5	12.5	5	5.5	4.5	FL	5	0					
1	RUFF	QZ	18.5	13.5	4				3	0			10	25	
1	LBF	QZ	14	9	2.5	5	2.5	FL	1	70					
1	AF	QZ	15	12	3				3	20					
1	FF	QZ	16	9	7				3	0					
1	FF	QZ	17.5	13	6				4	25					
1	RUFF	QZ	14	9	3				4	0			18.5	70	
1	FF	QZ	15	10	7				4	0					
1	F	QZ	12	10	4	3.5	1	FL	0	100					
1	LBF	QZ	14	10	4	8.5	4	FK	3	0					
1	FF	QZ	12	10.5	5				2	0					
1	AF	QZ	16.5	15	10				5	40					
1	F	QZ	17.5	9.5	4	8	5	FL	2	40					
1	TBF	QZ	14	9	4.5	6	7.5	FL	3	0					
1	FF	QZ	15.5	10	3				4	0					
1	FF	QZ	14	12	3				3	0					
1	FF	QZ	13.5	11	3				4	0					
1	LBF	QZ	13.5	8	3.5				1	60					
1	F	QZ	13.5	10.5	5	9	5	FAC	3	0					
1	TBF	QZ	13	11	3	6	3	FAC	3	5					
1	TBF	QZ	7	16	4	6.5	2.5	FAC	0	100					
1	FF	QZ	12	5	3				1	0					
1	FF	QZ	10	9	2.5				2	25					
1	RUFF	QZ	17	11	3.5				2	20			8	25	
1	AF	QZ	14	10	7				2	10					
1	FF	QZ	13	13	5				1	40					
1	TBF	QZ	14	11	3	14	3	FAC	1	80					
1	FF	QZ	14	8	2.5				2	20					
1	TBF	QZ	10	15	5	12	3.5	FK	3	15					
1	F	QZ	14	12	3	6	3	FK	3	10					
1	AF	CQ	32	19	14				1	85					
1	RUF	QZ	34	24	7			COL	1			DM	27	20	
2	TBF	SS	33	27	13	9	10	CO	1	90					
3	VOID														
4	VOID														

SITE KAR 11-01 FLAKES

Sample Square #	Artefact Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)	Platform width (mm)	Platform thickness (mm)	Platform Surface	# Dorsal Scars	% Dorsal Cortex	OHR	Retouch Location	Retouch Length (mm)	Retouch % of chord	Comments
5	VOID														
6	FF	QZ	29	18	7				3	10					
7	TBF	QZ	42	36	13	14	6	FL	2	30					
7	RUFF	QZ	28	17	6				1	0			12	20	
7	AF	QZ	26	15	9				4	20					
7	LBF	QZ	22	18	7	17	8	FL	1	60					
7	FF	QZ	14	12	3				1	0					
7	RUF	BIF	28	26	7	19	3	CO	5	15		LLMM, RLMM	L=9, R=21	40	
7	FF	QZ	28	14	8				1	30					
7	FF	QZ	28	27	12				1	80					
7	TBF	QZ	30	21	11	10	4	FL	1	70					
7	F	QZ	20	17	4	12	4.5	FL	4	0					
7	LBF	QZ	19	15	5	3.5	2.5	FK	2	0					
7	TBF	BIF	26	21	5.5	21.5	5	CO	2	10					
7	F	QZ	24	17	5.5	10	3	FAC	6	0					
7	TBF	QZ	25	22				COL	2	40					
7	TBF	QZ	18	17	6	6	4.5	CO	3	30					
7	FF	QZ	21	20	7				4	10					
7	TBF	QZ	18	12.5	3	8	2	FL	3	10					
7	F	QZ	23	18	5.5	17.5	5	CO	3	0					
7	AF	QZ	14	9.5	7.5				4	0					
7	FF	QZ	14	7.5	3				4	0					
7	LBF	QZ	26.5	18	10	8.5	7	FL	6	10					
7	FF	QZ	30	19	9				2	20					
7	TBF	QZ	14	13	4	11	4	FK		0					
7	FF	QZ	25	13	4					0					
7	LBF	QZ	48	33	9	33	9	FL		10					
7	FF	QZ	19	13	4.5					0					
7	AF	QZ	15	11	7.5					40					
7	LBF	QZ	15	12.5	3	1	1	FOC		0					
7	F	QZ	18	17	7	10	4	CO	2	40					
7	FF	QZ	17	9.5	4					0					
7	AF	QZ	16.5	8.5	6					30					
7	FF	QZ	14	12	5					10					
7	TBF	QZ	13.5	9	3			COL		0					
7	FF	QZ	14	9.5	4					0					
7	FF	QZ	22	15	8					10					
7	AF	QZ	52	50	36					60					
7	HAMMER	QU	97	72	78	31	27.5			99					Pitting
8	F	QZ	15	10	5	6	4	FL	1	60					

SITE KAR 11-01 FLAKES

Sample Square #	Artefact Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)	Platform width (mm)	Platform thickness (mm)	Platform Surface	# Dorsal Scars	% Dorsal Cortex	OHR	Retouch Location	Retouch Length (mm)	Retouch % of chord	Comments
8	F	QZ	21	10	7	3	2	FK	1	75					
8	AF	QZ	21	12	7				2	75					
8	TBF	QZ	35	24	7.5	11	7	FL	0	100					
8	TBF	QZ	37	18	14	9	9	FAC	1	50					
8	F	QZ	24	14	8	7	4	FL	0	100					
8	FF	QZ	28	16	8				0	100					
8	F	QZ	23	20	4	9	4	FK	1	90					
8	RUF	IS	36	23	8	14	8	FK	4	10		DIST	13	15	
8	AF	QZ	36	16	17				2	65					
9	RUAF	CH													
10	VOID														
11	VOID														
12	VOID														
13	VOID														
14	VOID														
15	F	QZ	37	22	9.5	24	11	FL	1	20					
15	RUF	QZ	34	30	11	34	11	FL	4	10		LLM	38	35	
15	FF	QZ	32	23	8				1	70					
16	LBF	QZ	23	13	5	7	3	CO	1	70					
16	LBF	QZ	29	20	10.5	13	9.5	FL	2	0					
16	FF	QZ	20	11.5	5				2	0					
16	AF	QZ	15	11	9.5				3	30					
16	LTBF	QZ	36	34.5	12	26	10	FL	2	0					
17	VOID														
18	VOID														
19	VOID														
20	TBF	CH	24	22	7	11	5	FL	0	100					
20	F	CH	43	18	6	13	5	FK	4	5					
20	FF	QZ	23	17	8				1	80					
20	TBF	CQ	22	20	8			COL	5	15					
20	FF	QZ	21	13	6				2	10					
20	TBF	QZ	28	24	9.5	19	8	FL	0	100					
20	TBF	CQ	17	13	6	4	3	FL	2	40					
20	RUF	QZ	24	22	9	9	6	FL	6	20		DIST	15	25	
20	FF	QZ	18	11	4				1	60					
20	FF	QZ	22	14	7				3	10					
20	RUFF	QZ	22	12	8				4	10			14	25	
20	TBF	QZ	26	24	9	16	9	FAC	4	0					
20	AF	QZ	33	23	16				3	70					
20	RUFF	QZ	31	16	10				2	20			25	35	
20	FF	QZ	16	10	4				2	10					
20	F	QZ	19.5	14.5	6.5	7	6	FAC	0	100					

SITE KAR 11-01 FLAKES

Sample Square #	Artefact Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)	Platform width (mm)	Platform thickness (mm)	Platform Surface	# Dorsal Scars	% Dorsal Cortex	OHR	Retouch Location	Retouch Length (mm)	Retouch % of chord	Comments
20	AF	QZ	16	12	11				1	80					
20	F	QZ	16	9	4	7	3	FL	0	100					
21	VOID														
22	RUFF	SS	37	29	14				6	0					
22	TBF	QZ	32	17	8	7.5	7	FAC	0	100					
22	F	QZ	22	9	5	6	4	FK	2	15					
22	RUF	QZ	25	11	6				0	95			31	65	
22	RUFF	QZ	31	25	9				1	25			21	30	
23	VOID														
24	VOID														
Adjacent to Dev't.	HAMMER	QU	65	39	39				12	40	Not in sample, noted outside boundary & recorded as extra; single ground suface, with pitting, bashin etc. impace along one margin.				

SITE KAR 11-01 CORES

Sample Square #	Artefact Type	Raw Material	Length (mm)	Width (mm)	Thickness (mm)	Platform #	Platform width (mm)	Platform thickness (mm)	Platform Type	# Negative Flake Scars (complete)	Flake Scar Length (mm)	Flake Scar Width (mm)	# Negative Flake Scars (Incomplete)	Total # Negative Flake Scars	% Cortex	% Heat Fracture	OHR	Comments
1	CF	QZ	29	19	8	1	12	3	FL				4	4	not recorded			bipolar
1	CF	QZ	18	7.5	4.5	1	5	2.5	FL	3	0		3	3	0			
1	CF	QZ	17	11	8	1	3.5	1.5	FL	4	0		4	4	0		Y	
1	MPC	QZ	29	20	13	1	9.5	21	FAC	1	16	12	0	3	70			
						2	10	13	FAC	2	19	12						
											9	21						
1	MPC	QZ	31	30	18	1	18	13	FAC	2	28	11	2	5	25			
											18	11						
						2	10	5	FAC	1	26	13						
1	SPC	QZ	20	18	13	1	13.5	10	FL	1	17	18	4	5	30			
1	SPC	QZ	25	19	12	1	8	6	FL	1	6.5	7	4	5	60			
7	SPC	QZ	50	48	28	1	14	9	CO	2	13	31	0	2	80			
											33	26						
20	MPC	QZ	55	32	24	1	24	21	CO	2	14	9	3	6	60			
											18	11						
						2	16	14	FAC	1	40	19						

TOTALS

KAR 11-01

	#	%
AF	21	9.81
CF	3	1.40
F	27	12.62
FF	69	32.24
HAMMER	1	0.47
LBF	15	7.01
LTBF	6	2.80
MPC	3	1.40
RUAF	1	0.47
RUF	12	5.61
RUFF	13	6.07
RULTBF	1	0.47
SPC	3	1.40
TBF	39	18.22
total	**214**	**100.0**

	#	%
BAS	5	2.34
BIF	5	2.34
CH	5	2.34
CQ	9	4.21
DOL	1	0.47
IS	1	0.47
QTE	2	0.93
QZ	183	85.51
SS	3	1.40
total	**214**	**100.0**

	Artefact density (/m²)	Artefact Population
max	5.3200	56179
mean	0.7782	8218

size (m²)	10,560
sample (m²)	275
% Sample	2.60%

KAR 11-02

	#	%
AF	1	4.55
CF		0.00
F	4	18.18
FF	11	50.00
HAMMER		0.00
LBF	3	13.64
LTBF		0.00
MPC		0.00
RUAF		0.00
RUF		0.00
RUFF		0.00
RULTBF		0.00
SPC	1	4.55
TBF	2	9.09
total	**22**	**100.0**

	#	%
BAS		0.00
BIF		0.00
CH		0.00
CQ		0.00
DOL		0.00
IS		0.00
QTE		0.00
QZ	22	100.00
SS		0.00
total	**22**	**100.0**

	Artefact density (/m²)	Artefact Population
max		0
mean	0.3099	22

size (m²)	71
sample (m²)	71
% Sample	100.00%

APPENDIX 3

ISOLATED ARTEFACT DATA

ISOLATED FLAKED ARTEFACTS

Artefact type	Lithology	Length (mm)	Width (mm)	Thick-ness (mm)	Platform Width (mm)	Platform Thick-ness (mm)	Platform Surface	Dorsal Flake Scars	# of Parallel Arris	Cortex %	Retouch/ Utilised	Retouch Length (mm)	MGA Easting	MGA Northing	Comments
F	CQ	27	22	10	15	9	FL	2		0			487714	6788638	
TBF	QZ	29	18	12.5	19	3.5	CO	2		40			488233	6789605	
F	QZ	49.5	31	15.5	22	9.5	FL	4		30			488196	6789633	
RUF	QZ	46	44	21	20	6	FL	2		0	RL, LL	22	487154	6787832	
FF	QZ	21	17	3				1		0			487410	6788433	
RUTBF	CQ	29	14	6	16	7.5	FL	2		0	RL, LL	21	487427	6788917	
F	QZ	22	19	7	6.5	2.5	FL	2		40			487156	6788500	
TBF	QZ	40	20	8			COL	2		10			487156	6788500	
LBF	QZ	35	15	9.5	4.5	3	CO	1		0			485563	6784742	
AF	QZ	30	19	6				3		40			486104	6785562	
FF	QZ	27	20	9				2		30			486104	6785562	

ISOLATED CORES

Core type	Lithology	Length (mm)	Width (mm)	Thick-ness (mm)	# of Platforms	Platform type	Platform Width	Platform Thickness	# of Flake Scars	Flake Scar Length (mm)	Flake Scar Width (mm)	Cortex %	AMG Easting	AMG Northing	Comments
MPC	QZ	62	49	30	2	CO	32	14	1	31	25	50	487056	6788177	
						CO	35	42	2	28	18				
										29	20				
MPC	QZ	58	49	32	2	CO	42.5	17	1	32	19	60	486201	6786340	
						CO	22	13	2	9	10.5				
										19	18				

APPENDIX 4

DIA SITE REGISTER SEARCH

Aboriginal Heritage Inquiry System

Aboriginal Sites Database

Search Criteria

2 sites in a search polygon. The polygon is formed by these points (in order):

MGA Zone 50	
Northing	Easting
6800000	480000
6800000	490000
6780000	490000
6780000	480000

Disclaimer

Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist. Consultation with Aboriginal communities is on-going to identify additional sites. The AHA protects all Aboriginal sites in Western Australia whether or not they are registered.

Copyright

Legend

Restriction

N	No restriction
M	Male access only
F	Female access

Access

C	Closed
O	Open
V	Vulnerable

Coordinate Accuracy

Accuracy is shown as a code in brackets following the site coordinates.

[Reliable]	The spatial information recorded in the site file is deemed to be reliable, due to methods of capture.
[Unreliable]	The spatial information recorded in the site file is deemed to be unreliable due to errors of spatial data capture and/or quality of spatial information reported.

Status

L - Lodged	→	IA - Information Assessed	→	ACMC Decision Made
Information lodged, awaiting assessment		Information Awaiting ACMC Decision Assessment Only		R - Registered Site I - Insufficient information S - Stored Data

*Explanation of Assessment

Sites lodged with the Department are assessed under the direction of the Registrar of Aboriginal Sites. These are not the final assessment.

Final assessment and decisions will be determined by the Aboriginal Cultural Material Committee (ACMC).

Spatial Accuracy

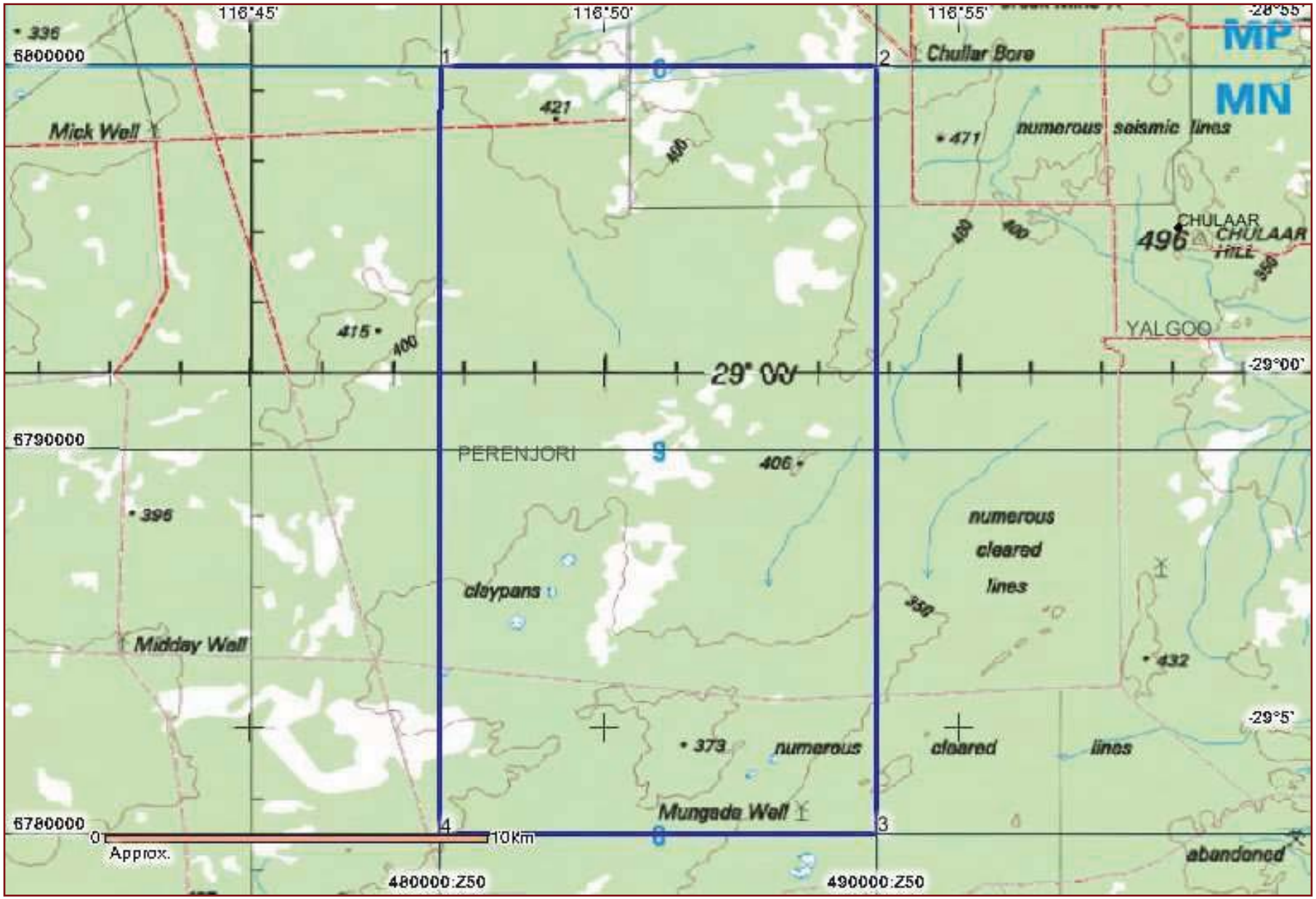
Index coordinates are indicative locations and may not necessarily represent the centre of sites, especially for sites with an access code “closed” or “vulnerable”. Map coordinates (Lat/Long) and (Easting/Northing) are based on the GDA 94 datum. The Easting / Northing map grid can be across one or more zones. The zone is indicated for each Easting on the map, i.e. '5000000:Z50' means Easting=5000000, Zone=50.

Sites Shown on Maps

Site boundaries may not appear on maps at low zoom levels

List of Registered Aboriginal Sites with Map

No results



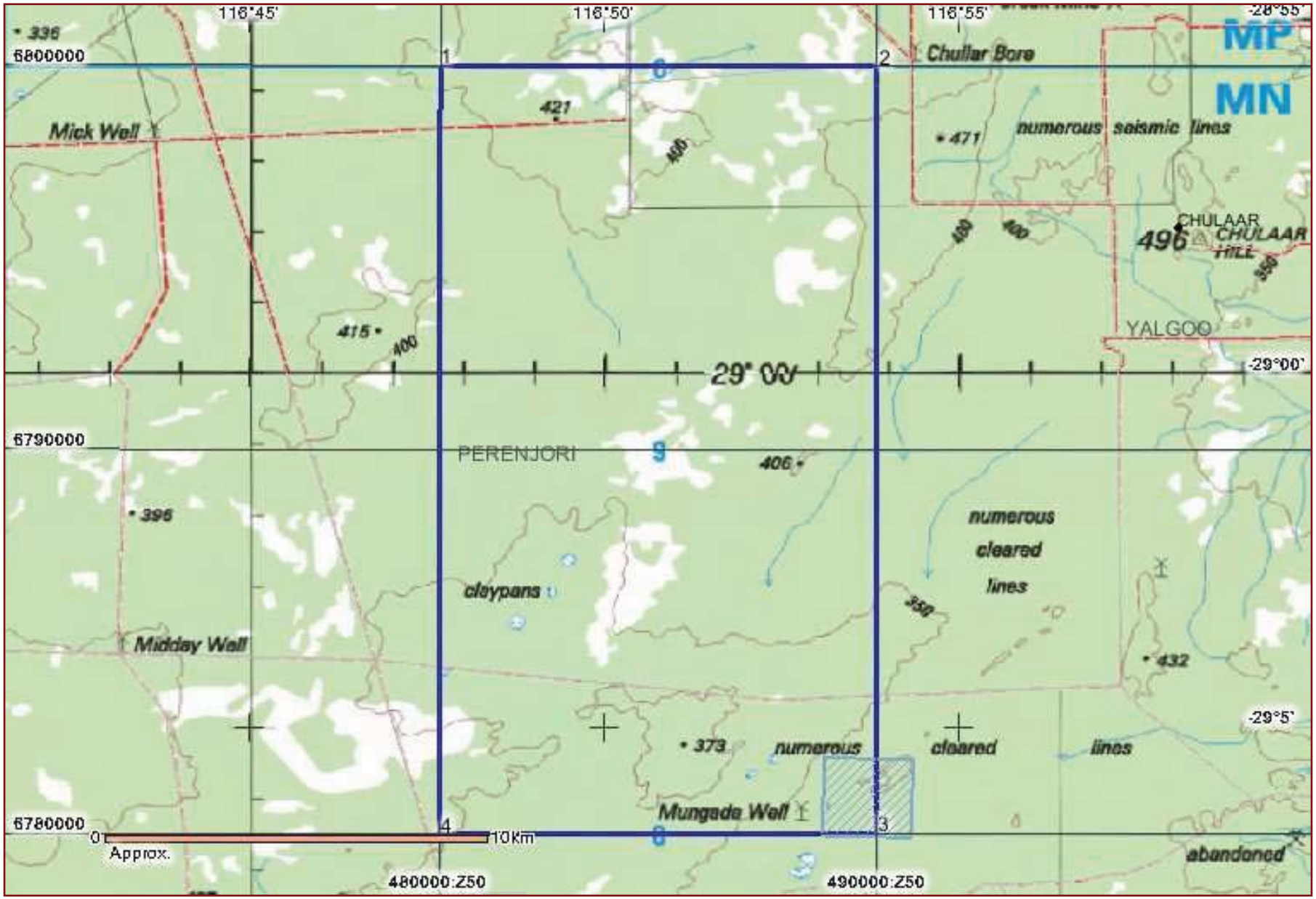
Legend

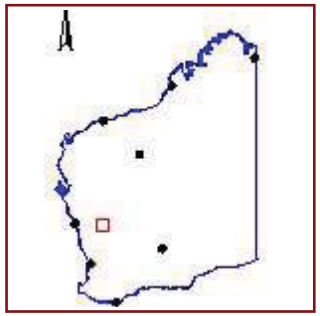
Selected Heritage Sites

- Registered Sites
- Town
- Map Area
- Search Area

List of 2 Other Heritage Places with Map

Site ID	Status	Access	Restriction	Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
24146	IA	C	N	Midwest Gnamma Hole	Mythological, Artefacts / Scatter	Water Source	*Registered Informant names available from DIA.	Not available for closed sites	
24150	L	O	N	Midwest Artefact Scatter 3	Artefacts / Scatter		*Registered Informant names available from DIA.	488895mE 6780744mN Zone 50 [Reliable]	





Legend

Selected Heritage Sites

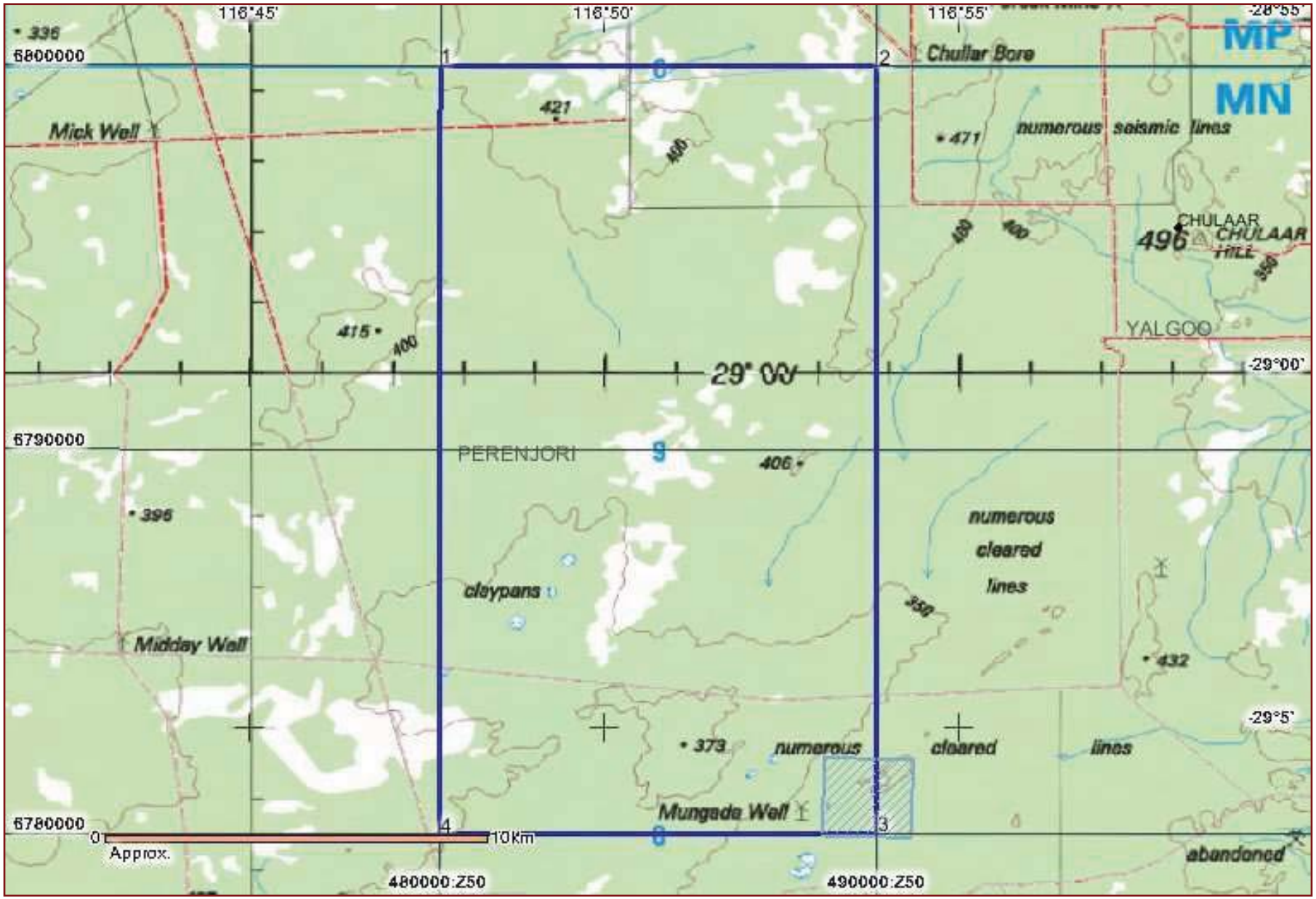
Other Heritage Places

Town

Map Area

Search Area

Map Showing Registered Aboriginal Sites and Other Heritage Places



Legend

Selected Heritage Sites

- Registered Sites
- Other Heritage Places
- Town
- Map Area
- Search Area

Aboriginal Heritage Inquiry System

Survey Report Catalogue

Search Criteria

12 survey reports with information on the sites in a search polygon. The polygon is formed by these points (in order):

MGA Zone 50	
Northing	Easting
6780000	480000
6800000	480000
6800000	490000
6780000	490000

Disclaimer

Reports shown may not be held at DIA. Please consult report holder for more information. Refer to www.dia.wa.gov.au/heritage for information on requesting reports held by DIA.

Copyright

Legend

Access

Some reports are restricted. The type of restriction is shown as a code in brackets following the catalogue number. No code indicates an unrestricted report.

[CLOSED]	Closed
[OWE]	Open with exception
[TBD]	To be determined
[RESTRICTED PENDING]	Restricted pending

Report ID	Catalogue Number	Title	Author	Old Ref No.
22791	HSR GM 2007 AUS [CLOSED]	A report on a section 18 consultation and site avoidance survey at Mt Karara, East of Morawa, Western Australia	Australian Interaction Consultants	3080/08
21930	HSR GM 2005 AUS	Addendum to a report on an archaeological survey of Blue Hills, Western Australia	Australian Interaction Consultants	2368 05
22800	HSR GM 2007 AUS	Report of an ethnographic and archaeological work area clearance of the Proposed Exploration Program at Mount Mulgine, Western Australia	Australian Interaction Consultants	2933 07
21608	HSR GM 2005 AUS [OWE]	Report on an archaeological and ethnographic S18 consultation regarding a Proposed Drilling Operations Expansion at Mt Karara, Western Australia	Australian Interaction Consultants	HSR GM 2
22598	HSR GM 2007 AUS	Report on Site Identification Survey of Tilley Siding and a Proposed RC Drilling Programme on MIdwest Corporation Ltd tenements near Blue Hills, Wedtern Australia	Australian Interaction Consultants	2814/07
21723	HSR GM 2005 AUS	Report on the Archaeological Investigation of the Proposed Mungada Tenements Exploration Program at Blue Hills, Western Australia	Australian Interaction Consultants	2258 05
21057	HSR GM 2004 HAM	Section 18 application under the Aboriginal Heritage Act (1972) to undertake exploration of tenements at Mt Karara Western Australia	Hames Consultancy Group	1871 04
20797	HSR GM 2003 HAM	Section 18 Application under the Aboriginal Heritage Act (1972) to undertake mining operations at Blue Hills, Western Australia	Hames, Kim	1696
22873	HSR GM 2007 AUS [TBD]	Section 18 Report for Proposed Magnetite Mine and Infrastructure at Mt Karara, East of Morawa, Western Australia	Australian Interaction Consultants	3002 08
22897	HSR GM 2008 AUS [CLOSED]	Section 18 report for proposed Magnetite Mine and Infrastructure at Mt Karara, East of Morawa, Western Australia	Australian Interaction Consultants	3024 08
28153	HSR GM 2009 FOR	Site Identification and Work Area Clearance Heritage Survey Report of the Karara Iron Ore Project Area at Karara, Western Australia : volume ii	Fordyce, Ben	3983/10
22367	HSR GM 2006 AUS	Site identification survey of the proposed Gindalbie Metals Mungada Ridge Hematite Project, Minesite Layout and Haul Road Western Australia	Australian Interaction Consultants	2685 06

REPORT OF THE ARCHAEOLOGICAL SITE IDENTIFICATION HERITAGE SURVEY OF THE HINGE, HINGE HAUL ROAD, KARARA CAMP EXTENSION, BEN'S SURPRISE, TOM'S KITCHEN, SHINE E, THE GAP, ONGA EXTENSION, LISTER/GOBO, BRAK G, BRAK SOUTH, SKEKSI, TERAPOD EAST, MYSTIC, WEAVE AND HORSE & PEBBLES PROPOSED DEVELOPMENT AREAS WITHIN THE REGIONAL EXPLORATION PRIORITIES PROJECT AREA, CONDUCTED BY THE WIDI MOB TRADITIONAL OWNERS AND TERRA ROSA CULTURAL RESOURCE MANAGEMENT PTY LTD AND PREPARED FOR KARARA MINING LIMITED

Report of the Archaeological Site Identification Heritage Survey of Sixteen Proposed Development Areas within the Karara Mining Ltd Regional Exploration Priorities Project Area, conducted with the Widi Mob Traditional Owners

March 2013

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TERRA ROSA
CULTURAL RESOURCE MANAGEMENT

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DISCLAIMER

The information, opinion, ideas and recommendations presented in this document is partly based on the experience of the Authors, research, and recognised procedures, which are believed to be accurate, but not infallible. The advice contained herein is given in good faith and follows acceptable professional standards and procedures, but is not meant to encourage any activity, practice or exercise, which may have ceased, changed or have been superseded for any reason without the knowledge of the Author. The Author assumes no responsibility or liability for any loss or damage caused directly or indirectly by the information presented in this document.

COORDINATE CAPTURE

The Author advises that all coordinates quoted in this document were initially obtained with a Garmin hand held GPS, using the MGA 94 datum. All grid references provided are located within MGA Zone 50, unless otherwise stated.

ACKNOWLEDGEMENTS

The Authors would like to acknowledge and thank the following people in this Report:

- The Widi Mob Traditional Owners who participated in the Survey;
- Patricia Edwards of Heritage Link; and
- Des Mongoo of Karara Mining Limited.

SURVEY PARTICIPANTS

The Survey Team consisted of representatives of the Widi Mob Traditional Owners and heritage consultants from Terra Rosa Cultural Resource Management.

The Survey was conducted over three field trips with the assistance and involvement of the following people:

Trip 1 Survey Dates: 5 November to 14 November 2012

WIDI MOB TRADITIONAL OWNERS	
Bill Lewis	Lynette Phillips
Stephen Spring	Irwin Lewis
Errol Martin Jnr	Clinton Lewis

TERRA ROSA CULTURAL RESOURCE MANAGEMENT	
Vanessa Macri	Luke May
Denise Drummond	

Trip 2 Survey Dates: 10 December to 18 December 2012

WIDI MOB TRADITIONAL OWNERS	
Bill Lewis	Errol Martin Jnr
Irwin Lewis	Stephen Spring
Katrina Phillips	Clinton Lewis

TERRA ROSA CULTURAL RESOURCE MANAGEMENT	
Vanessa Macri	Annie Clarke
Alicia Scotman	

Trip 3 Survey Dates: 12 February to 21 February 2013

WIDI MOB TRADITIONAL OWNERS	
Bill Lewis	Irwin Lewis
Stephen Spring	Clinton Lewis
Tanya Lewis	Dillon Lewis

TERRA ROSA CULTURAL RESOURCE MANAGEMENT	
Vanessa Macri	Alicia Scotman
Denise Drummond	Claire Rayner

LIST OF ACRONYMS

The following list of acronyms are utilised throughout the Report. Definitions are provided below for reference.

ABBREVIATION	DEFINITION
ACMC	Aboriginal Cultural Materials Committee
AHIS	Aboriginal Heritage Inquiry System
ATSIHPA	*Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Cwlth)
BOM	Australian Government Bureau of Meteorology
CHMP	Cultural Heritage Management Plan
DIA	Department of Indigenous Affairs
GIS	Geographic Information System
GPS	Global Positioning System
KML	Karara Mining Limited
MGA	Map Grid of Australia
NNTT	National Native Title Tribunal
PDA	Proposed Development Area
Terra Rosa CRM	Terra Rosa Cultural Resource Management Pty Ltd
The Act	*Aboriginal Heritage Act 1972* (WA)
The Project	The Regional Exploration Priorities Project
Traditional Owners	Widi Mob Native Title Claimants (NNTT No. WC96/98)
UTM	Universal Transverse Mercator system

EXECUTIVE SUMMARY

Karara Mining Ltd (KML) proposes to undertake exploration drilling for iron ore deposits at a number of locations across the Karara Iron Ore Project. The project is a joint venture between Gindalbie Metals Ltd and AnSteel and is located in the Midwest region of Western Australia, approximately 200 km east of Geraldton and 70 km south-southeast of Yalgoo. The project consists of 16 separate Proposed Development Areas (PDAs) known as the Regional Exploration Priorities Project (the Project). The Project is located across an area measuring approximately 50 km from north to south. The PDA is located within the Widi Mob Native Title Claim area (NNTT No. WC97/92).

Heritage Link, as the agent for the Widi Mob Traditional Owner Group (Widi Mob), commissioned Terra Rosa Cultural Resource Management (Terra Rosa CRM) to conduct an archaeological site identification heritage survey of the 16 PDAs on behalf of KML. The PDAs and survey dates are summarised in Table 1 below. All field trips were conducted with the participation and assistance of six representatives of the Widi Mob and three heritage consultants from Terra Rosa CRM (see list of Survey Participants above).

Table 1: Summary of results of the KML Regional Exploration Priorities Heritage Survey

Survey Dates	PDA	Number of Heritage Sites
Field Trip 1 5 November – 14 November 2012	The Hinge	0
	The Hinge Haul Road	0
	Karara Camp Extension	0
	The Gap	1
	Skeksi	0
Field Trip 2 10 December – 18 December 2012	Ben's Surprise	3 field site points yet to be assessed to site identification standard
	Tom's Kitchen	3
	Shine E	0
	Onga Extension	0
	Lister/Gobo	0
	Brak G	0
	Brak South	0
	Terapod East	1

Survey Dates	PDA	Number of Heritage Sites
Field Trip 3 12 February – 21 February 2013	Mystic	0
	Weave	1
	Horse & Pebbles	1

The objective of a site identification heritage survey is to identify areas within the PDA that constitute Aboriginal heritage sites as defined within Section 5 of the *Aboriginal Heritage Act 1972* (WA) (the Act) and provide KML with heritage management recommendations relevant to the PDAs. Any heritage sites identified within the PDA are recorded to a site identification standard. This report has been prepared for submission to the Minister of Indigenous Affairs in conjunction with a Notice under Section 18 of the Act to use the land subject to survey during the above dates.

A desktop search of the Department of Indigenous Affairs (DIA) Aboriginal Heritage Inquiry System (AHIS) was conducted prior to field work to establish the presence and nature of any registered heritage sites within the area. Desktop research also involved investigating factors likely to influence site patterning within the area. Results of the desktop research are detailed below in Section 3.

KML, the Widi Mob and Heritage Link are advised that the archaeological and ethnographic site identification heritage survey of the 16 PDAs within the Project Area is complete.

The following conclusions and recommendations have been approved by the Widi Mob Traditional Owners:

1. KML is advised that the archaeological site identification heritage survey of The Hinge, Hinge Haul Road, Karara Camp Extension, Ben's Surprise, Tom's Kitchen, Shine E, The Gap, Onga Extension, Lister/Gobo, Brak G, Brak South, Skeksi, Terapod East, Mystic, Weave and Horse & Pebbles PDAs within the Project Area is complete;

2. All employees and contractors working within the Hinge, Hinge Haul Road, Karara Camp Extension, Ben's Surprise, Tom's Kitchen, Shine E, The Gap, Onga Extension, Lister/Gobo, Brak G, Brak South, Skeksi, Terapod East, Mystic, Weave and Horse & Pebbles PDAs should be made aware of the location and boundaries of all heritage sites identified therein and be clearly instructed to restrict access and works to areas that KML has clearance to utilise;

3. It is recommended that KML commission archaeological test-pitting to be undertaken in the area surround the newly identified sates TKAS13-01, TKAS13-02, TKAS13-03 and previously recorded site MJGAS12-01;

4. KML is advised to engage two Widi Mob Traditional Owner group representatives to monitor all ground disturbing works within proximity to heritage sites identified within the PDAs; and

5. If KML proposes to utilise areas in which heritage sites have been identified, KML is advised to consult with the Widi Mob Traditional Owners and apply to disturb the sites under Section 18 of the Act.

Results of the field work are detailed in Section 5 and the above recommendations are discussed further in Section 7 of the current report.

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1 PROJECT BRIEF

1.1 Overview

KML proposes to undertake exploration drilling for hematite ore bodies and magnetite resources within the Regional Exploration Priorities Project (the Project). The portion of the Project to which this Heritage Report pertains includes thirteen areas of proposed exploration, two haul roads and an extension to Karara Village. The 16 PDAs are located within an area measuring approximately 50 km from the existing Karara Village north towards Yalgoo in Western Australia's Midwest Region. A number of the tenements included in the current heritage survey have been subject to site avoidance and/or work program clearance surveys in the past, and are subsequently disturbed by previous exploration activity. KML propose to undertake further works in these areas, and as such will be applying under section 18 of the *Aboriginal Heritage Act, 1972* (the Act) for consent to use the land on which any heritage sites may exist.

The Project is located approximately 225 km east of Geraldton and 70 km south-southeast of Yalgoo, in the Midwest Region and spans an area covering 50 km north to south and 25 km east to west. Where available, maps of the PDAs are provided below in Section 4. The Project Area is located within the Widi Mob Native Title Claim (NNTT No. WC97/92). Terra Rosa Cultural Resource Management (Terra Rosa CRM) was engaged by Heritage Link, agent of the Widi Mob, to undertake an archaeological and ethnographic site identification heritage survey of the 16 PDAs that constitute the Project.

The PDAs cover a total area of 15.47 km^2 and are summarised below in Table 2.

Table 2: KML PDAs discussed within Report.

PDA Name	Tenement(s)	Survey Area (km^2)
The Hinge	E59/1170	6.7
The Hinge Haul Road	L59/128	1.1
Karara Camp Extension	L59/99	0.1
The Gap	M59/731	0.89
Skeksi	E59/1170	0.16
Ben's Surprise	E59/1199	0.47
Tom's Kitchen	M59/406	2.26
Shine E	M59/406	0.34
Onga Extension	E59/887	0.17
Lister/Gobo	E59/887, M59/458	0.51
Brak G	E59/1202	0.31

PDA Name	Tenement(s)	Survey Area (km^2)
Brak South	E59/1170	0.22
Terapod East	M59/649	0.41
Mystic	M59/644	0.22
Weave	E59/1170, P59/1842, E59/935, E59/1202	1.06
Horse & Pebbles	E59/1170	0.55

The objective of the heritage survey was to identify areas within the PDAs that constitute Aboriginal heritage sites (as defined within Section 5 of the Act), and record them to site identification level. The survey was conducted over three field trips with the full participation of representatives of the Widi Mob Traditional Owner Group and heritage consultants from Terra Rosa CRM.

1.2 Participation of the Traditional Owners

Six members of the Widi Mob Traditional Owners were present on each of the three field trips undertaken as part of the survey (see Plates 1 to 3).

The Traditional Owners directed the survey process in conjunction with the Heritage consultants and actively participated in the examination of the heritage sites as well as in the pedestrian transects and site recording.

The Traditional Owners provided ethnographic background and information on the area to the Heritage consultants, and discussed the archaeological values of the area.

During the survey, heritage management and mitigation strategies were discussed by heritage consultants and Traditional Owners with regards to the PDA and wider developments in the region. These discussions were then collated and presented back to the survey team during a debrief at the end of the survey.

The Widi Mob Traditional Owners identify themselves with an area that includes the Shires of Carnamah, Chapman Valley, Coorow, Dalwallinu, Greenough, Irwin, Mingenew, Morawa, Mount Magnet, Mount Marshall, Mullewa, Murchison, Perenjori, Three Springs and Yalgoo.

The Widi Mob Traditional Owners trace their connection to the region through their ancestors who lived in and around the area, and they continue to hunt, fish, gather bush tucker and practice cultural traditions according to their laws and customs. The Widi Mob Traditional Owners present during the survey assert the right to speak and be responsible for the country within and surrounding the PDAs.

Plate 1: The Survey Team, Trip 1

Plate 2: The Survey Team, Trip 2

Plate 3: The Survey Team, Trip 3

1.3 Limitations to the Survey

The progress of the Survey was not impacted by any significant limitations; however, extremely hot weather conditions were monitored throughout Field Trip 3.

2 METHODOLOGY

The heritage survey was conducted as per the requirements of relevant statutory requirements and guidelines pertaining to the protection of heritage sites within Western Australia.

Prior to field work, a preliminary desktop assessment was undertaken to provide an overview of heritage research undertaken to date within the area. Additionally, a biogeographical overview was determined so as to forecast likely site patterning.

Field work was conducted over three field trips. Field Trip 1 was conducted by six Widi Mob Traditional Owner representatives and three heritage consultants from Terra Rosa CRM from 5 November to 14 November 2012. Field Trip 2 was conducted by six Widi Mob Traditional Owner representatives and three heritage consultants from Terra Rosa CRM from 10 December to 18 December 2012. Field Trip 3 was conducted by six representatives of the Widi Mob Traditional Owners and four heritage consultants from Terra Rosa CRM from 12 February to 21 February 2013.

A site identification methodology was employed for the archaeological and ethnographic heritage assessment of the PDA. As such, all sites identified by the survey team within these areas were recorded to a site identification level. GPS locations were recorded using hand-held Garmin GPS units, affording a spatial accuracy of ± 5 m.

A formal debrief meeting upon conclusion of each field trip afforded representatives of the Widi Mob Traditional Owner group the opportunity to discuss and comment upon the survey methodology and the sites identified, including mitigation strategies and recommendations for heritage management of sites within the area.

The methodology utilised during field work was approved and endorsed by the Traditional Owners that participated in the Survey.

2.1 Legislation and Heritage Agreements

The Australian Federal Government and the Western Australian State Government maintain legislation applicable to the identification, protection and management of Aboriginal heritage places. At a Federal level, and applicable to heritage places across Australia, is a heritage protection regime including the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHPA), *Australian ICOMOS Burra Charter 1999* and the *Australian Natural Heritage Charter 2002*.

Of these frameworks, only the ATSIHPA is mandated as legislation, with the Natural Heritage Charter and the Burra Charter used to detail best practice methodologies for the identification, protection and management of Aboriginal heritage places. Federal legislation provides an overarching framework for the preservation of heritage sites and places, and is intended to resolve any inadequacies that may exist within State legislation.

At a State level, the *Aboriginal Heritage Act 1972* (WA) (the Act) outlines the legislation applicable to Aboriginal objects and heritage places. All sites, even those that have not been formerly identified or registered with the Department of Indigenous Affairs (DIA), are protected by the Act. Violations of the Act may still result in prosecution, regardless of the registration status of the site.

2.2 Desktop Research Methodology

Desktop research for heritage values relies largely on the Register of Sites maintained by the DIA, which provides an indication as to the presence and nature of any heritage values previously recorded and registered within the PDA.

Prior to field work, the PDA boundaries are entered into the DIA Aboriginal Heritage Inquiry System (AHIS) to ascertain whether any Aboriginal heritage sites or other heritage places have been registered within the area. Aboriginal heritage sites are those areas that have been assessed by the Aboriginal Cultural Materials Committee (ACMC) as constituting sites under the Act. Other heritage places include potential sites for which data has been lodged with the DIA but is pending assessment by the ACMC (status L), potential sites for which insufficient information has been provided for accurate assessment by the ACMC (status I), and stored data pertaining to areas of heritage value that have been assessed by the ACMC as not constituting heritage sites under the Act (status S). The site status codes utilised by the DIA are provided below.

DIA SITE STATUS ABBREVIATIONS		
C *Closed*	**F** *Female only*	**I** *Insufficient information*
L *Lodged*	**M** *Male only*	**MI** *Initiated males only*
N *No restriction*	**O** *Open*	**R** *Registered site*
S *Stored data*	**V** *Vulnerable*	

The AHIS search is also utilised to ascertain whether any heritage surveys have previously been conducted within the PDA, and if any Heritage Reports containing information relevant to the PDA have been registered with the DIA.

Following the AHIS search, relevant site files and Heritage Reports held by the DIA are accessed and studied. Some of the information held by the DIA is not publically accessible due to cultural sensitivity (status C) or due to temporary access suspension as a result of DIA administrative processes. In such cases, the inability to access information is noted in the heritage report for the survey.

Unpublished materials, such as heritage reports not registered with the DIA that are available for review are also researched prior to field work.

In addition to research pertaining to previous heritage assessments, the climatic, environmental and geographic characteristics of the PDA are examined in order to establish a model for likely site patterning.

2.3 Field Methodology

The field assessment of the PDA was conducted to a site identification standard and included both archaeological and ethnographic surveys.

The objective of site identification heritage surveys is to identify areas within the PDA that constitute heritage sites. It is designed to document Aboriginal heritage values to a standard sufficient to register sites under the Act and to provide the proponent with heritage

management considerations for sites that are likely to be impacted by the proposed development.

According to a site identification standard, documentation of heritage sites must include site spatial extent and the establishment of boundaries, along with a thorough recording of site attributes and components. This information is used to determine the status of sites under Section 5 of the Act.

The survey team conducting the assessment included nominated representatives of the Widi Mob Traditional Owner group, who assert the right to speak for the country being surveyed, and heritage consultants from Terra Rosa CRM (see Plate 4).

Plate 4 Heritage consultant discussing the survey strategy with the Widi Mob

2.3.1 Archaeological Methodology

In order to comprehensively assess and record any archaeological heritage values located within the PDA, a pedestrian transect methodology was utilised (see Plate 5).

This methodology involved the Terra Rosa CRM heritage consultants walking the two outer and centre transects with a handheld Garmin GPS units, with Traditional Owners spaced evenly in between. This spacing ranged between 15 m and 40 m, depending on the terrain and vegetation coverage of each PDA. The arrangement of team members also depended on the width of the area to be surveyed.

Plate 5: Survey Team conducting pedestrian transects in the Hinge PDA

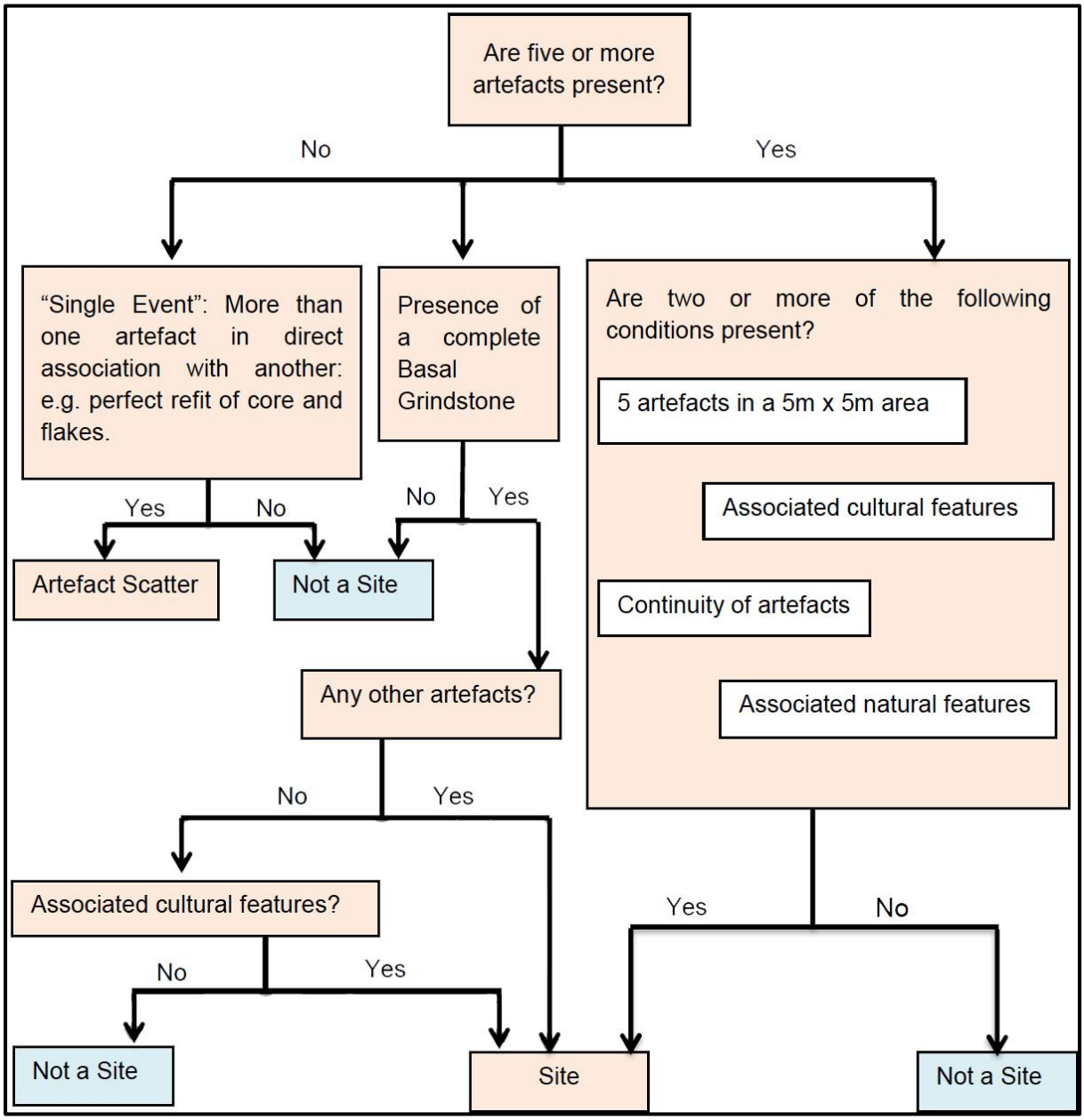
Where archaeological materials were encountered, the survey team conducted intensive, targeted inspection of the area in order to determine the nature and approximate extent of the find. The assessment of artefacts process is detailed in the below flow chart (see Figure 1). If the material present was found to constitute an archaeological heritage site, it was recorded to site identification level with the assistance and involvement of the Traditional Owners. Artefact recording codes utilised during the survey are detailed in Appendix 1.

Following thorough investigation, if artefacts were deemed to be of insufficient density to constitute Aboriginal heritage sites, artefacts were recorded as isolated material. For isolated artefacts the location, artefact lithology and typology were noted. Artefacts were deemed to be isolated unless one or more of the following conditions existed:

- The density of artefacts exceeded five artefacts within 25 m^2;
- The material was identified in association with other natural or cultural site elements;
- The presence of a grindstone base when considered with the above criteria; or
- The Traditional Owners requested that the material be recorded as a site.

The methods employed during the survey were discussed in depth with the Traditional Owners. The methodology was approved and endorsed by the Widi Mob Traditional Owners who participated in the survey.

Figure 1: Artefact scatter assessment process



The Widi Mob Traditional Owners discussed the cultural significance of areas within the PDAs with the heritage consultants during, and at the completion of the pedestrian surveys, and during site recording. At the completion of the pedestrian survey the Traditional Owners briefed the heritage consultants on their cultural directives regarding the PDA and sites located therein.

2.3.2 Ethnographic Methodology

Following an initial Survey brief, ethnographic assessment of the PDA was undertaken concurrently with the archaeological assessment. Any areas of ethnographic significance that were encountered during pedestrian transects were discussed by the Traditional Owners and, where necessary, site boundaries were established.

Ethnographic consultation occurred consistently throughout the survey in open discussions with the Traditional Owners and the attending heritage consultant (see Plate 6). The heritage consultant recorded ethnographic comment offered by the Traditional Owners regarding sites identified within the PDA and surrounding area, along with any management recommendations.

In areas where disturbance was extensive, the Widi Mob Traditional Owners advised that they would not require a full pedestrian survey and instead chose to target only areas of the above PDAs that were relatively undisturbed.

Further to identifying heritage concerns within the PDA, the Traditional Owners were invited to provide broader ethnographic comment regarding the PDA and surrounding areas, to discuss concerns regarding the proposed development, and to specify recommendations regarding the project and management of heritage interests within the area.

The boundaries for any ethnographic sites recorded during the course of surveys are defined by the physical extent of cultural values as indicated by the Traditional Owners at the time of recording. Handheld Garmin GPS units were used to capture boundary coordinates and the location of any significant features identified within the sites and surrounding area. As such, ethnographic site boundaries are representative of the cultural knowledge held by the Traditional Owners present during the survey.

Plate 6: Ethnographic consultation and discussion with a Widi Mob representative

2.4 Post-Survey Analysis

2.4.1 Heritage Significance Assessment

To ensure the significance of sites is assessed consistently, Terra Rosa CRM uses a suite of criteria that reflect a combination of standards set out in the Act as well as broader heritage principles, such as those detailed in the Burra Charter. During post-survey analysis, the significance of each site is gauged according evaluation of five factors:

1. Integrity	To what degree does the site remain intact and undisturbed?
2. Uniqueness	Is the site distinctive in comparison to other sites in the area?
3. Cultural associations	What degree of cultural significance do the Traditional Owners place upon the site?
4. Features	Are there any specific components within the site that are exceptional? Does the site consist of a multitude of interrelated features?
5. Research potential	Can further investigation of the site contribute to overall understandings of the area?

As the significance of sites increases, the value placed upon those sites becomes important in broader contexts. For example, sites with lower degrees of significance are likely to hold importance regionally, but are unlikely to have substantial value at a State or national level. In order to reflect this correlation, the ratings of the five criteria outlined above are depicted in conjunction with the following significance scale:

1. Negligible	The site has a limited degree of significance at the local level and may be deemed by the ACMC as not constituting a heritage site under the Act;
2. Low to high	The site has a graded (low, medium or high) level of regional significance;
3. Very high	The site holds meaningful significance within Western Australian heritage. The site may be deemed by the ACMC to be a Protected Area under Section 19 of the Act;
4. Outstanding	The site is nationally significant and is of substantial value to past, present and future generations.

The outcomes of significance assessment are presented in a matrix format (i.e. Table 3) to reflect the relationship between the ratings afforded to sites according to each of the assessment criteria and the scale of significance for each site.

Table 3: Example significance assessment matrix

<table>
<tr><th></th><th>NOT A SITE</th><th colspan="3">REGIONAL</th><th>STATE</th><th>NATIONAL</th></tr>
<tr><td>Degree of Significance</td><td>Negligible</td><td>Low</td><td>Moderate</td><td>High</td><td>Very High</td><td>Outstanding</td></tr>
<tr><td>Integrity</td><td></td><td></td><td></td><td colspan="3">The site has a moderate degree of integrity in comparison to other sites in the area</td></tr>
<tr><td>Uniqueness</td><td></td><td></td><td colspan="4">Such sites are common in the area</td></tr>
<tr><td>Cultural</td><td></td><td></td><td colspan="4">The Traditional Owners consider the site to have a low degree of cultural significance</td></tr>
<tr><td>Features</td><td></td><td colspan="5">The site does not contain any distinguishing features</td></tr>
<tr><td>Research Potential</td><td></td><td colspan="5">The site lacks meaningful research potential</td></tr>
</table>

2.4.2 Heritage Report Review Process

Outcomes of the heritage research are reviewed by the Widi Mob and Heritage Link prior to the dissemination of results to the Proponent. This includes brief, preliminary information provided immediately following field work, as well as the full and final Heritage Report that details the desktop and field work results. The review process ensures that culturally sensitive information is appropriately indicated, the recommendations discussed amongst the survey team are assessed by a wider representative group and any amendments are made in accordance with the Traditional Owners' suggestions. The review process does not, however, provide for changes in research results, which Terra Rosa CRM reports impartially as an independent party.

3 DESKTOP RESEARCH

Prior to field work, desktop research was undertaken to establish an overview of previous heritage findings in the area and to forecast any likely site patterning based on biogeographical features of the area.

3.1 AHIS Research

The boundary coordinates of the PDAs were searched on the DIA AHIS to establish the presence or absence of Aboriginal heritage sites and other heritage places previously registered with the DIA. The search revealed that there are two Registered Aboriginal heritage sites and nine other heritage places previously registered within the PDA.

The AHIS was also searched for reports of previous heritage surveys within the PDAs. The search revealed fifty one previous reports relevant to the PDAs.

3.1.1 Summary of DIA Registered Sites within the PDAs

Below in Table 4 are the details of previously recorded sites registered with the DIA as being located within the Project Area.

Table 4 Registered Aboriginal Heritage Sites, KML Regional Exploration Priorities Project

DIA Site ID	Site Type	Location (mE / mN)	Related Report	PDA
DIA 26485 (MIOP08 Terapod Artefacts 01)	Artefacts / scatter	488388 mE / 6777994 mN	*AIC, 2005. Report on an archaeological and ethnographic S18 consultation regarding a Proposed Drilling Operations Expansion at Mt Karara, Western Australia*	Terapod East
DIA 28481 (MIOP32 Terapod Gnamma 01)	Mythological / Water Source	488496 mE / 6778035 mN	*AIC, 2005. Report on an archaeological and ethnographic S18 consultation regarding a Proposed Drilling Operations Expansion at Mt Karara, Western Australia*	Terapod East

3.1.1.1 DIA 26485 (MIOP08 Terapod Artefacts 01)

This site was originally recorded in 2008 by Australian Interaction Consultants and has been subsequently revisited a number of times by representatives of the Widi Mob, Binyardi and Badimia Traditional Owner groups as part of Section 18 consultations.

DIA 26485 (MIOP 08 Terapod Artefacts 1) is an artefact scatter of moderate size and density with a variety of lithic types being represented. The site is located on the lower slope of a banded ironstone ridge. Quartz flakes dominate the recorded assemblage.

At the time of the current survey the site was no longer in existence. KML had undertaken the Section 18 process and consent was granted to destroy both this site and DIA 28481 (see Plate 7).

3.1.1.2 DIA 28481 (MIOP32 Terapod Gnamma 01)

This site was initially identified during a heritage survey conducted by Australian Interaction Consultants and the Widi Mob Traditional Owner group in 2008. The site was allotted a high level of significance by the Widi Mob representatives during this survey, and also by representatives of the West Badimia and Binyardi Traditional Owner groups during a subsequent Section 18 consultation.

DIA 28481 is described as a water hole situated in the opening of a wall of banded iron formation. No artefacts were identified in the immediate vicinity of the water hole; however, DIA 26485 (MIOP08 Terapod Artefacts 01) is located nearby. The water hole showed no signs of human modification.

The Traditional Owners groups attribute mythological significance to this, and all, waterholes located on their Country. The Widi Mob representatives were shown this place by a deceased Elder who told them it was a highly significant place linked to both male and female fertility.

At the time of the current survey the site was no longer in existence. KML had undertaken the Section 18 process and consent was granted to destroy both this site and DIA 26485 (see Plate 7).

Plate 7: Area modified by mining activity at the Terapod East PDA, in the location of DIA 26485 and DIA 28481

3.1.2 Summary of DIA Other Heritage Places within the PDAs

Further to the Registered sites discussed above, nine Other Heritage Places are catalogued by the DIA as existing within the Project Area. These places are listed in Table 5 and summarised below.

Table 5 Other Heritage Places within the PDAs

DIA Site ID	Site Type	Status	Location (mE / mN)	PDA
DIA 31760 (Kar12-01)	Artefacts/Scatter	Lodged	487004 / 6788179	The Hinge
DIA 21374 (Karara02/Mt Karara) [CLOSED]	Ceremonial/ Mythological	Stored Data	Not available for closed sites	Mystic
DIA 31593 (Creekline with Rockhole)	Water Source	Stored Data	493756 / 6807530	The Gap
DIA 31594 (Shine PDA & Haul Road Isolated Finds)	Isolated artefacts	Stored Data	493848 / 6807484	The Gap
DIA 20735 (Breakaway Ridge Ggp/03)	Natural Feature	Stored Data	492547 / 6813134	Tom's Kitchen
DIA 20736 (Rockshelter Ggp/02)	Rockshelter/Natural Feature	Stored Data	492602 / 6813075	Tom's Kitchen
DIA 20737 (Rock Formation Ggp/01 Ggw/01)	Natural Feature	Stored Data	492851 / 6813005	Tom's Kitchen
DIA 20738 (Camp Ggw/02)	Meeting Place, Camp	Stored Data	492864 / 6812987	Tom's Kitchen
DIA 20859 (Blue Hills)	Mythological	Stored Data	488111 / 6775709	Terapod East

3.1.2.1 DIA 31760 (Kar12-01)

This site was identified by Gavin Jackson during a heritage survey conducted in 2011. It is recorded as being a large, medium sized artefact scatter with a large variety of lithic types being represented in the archaeological assemblage. A large percentage (13%) of retouched artefacts was noted here. In addition to the artefact scatter, some small gnamma holes were also noted.

This site was not re-identified during the current survey. According to the coordinates provided in the original report it is located on the boundary of the Hinge PDA. Very few isolated artefacts were identified in the vicinity. It is likely that this site is situated outside the current scope of works.

3.1.2.2 DIA 21374 (Karara02/Mt Karara) [CLOSED]

Information is not publically available for Closed Sites; however, this site is not located within the boundary of the Mystic PDA.

3.1.2.3 DIA 31593 (Creekline with Rockhole)

This site was identified during a site identification survey undertaken in 2011 by Terra Rosa CRM in conjunction with the Widi Mob, West Badimia and Binyardi Traditional Owner groups.

The site as recorded at the time consists of a series of three conjoined rockholes located in a rocky ephemeral creekline and connected to a spring a further 25 m along the creek. No cultural material was noted in the immediate vicinity of the rockholes.

This site was re-identified during the current survey and has been recorded in conjunction with artefact scatter TGAS12-01 (see Section 5 of this report).

3.1.2.4 DIA 31594 (Shine PDA & Haul Road Isolated Finds)

These isolated artefacts were identified during a heritage survey undertaken in 2011 by Terra Rosa CRM in conjunction with representatives of the Widi Mob, West Binyardi and Badimia Traditional Owner groups. As isolated material is not considered a site under the Act, no attempt was made to relocate this material.

3.1.2.5 DIA 20735 (Breakaway Ridge Ggp/03)

This site was originally recorded by Ron Parker in conjunction with the Pandawn Native Title Claimants in 2003 and revisited in 2006 by Australian Interaction Consultants. It is recorded as a large ironstone ridge associated with Gossan Hill which extends in a north/south orientation behind the Minjar Gold Camp. The site is recorded as having Dreamtime connections, however no further detail is provided.

This natural feature was noted during the current survey; however, the formation occurs largely outside the current Tom's Kitchen PDA. No comment was made by the Widi Mob representatives present.

3.1.2.6 DIA 20736 (Rockshelter Ggp/02)

This site was originally recorded by Ron Parker in conjunction with the Pandawn Native Title Claimants in 2003 and revisited in 2006 by Australian Interaction Consultants. It is recorded as a rockshelter embodied with the banded iron formation that constitutes DIA 20735 (Breakaway Ridge Ggp/03). No further detail was provided of any significance imbued in this place by the Traditional Owners.

This site was revisited by Terra Rosa CRM during the current survey. This place is considered to be too small for habitation purposes and the Widi Mob representatives present attributed no ethnographic significance to the place. It is the opinion of Terra Rosa CRM and the Widi Mob that this place does not constitute a site under the Act.

3.1.2.7 DIA 20737 (Rock Formation Ggp/01 Ggw/01)

This site was originally recorded by Ron Parker in conjunction with the Widi Mob Traditional Owner group in 2003 and revisited in 2006 by Australian Interaction Consultants. This site

has been recorded as a Meeting Place and is a large banded iron formation feature which is highly visible throughout the landscape. Australian Interaction Consultants reported that this site was likely to have been "written into the local ethnolandscape by Tribal Elders" (AIC 2006:18).

No further consultation was undertaken with the Widi Mob representatives regarding this place during the current heritage survey.

3.1.2.8 DIA 20738 (Camp Ggw/02)

This site was originally recorded by Ron Parker in conjunction with the Widi Mob Traditional Owner group in 2003 and revisited in 2006 by Australian Interaction Consultants. No information is provided in the DIA site file, apart from that the site is described as a Camp.

This site was not re-identified by Terra Rosa CRM during the current survey. No artefacts were identified in the vicinity of the registered location of the "Camp" nor were there any other indications of a campsite.

3.1.2.9 DIA 20859 (Blue Hills)

DIA 20859 (Blue Hills) was originally recorded by Ron Parker and the Widi Mob during a heritage survey conducted in 2004 and has been subsequently revisited during numerous heritage surveys in the area. The site is reported to encompass the entirety of the Blue Hills formation and has mythological significance attributed to it by Traditional Owner groups. Blue Hills holds meaning derived from stories concerning the creation snake "Bemurra" travelling through the Midwest area and meeting other creation beings along the way.

DIA 20859 (Blue Hills) was deemed Not a Site by the ACMC in 2006.

3.1.3 Heritage places not registered with DIA

One site, not registered with the DIA, is known to exist within the Project Area. The site is summarised below.

3.1.3.1 MJGAS12-01

MJGAS12-01 was identified in 2012 by Terra Rosa CRM in conjunction with representatives of the Widi Mob Traditional Owner group during a survey conducted on behalf of Minjar Gold Pty Ltd. MJGAS12-01 is a large artefact scatter located around a soak and containing a well. It is situated within the mid-section of the Tom's kitchen PDA and is in proximity to three newly identified heritage sites (TKAS13-01, TKAS13-02 and TKAS13-03). It is very similar in density and composition to these sites.

3.1.4 Heritage Reports relating to the PDAs

The following heritage reports are relevant to the PDAs assessed during the three field trips.

Table 6 Heritage Reports relating to the PDA

Report ID	Author and Date	Title	PDA	Related Site/s
103216	Veth, P. 1990	*Report of archaeological and ethnographic survey of the Winddine Prospect, south of Yalgoo, Western Australia*	Ben's Surprise, Brak G, Lister/Gobo, Onga Extension, Shine E, Horse & Pebbles	
23496	Doulman, T. 2007	*A report of an Ethnographic Survey of Karara Mining Limited's Karara Iron Ore Project and Mungada Iron Ore Project Proposed Linear Infrastructure Corridor with the* Widi *Binyardi Native Title Claimant Group*	Mystic	DIA 21374
22791	AIC 2007	*A report on a section 18 consultation and site avoidance survey at Mt Karara, East of Morawa, Western Australia*	Mystic	DIA 21374
28513	AIC 2010	*Consolidation Report of Proposed Iron Ore Exploration, Mining and Infrastructure in the Terapod and Blue Hills Areas near Morawa, Western Australia*	Mystic	DIA 21374
23290	CAD Resources. 2008	*Karara and Mungarda Iron Ore Project : Lake Weelhamby Causeway to Karara*	Mystic	DIA 21374
22828	Glendenning, W. 2005	*Report of an archaeological survey of the proposed Blue Hills haul road and Morawa rail siding.*	Mystic	DIA 21374
21608	AIC 2005	*Report on an archaeological and ethnographic S18 consultation regarding a Proposed Drilling Operations Expansion at Mt Karara, Western Australia*	Mystic	DIA 21374
22706	AIC 2005	*Report on an archaeological survey of a proposed slurry pipeline between Mt. Gibson and Geraldton, Western Australia*	Mystic	DIA 21374
22817	AIC 2007	*Report on European & Aboriginal use and heritage significance of land along a proposed slurry pipeline route between Geraldton and Karara, Western Australia*	Mystic	DIA 21374

Report ID	Author and Date	Title	PDA	Related Site/s
22598	AIC 2007	*Report on Site Identification Survey of Tilley Siding and a Proposed RC Drilling Programme on Midwest Corporation Ltd tenements near Blue Hills, Western Australia*	Mystic	DIA 21374
21057	Hames Consultancy Group 2004	*Section 18 application under the Aboriginal Heritage Act (1972) to undertake exploration of tenements at Mt Karara Western Australia*	Mystic	DIA 21374
22873	AIC 2007	*Section 18 Report for Proposed Magnetite Mine and Infrastructure at Mt Karara, East of Morawa, Western Australia*	Mystic	DIA 21374
22897	AIC 2008	*Section 18 report for proposed Magnetite Mine and Infrastructure at Mt Karara, East of Morawa, Western Australia*	Mystic	DIA 21374
28153	Fordyce, B. 2009	*Site Identification and Work Area Clearance Heritage Survey Report of the Karara Iron Ore Project Area at Karara, Western Australia : volume ii*	Mystic	DIA 21374
22522	AIC 2007	*Site Identification Survey Of The Proposed Gindalbie Metals Mt Karara Magnetite Project, Western Australia*	Mystic	DIA 21374
22367	AIC 2006	*Site identification survey of the proposed Gindalbie Metals Mungada Ridge Hematite Project, Minesite Layout and Haul Road Western Australia*	Mystic	DIA 21374
21578	Machin, B. 2000	*Aboriginal Heritage Report on a Site Survey for Gindalbie Gold NL Minjar North Project Tenements E59/518, M 59/219,406, 420, 421, 457, 458 with* Widi Mob *97/72, Pandawn 96/83, Badimia WC 96/98 Claimants*	Onga Extension, Shine E	
23449	Martin, A. 2008	*A site identification Heritage Survey Report of the Proposed Tailing Storage Facility at Gossan Hill, Western Australia*	Tom's Kitchen	DIA 20735, DIA 20736, DIA 20737, DIA 20738
22838	AIC 2006	*Report on a site identification survey and a Section 18 consultation under the Aboriginal Heritage Act 1972 of the proposed Gossan Pit Mine Site at Gossan Hill, Western Australia*	Tom's Kitchen	DIA 20735, DIA 20736, DIA 20737, DIA 20738

Report ID	Author and Date	Title	PDA	Related Site/s
20641	Hames Consultancy Group. 2003	*Section 18 application under the Aboriginal Heritage Act (1972) to undertake mining operations at Gossan Hill in the South Murchison Province, South East of Yalgoo*	Tom's Kitchen	DIA 20735 DIA 20736, DIA 20737, DIA 20738
n/a	AIC 2007*	*Preliminary Report on Aboriginal Heritage Survey Site Avoidance Survey with* Widi Mob *NTC of Proposed Exploration Program at Gap and Shine Prospect in Tenement E59/0087, WA.*	The Gap, Shine East	DIA 31593, DIA 31594
n/a	AIC 2007*	*Preliminary Advice of a Work Area Clearance Survey of a Proposed Exploration Program at the Gap Project Area (E59/887, M59/406, M59/421) near Yalgoo, WA*	The Gap	
n/a	AIC 2009*	*Shine POW Heritage Advice for Karara Mining Limited*	The Gap	
n/a	Terra Rosa CRM 2011*	*Archaeological and Ethnographic Heritage Survey of the Shine Development Extension Area.*	Shine East	
23954	Lane, V. 2006	*A Report of an Ethnographic Survey of the Proposed Terrapod, Gully & Thor, Skyhook and Skyhook South Open Cut Pit Mungada Ridge Project*	Terapod East	DIA 20859
22791	AIC 2007	*A report on a section 18 consultation and site avoidance survey at Mt Karara, East of Morawa, Western Australia*	Terapod East	DIA 20859
21930	AIC 2005	*Addendum to a report on an archaeological survey of Blue Hills, Western Australia*	Terapod East	DIA 20859
28513	AIC 2010	*Consolidation Report of Proposed Iron Ore Exploration, Mining and Infrastructure in the Terapod and Blue Hills Areas near Morawa, Western Australia*	Terapod East	DIA 20859
27327	Chisholm, S. 2011	*Consolidation Report of Proposed Iron Ore Exploration, Mining and Infrastructure in the Terapod and Blue Hills Areas near Morawa, Western Australia*	Shine E, Terapod East	DIA 20859
22800	AIC 2007	*Report of an ethnographic and archaeological work area clearance of the Proposed Exploration Program at Mount Mulgine, Western Australia*	Terapod East	DIA 20859
21608	AIC 2005	*Report on an archaeological and ethnographic S18 consultation regarding a Proposed Drilling Operations Expansion at Mt Karara, Western Australia*	Terapod East	DIA 20859

Report ID	Author and Date	Title	PDA	Related Site/s
22706	AIC 2005	*Report on an archaeological survey of a proposed slurry pipeline between Mt. Gibson and Geraldton, Western Australia*	Terapod East	DIA 20859
27275	Chisholm, S. 2011	*Report on an Archaeological Survey of the Blue Hills Project Area, Prepared For Sinosteel Midwest Corporation Limited and the West Badimia, Binyardi People and* Widi Mob *Traditional Owners*	Terapod East	DIA 20859
27276	Smith, C. 2011	*Report on an Ethnographic Survey of the Blue Hills Project Area, Prepared For Sinosteel Midwest Corporation Limited and the West Badimia, Binyardi People and the* Widi Mob *Traditional Owners*	Terapod East	DIA 20859
22598	AIC 2007	*Report on Site Identification Survey of Tilley Siding and a Proposed RC Drilling Programme on MIdwest Corporation Ltd tenements near Blue Hills, Wedtern Australia*	Terapod East	DIA 20859
21723	AIC 2005	*Report on the Archaeological Investigation of the Proposed Mungada Tenements Exploration Program at Blue Hills, Western Australia*	Terapod East	DIA 20859
21057	Hames Consultancy Group 2004	*Section 18 application under the Aboriginal Heritage Act (1972) to undertake exploration of tenements at Mt Karara Western Australia*	Terapod East	DIA 20859
20797	Hames, K. 2003	*Section 18 Application under the Aboriginal Heritage Act (1972) to undertake mining operations at Blue Hills, Western Australia*	Terapod East	DIA 20859
22873	AIC 2007	*Section 18 Report for Proposed Magnetite Mine and Infrastructure at Mt Karara, East of Morawa, Western Australia*	Terapod East	DIA 20859
22897	AIC 2008	*Section 18 report for proposed Magnetite Mine and Infrastructure at Mt Karara, East of Morawa, Western Australia*	Terapod East	DIA 20859
28153	Fordyce, B. 2009	*Site Identification and Work Area Clearance Heritage Survey Report of the Karara Iron Ore Project Area at Karara, Western Australia : volume ii*	Terapod East	DIA 20859
22522	AIC 2007	*Site Identification Survey Of The Proposed Gindalbie Metals Mt Karara Magnetite Project, Western Australia*	Terapod East	DIA 20859

Report ID	Author and Date	Title	PDA	Related Site/s
22367	AIC 2006	*Site identification survey of the proposed Gindalbie Metals Mungada Ridge Hematite Project, Minesite Layout and Haul Road Western Australia*	Terapod East	DIA 20859
23233	Martin, A. 2008	*Work program clearance Heritage Survey Report of the proposed RC Drilling and Bulk Sampling Programs at Mt Mulgine, Western Australia*	Terapod East	DIA 20859
n/a	AIC 2007*	*Preliminary Advice of a Work Area Clearance Survey of a Proposed Exploration Program at the Lister Project Area (M59/0458), near Yalgoo, WA*	Onga Extension	
n/a	Yamatji Communications. 2008*	*A Report of an Archaeological Survey of Karara West, Lister, Brak, Hinge and Moondyne Project Areas, Near Mt Karara, WA*	Onga Extension, Lister	
n/a	Yamatji Communications. 2008*	*A Report of an Ethnogaphic Survey of Gindalbie Metals Ltd's Proposed Drilling Areas Located on Lister, Brak, Hinge, Moondyne and Karara West, with the Badimia and* Widi *Binyardi Representatives*	Onga Extension, Lister	
n/a	AIC 2006*	*Site Identification Survey of the Proposed Gindalbie Metals Mt Karara Magnetite Project, Western Australia*	Mystic	
n/a	AIC 2009*	*Site Identification and Work Area Clearance Survey Heritage Survey Report of the Mungada Iron Ore Project at Karara, Western Australia (Volumes 1 and 3)*	Mystic	
n/a	Yamatji Communications. 2009*	*An Archaeological Survey Report of Karara Mining Ltd's Mungada Iron Ore Project at Mt Karara near Morawa, Western Australia*	Mystic	
n/a	AIC 2007*	*Preliminary Advice of a Work Area Clearance Survey of a Proposed Exploration Program at the Lister Project Area (M59/0458), near Yalgoo, WA*	Lister	

* Reports not submitted to DIA

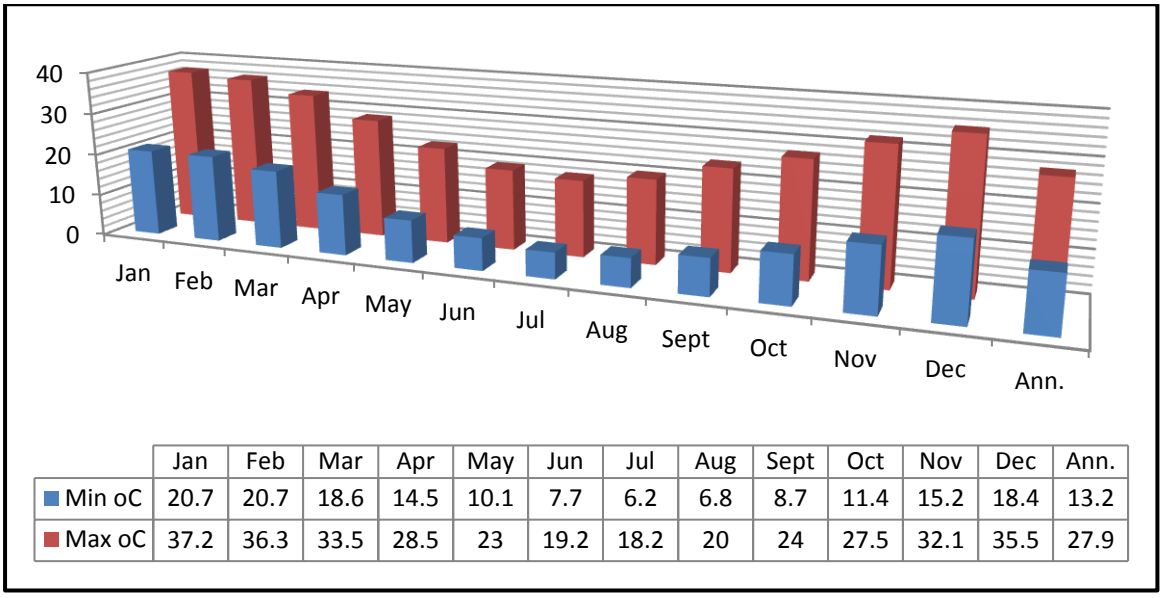
3.2 Regional Background

3.2.1 Climate

The climate of the survey area is classified, according to the modified Köppen system of climate classification, as hot, semi-arid grassland with summer drought (Stern, de Hoedt, & Ernst, 2001). The nearest available records from the Australian Bureau of Meteorology (BOM) are for the Yalgoo Weather Station, located approximately 47 km from the northern extent of the Project Area and 93 km from the southern extent.

The average maximum annual temperature for the Yalgoo Region from between the years 1897 and 1975 is 27.9°C. Monthly, these temperatures range from a maximum and minimum of between 37.2°C to 20.7°C in January, and 18.2°C to 6.2°C in July (BOM 2012, see Figure 2).

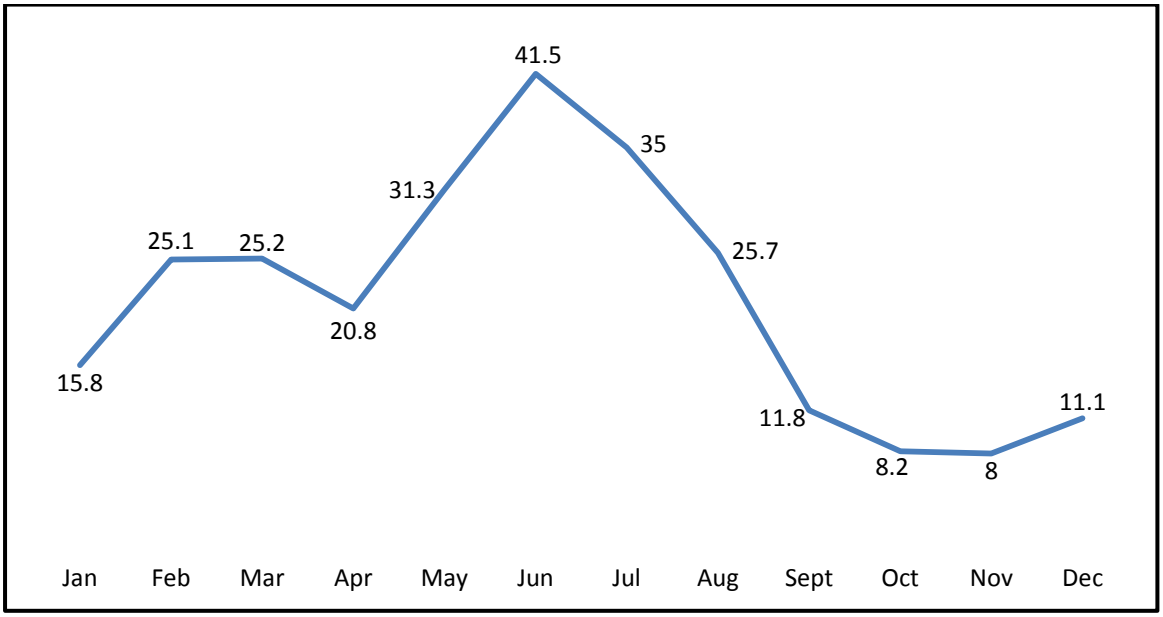
Figure 2: Average monthly temperatures for Yalgoo (BOM 2012)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann.
Min oC	20.7	20.7	18.6	14.5	10.1	7.7	6.2	6.8	8.7	11.4	15.2	18.4	13.2
Max oC	37.2	36.3	33.5	28.5	23	19.2	18.2	20	24	27.5	32.1	35.5	27.9

Within the region, rainfall is generally irregular. Yalgoo is located within a semi-arid desert environment where the annual average rainfall recorded from 1896 to 2012 was 278.8 millimetres (*ibid*. 2012). June is the wettest month with an average of 41.5 mm of rain. November is noted as the driest month, with an average of 8 mm of rain (see Figure 3).

Figure 3: Average monthly rainfall for Yalgoo (BOM 2012)



In the summer, regional rainfall is influenced by the stormy, northerly low pressure systems, while winter rainfall is influenced by southerly low pressure systems. Light prevailing winds stem from the southeast in the summer and from the northwest in the winter (Leighton 1998:29).

3.2.2 Topography and Geology

The PDA is located in the Murchison Province of the Archaean Yilgarn Craton, an immense geological feature covering approximately 657,000 km^2 of Western Australia (Flint *et al*. 2000:19). The geology of the Yilgarn Craton, and subsequently the Midwest province is predominantly comprised of north to northwest trending granite-greenstone and granitic-migmatitic belts (Flint *et al*. 2000:19; Johnson 1998:39). These contain "sequences of mafic to ultramafic volcanic rocks, felsic volcanic rocks, and metasedimentary rocks, including cherts and banded iron-formations" (Johnson 1998:39). A number of these rocks are sufficiently isotropic and siliceous to have been used for stone tool production (i.e. have conchoidal fracturing properties).

The Project area is surrounded in all directions by a series of weathered, low-lying, banded ironstone and granitic ranges which have and continue to be of interest to miners for the extraction of a number of mineral resources. These ranges feature an elevation of up to 450 m above sea level, which equates to between 50 m and 100 m above the elevation in the flats below.

Plate 8: Landscape characteristic of the Project Area

Soils within the survey area are mainly shallow (>1 m in thickness) and over lie siliceous hardpan. Ground surface across all 14 PDAs are generally a combination of gently undulating and level ground, featuring a soil profile comprised of red-brown loamy sand soils with a ubiquitous overlying unit of predominantly pisolitic laterite nodules (Plate 9). Mixed lithology gibber is typically present within floodplain and wash areas.

Plate 9: Hardpan typical of the Project area

Surface hydrogeology in the region, particularly in regards to prehistoric human utilisation, is generally identified as dips, fractures or deformations in the Achaean aged granitoid, greenstone, migmatite and gneissic stratigraphic features. Lithology of these are generally weathered and laterised and then either supplied by groundwater or surface exposure to rainfall (Johnson 1998:41). These features are most commonly referred to herein as rock holes or *gnamma* holes. Surface drainage is mostly disorganised and shallow, with the hardpan ground surface preventing deep erosional incision from fluvial movement across the landscape.

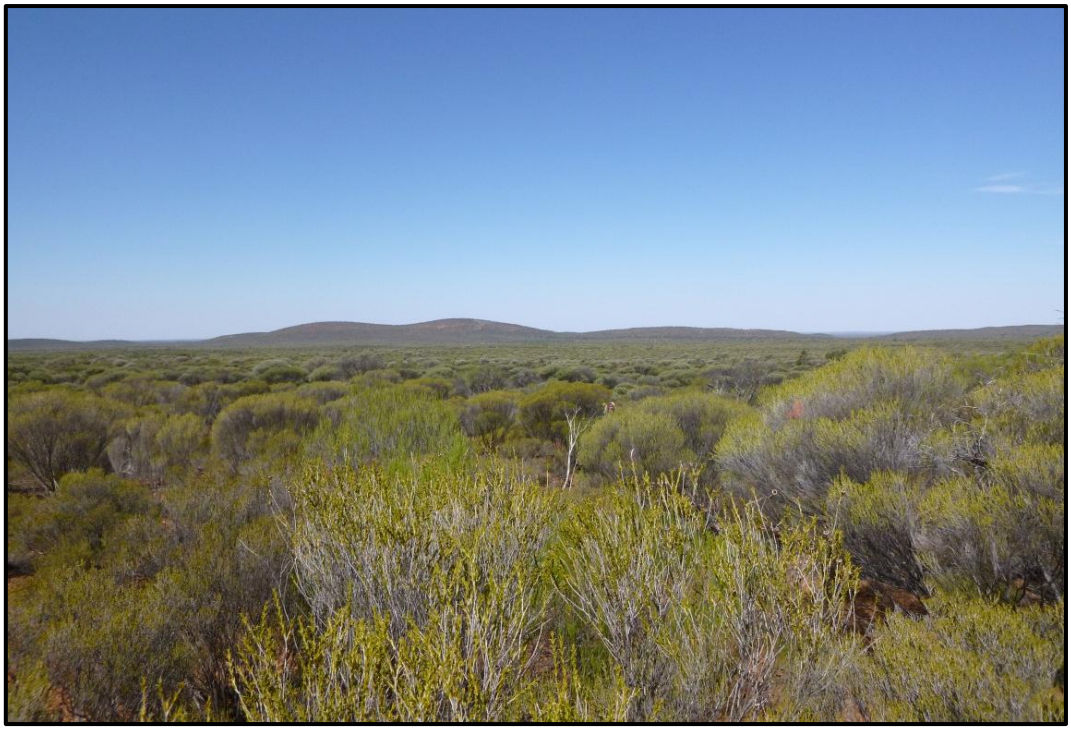
3.2.3 Vegetation

The Project area lies within the Austin Botanical District of the Murchison Region. This is situated within the broader Eremaean province of Western Australia, with the Eremaean Province falling within the Australian Arid Zone (Beard and Sprenger 1984 p. 6).

Vegetation within this region is broadly termed as mulga low woodland and tall acacia shrubland over hardpan and sandplain, and is dominated by Acacia *aneura*, which is found in all environments from saline lacustrine to stony breakaways (Beard 1976a, 1976b). Payne *et al*. (1998) indicate that the most common species include "*Acacia, Atriplex, Eremophilia, Eucaluptus, Maireana, Ptilotus, Senna* and *Stipa*. Cotton bush (*Ptilotus obovatus*), curara (*Acacia tetragonophylla*) and mulga (*A. aneura*) are the most ubiquitous perennials" (p. 2)

Within all survey areas, often thick, low Acacia spp. scrub dominates. Eucalyptus spp. exists sporadically in open woodland groves, with an upper canopy up to 5 m in height (Plate 10).

Plate 10: Vegetation characteristic of the wider Project area



3.2.4 Land Integrity

Land integrity within the PDAs has been impacted by a number of natural and anthropogenic factors. Seasonal rainfall has led to water erosion within the area, as evidenced in the wash areas and drainage lines that abrade the area. Subsurface material may be present in areas of soil and clay deposition, as a result of erosion.

A number of the PDAs are located within areas that have been subject to extensive mining activity over the past century, beginning with the discovery of gold at Rothsay ('Woodley's find') in 1894 (Landgate 2012, Hennig 1998:13). In more recent years, mineral prospecting (predominantly gold and iron ore) has led to the creation of a number of large, open cut mines and innumerable cleared drill lines, which impact all the PDAs inspected to varying degrees. Also located in close proximity to much of the Project area are the Minjar Gold exploration leases and the Golden Grove Gossan Hill and Scuddles mines and surface processing operations. A network of unsealed roads, tracks and fence lines also exist throughout the area.

Given the longstanding effects on mining in the area it is therefore not unsurprising that ground disturbance was noted within most of the PDAs to some degree. This disturbance was noted as mostly being of relatively recent origin (within the past decade), with numerous old drill lines, drill holes, some open pit mining activity and access tracks visible to the survey team. The Gap, Shine E, Onga Extension, Mystic and Terapod East PDAs in particular showed extensive ground clearing and relatively recent drilling activity or preparation for such. Relatively few survey reports have been registered with the DIA for these areas; however, a number of unpublished reports exist which pertain to site avoidance and/or work program clearance surveys undertaken within these tenements previously. The Mystic PDA has not been surveyed previously, but holds a current PoW, which Terra Rosa CRM has been advised permits work to proceed without heritage clearance under the Western Australian Government's Cultural Heritage Due Diligence Guidelines (2011).

The effects of pastoral activity are also present within the PDA. Grazing and the presence of hard-hooved livestock has led to some degradation of vegetation within the region which has made the soil more vulnerable to erosive action. Feral animals such as goats have further contributed to devegetation. Pastoral infrastructure such as stockyards, wells and fences were also noted within the wider Project Area.

4 OVERVIEW OF THE PROPOSED DEVELOPMENT AREAS

The Project is located approximately 225 km east of Geraldton and approximately 70 km south-southeast of Yalgoo in the Midwest region of Western Australia. The 16 PDAs assessed to site identification level are separated from north to south by a total distance of approximately 50 km.

The PDAs are surrounded in all directions by a series of weathered, low-lying, banded ironstone and granitic ranges. The PDAs themselves are a mixture of relatively flat areas subject to water runoff from the surrounding ranges, and low-lying rocky hills of banded iron formation, laterite and granite. This has created an expanse of floodways and scattered soak areas which feed into shallow, subterranean aquifers. Despite this, the landscape is generally stable, and should be expected to display low levels of erosion and sedimentary re-deposition.

The area encompassed within the greater Project area exists within two Native Title Claim boundaries: Badimia (WC96/98) and Widi Mob (WC97/72-6). The PDAs discussed in this report all fall within Widi Mob country. Karara Mining Ltd are currently developing an Indigenous Land Access Agreement with the Widi Mob Traditional Owners.

As a whole, the Project Area exists within a region which has a long and rich history from both an Indigenous and post-colonial perspective. The ranges and the areas surrounding them have and continue to be of interest to miners for the extraction of a number of mineral resources. Gold in particular has drawn prospectors to the Midwest and Murchison regions of Western Australia since the late 19th century, with the Yalgoo area of particular note for its alluvial deposits. A number of old mine shafts and abandoned structures remain in the region. While such historic sites have contributed to the development of the region, there may be implications on the existence or preservation of Indigenous sites which may have pre-existed in the area. With mining and agriculture comes the creation of auxiliary constructions such as roads, fence lines and wells, all of which reduce the integrity of the land on which Indigenous sites may be located.

Though few registered sites or other heritage places exist in the PDAs (See 3.1 – AHIS Search) a large number of Aboriginal heritage sites have been registered within the area immediately surrounding the PDAs. These include artefact scatters, water sources, hunting sites, rock art sites, stone and ochre quarries, camping sites, rock shelters, scarred trees, grinding stones, and mythological sites (AHIS 2012). Such a diversity of site typologies reflects a complex cultural landscape which would have had dual habitation/subsistence and ceremonial roles for the people who lived and travelled through the region.

Following extensive research in the Midwest region, Terra Rosa CRM has developed an internal dataset of heritage site information. Based on this internal dataset, regional site patterning for the Midwest and Murchison regions has shown that artefact scatters are the most common site type encountered (81%), followed by rock holes (6.78%). It is not expected that the results of the current project will vary greatly from this data, given the cultural and physical environment in which the PDAs are located.

With floodplains and alluvial plains the most common location for artefact scatters to occur (27.15%), it may be expected that such sites may be present within the PDAs. Any hills, ridges and footslopes (14.46%) or waterways such as creeks or river banks (12.21%) within

the PDAs may also feature artefact scatters. Depending on the context, it should be noted that floodplain artefact scatters are often not in their primary context due to ongoing, recurrent taphonomic processes which may affect the integrity of the site. Floodplains have also been found to feature broad background scatters of isolated artefacts, with mixed lithologies most commonly encountered in the immediate region. Rock holes are typically located on stone outcrops (such as granite), but may also be found along hill slopes or in creek beds. The heritage Survey Team intensively inspected these land forms where encountered during the course of the survey.

It should also be noted that the majority of the prominent or significant archaeological sites in the wider Widi Mob region are located in some proximity to rock or *gnamma* holes – either permanent or ephemeral. This, according to Veth (1989a; 1989b; 1993; 1995; 1996), conforms with the predictive model for arid-zone occupation whereby we can expect not only a greater number of sites with a greater variety of lithic typology and material diversity, but also greater social complexity and longevity from sites than in areas where there is no water present. From previous research in the region, a hypothesis for site patterning in the Project Area may be put forward:

> *It is predicted that archaeological sites such as artefact scatters or rockshelters are more likely to occur in close association with granite-bedded rock or gnamma holes. Where granitic outcrops, and more importantly, rock or gnamma holes are not present, the likelihood of archaeological materials being present decreases.*

The research conducted to date may allow archaeologists to predict and reconstruct landscape usage and site distribution patterning throughout the region if this hypothesis holds true, and may be considered alongside Veth's predictive model as described above.

It is worth considering that previous exploration and mining activities in the area may have already impacted upon any heritage sites which may exist within these areas, with Minmetals Resources Ltd, Gindalbie Metals Ltd, Minjar Gold, Golden Stallion and Monarch Resources all having conducted exploration and mining in the area within the past decade. For a large portion of the area surrounding the Project Area, no record of heritage surveys conducted in the PDAs exists with either the DIA, and in the absence of any documentation detailing otherwise it cannot be assumed that these areas were investigated for heritage values prior to any ground disturbing works. As mentioned above, a number of heritage surveys have been conducted within the PDAs, and these have been discussed in Section 3 of this Report.

4.1 The Hinge PDA

The Hinge PDA is situated approximately 23 km northeast of mining operations at KML. The Hinge PDA is located within KML exploration tenement E59/1170. The PDA measures approximately 3.1 km (northwest to southeast) and 3.7 km (northeast to southwest), totalling an area of 6.7 km^2. The PDA straddles an area previously subject to exploration drilling by KML. The Hinge was accessed using an access track that connects the Mulga Track to the Weave PDA, and various tracks associated with a recent drill program in the centre of the PDA.

The Hinge PDA is large and variable in nature, particularly between the north and south. The northern portion of the PDA is flat and composed primarily of a softpan red alluvium with occasional ironstone gibber occurring in isolated pockets. A low ridge of laterite and ironstone intersect the northern area, separating the eastern portion from the western portion (see Plate 11). This area has been subject to exploration drilling previously.

Vegetation within the PDA can be broadly described as low to moderate density low-lying *Acacia* spp. scrub, with an understorey of $\leq$ 1 m, and an upper canopy of $\geq$ 2 m. Additionally, mature York Gum (*Eucalyptus loxophleba*) ($\geq$ 5 m) are scattered sporadically throughout the area, with some open areas containing York Gum thickets to the west and south east.

Plate 11: View to the southwest from ridge in previously disturbed portion of the Hinge PDA

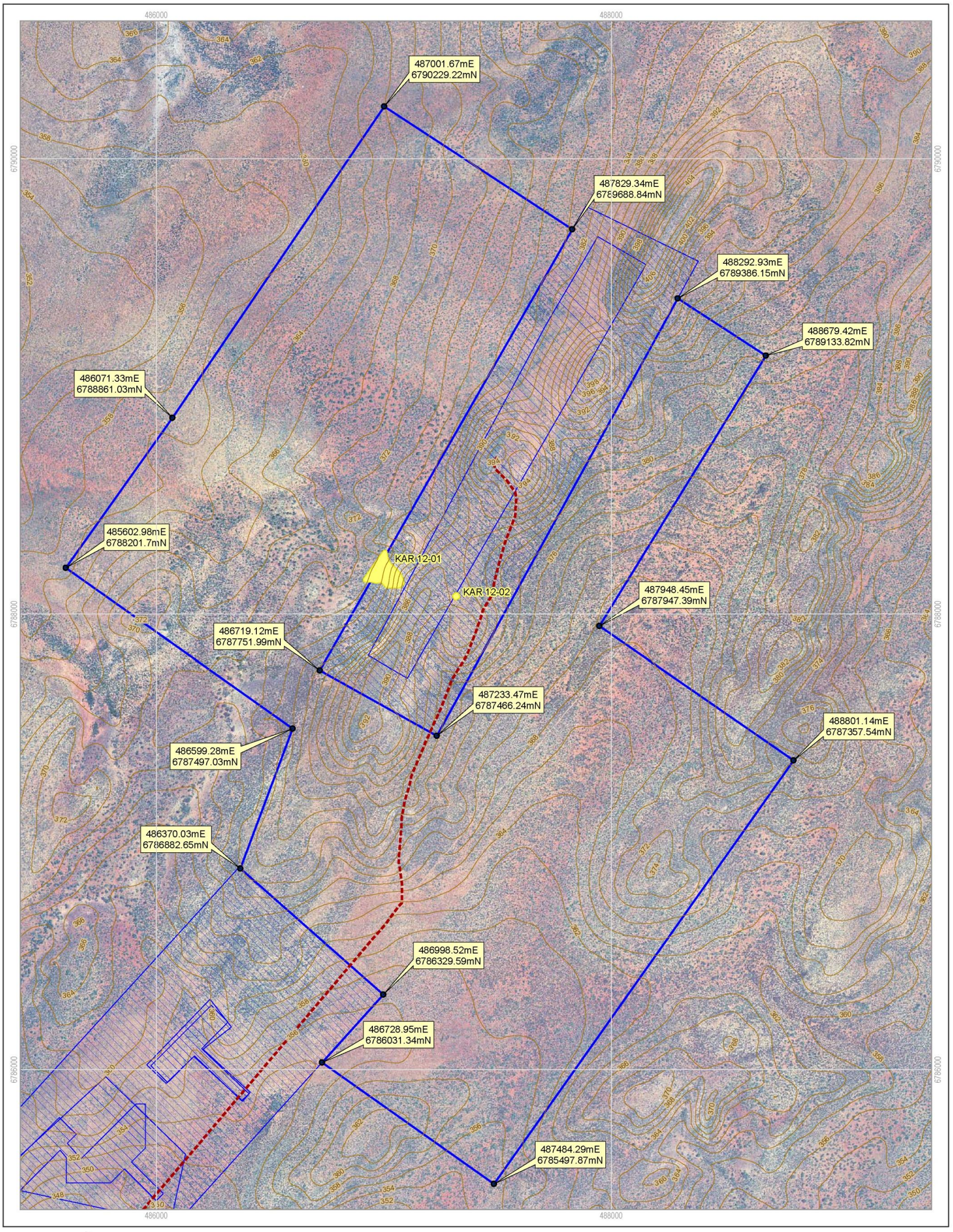
The southern portion of the Hinge PDA differs significantly from the north, with low-lying, undulating laterite and ironstone hills characterising the topography. The ground surface is comprised of hardpan red silty sand, with a gravelly mantle of ironstone, quartz and laterite visible throughout. The soils in this area are shallow and exhibit the effects of erosion and poor drainage. Parts of the southern portion of the PDA are characterised by very dense thickets of Mulga (*Acacia aneura*), Horse Mulga (*A. ramulosa*) and Jam (*A. acuminata*) saplings (<1 m) and burnt trees were noted throughout. A number of mature White Cypress Pines (*Callitris glaucophylla*) were present throughout the area.

On average, ground surface visibility was considered to be 80%, however occasional patches of dense organic detritus reduce visibility to as low as 30%.

Plate 12: Low Acacia aneura thicket in southern portion of the Hinge PDA

The Hinge PDA is illustrated below in Map 1.

Map 1: The Hinge PDA



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4.2 Hinge Haul Road PDA

The Hinge Haul Road PDA is designed to provide access from the Hinge PDA to KML's mining areas at Blue Hills and Terapod. The PDA is aligned roughly north to south and is contained within tenement L59/128. The PDA corridor is 100 m wide and extends for a distance of 11.3 km, totalling an area of approximately 1.1 km^2. The northern extent of this PDA was accessed on foot from the Hinge PDA, while the mid-section was accessed at the intersection of the Mulga Track and a track that extends towards the Mungada Road. The southern mid-section was accessed using a poorly maintained track intersecting with the second track and access was gained to the southern extent by passing by the Terapod Mine site.

Broadly speaking, the PDA is flat with occasional stretches of low, undulating ground, particularly where it intersects with the southern portions of the Hinge PDA. Further to the south, the PDA is intersected by shallow, braided drainage and is a low-lying area in which water appears to accumulate. A number of large claypans were noted in the vicinity, including those comprising the site DIA 24145 (Midwest Claypan).

The vegetation in the northern half of the PDA is largely similar to that of the southern portion of the Hinge, with dense *Acacia spp*. dominating and occasional York Gum (*Eucalyptus loxophleba)* and White Cypress Pine (*Callitris glaucophylla* occurring throughout. The southern half of the PDA is largely open York Gum woodland. The ground surface is largely moderately compact red alluvium with a light algal turf in places. Ground surface visibility ranged between 40 to 90% depending on organic detritus and foliage cover (Plates 13 and 14).

Plate 13: View north across central portion of the Hinge Haul Road PDA

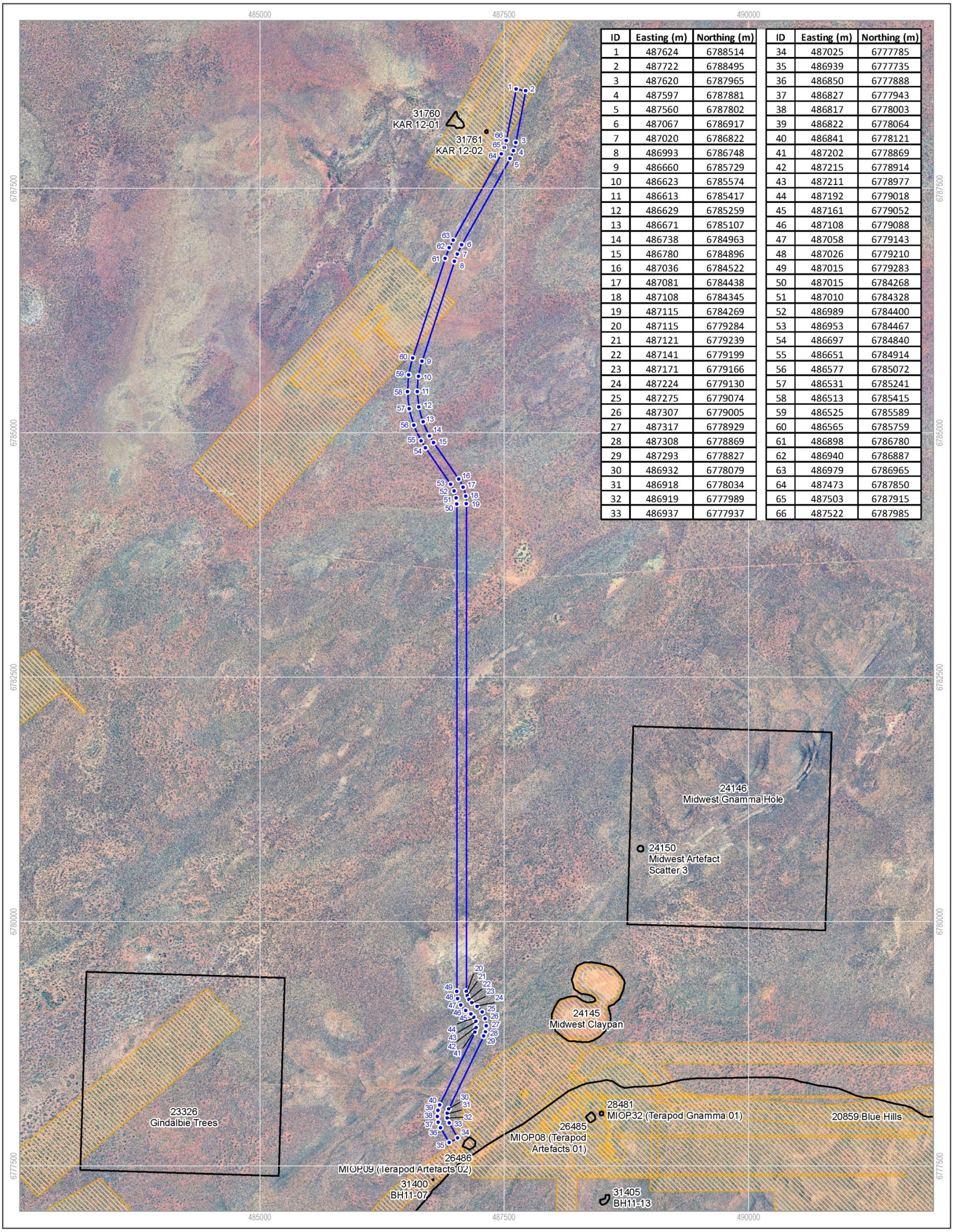
Plate 14: View north from southern portion of the Hinge Haul Road PDA

The Hinge Haul Road PDA has been previously disturbed to a moderate degree, particularly in the central to southern portions. Poorly preserved light vehicle tracks crisscross the area, and access was difficult to most of this PDA.

The Hinge Haul Road PDA is illustrated below in Map 2.

Map 2: Hinge Haul Road PDA

ID	Easting (m)	Northing (m)	ID	Easting (m)	Northing (m)
1	487624	6788514	34	487025	6777785
2	487722	6788495	35	486939	6777735
3	487620	6787965	36	486850	6777888
4	487597	6787881	37	486827	6777943
5	487560	6787802	38	486817	6778003
6	487067	6786917	39	486822	6778064
7	487020	6786822	40	486841	6778121
8	486993	6786748	41	487202	6778869
9	486660	6785729	42	487215	6778914
10	486623	6785574	43	487211	6778977
11	486613	6785417	44	487192	6779018
12	486629	6785259	45	487161	6779052
13	486671	6785107	46	487108	6779088
14	486738	6784963	47	487058	6779143
15	486780	6784896	48	487026	6779210
16	487036	6784522	49	487015	6779283
17	487081	6784438	50	487015	6784268
18	487108	6784345	51	487010	6784328
19	487115	6784269	52	486989	6784400
20	487115	6779284	53	486953	6784467
21	487121	6779239	54	486697	6784840
22	487141	6779199	55	486651	6784914
23	487171	6779166	56	486577	6785072
24	487224	6779130	57	486531	6785241
25	487275	6779074	58	486513	6785415
26	487307	6779005	59	486525	6785589
27	487317	6778929	60	486565	6785759
28	487308	6778869	61	486898	6786780
29	487293	6778827	62	486940	6786887
30	486932	6778079	63	486979	6786965
31	486918	6778034	64	487473	6787850
32	486919	6777989	65	487503	6787915
33	486937	6777937	66	487522	6787985



NORTH

0 kilometres 1

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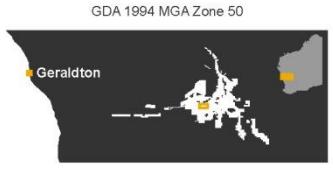
GDA 1994 MGA Zone 50



Legend

- Hinge Haul Rd Survey Area
- DIA Site
- Area Surveyed for Heritage

G:\Exploration\GIS\Maps\Heritage\2012\10 15 - Hinge Haul Road Heritage Survey\TS-ENV-Hinge Haul Rd Heritage Survey Aerial-DM-15Oct2012.mxd

Hinge

Haul Road Heritage Survey Area

15 October 2012

GINDALBIE METALS LTD

TS-ENV-Hinge Haul Rd Heritage Survey Aerial-DM-15Oct2012

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4.3 Skeksi PDA

The Skeksi PDA is located wholly within the central western portion of the Hinge PDA. The PDA measures 550 m by 300 m and covers an area of 0.16 km².

This PDA is characterised by a gently undulating ground surface of soft sandy silt alluvium and is located immediately to the west of the low ironstone and laterite ridge that dissects the Hinge PDA. Vegetative cover is dense, with Mulga (*Acacia aneura)* being the dominant species in the area, and Horse Mulga (*A. ramulosa*) and Jam (*A. acuminata*) also being common throughout. Occasional groves of York Gum (*Eucalyptus loxophleba)* occur throughout and there is an understorey of low *Acacia spp*. shrubs. Overall surface visibility ranged from 80% in open areas to 30% in areas of denser vegetation.

Plate 15: The Skeksis PDA

4.4 The Gap PDA

The Gap PDA is situated on the western side of the Minjar Gold Haul Road, and falls within mining tenement M59/731. The PDA measures 1.7 km by 0.51 km, totalling an area of approximately 0.89 km^2. The Gap PDA is located to the northeast of a currently disused open-cut mine, and the area surrounding the PDA has been heavily disturbed by previous mining and exploration activities. A recent exploration drilling program and associated access tracks occur throughout the centre of the Gap PDA. The PDA was accessed using these tracks, which transect the Minjar Gold Haul Road.

The Gap PDA is situated amongst a series of undulating ironstone and laterite hills. The area is undulating and, in places, the topography was quite steep and rocky. The ground surface at the Gap PDA was comprised of shallow loamy sediment, overlain with a dense covering of ironstone, quartz, laterite and granite gibber.

The vegetation in the northern portion of the PDA was extremely dense, with Mulga (*Acacia aneura),* Horse Mulga (*A. ramulosa*), Jam (*A. acuminata*), Snakewood (*A. xiphophylla*)

dominating the subset, along with Kurara bush (*Acacia tetragonophylla*). A dense understorey of small *Acacia spp*. shrubs was also present in this area.

The vegetation in the southern portion of the PDA was also dominated by *Acacia aneura*; however, the understory was far less dense. Thickets of mature *Acacia aneura* were present on the hill tops in this area, with almost no ground cover or small shrubs. Numerous dead Kurara were also noted on the hills.

Ground surface visibility was generally poor throughout the Gap PDA, being restricted to around 30% by the dense vegetation and rocky nature of the surface matrix. Further to this, the PDA has been extensively disturbed by previous exploration activity and the establishment of access tracks.

4.5 Karara Camp Extension PDA

The Karara Camp Extension area is located immediately adjacent to the existing village. The PDA extends approximately 400 m from the western extent of the current camp and is 230 m wide (north to south). The total area measures 0.1 km^2 and is located within tenement L59/99.

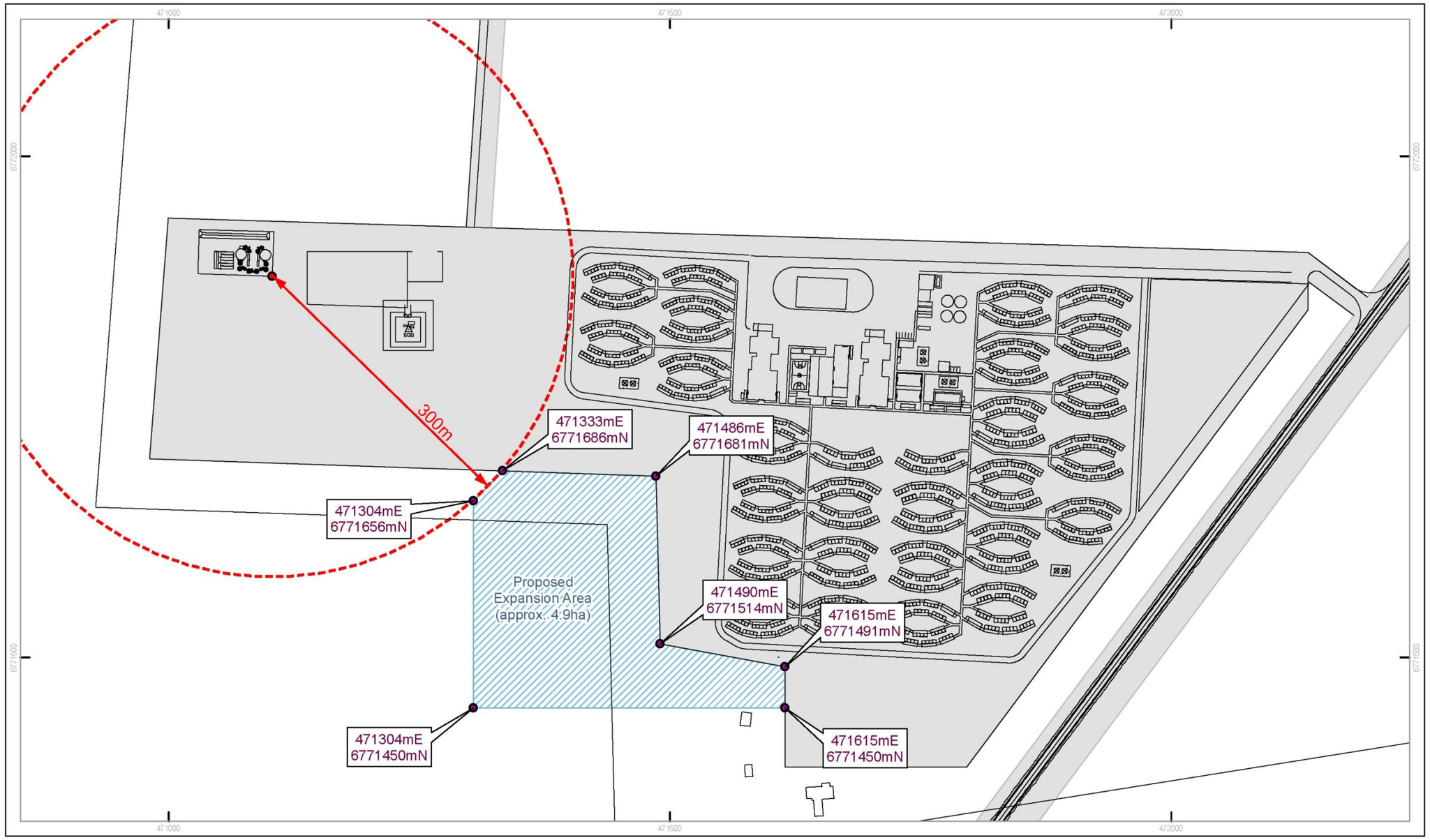
The Karara Camp Extension PDA has been subject to ground clearing activities in the past, as evidenced by the degraded nature of the ground surface. The PDA is composed of moderately compacted red silty alluvium, with patches of mixed gibber on the northern side. The vegetation is an open Mulga (*Acacia aneura),* and *Eucalyptus oleosa* woodland, with seasonal grasses and small shrubs. A mature *Acacia tetragonophylla* was noted within the PDA.

Ground surface visibility was generally very good (80% to 90%) throughout, restricted only by the disturbed nature of the ground and some plant detritus around the larger *Eucalypts*.

The Karara Camp Extension PDA is illustrated below in Map 3.

Plate 16: The Karara Camp Extension PDA

Map 3: Karara Camp Extension PDA



4.6 Tom's Kitchen PDA

The Tom's kitchen PDA is located approximately 45 km north east of the main KML operations at Blue Hills, and incorporates the area of Minjar Gold Ltd Camp. This PDA measures 3.7 km by 0.6 km and covers an area of 2.6 km^2. The PDA was accessed via the Minjar Gold/Golden Grove access road and tracks emanating from this.

The Tom's Kitchen PDA covers a vast area and as such incorporates a number of landform types. The northern portion of the PDA can be described as gently undulating, with a hard pan red sandy silty alluvium ground surface overlain with patches of fine gravels and occasional mixed gibber. The vegetation in this area is largely moderately dense mixed *Acacia* scrub, with Kurara (*A. tetragonophylla*) to 3 m, Horse Mulga (*A. ramulosa*) and Jam (*A. acuminata*) also to 3 m dominating the upperstorey of the subset, with occasional Snakewood (*A. xiphophylla*) noted throughout. Very sparse seasonal grasses were also identified in this area, with very few other plants occurring in the understorey.

Plate 17: The Tom's Kitchen PDA

The northern mid-section of this PDA is dominated by a series of large claypans associated with an ephemeral drainage tract that flows from this area towards the west/southwest. This area is a low-lying area that appears to retain water that is likely to drain away from the hills to the north and west. A windmill is located here and is possibly associated with a spring or soak utilised by Indigenous groups in the pre-European period.

Around these claypans, the density of the mixed gibber increases, as caused by water movement towards these low-lying areas. While the scrub is still dominated by the *Acacia* species noted in the northern section of the PDA, a wider variety of species were identified around the margins of the claypans where the vegetation becomes notably thicker. The claypans themselves were notable for the distinct lack of vegetation and a marked decrease in the density of gibber.

The southern portions of the PDA are characterised by a series of low laterite and banded iron formation hills with very dense, low *Acacia spp*. scrub. Overall the ground surface visibility in the PDA varied considerably from 50% to 90%.

The Tom's Kitchen PDA is largely undisturbed; however, a number of well-established access tracks and some less well-defined light vehicle tracks transect the area. The Minjar Gold Ltd Camp and two turkey nests (of the mining variety) are located within the PDA. Some mild water erosion may have altered the ground surface somewhat throughout.

4.7 Ben's Surprise PDA

The Ben's Surprise PDA is the northernmost PDA of the Project. It is located 53 km northeast of the KML Camp. The PDA is irregular in shape, with maximum dimensions of 1.5 km by 0.46 km and an overall size of 0.47 km^2. It is located on tenement E59/1199. The area was accessed using a number of tracks emanating from the Minjar Gold/Golden Grove access road.

The Ben's Surprise PDA is relatively flat in the northern portions, with a crusted, hardpan red alluvial desposit overlain by a fine gravelly mantle and occasional patches of mixed gibber. The southern areas of the PDA are gently undulating, with a broad, low hill occurring close to the southern extent. The ground surface is a hardpan, pale red sandy silt overlain with dense laterite, ironstone and quartz gibber with cobbles of the same eroding out in places.

The vegetation can be consistently characterised as *Acacia* woodland throughout the PDA, with the density increasing away from the hills. The subset is dominated by Mulga (*Acacia aneura),* Horse Mulga (*A. ramulosa*), Jam (*A. acuminata*) and Snakewood (*A. xiphophylla*) of varying heights. The understorey is very sparse, with occasional Flannel bushes (*Solanum lasiophyllum*) and small Acacia shrubs being noted on the hills and very occasional seasonal grasses elsewhere.

The overall ground surface visibility ranged from 80% on the flats to 40% on the hills. There were moderate levels of disturbance noted in this PDA, with a number of light vehicle tracks transecting the area. A fenceline and access track runs parallel to the south eastern boundary of the PDA.

Plate 18: Southern end of the Ben's Surprise PDA

4.8 Shine E PDA

The Shine E PDA is located 44 km northeast of the KML Camp. The PDA is located within tenement M59/406 and adjoins the northern end of the Gap PDA. The Shine East PDA measures 890 m by 390 m and covers an area of 0.34 km^2. The area was accessed via old gridlines crossing over the Minjar Gold Haul Road.

The Shine E PDA is characterised by a series of laterite hills with extremely dense vegetation. The ground surface on the hills consisted of a hardpan red sandy silt overlain by dense, coarse quartz and laterite gibber. The shallow gullies in between also consisted of a hardpan red sandy silt, but with a fine gravelly mantle and relatively sparse gibber.

As mentioned above, the vegetation in this PDA is extremely dense, with Mulga (*Acacia aneura),* Horse Mulga (*A. ramulosa*), Jam (*A. acuminata*) and Snakewood (*A. xiphophylla*) dominating the subset. Large Shrubby Sheoaks (*Allocasuarina campestris*) were noted on the hills. The understorey is moderately sparse, with small *Acacia* shrubs and occasional seasonal grasses.

Plate 19: The Shine E PDA

The overall ground surface visibility at the Shine E PDA was moderate (60% to 75%). The level of disturbance in this PDA is considered to be moderately high, particularly in the northern sections where an old drill program has been conducted. As expected, this area is criss-crossed with numerous light vehicle tracks.

Plate 20: Old drilling activity in the Shine E PDA

4.9 Onga Extension PDA

The Onga Extension PDA is located approximately 41 km northeast of the KML Camp on tenement E59/887. It measures 700 m by 250 m and covers an area of 0.17 km^2. Access was gained using a series of tracks likely to be associated with the Winddine Well Mine site and extending from the Minjar Gold Haul Road.

The Onga Extension PDA is, much like Shine E, characterised by a series of laterite hills with extremely dense vegetation. The ground surface on the hills consisted of a hardpan red sandy silt overlain by dense, coarse quartz and laterite gibber. The shallow gullies in between also consisted of a hardpan red sandy silt, but with a fine gravelly mantle and relatively sparse gibber.

Plate 21: Katrina Phillips in the Onga Extension PDA

The vegetation in this PDA is extremely dense, with Mulga (*Acacia aneura),* Horse Mulga (*A. ramulosa*), Jam (*A. acuminata*) and Snakewood (*A. xiphophylla*) dominating the subset. Large Shrubby Sheoak (*Allocasuarina campestris*) were noted on the hills. The understorey is moderately sparse, with small *Acacia* shrubs and occasional seasonal grasses.

The ground surface visibility was generally fair (60% to 75%) and a moderate level of disturbance was noted. Vehicle access tracks were established in the area and some large, recently bulldozed areas were identified, impacting the integrity of the land surface substantially.

4.10 Lister/Gobo PDA

The Lister and Gobo PDA's cover exactly the same area, and as such will both be discussed here and referred to as Lister/Gobo. The Lister/Gobo PDA is located 750 m to the southwest of the Onga Extension PDA, and measures 1.5 km by 0.25 km. The PDA is located on tenements E59/887 and M59/458 and covers an area of 0.51 km^2. Access was gained to this area using a series of tracks likely to be associated with the Winddine Well Mine site and extending from the Minjar Gold Haul Road.

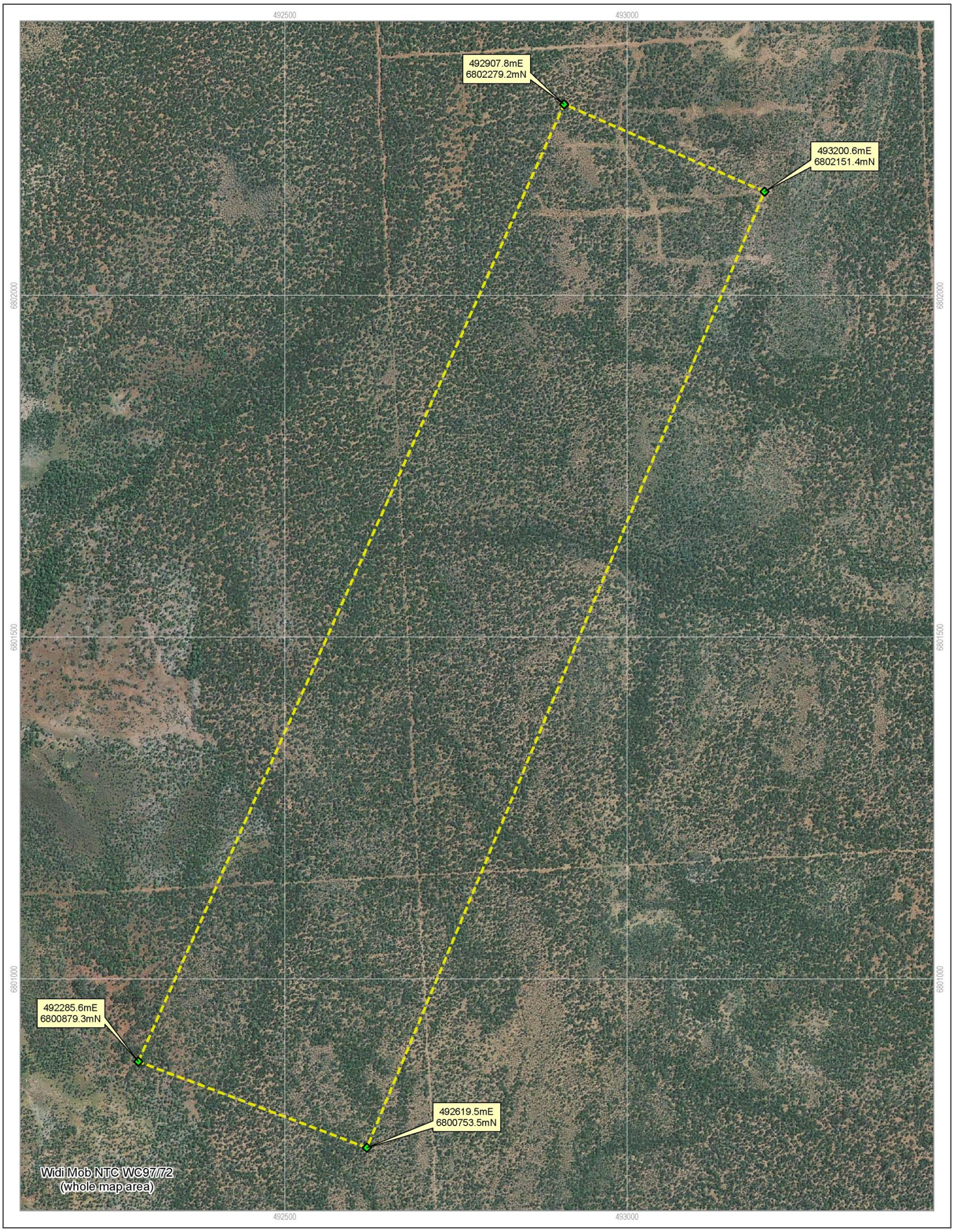
The topography, ground surface and vegetation at the Lister/Goba PDA are identical to that in the Onga Extension and Shine E PDAs. Laterite hills occur in the north eastern portion of the survey area, and the PDA tends to slope downwards towards the southern boundary. An ephemeral drainage channel extends from the southwest corner of the Onga Extension PDA and along the south western boundary of the Lister/Gobo PDA, at a distance of approximately 200 m from the boundary. Occasional poorly defined drainage channels intersected with this PDA.

Plate 22: The Lister/Gobo PDA

The overall ground surface visibility was moderate (60% to 75%) and the area was largely intact. Some access tracks associated with past exploration activity were visible in the northern portions and two gridlines transect the area. Some minor water erosion was also present. In general, the integrity of the land surface in this PDA was moderate to high.

The Lister / Gobo PDA is illustrated below in Map 4.

Map 4: The Lister / Gobo PDA



4.11 Brak G PDA

The Brak G PDA is situated in the centre of the Project Area, approximately 35 km northeast of the KML Camp. The PDA measures 820 m by 380 m and covers an area of 0.31 km^2. It is located on tenement E59/1202 and was accessed via a well-established fenceline access track which intersects with the Minjar Gold Haul Road to the east.

The Brak G PDA is a flat, alluvial area which is likely to act as a minor catchment area for water run-off from the hills to the north. The ground surface is largely comprised of moderately compact red sandy silts interspersed with soft sandy patches. Fine ironstone and laterite gravels were noted along with sparse mixed gibber, particularly in the firmer areas. An ephemeral drainage line snakes around the western boundary of the PDA and across the southern portion.

The vegetation can be classified as a moderately dense open Acacia and Eucalyptus woodland, with large open areas throughout. Mulga (*Acacia aneura),* Horse Mulga (*A. ramulosa*), Jam (*A. acuminata*), Snakewood (*A. xiphophylla*) dominate the subset with York Gum (E. loxophleba) and occasional Gidgee (A. cambagei) occurring throughout. All of the vegetation in this area appears to be relatively immature, signifying regeneration after a bush fire. The understorey is comprised predominately of Flannel bushes (*Solanum lasiophyllum*) and seasonal grasses.

Overall ground surface visibility in this PDA is considered to be moderately high (80% to 90%), with very little impediment. The Brak G PDA has a high level of ground surface integrity, with very little damage being caused by human agency. Two old gridlines cross through the area and a future drill programme has been pegged out.

Plate 23: The Brak G PDA

4.12 Brak South PDA

The Brak South PDA is located 1.5 km west of the Brak South PDA in the centre of the KML Regional Exploration Priorities Project, approximately 35 km northeast of the KML Camp. The PDA measures 750 m by 295 m and covers an area of 0.22 km^2. It is located on tenement E59/1170 and was accessed via a well-established fenceline access track which intersects with the Minjar Gold Haul Road to the east.

The Brak South PDA is a flat, densely vegetated area with moderately compacted red sandy silt deposits overlain in patches by fine gravels. The vegetation is characterised by low mixed Acacia regrowth less than 1.5 m in height. Mulga (*Acacia aneura),* Horse Mulga (*A. ramulosa*) and Jam (*A. acuminata*) dominate the subset. The thickness of the regenerating vegetation has prohibited the development of an understorey.

The overall ground surface visibility at the Brak South PDA is poor (30% to 40%). The land integrity here is generally high, with two vehicle access tracks being the only obvious disturbance. The fenceline access track conjoins a less well-established track at the northern end of the PDA.

Plate 24: The Survey Team in the Brak South PDA

4.13 Terapod East PDA

The Terapod East PDA is located opposite current workings at the Terapod Mine site and 18 km northeast of the KML Camp. It is situated on tenement M59/649 and measures 885 m by 460 m. The PDA covers an area 0.41 km^2. The PDA was accessed via a series of tracks connecting Mulga Track to the Mungada Road.

The PDA is situated on a large laterite hill, sloping upwards towards the north. The ground surface consists of a hardpan red sandy silt deposit overlain by very coarse, dense laterite gibber. Large outcrops of granite and laterite were noted around the apex of the hill, as were smaller outcrops of banded iron formation and high quality quartzite conglomerate. Some ephemeral, braided drainage was noted on the western and southern slopes of the hill.

The vegetation in the Terapod East PDA can be classified as very dense mixed Acacia scrub. The subset is dominated by Mulga (*Acacia aneura),* Horse Mulga (*A. ramulosa*), Jam (*A. acuminata*) and Snakewood (*A. xiphophylla*), with a number of Shrubby Sheoak (*Allocasuarina campestris*) noted on the apex of the hill. Occasional York Gums (*E. loxophleba*) were observed at the northern most extent of the PDA.

Visibility was generally poor throughout the Terapod East PDA (30% to 50%), with dense vegetation and heavy gibber being the cause. This PDA is considered to be highly disturbed, with well over half of the PDA being modified by activity associated with mining at the Terapod Mine site (see Plate 7).

Plate 25: The Terapod East PDA

4.14 Mystic PDA

The mystic PDA is located approximately 9 km south west of mining activity at Terapod and 9 km east of the KML Camp, on tenement M56/644. The area measures 850 m by 260 m and covers an area of 0.22 km^2. The PDA is situated roughly 2 km from the apex of Mt Karara, and 16 km from Blue Hills. The Mongers Lake complex is located approximately 40 km to the east.

The Mystic PDA is very flat, with a moderately compacted ground surface of silty red alluvium. For the most part the ground surface has a crusty, cracked appearance consistent with areas that retain water; however, there are also patches of soft, sandy sediment throughout. Very little gibber was noted throughout this PDA, with some discrete areas of fine ironstone gravels occurring in pockets. Overall the visibility in this PDA was very high (90%).

The vegetation at the Mystic PDA is characterised by an open *Eucalypt* and *Acacia* woodland, with large, mature York Gums (*E. loxophleba*) occurring in clusters of four to five throughout the area. These clusters coincided with the areas of soft sandy deposits. Outside of these open pockets of *Eucalypt* woodland, the vegetation became moderately dense, with

Mulga (*A. aneura*), Horse Mulga (*A. ramulosa*), Jam (*A. acuminata*), Kurara (*A. tetragonophylla*) and a spiny Acacia (possibly related to *A. wiseana*) occurring in equal numbers. Occasional Kurrajongs (*Brachychiton gregorii*) were also noted amongst the subset. The understorey was populated by a variety of species, including seasonal grasses, Flannel bushes (*Solanum lasiophyllum*) and Desert Pride (*Eremophila mackinlayi*).

Plate 26: View across disturbance at the Mystic PDA

This PDA was heavily disturbed by newly established vehicle tracks leading to large areas roughly 25 m by 25 m in size which have been stripped of vegetation and cleared for future drilling (see Plates 26 and 27). These prepared drill pads each contained a wooden peg with the drill hole number on it and a sump excavated to a depth of between 0.5 m and 1 m for drainage. Each of these drill pads were recorded in case of future reference. This PDA or drill program has not been subject to a heritage survey in the past; however, KML hold a PoW, which Terra Rosa has been advised permits work to proceed without heritage clearance under the Western Australian Government's Cultural Heritage Due Diligence Guidelines (2011).

Plate 27: Typical prepared drill pad encountered at the Mystic PDA

4.15 Weave PDA

The Weave PDA is situated approximately 30 km northeast of the main KML work area. KML is proposing to widen existing vehicle tracks in the eastern and southern portions of the Weave PDA to create access to a future exploration area to the west. The PDA totals 8 km in length, covers an area of 1.06 km^2 and is located across four tenements (E59/1170, P59/1842, E59/935 and E59/1202).

The eastern and western portions of the Weave PDA vary significantly in landform and vegetative cover. The north-eastern portion is comprised of a sandy silt softpan alluvium flat sloping slightly down towards the south. While there is little to no gibber in this area, there are some small patches of eroded limestone and quartz. The vegetation consists of very low, moderately dense *Acacia* regrowth dominated by Mulga (*A. aneura*) <1 m and mixed with Jam (*A. acuminata*) and Horse Mulga (*A. ramulosa*). It is likely that a fire has damaged this area in the recent past and the low-lying vegetation is a result of this.

Plate 28: The eastern portion of the Weave PDA

The southern portion of the PDA levels out and forms a catchment area for run-off from the northern portions. The ground surface in this area is comprised of firmer sandy silt which is slightly crusted from retaining water. It is covered by a moderately dense mixed gibber of ironstone, quartz and laterite. The vegetation is this area is a dense *Acacia* and *Eucalyptus* woodland, dominated by larger versions on the varieties listed above, along with Kurara (*A. tetragonophylla*) and large, mature York Gums (*E. loxophleba*) occurring throughout. There is a moderately sparse understorey of Flannel bushes (*Solanum lasiophyllus*), Desert Pride (*Eremophila mackinlayi*) and mixed *Acacia* spp.

Plate 29: The southern portion of the Weave PDA

The western portion of the Weave PDA is located on a series of low laterite hills with regular outcrops of quartzite, laterite and quartz. The ground surface is comprised of a hardpan, pale red sandy silt with a moderately dense mixed gibber of ironstone, laterite, quartzite and quartz on the hills and soft sandy alluvium with very sparse mixed gibber in the shallow gullies in between. The vegetation on the hills varied, with the southern end being characterised by the same low regrowth that was observed on the flats to the east. In general, the hills were thickly vegetated by mixed Acacia scrub dominated by Mulga (*A. aneura*), Jam (*A. acuminata*) and Horse Mulga (*A. ramulosa*) <4 m, with an understorey of Flannel bushes (*Solanum lasiophyllus*), Desert Pride (*Eremophila mackinlayi*) and mixed *Acacia* spp. In the low-lying areas, large York Gums (*E. loxophleba*) to 15 m dominated the subset, occurring in clusters with very little other vegetation being noted, apart from seasonal grasses.

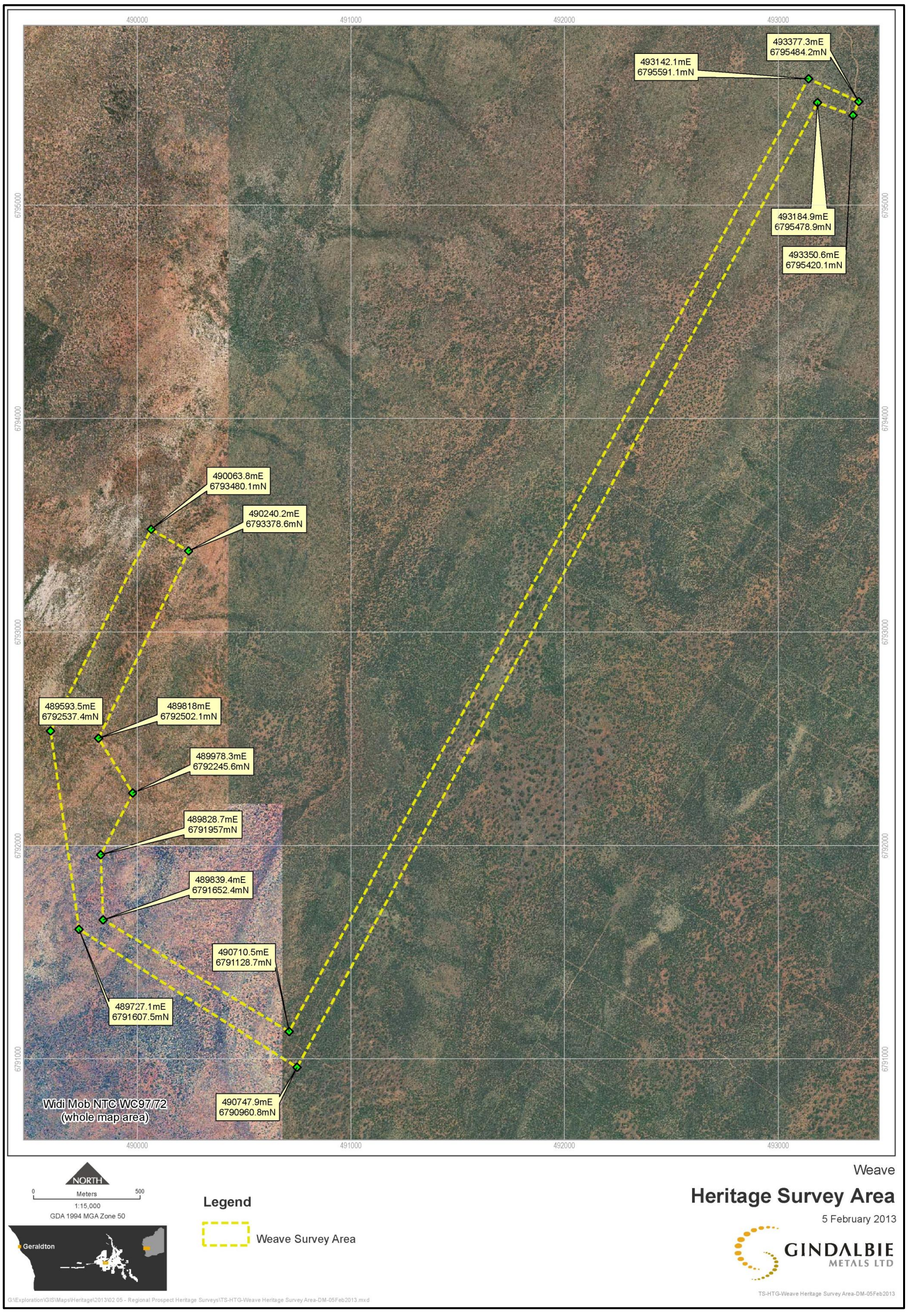
Plate 30: Facing north across the western portion of the Weave PDA

The overall ground surface visibility in this PDA varied considerably, with moderate visibility in the northern and mid sections of the eastern portion (75%) and poor visibility across the remainder of the PDA (30% to 50%).

The land integrity at the Weave is considered to be moderate. An existing track in poor condition runs through the middle of the eastern and southern portions of the PDA and there are traces of some long-disused gridlines intersecting this track. There is also some moderate some damage caused by water erosion. The western section of the PDA is largely undisturbed and is impenetrable by vehicle.

The Weave PDA is illustrated below in Map 5.

Map 5: The Weave PDA



4.16 Horse & Pebbles PDA

The Horse & Pebbles PDA is located 1.8 m to the west of the northern extent of the Weave PDA and overlaps the Brak South PDA. The PDA is irregular in shape, with maximum dimensions of 410 m by 980 m (not including the area previously surveyed as Brak South) and covers an area of 0.3 km^2. The Brak South and Horse & Pebbles PDAs are located on tenement E59/1170 (see Map 6).

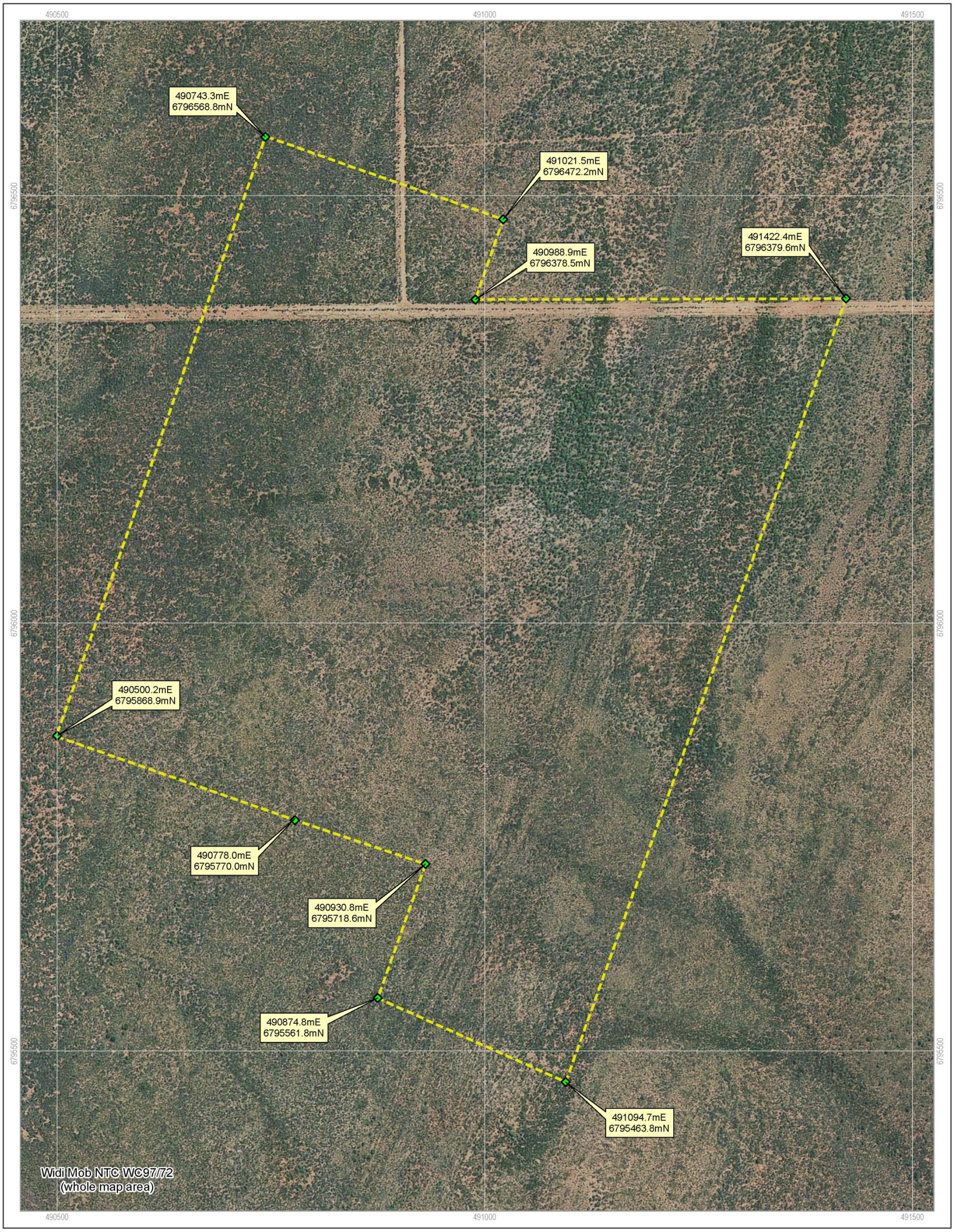
The Horse & Pebbles PDA is situated on the southern slopes of a series of low-lying, gently undulating hills which transect the area in an east/west orientation. The PDA slopes downwards and undulates from the north eastern end to approximately mid-way through the PDA, where the ground surface levels out. A rocky, ephemeral creekline transects the area, running roughly northeast/southwest through the centre of the PDA and the landform in the eastern portion of the PDA is dominated by a drainage area. The ground surface on the rises to the north are characterised by hardpan red sandy silt with a moderate to dense mixed gibber of laterite, quartz and siltstone. A number of outcrops of quartzite, laterite and quartz were noted on the hills. In the southern portions of the PDA, the ground surface is comprised of a softpan silty sand with low densities of mixed gibber.

The vegetation is the eastern and southern portions of the PDA are characterised by low-lying mixed Acacia regrowth, similar to Brak South and the northern portion of the Weave. The subset on the rocky hills is characterised by dense mixed Acacia, Eucalyptus and native pine thicket, with Mulga (*A. aneura*), York Gum (*E. loxophleba*) and White Cypress Pine (*Callitris glaucophylla)* dominating the upperstorey. The understorey is comprised of low, mixed Acacia regrowth, Flannel bushes (*Solanum lasiophyllus*), Desert Pride (*Eremophila mackinlayi*) and seasonal grasses.

The overall ground surface visibility at the Horse & Pebbles PDA is considered to be poor (30% to 40%). The integrity of the ground surface is moderate to good, with water erosion causing extensive damage throughout the northern and eastern sections of the PDA.

Plate 31: The Horse and Pebbles PDA

Map 6: Horse and Pebbles PDA



5 FIELD SURVEY RESULTS

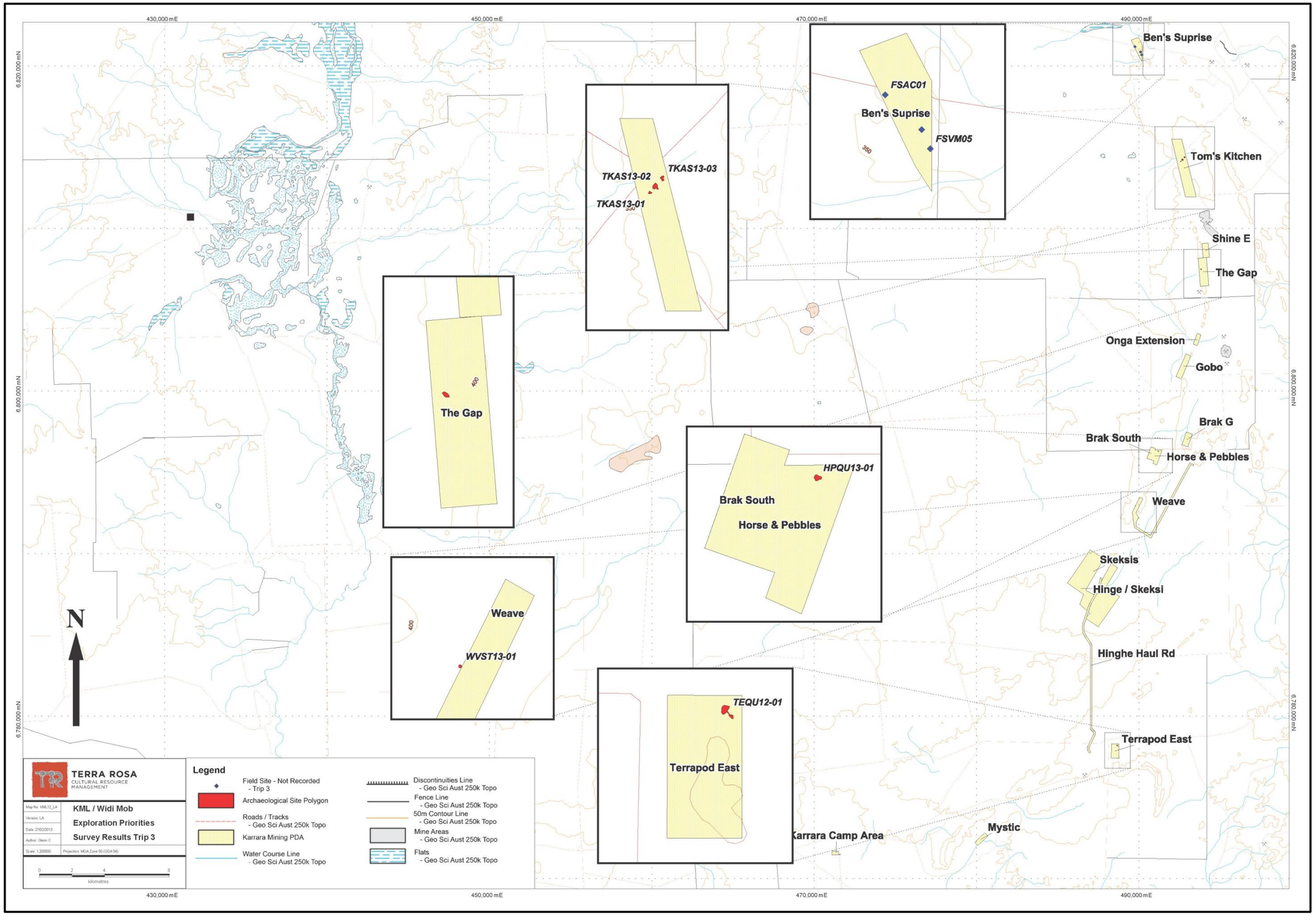
The survey of all 16 PDAs has been completed. The results of the archaeological and ethnographic site identification heritage survey of the PDAs are summarised below in Table 7 and illustrated in Map 7.

Table 7: Results of the Widi Mob Site Identification Heritage Survey

PDA Name	Sites Identified
The Hinge	0
The Hinge Haul Road	0
Karara Camp Extension	0
The Gap	1
Skeksi	0
Ben's Surprise	*
Tom's Kitchen	3
Shine E	0
Onga Extension	0
Lister/Gobo	0
Brak G	0
Brak South	0
Terapod East	1
Mystic	0
Weave	1
Horse & Pebbles	1

* Three field site points were identified in this PDA; however, as it has been removed from the Priority list, they have not yet been assessed and recorded to site identification standard. It is likely that the three points constitute a single, large site.

Map 7: Overview of field survey results within the Regional Exploration Priorities Project Area



5.1 Heritage Sites Identified within the PDA

5.1.1 TEQU12-01 Quarry and Artefact Scatter

Central Coordinate: 488673 mE / 6778187 mN

5.1.1.1 Location and Environment

TEQU12-01 is situated in the north eastern corner of the Terapod East PDA (see Map 8) on a laterite hill with large, rocky outcrops of dolerite, quartz and banded iron formation. The view from this position is far-reaching, with the claypans that form site DIA 24145 (Midwest Claypan) clearly visible from this vantage point. The site is located less than 1 km from current workings at the Terapod Mine site and within metres of a large excavated area associated with the Terapod Mine (see Plate 7).

The ground surface at this site is composed of hardpan red/brown sandy silts overlain by a dense covering mixed gibber of dolerite, banded iron formation, quartz and quartzite. There were obvious signs of water erosion in the form shallow drainage channels filled with small rocks and other debris around the site.

The vegetation within TEQU12-01 can be described as dense mixed Acacia scrub, dominated by mature Mulga (*A. aneura*), Horse Mulga (*A. ramulosa*) and Snakewood (*A. xiphophylla*). Shrubby Sheoak (Allocasuarina campestris) and Kurrajong (*Brachychiton gregorii*) were also noted throughout the site. The understorey consisted of low *Acacia* shrubs, mainly wattles.

The boundary coordinates for TEQU12-01 are provided in Table 15 (see Appendix 2).

Plate 32: Facing east across TEQU12-01

5.1.1.2 Site Integrity

While the site has not been directly impacted by human agency, it is potentially being affected indirectly by activity occurring within metres of the site boundary (see Plate 7 and 34). Water erosion has caused moderate to severe impacts in some portions of the site, mainly around the north western boundary.

Plate 33: Spoil heap visible from the western boundary of TEQU12-01

5.1.1.3 Recording Methodology

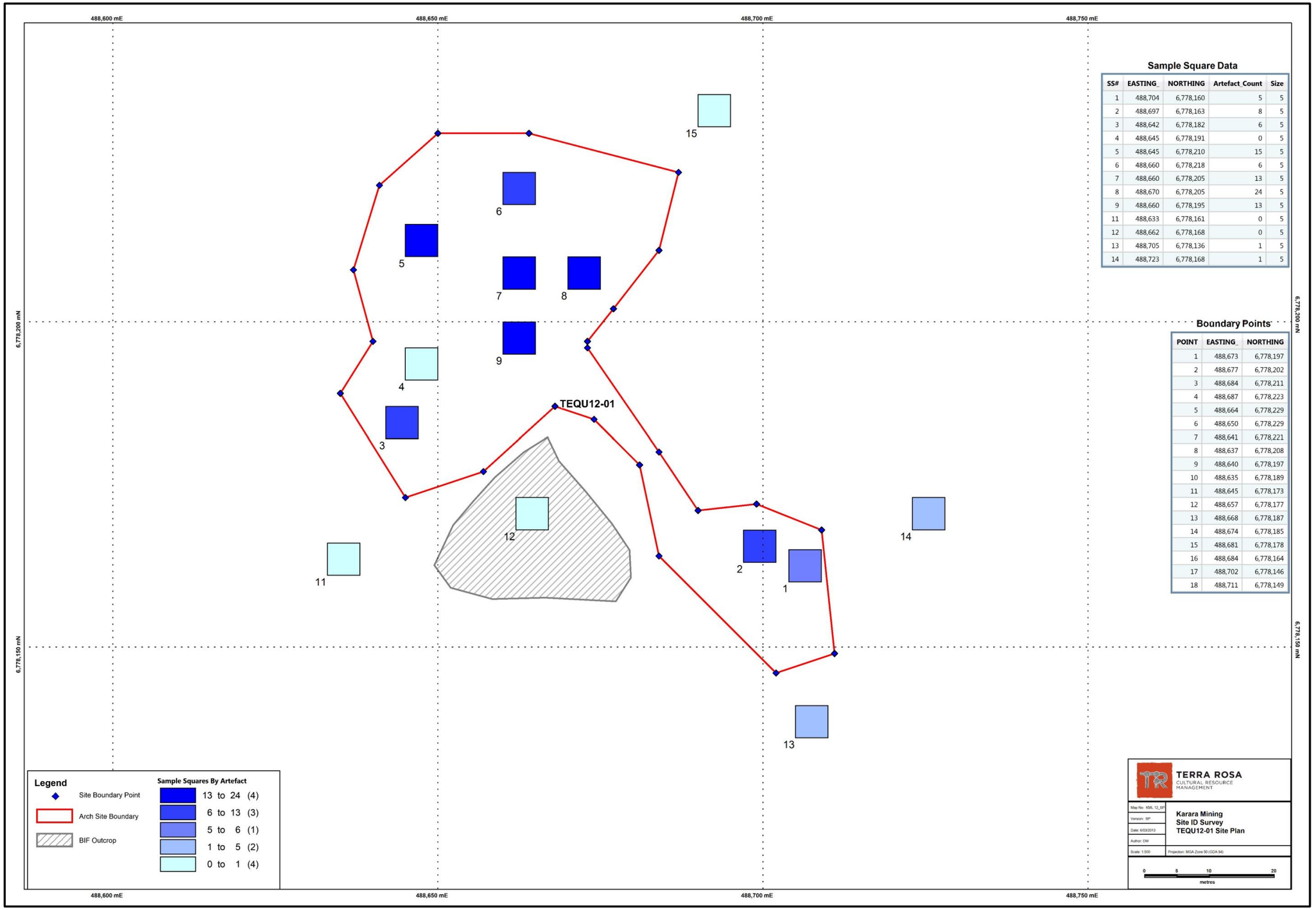
TEQU12-01 is a small, relatively discrete quarry site and artefact scatter with a total site surface measuring 2207 m^2. Pedestrian inspection of the area ascertained that the surface expression of the site is contained within a small area which is not bounded by any natural land forms.

The site boundaries were determined by walking in cardinal directions from the centre of the site until no artefacts were visible on the ground surface. Flagging tape was then attached to trees in order to demarcate the site.

Once the site boundaries were established, Terra Rosa CRM heritage consultants used a combination of arbitrary and targeted methods to place sample squares around the site. Each sample square measured 5 m by 5 m. A total of nine sample squares were placed within the site boundaries which resulted in 10.2% of the total surface area of the site being sampled. The artefacts which were present in the sample squares were recorded to site identification level (see Plate 34).

Plate 34: Irwin Lewis inspecting a sample square

Map 8: TEQU12-01 site plan



Sample Square Data

SS#	EASTING_	NORTHING	Artefact_Count	Size
1	488,704	6,778,160	5	5
2	488,697	6,778,163	8	5
3	488,642	6,778,182	6	5
4	488,645	6,778,191	0	5
5	488,645	6,778,210	15	5
6	488,660	6,778,218	6	5
7	488,660	6,778,205	13	5
8	488,670	6,778,205	24	5
9	488,660	6,778,195	13	5
11	488,633	6,778,161	0	5
12	488,662	6,778,168	0	5
13	488,705	6,778,136	1	5
14	488,723	6,778,168	1	5

Boundary Points

POINT	EASTING_	NORTHING
1	488,673	6,778,197
2	488,677	6,778,202
3	488,684	6,778,211
4	488,687	6,778,223
5	488,664	6,778,229
6	488,650	6,778,229
7	488,641	6,778,221
8	488,637	6,778,208
9	488,640	6,778,197
10	488,635	6,778,189
11	488,645	6,778,173
12	488,657	6,778,177
13	488,668	6,778,187
14	488,674	6,778,185
15	488,681	6,778,178
16	488,684	6,778,164
17	488,702	6,778,146
18	488,711	6,778,149

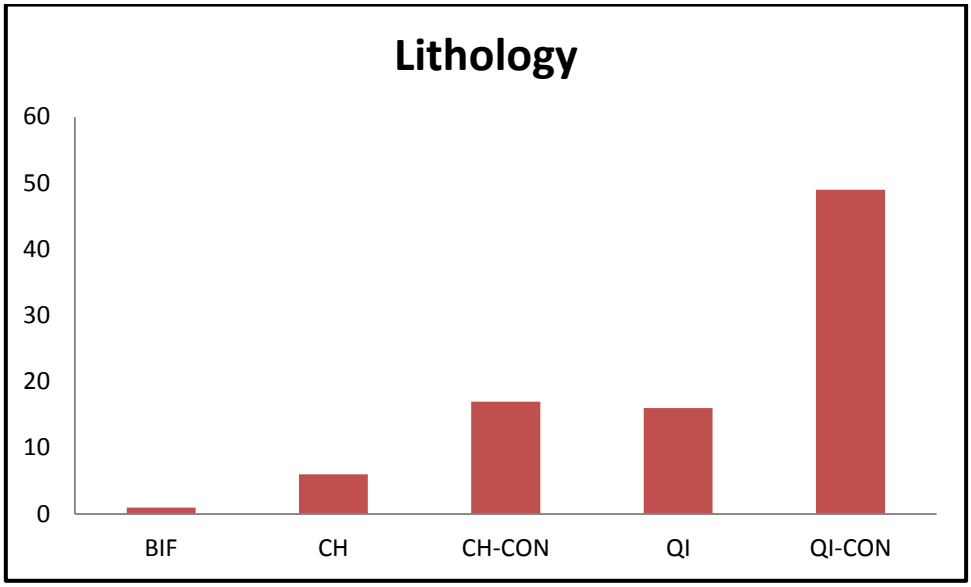
5.1.1.4 Site Fabric

TEQU12-01 is a small, relatively discrete quarry site located on a laterite hill. The main source material utilised is a quartzite conglomerate, which is outcropping in large boulders in the mid-section of the site (see Plate 35 below). Large outcrops of poor quality banded iron formation, dolerite and quartz also occur within the site; however, these do not exhibit evidence of human agency.

Plate 35: Quartzite conglomerate outcrops at TEQU12-02

The artefact assemblage at the site is composed predominantly of quartzite conglomerate (55%), with chert conglomerate (19%), quartzite (18%), chert (7%) and banded iron formation (1%) also being present within the assemblage (see Figure 4 below). All of these lithic types have been sourced on site, and three main types vary only based on the percentage of chert and quartzite present in each piece (see Plate 36).

Figure 4: Lithologies present with the TEQU12-01 sampled assemblage



* Please note that a complete list of artefact codes is provided in Appendix 1 of this Report

Plate 36: An example of quartzite conglomerate artefacts at TEQU12-01

Flakes (55%) are the most common artefact type identified at this site. Flake fragments and broken flakes contribute 21% of the assemblage, with cores and core fragments constituting

5.6% and 12.4% respectively (see Figure 5 below). One formal tool was identified and three utilised flakes were also noted within the recorded assemblage. Based on the figures presented above, it is possible to interpret this site as a quarry site due to the high incidence of flakes, broken flakes and core fragments. It is likely that core preparation was the main activity undertaken here, as evidenced by the relatively low numbers of cores identified *in situ*.

Figure 5: Artefact typologies present within the TEQU12-01 assemblage

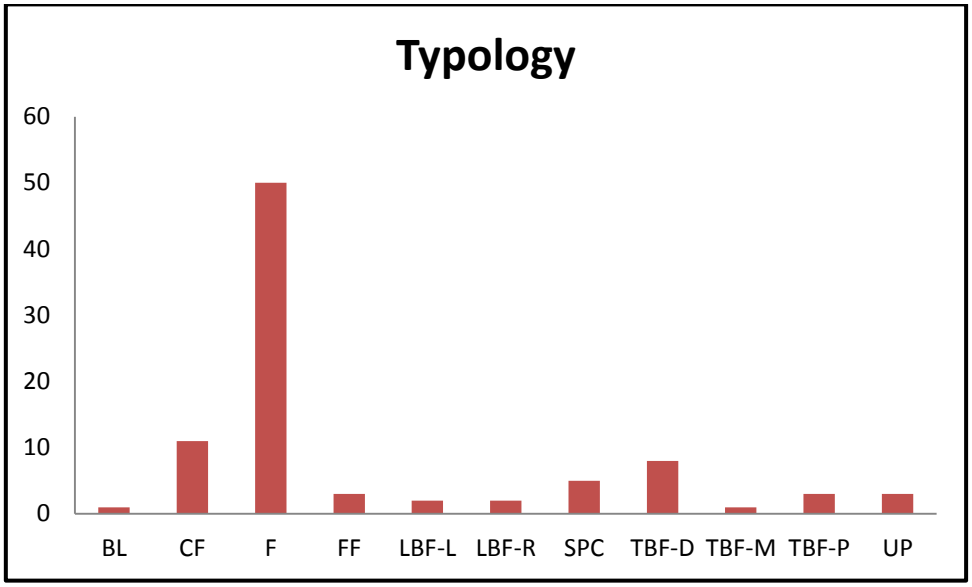


Plate 37: Flakes, flake fragments and core fragments in situ *at TEQU12-01*

A total of 89 artefacts were recorded at TEQU12-01 within the sampled assemblage. Using this data, it is possible to extrapolate that the average density of artefacts across this site is 0.39/m² with an overall population of 860 artefacts. The maximum density of artefacts based on the statistics is 0.96/m² (n=2118) and the minimum density is 0.2/m² (n=441). However, based on the visual inspection of the site, and the fact that the site has been subject to water erosion, the actual density of artefacts across this site is likely to at the higher end of the spectrum.

The raw source material at this site is very distinctive and rare, and as such it may be possible to trace artefacts made from this material back to the original source at this site. As stated above, it is likely that core preparation activities took place at this site and prepared cores were carried away for further use or perhaps as trade items.

5.1.1.5 Significance Assessment

The significance assessment for TEQU12-01 is summarised in Table 8 and discussed below.

Table 8: TEQU12-01 Significance Assessment Matrix

	NOT A SITE	REGIONAL			STATE	NATIONAL
Degree of Significance	Negligible	Low	Moderate	High	Very High	Outstanding
Integrity						
Uniqueness						
Cultural						
Features						
Research Potential						

TEQU12-01 has been attributed a high level of regional significance in Uniqueness and Research Potential. This is due to the rarity and highly distinctive nature of the raw material at this site and the potential for artefacts to be traced back to this source. Further to this, according to a search of the AHIS, quarry sites represent only 7.6% of all sites and other heritage places within 50 km of TEQU12-01.

While it has been noted above that the site has suffered some damage by water erosion, it remains largely intact. Any artefacts displaced by water activity are likely to be within the vicinity of the site in drainage channels and may be buried beneath alluvial deposits in these areas. Overall there is little potential for subsurface material within the site as recorded.

The site is considered to be of moderate significance to the Widi Mob Traditional Owner group due to the rarity and distinctive nature of the raw source material here. It is noteworthy that the representatives present, along with the heritage consultants present, had not seen this particular type of material previously.

5.1.1.6 Site Management Considerations and Recommendations

The following conclusions and recommendations have been approved by the Widi Mob Traditional Owner representatives that were present during the Survey:

- KML employees and contractors should be made aware of the location and boundaries of newly identified Aboriginal heritage site TEQU12-01;
- The Widi Mob Traditional Owners request that the site is avoided if possible during future developments at the Terapod Mine site; and
- TEQU12-01 may constitute a heritage site under Section 5a of the Act. Regardless of the status attributed the site by the ACMC, and if consent to destroy it is granted under Section 18, the Widi Mob request the opportunity to undertake a targeted salvage program at TEQU12-01.

5.1.2 TGAS12-01 Artefact Scatter

Central Coordinate: 493828 mE / 6807492 mN

5.1.2.1 Location and Environment

TGAS12-01 is located just to the west of the centre of The Gap PDA on the apex of a low laterite hill. From this position, the view stretches far to the west and the Winndine Well Mine Site, located 1.4 km to the south, is visible through the dense scrub (see Plate 38 below). Previously recorded site DIA 28481 (MIOP 32 Terapod Gnamma 01) is located 50 m to the northwest of the TGAS12-01 boundary. The boundary coordinates for TGAS12-01 are provided in Table 16 (see Appendix 2) and the site plan is illustrated in Map 9.

Plate 38 View facing south from boundary of TGAS12-01

The ground surface on the low laterite hill is comprised of a hardpan, pale red silty sand overlain by a moderately dense covering of laterite and ironstone gravels. Occasional larger pieces of laterite were noted throughout the area, with outcropping around the creek line. A braided, rocky ephemeral creek line is situated approximately 30 m to the north of the site and drains down from the hill in a north/south orientation.

The vegetation at TGAS12-01 can be classified as dense *Acacia* scrub, consisting mostly of mature Mulga (*A. aneura*), Horse Mulga (*A. ramulosa*) and Jam *(A. acuminata*) (Plate 39). The understorey is moderately dense, and consists of mixed *Acacia spp*., Kurara bushes (*A. tetragonophylla*), Flannel bushes (*Solanum lasiophyllus*), and *Eremophila spp.* less than 1.5 m in height. Seasonal grasses were also noted throughout.

Plate 39: Typical vegetation within TGAS12-01

5.1.2.2 Site Integrity

TGAS12-01 is situated in a relatively stable position, on the flat apex of a low hill, and with dense vegetation prohibiting large-scale movement of artefacts through water erosion. Some minimal movement was noted along the south-western boundary of the site, where the hill slopes down steeply.

The site has been impacted by human agency, with an access track associated with previous drilling activity intersecting with the northern extent of the site (see Plate 40 below). Overall the integrity of TGAS12-01 is moderate to good.

Plate 40: Access track intersecting TGAS12-01

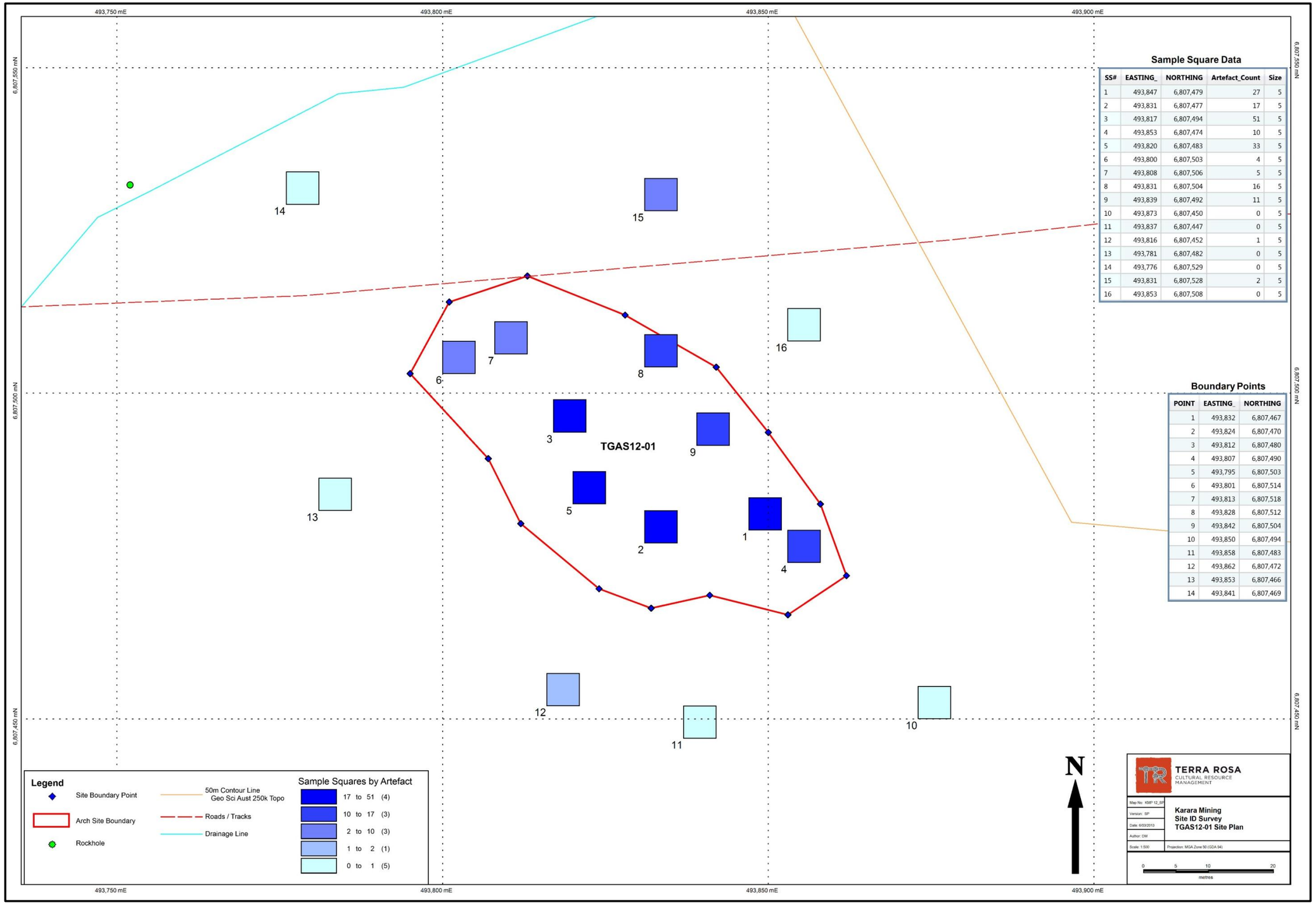
5.1.2.3 Recording Methodology

TGAS12-01 is a small, discrete artefact scatter with a total site surface measuring 2020 m^2. Pedestrian inspection of the area ascertained that the surface expression of the site is contained within a small area confined to the flat apex of a low laterite hill.

The site boundaries were determined by walking in cardinal directions from the centre of the site until no artefacts were visible on the ground surface. Flagging tape was then attached to trees in order to demarcate the site.

Once the site boundaries were established, Terra Rosa CRM heritage consultants used a combination of arbitrary and targeted methods to place sample squares around the site. Each sample square measured 5 m by 5 m. A total of nine sample squares were placed within the site boundaries which resulted in 11.13% of the total surface area of the site being sampled. The artefacts which were present in the sample squares were recorded to site identification level.

Map 9: TGAS12-01



5.1.2.4 Site Fabric

TGAS12-01 is a small, discrete artefact scatter located on the flat apex of a low laterite hill. A rocky, braided ephemeral creekline is present approximately 30 m to the north of the site, which runs into three rockholes that form DIA 28481 (MIOP32 Terapod Gnamma 01) (see Plate 41). These rockholes were not recorded within the boundary of TGAS12-01 as no artefacts were noted in the vicinity, or within the 50 m distance between them and the boundary of TGAS12-01. It is possible, however, that these rockholes were utilised during the same occupation event/s as TGAS12-01.

Plate 41: Rock holes constituting DIA 28481 (MIOP32 Terapod Gnamma 01)

A total of 174 artefacts were recorded within the 11.14% sample at TGAS12-01. The artefact assemblage is comprised predominately of flakes (45% n=79) and broken flakes (40.8% n=71), with cores (n=8) and core fragments (n=14) constituting 4.6% and 8% respectively (see Figure 6 below). Two blades were also recorded within the sampled assemblage, one of chert with retouch and utilisation on both margins, and the other a backed blade of quartz (Plate 42). No grinding material or other formal implements were noted within the assemblage at TGAS12-01.

Figure 6: Typological variation within the artefact assemblage at TGAS12-01

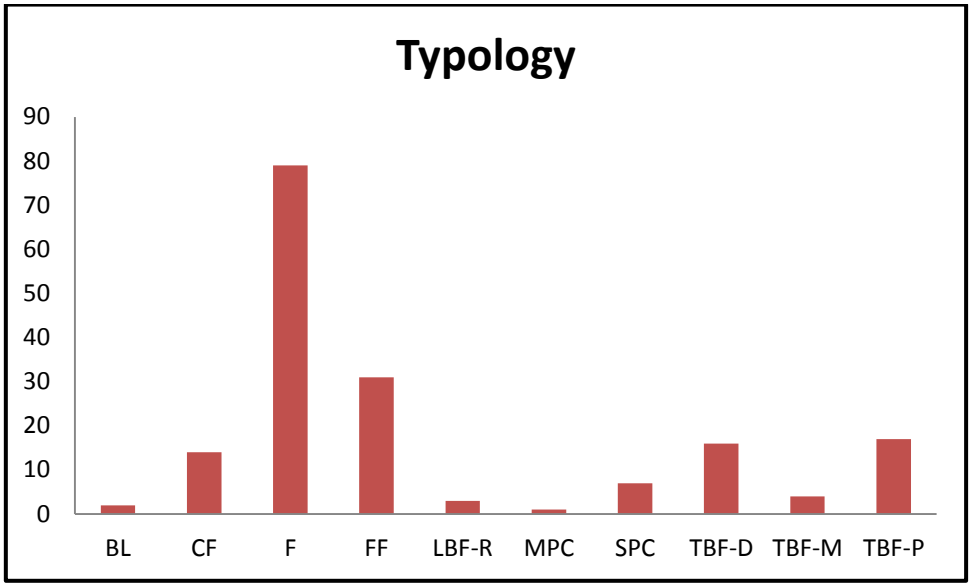


Plate 42: Quartz backed blade in situ*, TGAS12-01*

The lithic variation at TGAS12-01 is somewhat limited, with only five typologies noted within the recorded assemblage. Quartz artefacts dominated, representing 70% (n=122) of the overall assemblage. Quartzite constituted 12.6% of the assemblage (n=22), crystal quartz 8.6% (n=15) and chert 8% (n=14). One silcrete flake was also recorded constituting 0.6% of the total assemblage (see Figure 7 below).

Figure 7: Lithic variation within artefact assemblage at TGAS12-01

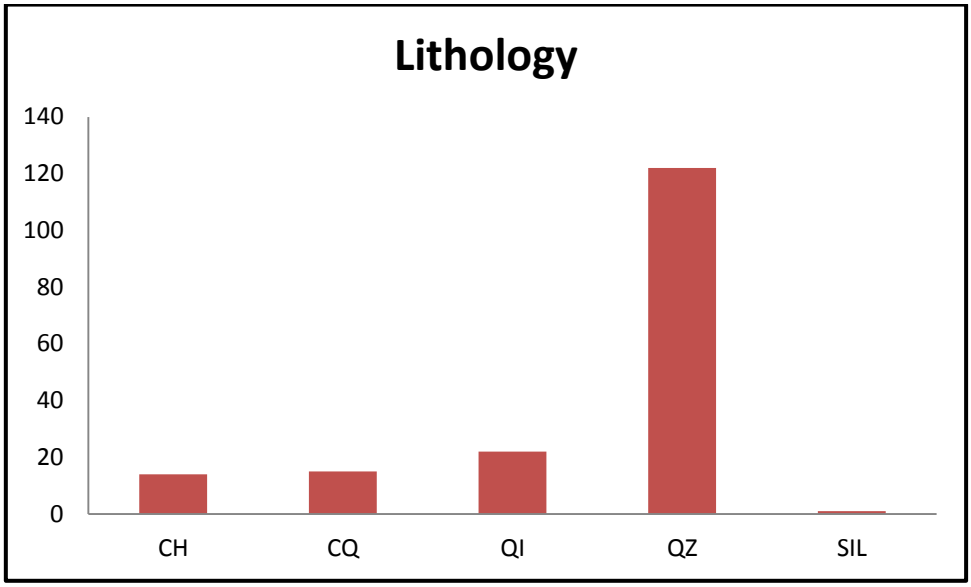


Plate 43: Artefacts in situ, TGAS12-01

Based on the results of the recorded sample at TGAS12-01, it can be extrapolated that the total artefact population ranges between 323 artefacts (0.16 artefacts per m²) and 4120 artefacts (2.04/m²). The average artefact density is 0.77 per m², which results in an artefact population of 1562. Based on a visual inspection of the site, a total artefact population of

between 400 and 1000 is likely, as the areas of higher density were small and discrete and not typical of the majority of the site surface. The two sample squares with the highest densities (n=51 and n=33) were composed predominantly of quartz flakes and broken flakes, the former also containing 9 of the 14 core fragments recorded across the assemblage. These figures suggest that some level of core reduction was taking place in these areas, thus producing uncharacteristically high artefact numbers and skewing the results across the site.

This site is likely to represent a short-term camping place, either irregularly visited or utilised only once. The artefact assemblage here is characteristic of one produced during core reduction activities, with the majority of artefacts here being characteristic of waste flakes and debitage associated with this activity. The presence of two formal tools and eight artefacts (4.59% of the total assemblage) exhibiting retouch and/or utilisation on one or more margins, suggests that other activities were also taking place here.

5.1.2.5 Significance Assessment

The significance assessment for TGAS12-01 is summarised in Table 9 and discussed below.

Table 9: TGAS12-01Significance Assessment Matrix

	NOT A SITE	REGIONAL			STATE	NATIONAL
Degree of Significance	Negligible	Low	Moderate	High	Very High	Outstanding
Integrity						
Uniqueness						
Cultural						
Features						
Research Potential						

TGAS12-01 is of low archaeological significance. It contains no outstanding features and is of a similar size and type to many other sites in the region.

5.1.2.6 Site Management Considerations and Recommendations

The following conclusions and recommendations have been approved by the Widi Mob Traditional Owner representatives that were present during the Survey:

- KML employees and contractors should be made aware of the location and boundaries of newly identified Aboriginal heritage site TGAS12-01;
- The Widi Mob Traditional Owners request that the site is avoided if possible during future developments at the Terapod Mine site; and
- TGAS12-01 may constitute a heritage site under Section 5a of the Act. Regardless of the status attributed the site by the ACMC, and if consent to destroy it is granted under Section 18, the Widi Mob request the opportunity to undertake a targeted salvage program at TGAS12-01.

5.1.3 TKAS13-01 Artefact Scatter

Central coordinate: 492581 mE / 6814128 mN

5.1.3.1 Location and Environment

TKAS13-01 is situated in the middle portion of the Tom's Kitchen PDA, in close proximity to TKAS13-02, TKAS13-03 and previously recorded site MJGAS12-01. Site boundary coordinates are detailed in Table 17 (Appendix 2) and the site plan is illustrated in Map 10.

The site is located along the margin of a series of claypans situated to the north and northwest. These claypans are likely to retain water draining from the range of low hills that run in a north/south orientation to the west of TKAS13-01. It should be noted that there is a relatively high background scatter present in this area, attributed to the availability of food resources associated with the claypans.

The soil is composed of compacted red silty alluvium with light laterite and ironstone gravels. The area appears susceptible to sheet wash associated with flooding events as evidenced by the even distribution of these gravels and the crusted appearance of the sediments.

Ground surface visibility is very high, at 70% to 100%. The vegetation at this site can be classified as open *Acacia* woodland (see Plate 44), with mature Mulga (*A. aneura*), Horse Mulga (*A. ramulosa*) and Jam (*A. acuminata*) typical throughout. Kurara bushes (*A. tetragonophylla*), the seeds of which were harvested as a food resource by Aboriginal groups, and Shrubby Sheoak (*Allocasuarina campestris*) were also noted occasionally throughout the area. The understorey is very sparse, consisting of a variety of Mulla Mulla, *Solanum* and *Eremophila* species. Dead seasonal grasses were also noted.

Plate 44: Typical vegetation and landform at TKAS13-01

5.1.3.2 Site Integrity

TKAS13-01 is a small site with moderate ground surface integrity, caused by water activity in the area. As mentioned above, the area is susceptible to sheet wash during flooding events, so it is possible that the artefacts within this site have been displaced. No direct impacts have been made via human agency; however, a number of well-established vehicle access tracks traverse the greater area.

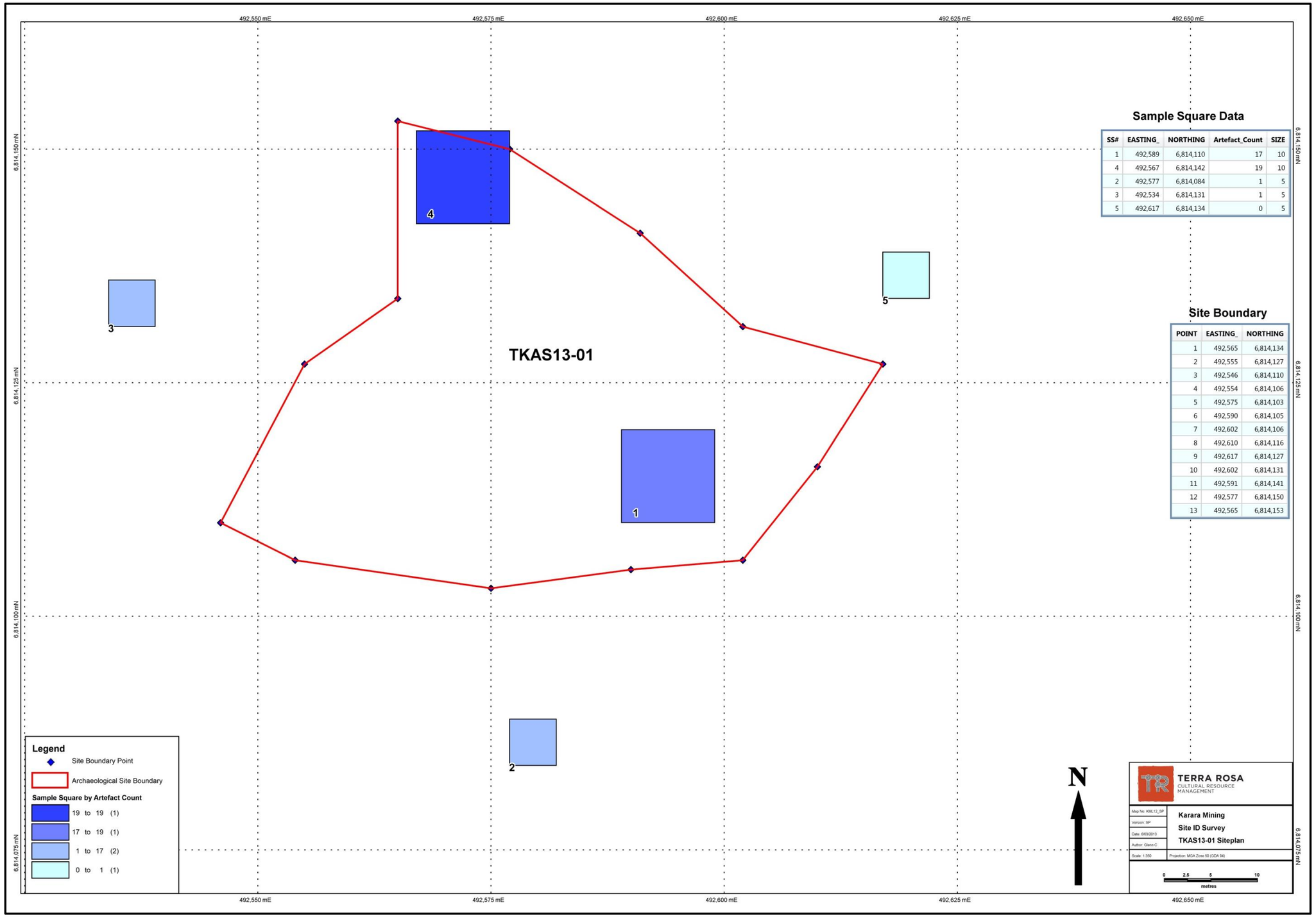
5.1.3.3 Recording Methodology

TKAS13-01 is a small, diffuse artefact scatter with a total site surface measuring 2039 m^2. Pedestrian inspection of the area ascertained that this site is an area of increased artefact density within a larger area of high background scatter surrounding a series of claypans.

The site boundaries were determined by walking in cardinal directions from the centre of the site until no artefacts were visible on the ground surface. Flagging tape was then attached to trees in order to demarcate the site.

Once the site boundaries were established, Terra Rosa CRM heritage consultants used a combination of arbitrary and targeted methods to place sample squares around the site each measuring 5 m by 5 m. A total of two sample squares measuring 10 m by 10 m were placed within the site boundaries which resulted in 9.8% of the total surface area of the site being sampled. The artefacts which were present in the sample squares were recorded to site identification level.

Map 10: TKAS13-01 site plan

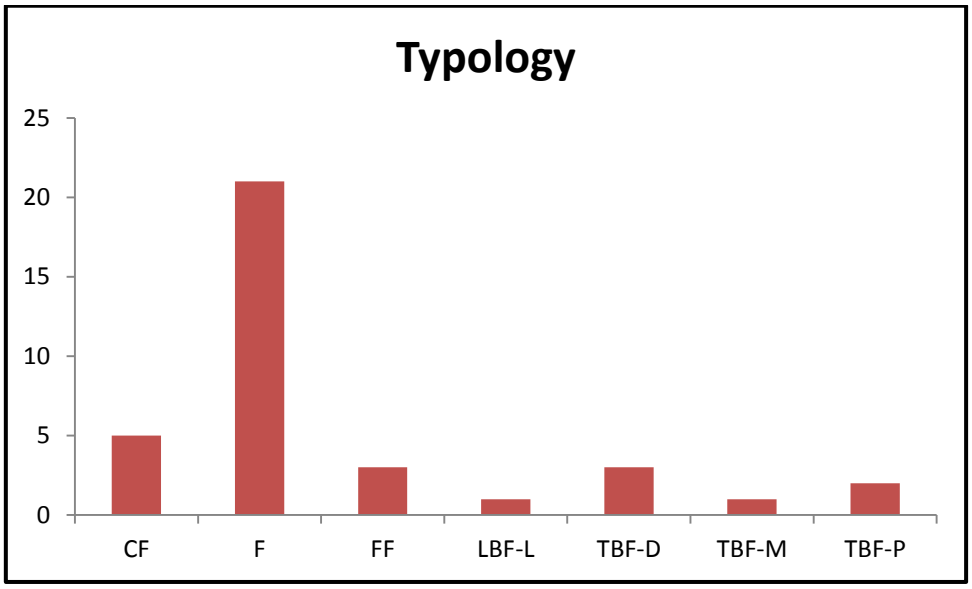


5.1.3.4 Site Fabric

TKAS13-01 is a very small, diffuse artefact scatter located along the eastern margin of a series of claypans. The site is relatively sparse, and is situated in proximity to a number of other sites of similar size and composition.

A total of 36 artefacts were recorded within the sampled portion of TKAS13-01. 58% of these artefacts were complete flakes (n=21), while broken flakes constituted 28% (n=10) and core fragments 14% (n=5) (see Figure 9 below). No formal implements were identified and only one artefact exhibiting utilisation was noted in the recorded assemblage.

Figure 8: Typological variation within the artefact assemblage at TKAS13-01



A high degree of lithic variety was noted at this site, with eight different stone types being represented. Quartz was the most common lithic, constituting 53% (n=19) of the total assemblage, with crystal quartz representing 22% (n=8), quartzite, banded iron formation and chert each constituting 5.5% (n=2) and basalt, granite and laterite comprising 2.8% (n=1) of the total assemblage (see Figure 10). The vast range of lithic types represented at this site is characteristic of sites identified in the vicinity of permanent or semi-permanent water sources (Veth 1989a; 1989b; 1993; 1995; 1996) and is likely to indicate the prolonged use of this site.

Figure 9: Lithic variation with the artefact assemblage at TKAS13-01

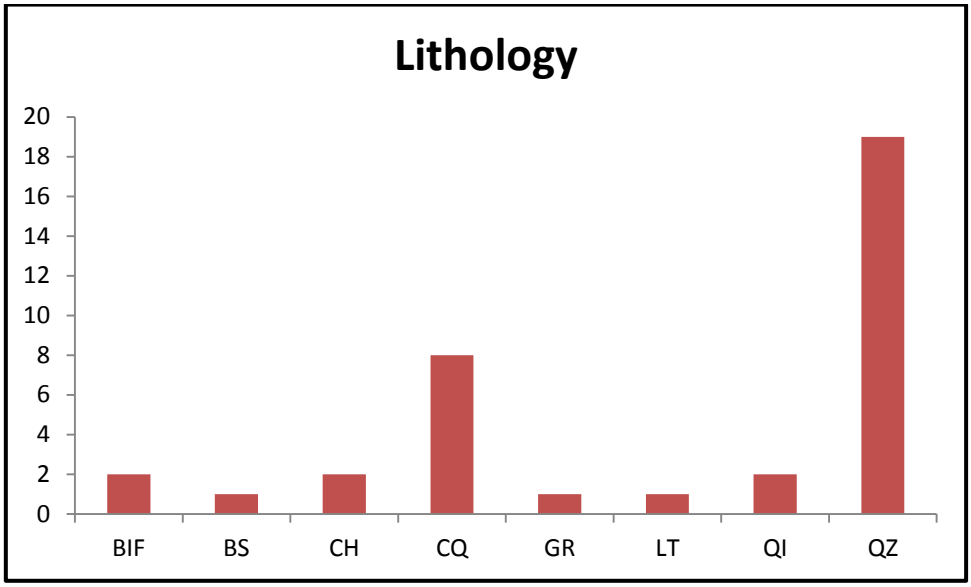


Plate 45: Artefacts in situ, TKAS13-01

Plate 46: Artefacts in situ, TKAS13-01

Based on the results of the recorded sample at TKAS13-01, it can be extrapolated that the total artefact population at this site ranges between a minimum of 346 artefacts (0.17 artefacts per m²) and a maximum of 387 artefacts (0.19/m²). The average density across the site is 0.18 artefacts per m², with a total population of 367 artefacts. Based on the visual inspection of the site, this is likely to be an accurate estimation. There is moderate potential for the existence of sub-surface material at this site due to the nature of the landform in which this site is situated and the likelihood of rapid deposition of sediments during flood events.

The nature of the artefact assemblage at TKAS13-01 is typical of that identified at a site used for camping, where a range of domestic tasks and function would have taken place. The wide variety of lithics represented here, along with the high proportion of complete and broken flakes, suggests that functional items have been transported from other areas as opposed to being sourced and manufactured locally. No cores and relatively low numbers of core fragments were identified here, indicating that core reduction activities were not undertaken here.

5.1.3.5 Significance Assessment

The significance assessment for TKAS13-01 is summarised in Table 10 and discussed below.

Table 10: TKAS13-01 Significance Assessment Matrix

	NOT A SITE	REGIONAL			STATE	NATIONAL
Degree of Significance	Negligible	Low	Moderate	High	Very High	Outstanding
Integrity						
Uniqueness						
Cultural						
Features						
Research Potential						

As indicated in the Significance Assessment Matrix above, TKAS13-01 has a low to moderate level of significance. The integrity of this site is considered moderate, with displacement of archaeological material likely to occur during flood events. Due to the location of the site in close proximity to the ephemeral source of water available at the claypans and to other site features in the immediate vicinity, the site is attributed with a moderate level of regional significance.

The area in which the site is located has obviously been a focal point of activity in the past, with evidence of continued use over time, if all the nearby sites and the high level of background scatter are taken into consideration. Sites situated on floodplains are susceptible to change over time, with taphonomic processes affecting the visibility of material and altering the surface expression of what is often a much larger archaeological deposit. There is a moderate level of research potential at TKAS13-01 as, despite being a common site type in the broader region, there is a high potential for sub-surface material to be present.

According to Widi Mob representatives Bill Lewis, Stephen Spring and Clinton Lewis, This site is of low cultural significance. It is considered to be a transient camping place where people would have stopped briefly en route to more permanent camping places, or when water resources were available in the nearby claypans. It is considered to be connected to the ancestors of the Widi Mob.

5.1.3.6 Site Management Considerations and Recommendations

The following conclusions and recommendations have been approved by the Widi Mob Traditional Owner representatives that were present during the survey:

- KML employees and contractors should be made aware of the location and boundaries of newly identified Aboriginal heritage site TKAS13-01 and be aware that the surface expression of the site is susceptible to change over time;
- It is recommended that KML consider commissioning archaeological test-pitting in the broader area surrounding TKAS13-01, TKAS13-02, TKAS13-03 and MGJAS12-01 in order to ascertain a more accurate boundary of what is potentially a single site;
- The Widi Mob Traditional Owners request that the site is avoided if possible during future developments at the Terapod Mine site; and
- TKAS13-01 may constitute a heritage site under Section 5a of the Act. Regardless of the status attributed the site by the ACMC, and if consent to destroy it is granted under Section 18, the Widi Mob request the opportunity to undertake a targeted salvage program at TKAS13-01.

5.1.4 TKAS13-02 Artefact Scatter

Central Coordinate: 492684 mE / 6814242 mN

5.1.4.1 Location and Environment

TKAS13-02 is situated in the middle portion of the Tom's Kitchen PDA, in close proximity to TKAS13-01, TKAS13-03 and previously recorded site MJGAS12-01. The boundary coordinates for TKAS13-03 are provided in Table 18 (see Appendix 2) and the site plan is illustrated in Map 11.

The site is located along the margin of a series of claypans situated to the north and northwest. These claypans are likely to retain water draining from the range of low hills that run in a north/south orientation to the west of TKAS13-02. It should be noted that there is a relatively high background scatter present in this area, attributed to the availability of food resources associated with the claypans.

The soil is composed of compacted red silty alluvium with light laterite and ironstone gravels. The area appears susceptible to sheet wash associated with flooding events as evidenced by the even distribution of these gravels and the crusted appearance of the sediments.

Ground surface visibility is very high, at 70% to 100%. The vegetation at this site can be classified as open *Acacia* woodland (see Plate 47), with mature Mulga (*A. aneura*), Horse Mulga (*A. ramulosa*) and Jam (*A. acuminata*) typical throughout. Kurara bushes (*A. tetragonophylla*), the seeds of which were harvested as a food resource by Aboriginal groups, and Shrubby Sheoak (*Allocasuarina campestris*) were also noted occasionally throughout the area. The understorey is very sparse, consisting of a variety of Mulla Mulla, *Solanum* and *Eremophila* species. Dead seasonal grasses were also noted.

Plate 47: Typical vegetation and landform at TKAS13-02

5.1.4.2 Site Integrity

TKAS13-02 is a small site with moderate ground surface integrity, caused by water activity in the area. As mentioned above, the area is susceptible to sheet wash during flooding events, so it is possible that the artefacts within this site have been displaced. No direct impacts have been made via human agency; however, a number of well-established vehicle access tracks traverse the greater area.

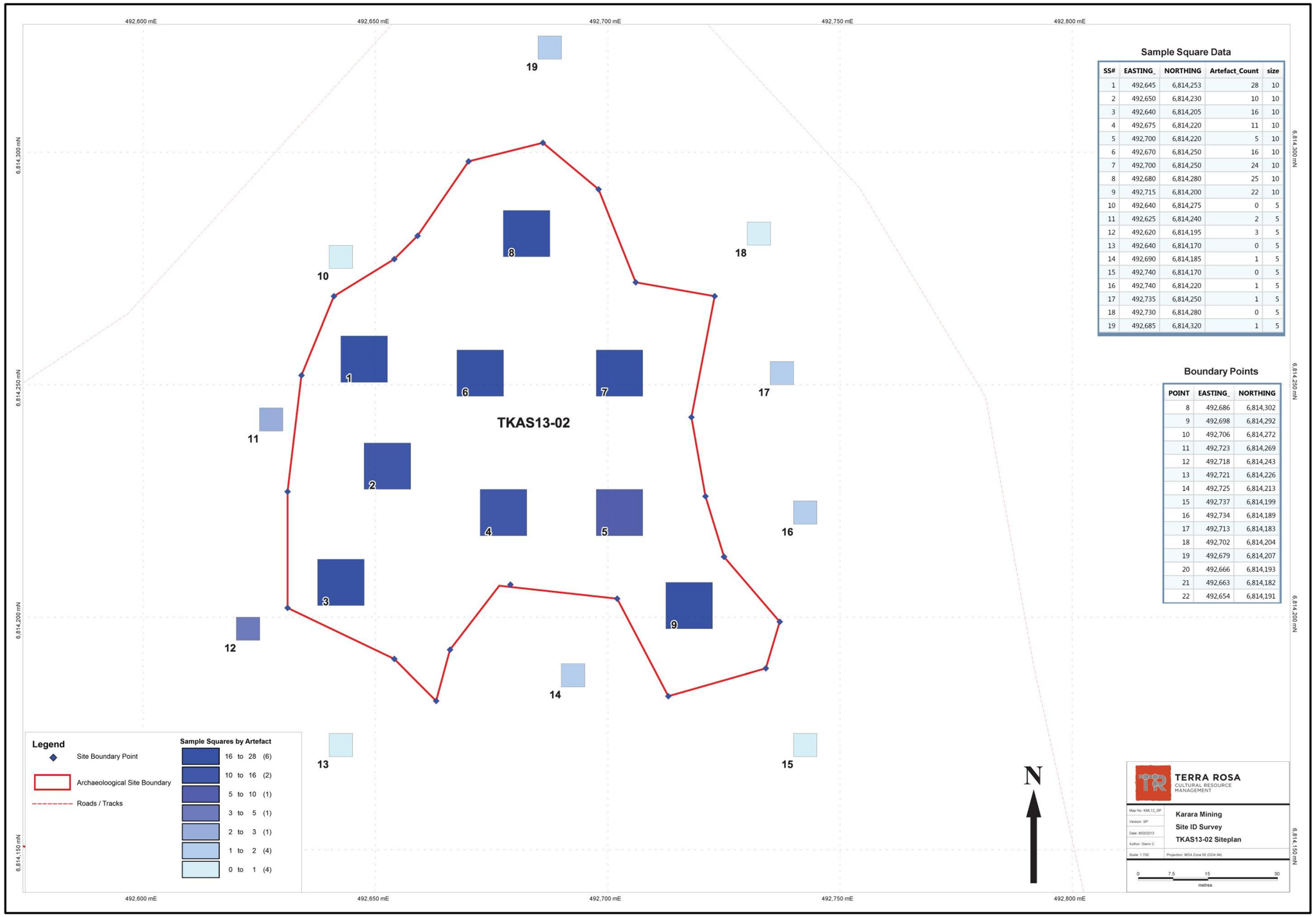
5.1.4.3 Recording Methodology

TKAS13-02 is a medium sized, diffuse artefact scatter with a total site surface measuring 7974 m^2. Pedestrian inspection of the area ascertained that this site is an area of increased artefact density within a larger area of high background scatter surrounding a series of claypans.

The site boundaries were determined by walking in cardinal directions from the centre of the site until no artefacts were visible on the ground surface. Flagging tape was then attached to trees in order to demarcate the site.

Once the site boundaries were established, Terra Rosa CRM heritage consultants used a combination of arbitrary and targeted methods to place sample squares around the site, each measuring 5 m by 5 m. A total of nine sample squares measuring 10 m by 10 m were placed within the site boundaries which resulted in 11.3% of the total surface area of the site being sampled. The artefacts which were present in the sample squares were recorded to site identification level.

Map 11: TKAS13-02 site plan



Sample Square Data

SS#	EASTING_	NORTHING	Artefact_Count	size
1	492,645	6,814,253	28	10
2	492,650	6,814,230	10	10
3	492,640	6,814,205	16	10
4	492,675	6,814,220	11	10
5	492,700	6,814,220	5	10
6	492,670	6,814,250	16	10
7	492,700	6,814,250	24	10
8	492,680	6,814,280	25	10
9	492,715	6,814,200	22	10
10	492,640	6,814,275	0	5
11	492,625	6,814,240	2	5
12	492,620	6,814,195	3	5
13	492,640	6,814,170	0	5
14	492,690	6,814,185	1	5
15	492,740	6,814,170	0	5
16	492,740	6,814,220	1	5
17	492,735	6,814,250	1	5
18	492,730	6,814,280	0	5
19	492,685	6,814,320	1	5

Boundary Points

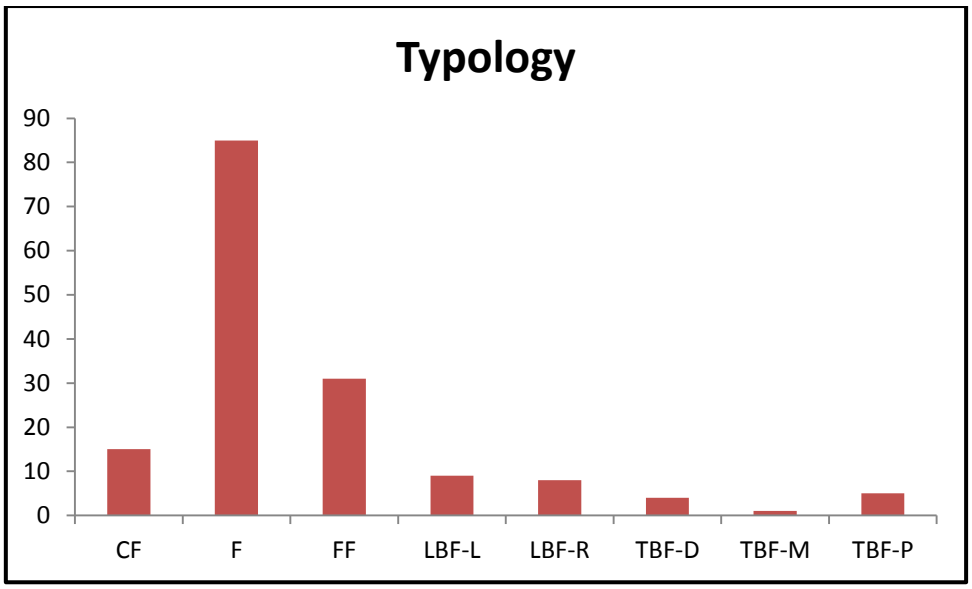
POINT	EASTING_	NORTHING
8	492,686	6,814,302
9	492,698	6,814,292
10	492,706	6,814,272
11	492,723	6,814,269
12	492,718	6,814,243
13	492,721	6,814,226
14	492,725	6,814,213
15	492,737	6,814,199
16	492,734	6,814,189
17	492,713	6,814,183
18	492,702	6,814,204
19	492,679	6,814,207
20	492,666	6,814,193
21	492,663	6,814,182
22	492,654	6,814,191

5.1.4.4 Site Fabric

TKAS13-02 is a medium sized, diffuse artefact scatter located along the eastern margin of a series of claypans. The site is relatively sparse, and is situated in proximity to a number of other sites of similar size and composition.

A total of 157 artefacts were recorded within the sample at TKAS13-02. Similarly to TKAS13-01, the vast majority of artefacts at this site are flakes (n=85) and broken flakes (n=58), representing 54% and 36.5% of the total assemblage respectively. Core fragments constitute the remaining 9.5% (n=15). No formal implements of grinding material were identified at TKAS13-02 (see Figure 12 below).

Figure 10: Typological variation in the artefact assemblage at TKAS13-02



A large variety of lithic types are represented at TKAS13-02. Quartz (n=72) is overwhelmingly the most common stone type utilised, representing 46% of the total assemblage. Crystal quartz (n=25), chert (n=19) and dolerite (n=15) each represent 16%, 12% and 9% respectively, while ironstone (n=8), banded iron formation (n=7) and quartzite (n=7) represent 5% and 4.5%. Negligible numbers of granite (n=2), basalt (n=1), chalcedony (n=1) and silcrete (n=1) complete the sampled assemblage (see Figure 13 below). The vast range of lithic types represented at this site is characteristic of sites identified in the vicinity of permanent or semi-permanent water sources (Veth 1989a; 1989b; 1993; 1995; 1996) and is likely to indicate the prolonged use of this site.

Figure 11: Lithic variation in the artefact assemblage at TKAS13-02

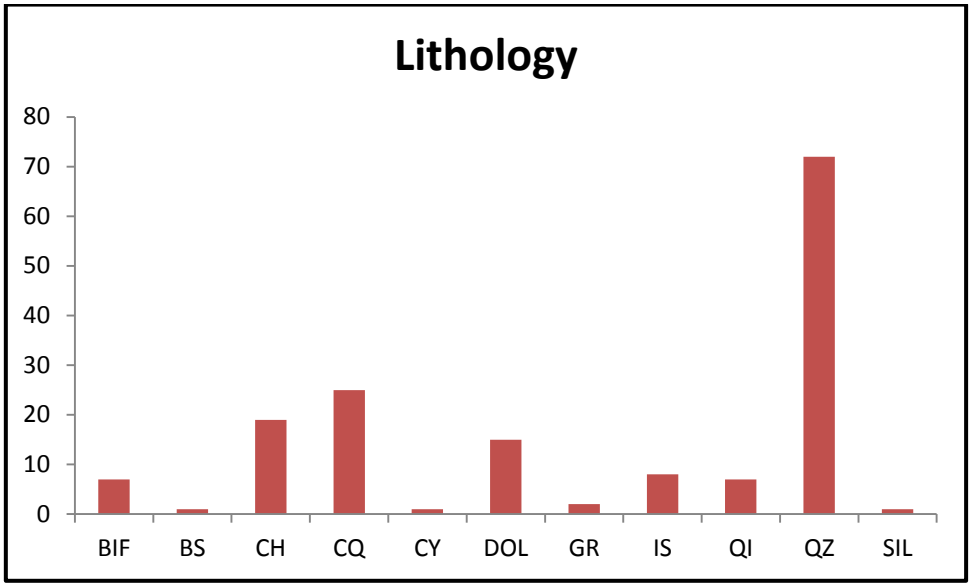


Plate 48: Artefact in situ*, TKAS13-02*

Based on the results of the recorded sample at TKAS13-03, it can be extrapolated that the total artefact population at this site ranges between a minimum of 398.7 artefacts (0.05 artefacts per m²) and a maximum of 2232.7 artefacts (0.28/m²). The average density across the site is 0.17 artefacts per m², with a total population of 1391 artefacts. Based on the visual

inspection of the site, this is likely to be an accurate estimation. There is moderate potential for the existence of sub-surface material at this site due to the nature of the landform in which this site is situated and the likelihood of rapid deposition of sediments during flood events.

The nature of the artefact assemblage at TKAS13-02 is typical of that identified at a site used for camping, where a range of domestic tasks and function would have taken place. The wide variety of lithics represented here, along with the high proportion of complete and broken flakes, suggests that functional items have been transported from other areas as opposed to being sourced and manufactured locally. No cores and relatively low numbers of core fragments were identified here, indicating that core reduction activities were not undertaken here.

5.1.4.5 Significance Assessment

The significance assessment for TKAS13-02 is summarised in Table 11 and discussed below.

Table 11: TKAS13-02 Significance Assessment Matrix

	NOT A SITE	REGIONAL			STATE	NATIONAL
Degree of Significance	Negligible	Low	Moderate	High	Very High	Outstanding
Integrity						
Uniqueness						
Cultural						
Features						
Research Potential						

As indicated in the Significance Assessment Matrix above, TKAS13-02 has a low to moderate level of significance. The integrity of this site is considered moderate, with displacement of archaeological material likely to occur during flood events. Due to the location of the site in close proximity to the ephemeral source of water available at the claypans and to other site features in the immediate vicinity, the site is attributed with a moderate level of regional significance.

The area in which the site is located has obviously been a focal point of activity in the past, with evidence of continued use over time if all the nearby sites and the high level of background scatter are taken into consideration. Sites situated on floodplains are susceptible to change over time, with taphonomic processes affecting the visibility of material and altering the surface expression of what is often a much larger archaeological deposit. There is a moderate level of research potential at TKAS13-02 as, despite being a

common site type in the broader region, there is a high potential for sub-surface material to be present.

According to Widi Mob representatives Bill Lewis, Stephen Spring and Clinton Lewis, This site is of low cultural significance. It is considered to be a transient camping place where people would have stopped briefly en route to more permanent camping places, or when water resources were available in the nearby claypans. It is considered to be connected to the ancestors of the Widi Mob.

5.1.4.6 Site Management Considerations and Recommendations

The following conclusions and recommendations have been approved by the Widi Mob Traditional Owner representatives that were present during the Survey:

- KML employees and contractors should be made aware of the location and boundaries of newly identified Aboriginal heritage site TKAS13-02 and be aware that the surface expression of the site is susceptible to change over time;
- It is recommended that KML consider commissioning archaeological test-pitting in the broader area surrounding TKAS13-01, TKAS13-02, TKAS13-03 and MGJAS12-01 in order to ascertain a more accurate boundary of what is potentially a single site;
- The Widi Mob Traditional Owners request that the site is avoided if possible during future developments at the Terapod Mine site; and
- TKAS13-02 may constitute a heritage site under Section 5a of the Act. Regardless of the status attributed the site by the ACMC, and if consent to destroy it is granted under Section 18, the Widi Mob request the opportunity to undertake a targeted salvage program at TKAS13-02.

5.1.5 TKAS13-03 Artefact Scatter

Central coordinate: 492804 mE / 6814389 mN

5.1.5.1 Location and Environment

TKAS13-03 is situated in the middle portion of the Tom's Kitchen PDA, in close proximity to TKAS13-01, TKAS13-02 and previously recorded site MJGAS12-01. The boundary coordinates for TKAS13-03 are provided in Table 19 (see Appendix 2) and the site plan is illustrated in Map 12.

The site is located along the margin of a series of claypans situated to the north and northwest. These claypans are likely to retain water draining from the range of low hills that run in a north/south orientation to the west of TKAS13-03. It should be noted that there is a relatively high background scatter present in this area, attributed to the availability of food resources associated with the claypans.

The soil is composed of compacted red silty alluvium with light laterite and ironstone gravels. The area appears susceptible to sheet wash associated with flooding events as evidenced by the even distribution of these gravels and the crusted appearance of the sediments.

Ground surface visibility is very high, at 70% to 100%. The vegetation at this site can be classified as open *Acacia* woodland (see Plate 49), with mature Mulga (*A. aneura*), Horse Mulga (*A. ramulosa*) and Jam (*A. acuminata*) typical throughout. Kurara bushes (*A. tetragonophylla*), the seeds of which were harvested as a food resource by Aboriginal groups, and Shrubby Sheoak (*Allocasuarina campestris*) were also noted occasionally throughout the area. The understorey is very sparse, consisting of a variety of mulla mulla, *Solanum* and *Eremophila* species. Dead seasonal grasses were also noted.

Plate 49: Typical vegetation and landform at TKAS13-03

5.1.5.2 Site Integrity

TKAS13-03 is a small site with moderate ground surface integrity, with disturbance caused by a combination of water activity and human agency. As mentioned above, the area is susceptible to sheet wash during flooding events, so it is possible that the artefacts within this site have been displaced. A fence line and associated vehicle access track intersects the northern portion of the site, and a small graded area is visible adjacent to this (see Plate 50 below).

Plate 50: Fence line and access track at TKAS13-03

5.1.5.3 Recording Methodology

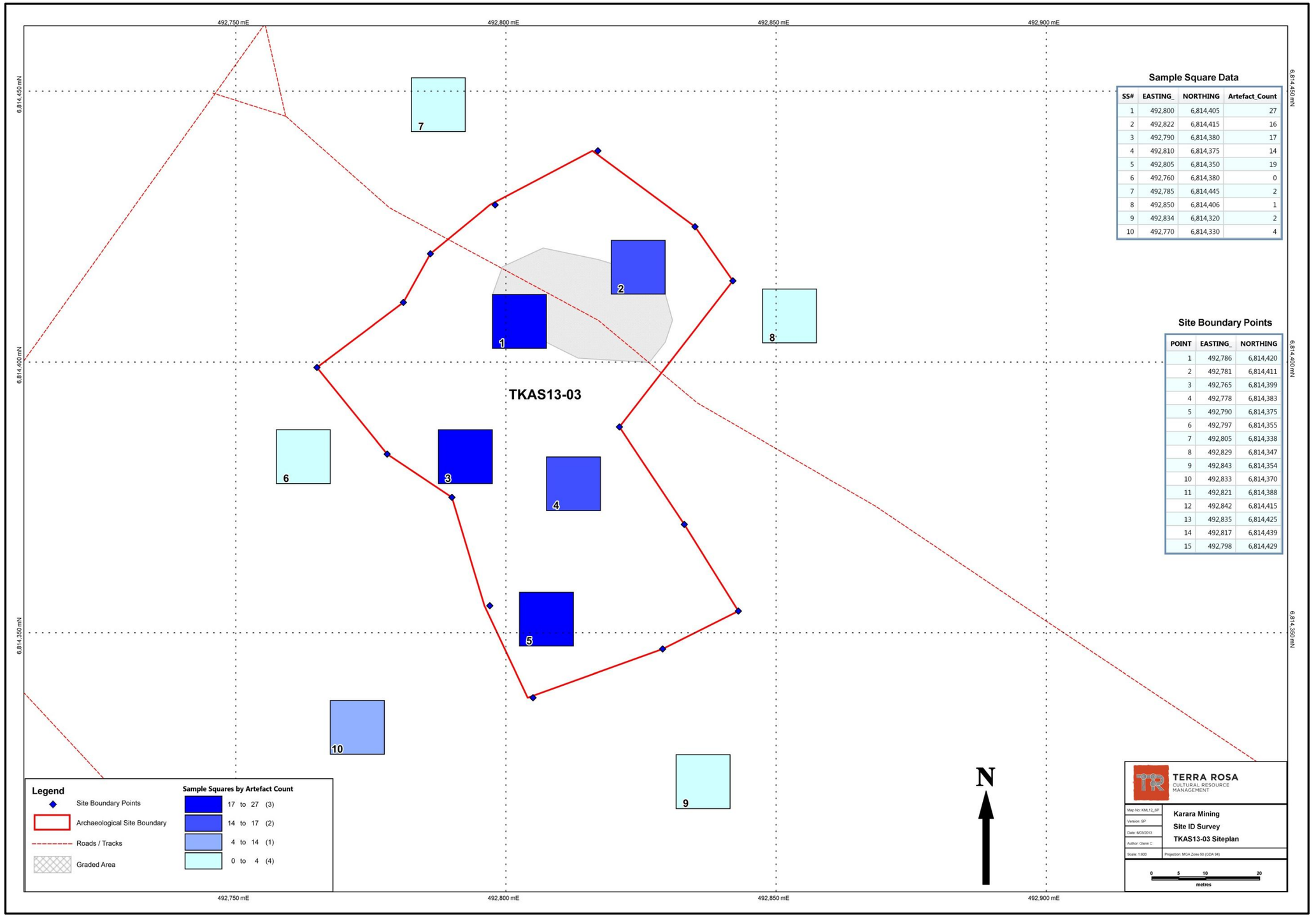
TKAS13-03 is a small, diffuse artefact scatter with a total site surface measuring 4304 m^2. Pedestrian inspection of the area ascertained that this site is an area of increased artefact density within a larger area of high background scatter surrounding a series of claypans.

The site boundaries were determined by walking in cardinal directions from the centre of the site until no artefacts were visible on the ground surface. Flagging tape was then attached to trees in order to demarcate the site.

Once the site boundaries were established, Terra Rosa CRM heritage consultants used a combination of arbitrary and targeted methods to place sample squares around the site, each measuring 5 m by 5 m. A total of five sample squares measuring 10 m by 10 m were placed within the site boundaries which resulted in 11.6% of the total surface area of the site being sampled. The artefacts which were present in the sample squares were recorded to site identification level.

Plate 51: Stephen Spring and Bill Lewis recording artefacts at TKAS13-03

Map 12: TKAS13-03 site plan



Sample Square Data

SS#	EASTING_	NORTHING	Artefact_Count
1	492,800	6,814,405	27
2	492,822	6,814,415	16
3	492,790	6,814,380	17
4	492,810	6,814,375	14
5	492,805	6,814,350	19
6	492,760	6,814,380	0
7	492,785	6,814,445	2
8	492,850	6,814,406	1
9	492,834	6,814,320	2
10	492,770	6,814,330	4

Site Boundary Points

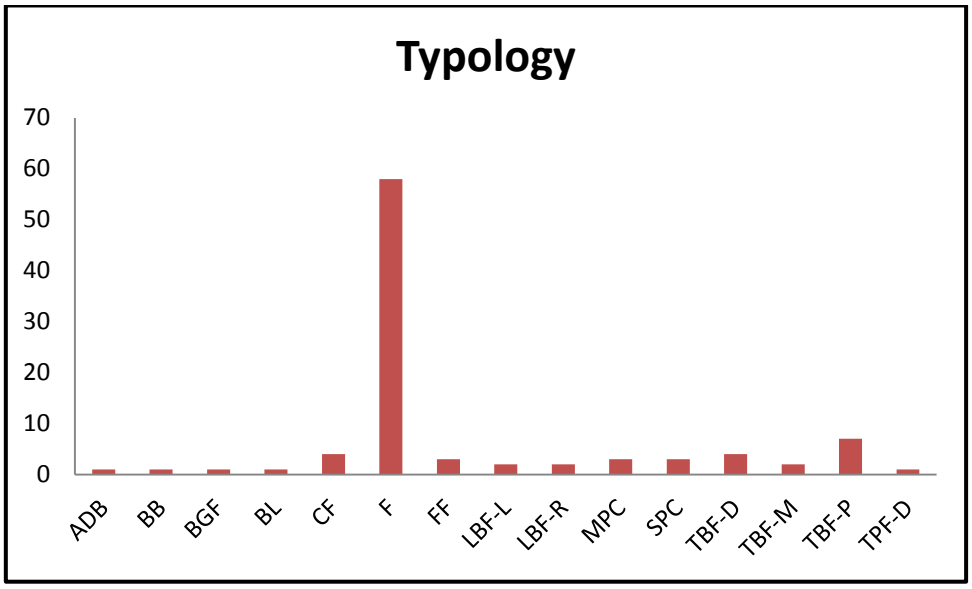
POINT	EASTING_	NORTHING
1	492,786	6,814,420
2	492,781	6,814,411
3	492,765	6,814,399
4	492,778	6,814,383
5	492,790	6,814,375
6	492,797	6,814,355
7	492,805	6,814,338
8	492,829	6,814,347
9	492,843	6,814,354
10	492,833	6,814,370
11	492,821	6,814,388
12	492,842	6,814,415
13	492,835	6,814,425
14	492,817	6,814,439
15	492,798	6,814,429

5.1.5.4 Site Fabric

TKAS13-03 is a medium sized, diffuse artefact scatter located along the eastern margin of a series of claypans. The site is relatively sparse, and is situated in proximity to a number of other sites of similar size and composition.

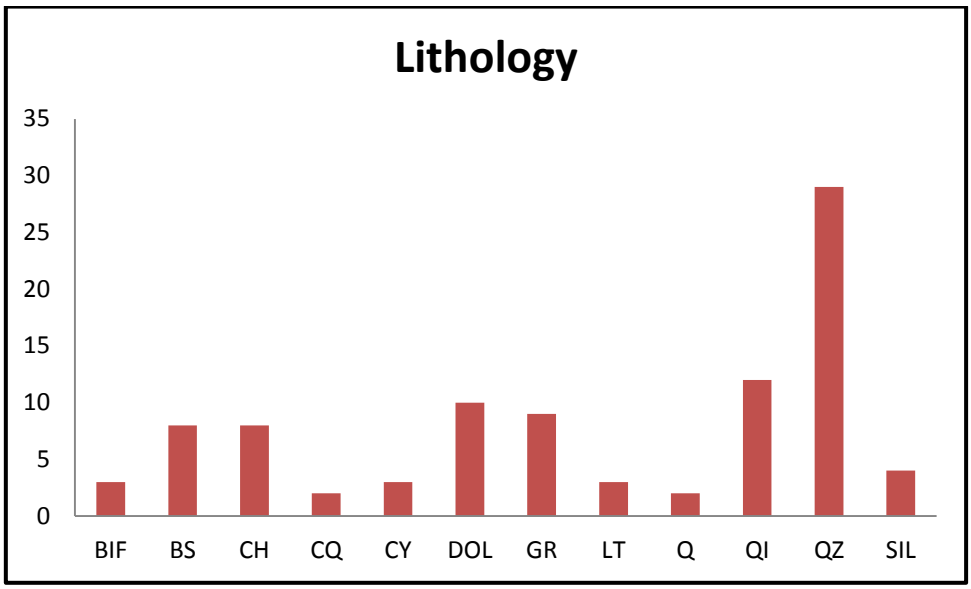
A total of 93 artefacts were recorded within the sample at TKAS13-03. Flakes (n=58) and broken flakes (n=21) represent 62% and 22.6% of the total assemblage respectively. Six cores were recorded representing 6.5% of the total assemblage, with only four core fragments identified. Compared with the assemblages at nearby sites TKAS13-01 and TKAS13-02, TKAS13-03 contains a high proportion of formal implements (4.5% of the assemblage), including Burin adze, a backed blade, a blade and a basal grinding stone fragment. In addition to this, 8.6% (n=8) of the artefacts in the assemblage exhibited evidence of retouch and/or utilisation on one or more margins (see Figure 15 below).

Figure 12: Typological variation within the artefact assemblage at TKAS13-03



Similarly to TKAS13-02, TKAS13-03 contains a large variety of lithic types within the recorded assemblage. Unlike the two nearby sites, the assemblage at TKAS13-03 is not overwhelmingly dominated by any one type of lithic. Quartz (n=31) is still the most common stone type utilised, representing 33% of the total assemblage. Quartzite (n=12), dolerite (n=10) and granite (n=9) each represent 13%, 11% and 9.5% respectively, while basalt (n=8) and chert (n=8) each represent 8.5% of the total lithic assemblage. Silcrete (n=4) comprises 4% of the assemblage, and banded iron formation, chalcedony and laterite each represent 3% (n=3). Negligible numbers of crystal quartz (n=2) complete the sampled assemblage (see Figure 16 below). The vast range of lithic types represented at this site is characteristic of sites identified in the vicinity of permanent or semi-permanent water sources (Veth 1989a; 1989b; 1993; 1995; 1996) and is likely to indicate the prolonged use of this site.

Figure 13: Lithic variation within the assemblage at TKAS13-03



Based on the results of the recorded sample at TKAS13-03, it can be extrapolated that the total artefact population at this site ranges between a minimum of 282 artefacts (0.14 artefacts per m²) and a maximum of 545 artefacts (0.27/m²). The average density across the site is 0.186 artefacts per m², with a total population of 375 artefacts. Based on the visual inspection of the site, this is likely to be an accurate estimation. There is moderate potential for the existence of sub-surface material at this site due to the nature of the landform in which this site is situated and the likelihood of rapid deposition of sediments during flood events.

The nature of the artefact assemblage at TKAS13-03 is typical of that identified at a site used for camping, where a range of domestic tasks and function would have taken place. The wide variety of lithics represented here, along with the high proportion of complete and broken flakes and retouched/utilised pieces suggests that functional items have been transported from other areas as opposed to being sourced and manufactured locally. No cores and relatively low numbers of core fragments were identified here, indicating that core reduction activities were not undertaken here.

5.1.5.5 Significance Assessment

The significance assessment for TKAS13-03 is summarised in Table 12 and discussed below.

Table 12: TKAS13-03 Significance Assessment Matrix

	NOT A SITE	REGIONAL			STATE	NATIONAL
Degree of Significance	Negligible	Low	Moderate	High	Very High	Outstanding
Integrity						
Uniqueness						
Cultural						
Features						
Research Potential						

As indicated in the Significance Assessment Matrix above, TKAS13-03 has a low to moderate level of significance. The integrity of this site is considered moderate, with displacement of archaeological material likely to occur during flood events. Due to the location of the site in close proximity to the ephemeral source of water available at the claypans and to other site features in the immediate vicinity, the site is attributed with a moderate level of regional significance.

The area in which the site is located has obviously been a focal point of activity in the past, with evidence of continued use over time if all the nearby sites and the high level of background scatter are taken into consideration. Sites situated on floodplains are susceptible to change over time, with taphonomic processes affecting the visibility of material and altering the surface expression of what is often a much larger archaeological deposit. There is a moderate level of research potential at TKAS13-03 as, despite being a common site type in the broader region, there is a high potential for sub-surface material to be present.

According to Widi Mob representatives Bill Lewis, Stephen Spring and Clinton Lewis, This site is of low cultural significance. It is considered to be a transient camping place where people would have stopped briefly en route to more permanent camping places, or when water resources were available in the nearby claypans. It is considered to be connected to the ancestors of the Widi Mob.

5.1.5.6 Site Management Considerations and Recommendations

The following conclusions and recommendations have been approved by the Widi Mob Traditional Owner representatives that were present during the Survey:

- KML employees and contractors should be made aware of the location and boundaries of newly identified Aboriginal heritage site TKAS13-03 and be aware that the surface expression of the site is susceptible to change over time;
- It is recommended that KML consider commissioning archaeological test-pitting in the broader area surrounding TKAS13-01, TKAS13-02, TKAS13-03 and MGJAS12-01 in order to ascertain a more accurate boundary of what is potentially a single site;
- The Widi Mob Traditional Owners request that the site is avoided if possible during future developments at the Terapod Mine site; and
- TKAS13-03 may constitute a heritage site under Section 5a of the Act. Regardless of the status attributed the site by the ACMC, and if consent to destroy it is granted under Section 18, the Widi Mob request the opportunity to undertake a targeted salvage program at TKAS13-03.

5.1.6 WVST13-01 Scarred Tree

Central coordinate: 489784 mE / 6792944 mN

5.1.6.1 Location and Environment

WVST13-01 is located approximately 10 m outside the western boundary of the western portion of the Weave PDA (see Map 13). The site is situated in a shallow gully amongst a series of low, undulating laterite hills. Site boundary coordinates for WVST13-01 are provided in Table 20 (see Appendix 2).

The scarred tree is situated in a small grove of York Gums (Eucalyptus loxophleba) surrounded by moderately dense mixed Acacia scrub. The ground surface varies between a red, softpan silty sand alluvium around the Eucalypt grove, to a red hardpan in the more exposed areas of the Acacia scrub. A moderately dense, coarse mixed gibber of ironstone, quartz and quartzite was present in throughout the area.

As mentioned above, the vegetation is characteristic of a dense, mixed Acacia scrub (see Plate 52), with Mulga (*A. aneura*), Horse Mulga (*A. ramulosa*), Jam (*A. acuminata*) and Snakewood (*A. xiphophylla*) to 3 m dominating the upperstory. Groves of three to four mature, sprawling York Gums (*E. loxophleba*) were noted throughout the area, typically in shallow gullies. The understory is characterised by low *Acacia spp.* shrubs and seasonal grasses. Occasional *Eremophila*, *Solanum* and *Allocasuarina spp*. were noted throughout.

Plate 52: Typical vegetation and landform at WVST13-01

5.1.6.2 Site Integrity

The area surrounding WVST13-01 is very stable and has not been impacted by human agency. A large amount of dead wood and other organic detritus was noted in the surrounding area; however, this has not affected the integrity of the site.

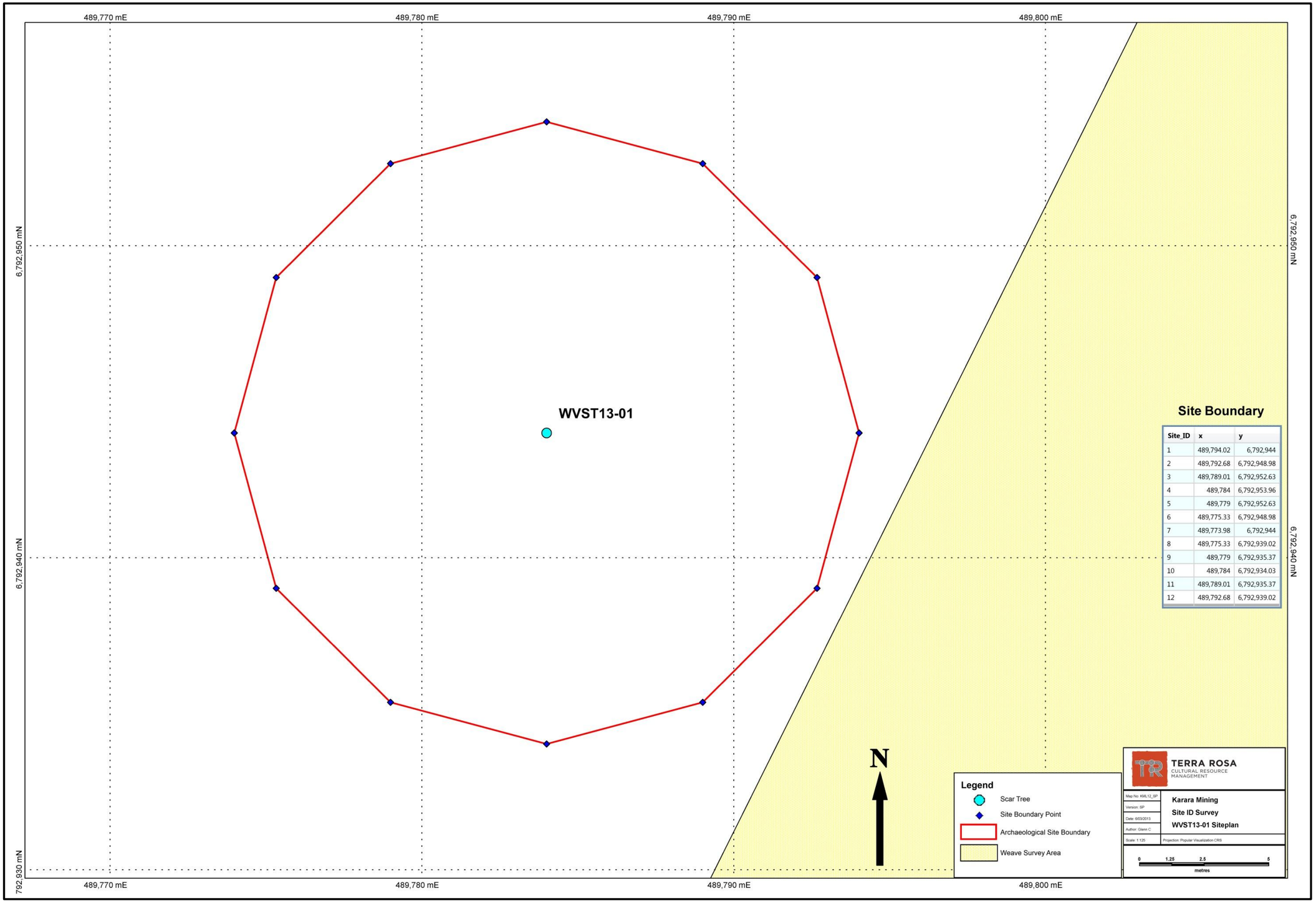
5.1.6.3 Recording Methodology

WVST13-01 is a located on a large York Gum (*E. loxophleba*) and is the result of bark removal for cultural use. The area surrounding the scarred tree was investigated for associated archaeological material using an observational method.

An arbitrary 10 m buffer has been placed around this site, at the request of the Widi Mob Traditional Owners present and as a protective measure against unintentional damage. The scarred tree was marked with a single piece of pink and black striped flagging tape.

WVST13-01 was recorded to site identification level, with numerous measurements and photographs being taken of the scar and tree. Information was also noted regarding the condition of the scar, the depth of regrowth and the position of the scar on the trunk of the tree.

Map 13: WVST13-01 site plan



5.1.6.4 Site Fabric

WVST13-01 is a large, ovoid cultural scar resulting of the removal of bark from a mature York Gum (*E. loxophleba*). It is situated in amongst a small grove of mature, sprawling York Gums in a shallow gully (Plate 53).

Plate 53: Large York Gum bearing cultural scar WVST13-01

The scar is situated 670 mm from the base of the tree, and measures 740 mm by 120 mm in size with a regrowth thickness of 110 mm (see Plate 54). The York Gum is over 10 m tall with a diameter of 520 mm. The dry face of the scar is in moderately good condition, with some signs of weathering and insect activity.

The scar faces east/southeast and axe marks are visible at the top end of the dry face. These axe marks are clearly visible and are irregular in shape and cutting angle, as is typical of axe marks made by stone axe heads (see Plate 55). A scar of this size and shape is likely to be the result of bark removal for a shield or carrying dish.

Plate 54: Cultural Scar WVST13-01

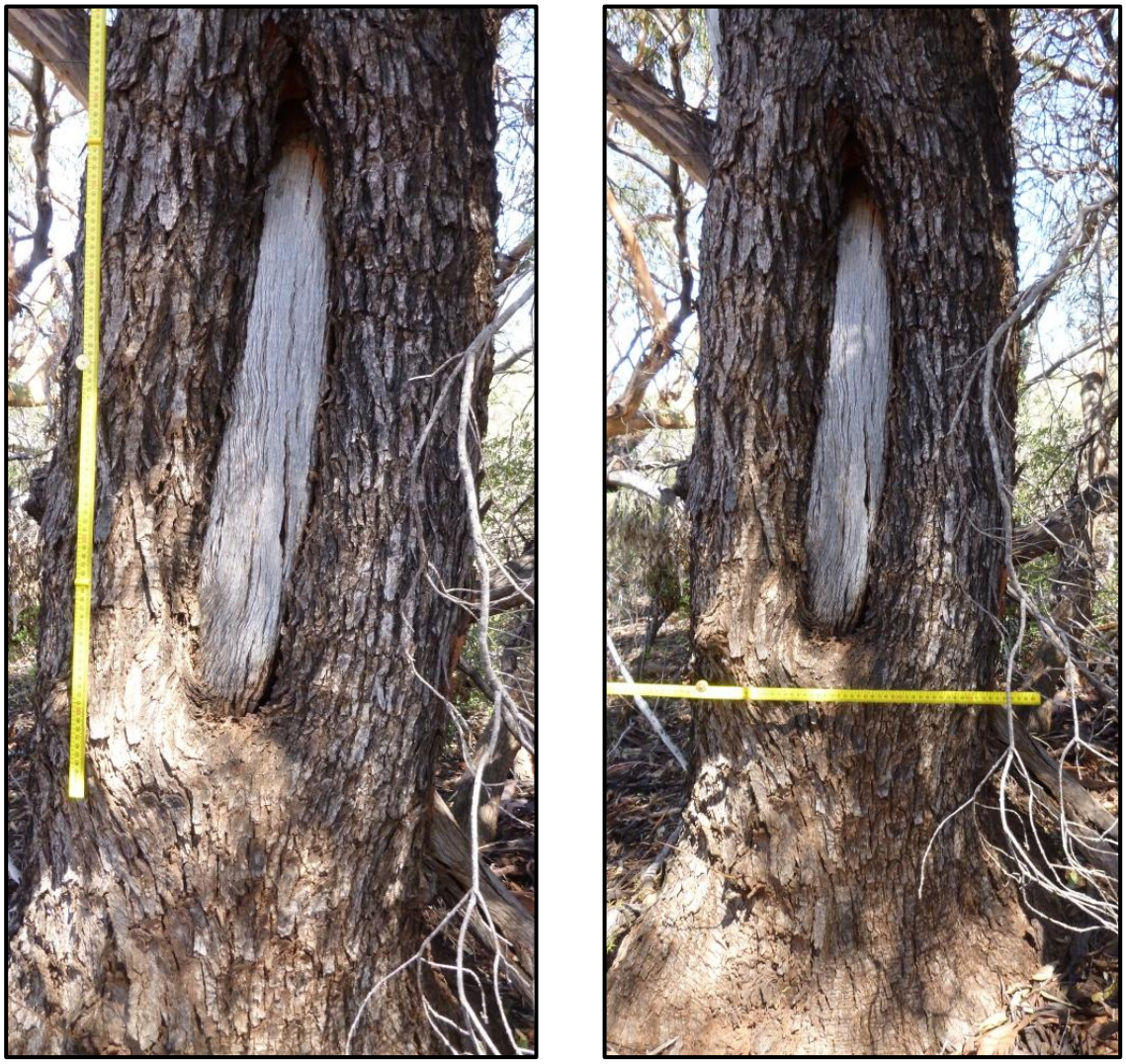


Plate 55: Detail of axe marks, WVST13-01

5.1.6.5 Significance Assessment

The significance assessment for WVST13-01 is summarised in Table 13 and discussed below.

Table 13: WVST13-01 Significance Assessment Matrix

	NOT A SITE	REGIONAL			STATE	NATIONAL
Degree of Significance	Negligible	Low	Moderate	High	Very High	Outstanding
Integrity						
Uniqueness						
Cultural						
Features						
Research Potential						

WVST13-01 is of high regional significance. This is based on a combination of uniqueness, cultural importance, site integrity and features. A search of the AHIS was conducted over an

area of 50 km radius around this site. In 10 000 km², only two other modified trees have been registered with the DIA, attributing a high level of regional significance to WVST13-01.

According to Widi Mob representatives present on the survey, WVST13-01 is of high cultural significance. This is due largely to the rarity of such sites, being the only modified tree that had been seen whilst on survey by any of the Widi Mob representatives present. The significance is further increased by the possibility that the resulting artefact was used as a shield for combat or ceremonial purposes, or to carry items while travelling, including young children. The presence of axe marks on the dry face of the scar provides an additional sense of connection to Widi Mob ancestors.

5.1.6.6 Site Management Considerations and Recommendations

The following conclusions and recommendations have been approved by the Widi Mob Traditional Owner representatives that were present during the Survey:

- KML employees and contractors should be made aware of the location and boundaries of newly identified Aboriginal heritage site WVST13-01;
- The Widi Mob Traditional Owners request that the site is avoided if possible during future developments at the Terapod Mine site; and
- WVST13-01 may constitute a heritage site under Section 5a of the Act. Regardless of the status attributed the site by the ACMC, and if consent to destroy it is granted under Section 18, the Widi Mob request the opportunity to salvage the scarred portion of the tree.

5.1.7 HPQU13-01 Quarry and Reduction Area

Central Coordinate 491196 mE / 6796301 mN

5.1.7.1 Location and Environment

Newly identified site HPQU13-01 is located 60 m south of the northern boundary of the Horse and Pebbles PDA. Site boundary coordinates are provided in Table 21 (see Appendix 2) and the site is illustrated in Map 14.

The site is situated to the west of a low north to south running ridgeline with a shallow gully to the immediate west. The gully contains a wash zone and drainage area to the west. There is an ephemeral creek line located 200 m to the south.

HPQU13-01 is situated on the apex of a low laterite hill with compacted red hardpan sandy silt overlain by a moderate to dense mixed gibber of laterite, quartzite, quartz and silcrete and with a gravely mantle of ironstone and laterite. Ground surface visibility at time of survey was moderate to poor, ranging from 20% to 50%. This was due to dense low shrubs, leaf litter and dense gibber restricting the visibility.

The vegetation at HPQU13-01 consists of a dense mixed *Acacia* scrub dominated by low Mulga (*A. aneura*), Horse Mulga (A. ramulosa) and Jam (A. acuminate) with occasional White Cypress Pine (*Callitris glaucophylla)*. A very sparse understory of mixed Acacia regrowth, Flannel bushes (*Solanum lasiophyllus*), Desert Pride (*Eremophila mackinlayi*) and seasonal grasses were also present.

Plate 56: Typical vegetation and landform at HPQU13-01

5.1.7.2 Site Integrity

Little disturbance was noted aside from mild water erosion which in some cases can result in the movement of cultural material.

5.1.7.3 Recording Methodology

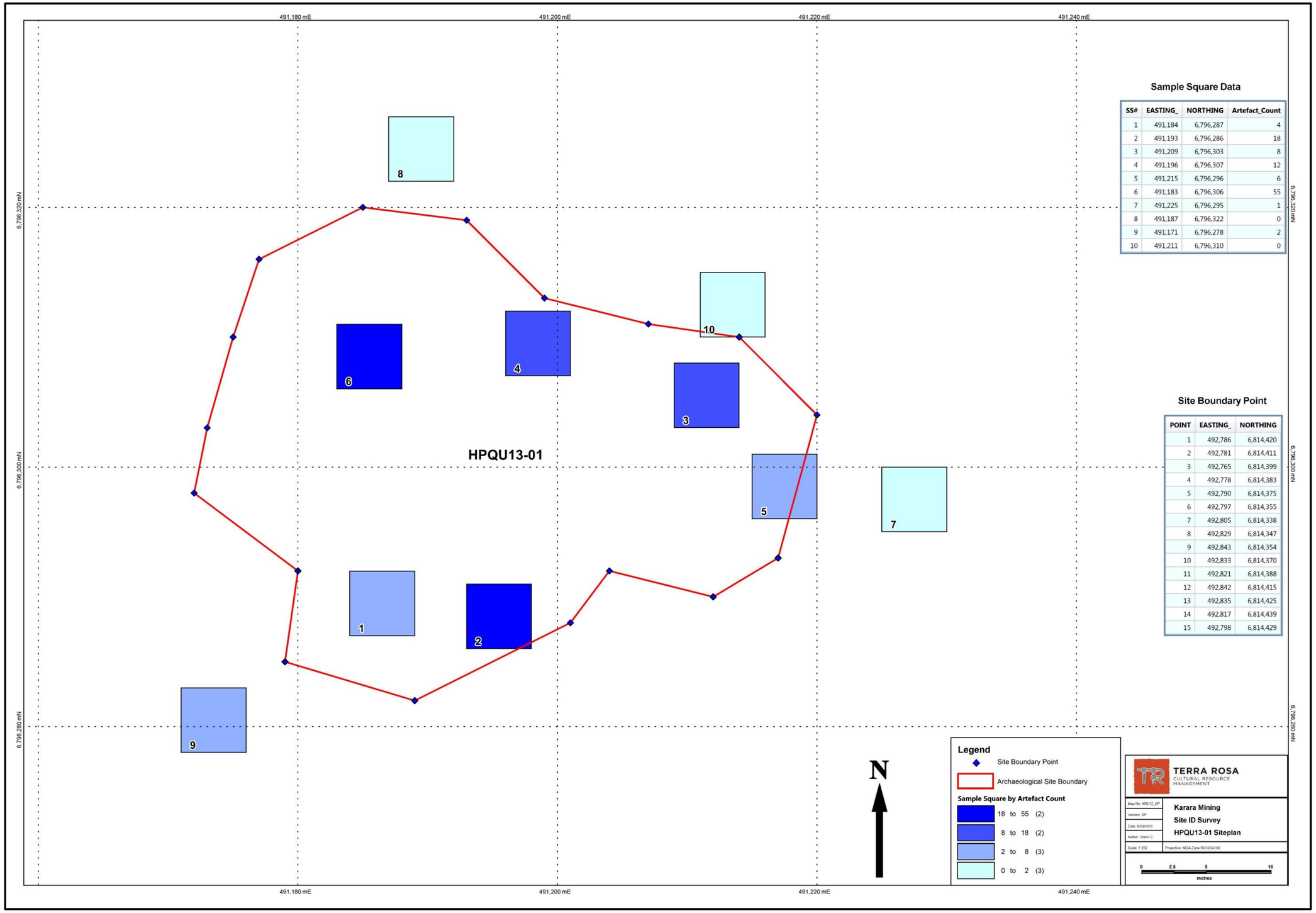
HPQU13-01 is a small, high density quarry and core reduction site with a total surface of 1172 m². Pedestrian inspection of the area ascertained that this site is an area of increased artefact density within a larger area of high background scatter surrounding a series of claypans.

The site boundaries were determined by walking in cardinal directions from the centre of the site until no artefacts were visible on the ground surface. Flagging tape was then attached to trees in order to demarcate the site.

Once the site boundaries were established, Terra Rosa CRM heritage consultants used a combination of arbitrary and targeted methods to place sample squares around the site, each measuring 5 m by 5 m. A total of seven sample squares measuring 5 m by 5 m were placed within the site boundaries which resulted in 14.9% of the total surface area of the site being sampled. The artefacts which were present in the sample squares were recorded to site identification level.

Plate 57: Recording artefacts at HPQU13-01

Map 14: HPQU13-01 site plan



Sample Square Data

SS#	EASTING_	NORTHING	Artefact_Count
1	491,184	6,796,287	4
2	491,193	6,796,286	18
3	491,209	6,796,303	8
4	491,196	6,796,307	12
5	491,215	6,796,296	6
6	491,183	6,796,306	55
7	491,225	6,796,295	1
8	491,187	6,796,322	0
9	491,171	6,796,278	2
10	491,211	6,796,310	0

Site Boundary Point

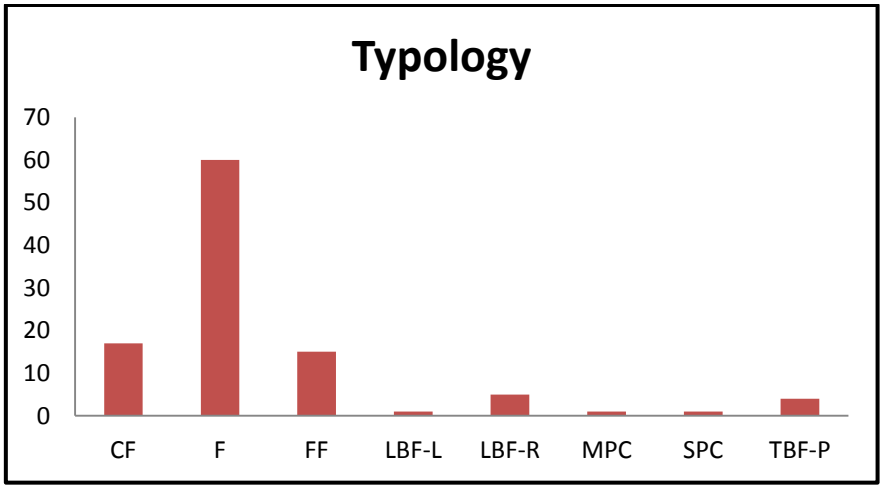
POINT	EASTING_	NORTHING
1	492,786	6,814,420
2	492,781	6,814,411
3	492,765	6,814,399
4	492,778	6,814,383
5	492,790	6,814,375
6	492,797	6,814,355
7	492,805	6,814,338
8	492,829	6,814,347
9	492,843	6,814,354
10	492,833	6,814,370
11	492,821	6,814,388
12	492,842	6,814,415
13	492,835	6,814,425
14	492,817	6,814,439
15	492,798	6,814,429

5.1.7.4 Site Fabric

The site is a small, discreet site located on the apex of a low laterite hill. The material has been sourced from quartz cobbles eroding from the ground and forming into quartz crystals. The assemblage contains quartz, quartzite and very high quality crystal quartz and smoky crystal quartz. A narrow quartzite seam extended from the site to ~200 m to the S S/W which shows signs of occasional though not intensive use.

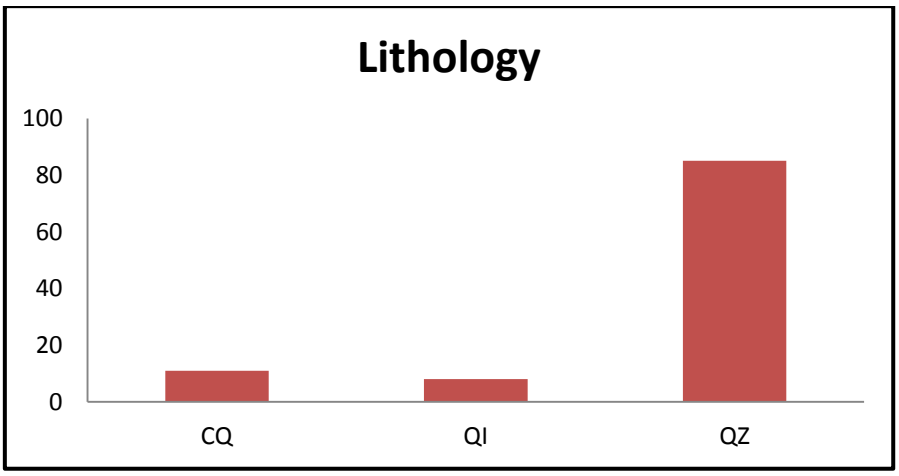
A total of 106 artefacts were recorded within the seven sample squares investigated. The assemblage is comprised of a high amount of complete flakes (57.69%; n=60) with the remaining artefacts being broken flakes (24%; n=25), core fragments (16.35%; n=17), a single platform core (0.96% n=1) and a multi-platform core (0.96% n=1) (see Figure 19).

Figure 14: Typological variation within the artefact assemblage at HPQU13-01



Three lithologies were present amongst the assemblage with quartz comprising 81.73% (n=85) of the assemblage, crystal quartz 10.58% (n=11) and quartzite 7.69% (n=8) (see Figure 20).

Figure 15: Lithic variation within the artefact assemblage at HPQU13-01



Based on the results of the recorded sample at HPQU13-01, it can be extrapolated that the total artefact population at this site ranges between a minimum of 47 artefacts (0.04 artefacts per m²) and a maximum of 2578 artefacts (2.2/m²). The average density across the site is 0.6 artefacts per m², with a total population of 709 artefacts. Based on the visual inspection of the site, the actual artefact population is likely to be at the upper end of the estimation. This is due to the density of material around the central portion of the site, where most of the activity appears to have taken place. There is very little potential for the existence of sub-surface material at this site due to the nature of the landform on which this site is situated.

The nature of the assemblage at HPQU13-01 is consistent with a quarry and core preparation site. The large proportion of flakes and broken flakes is indicative of core preparation activities, while the low representation of cores may reflect the fact that people were taking prepared cores and tool blanks away from the site for later use. No artefacts were identified as bearing evidence of retouch or utilisation and no formal implements were noted.

While no large or obvious outcrops of crystal quartz or quartz were noted here, small boulders of quartz were identified with quartz crystal formations. It is likely that the stone resource here was exhausted by extensive quarrying activity. The raw crystal quartz material here is very high quality, with a glass-like appearance and some instances of a very striking smoky inclusion (see Plates 58 and 59 below).

Plate 58: Artefact in situ at HPQU13-01

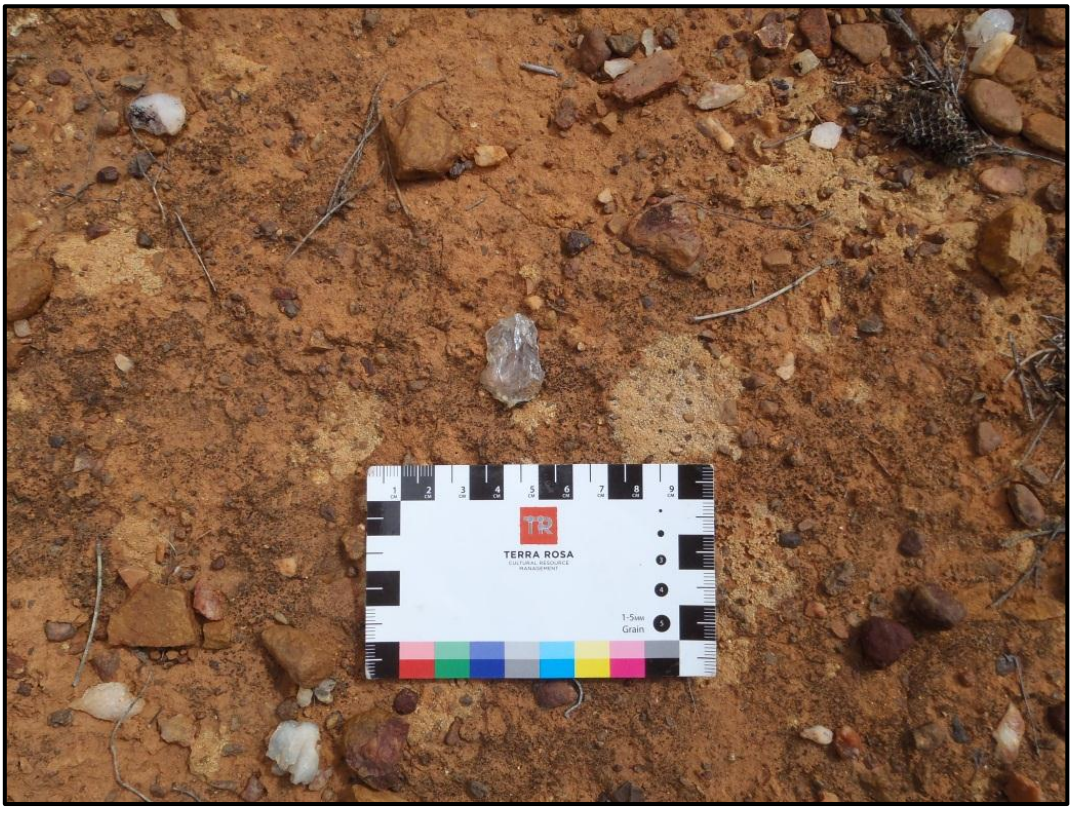
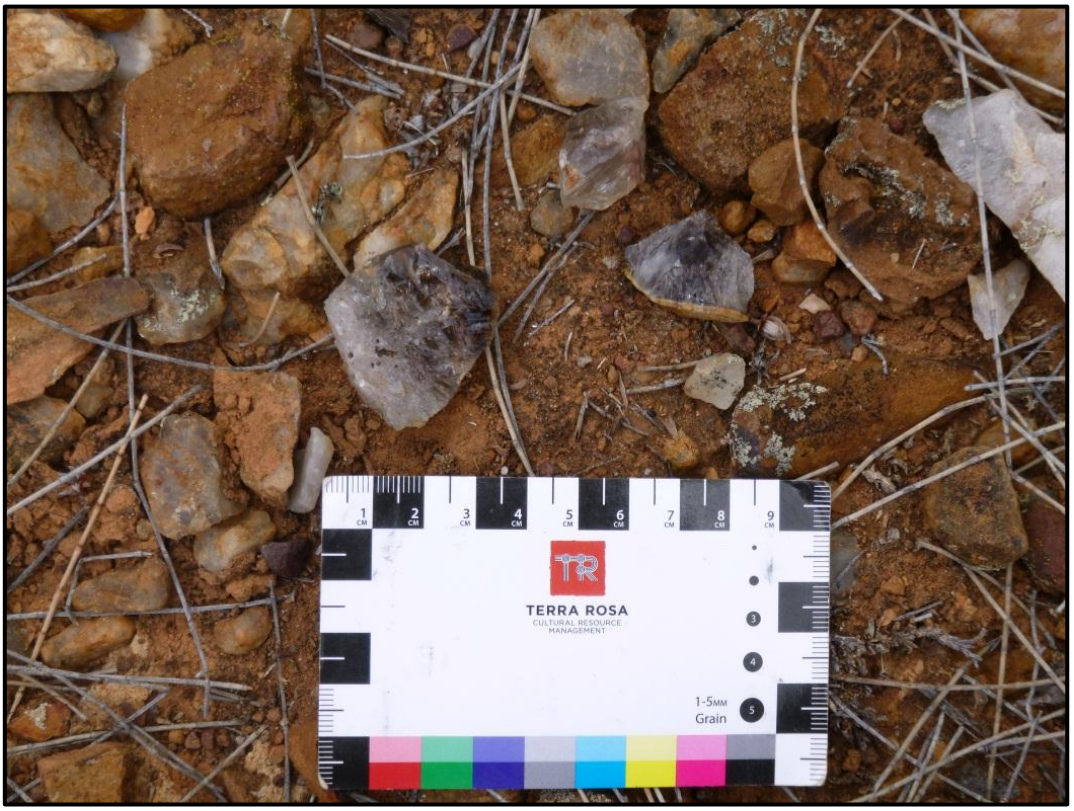


Plate 59: Smoky Crystal Quartz flakes in situ, HPQU13-01



5.1.7.5 Significance Assessment

The significance assessment for HPQU13-01 is summarised in Table 14 and discussed below.

Table 14: HPQU13-01 Significance Assessment Matrix

	NOT A SITE	REGIONAL			STATE	NATIONAL
Degree of Significance	Negligible	Low	Moderate	High	Very High	Outstanding
Integrity						
Uniqueness						
Cultural						
Features						
Research Potential						

HPQU13-01 is attributed a moderate to high level of regional significance overall. Based on a search of the AHIS, only 7.6% of all Sites and Other Heritage Places listed within 50 km of HPQU13-01 are quarry sites. This statistic suggests that quarry sites are quite rare in the region and thus increases its regional significance.

The Widi Mob representatives present during the recording of this site attributed it a moderate level of cultural significance. This is due to the uniqueness of the material and the possibility that it may have been used to produce implements for ceremonial use.

5.1.7.6 Site Management Considerations and Recommendations

The following conclusions and recommendations have been approved by the Widi Mob Traditional Owner representatives that were present during the Survey:

- KML employees and contractors should be made aware of the location and boundaries of newly identified Aboriginal heritage site HPQU13-01;
- The Widi Mob Traditional Owners request that the site is avoided if possible during future developments at the Terapod Mine site; and
- HPQU13-01 may constitute a heritage site under Section 5a of the Act. Regardless of the status attributed the site by the ACMC, and if consent to destroy it is granted under Section 18, the Widi Mob request the opportunity to undertake a targeted salvage program at HPQU13-01.

5.2 Isolated Artefacts

Following thorough investigation, if artefact concentrations were deemed to be of insufficient artefact density to constitute Aboriginal heritage sites, artefacts were recorded as isolated material.

The presence of isolated artefacts in an area may characterise a number of scenarios; they represent tangible evidence for the presence of humans within a landscape, either as a single artefact discard event or as a result of limited stone knapping activity. In some locations, isolated artefacts may indicate the presence of a sub-surface cultural deposit. In others, they may simply exist due to external taphonomic factors having moved them to their current location away from their primary point of deposit.

During the course of the three field trips, 297 isolated artefacts were identified within the 16 PDAs. The location, artefact lithology and typology of isolated artefacts were recorded. Details of isolated artefacts are provided in Appendix 3, and artefact recording codes are detailed in Appendix 1. Figures 22 and 23 illustrate the lithology and typology of the isolated artefacts recorded during the Survey.

Figure 16: Typological variation of isolated artefacts across all PDAs

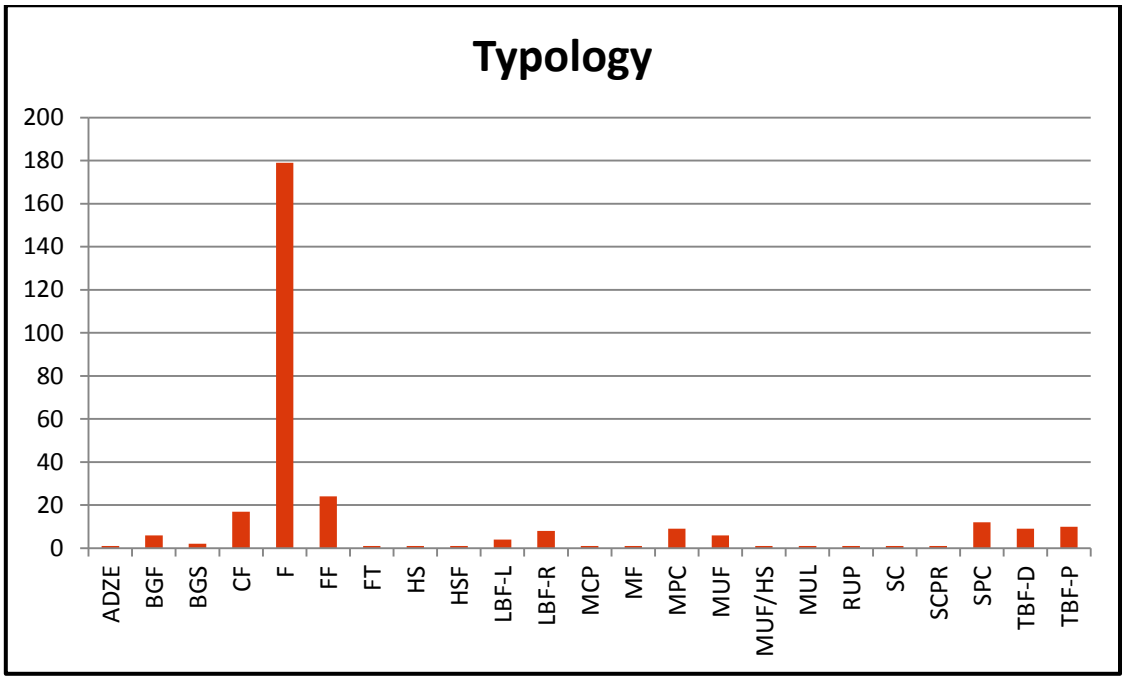
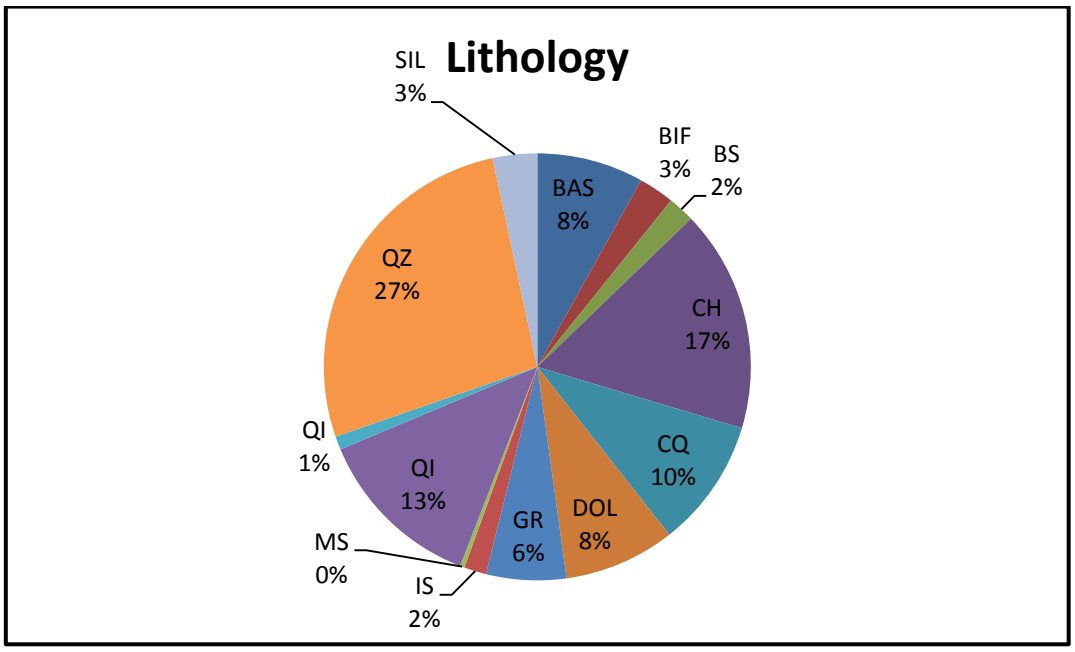


Figure 17: Lithic variation of isolated artefacts across all PDAs



6 DISCUSSION AND SITE IMPACT ASSESSMENT

Terra Rosa CRM was commissioned by Heritage Link, the agent for the Widi Mob Traditional Owner group, to undertake a site identification level heritage survey of the Project Area. The field work was conducted over three field trips, during which seven newly identified heritage sites were assessed and recorded (see Table 7 above). A further three field site points were identified within the Ben's Surprise PDA. This PDA was removed from the priority list and as such these field site points remain unassessed or recorded.

Of the new sites identified, four are artefact scatters, two are quarry sites and one is a scarred tree. These sites range in overall significance from low to high regional significance based on a number of variables. These variables include site integrity, uniqueness, cultural importance, research potential and related features.

As a result of a search conducted on the AHIS for an area of 100 km surrounding the Project Area, 35 registered heritage sites and 149 other heritage places were identified within the vicinity of the Project Area. Of these, 48% are artefact scatters, 7.8% are quarry sites and only 1.6% are scarred, or modified, trees. This correlates with the results of Terra Rosa CRM's regional dataset discussed in Section 4 above. As artefact scatters are relatively common in the broader region, they are considered to be of less significance, while scarred trees and quarry sites are decidedly rarer, hence affording them a higher level of regional significance. In addition to the statistical analysis, the raw source materials utilised at the two quarry sites (TEQU12-01 and HPQU13-01) are very distinctive and of high quality, again increasing the level of research potential and overall significance.

As mentioned in Section 4 of this Report, regional site patterning indicates that artefact scatters are more likely to be located in proximity to water sources, whether permanent, semi-permanent or ephemeral. The newly identified artefact scatters all conform to this patterning, with TGAS12-01 occurring 50 m from a braided, ephemeral creek line containing three large rock holes, and TKAS13-01, TKAS13-02 and TKAS13-03 all occurring within metres of a series of claypans and a previously recorded site (MGJAS12-01) containing a soak and a well. The area surrounding these artefact scatters contains a high background scatter, which is characteristic of floodplain taphonomy. The boundaries delineated around these sites are likely to change with flood events as the movement of sediments will undoubtedly result in artefacts being buried and uncovered. As such, it is recommended that KML consider commissioning archaeological test-pitting in the area surrounding the four artefact scatters identified in the Tom's Kitchen PDA. Definitively defining the boundary of these sites will enable KML to work in the area with certainty.

In terms of the artefact assemblages present within the recorded artefact scatters, all contain a high level of lithic variability. This is particularly true of TKAS13-01, TKAS13-02 and TKAS13-03, which are located adjacent to claypans, a soak and a well. This conforms to Veth's predictive model whereby he determined that artefact scatters identified in proximity to water sources are likely to contain high variability within the lithic assemblage (1989a; 1989b; 1993; 1995; 1996).

The two quarry sites identified (TEQU12-01 and HPQU13-01) are both situated on rocky hills and display a limited lithic variability. This is due to the nature of quarry sites being simply a place where raw material is sourced and often worked to produce core and/or tool blanks for later refinement and use. Scarred tree site WVST13-01 is situated in an area populated with

large, mature York Gums, an obvious location for such a site type in a region dominated by mixed *Acacia* scrub.

Overall, the results obtained from the Survey of the KML Regional Exploration Priorities Project Area support the preliminary 'site patterning hypothesis' as proposed in Section 4 of this Report. The data collected has the capacity to provide future researchers with information to further interpret how ancestral Aboriginal people utilised the landscape. While ground assessment is always the most valuable and practical means for identifying habitation patterns or travel routes in an area, a regional understanding of site patterning may be developed to assist future consultants or researchers in predicting, locating and interpreting heritage sites in the immediate KML Project Area or wider Widi Mob region.

As Terra Rosa CRM has not received notification of the proposed activities to be conducted within the PDAs, the direct impacts of the proposed activity on the seven newly identified heritage sites are currently unknown. As such, an accurate site impact assessment cannot be undertaken at the time of writing.

7 RECOMMENDATIONS

The following conclusions and recommendations have been approved by the Widi Mob Traditional Owner representatives who were present during the Survey:

1. **KML is advised that the archaeological site identification heritage survey of The Hinge, Hinge Haul Road, Karara Camp Extension, Ben's Surprise, Tom's Kitchen, Shine E, The Gap, Onga Extension, Lister/Gobo, Brak G, Brak South, Skeksi, Terapod East, Mystic, Weave and Horse & Pebbles PDAs within the Project Area is complete.**

   As a result of the heritage survey, seven archaeological sites (TEQU12-01, TGAS12-01, TKAS13-01, TKAS13-02, TKAS13-03, HPQU13-01 and WVST13-01) were identified and have been recorded to site identification level. A further three field site points have been identified with the Ben's Surprise PDA and have **not** been recorded or assessed.

2. **All employees and contractors working within the Hinge, Hinge Haul Road, Karara Camp Extension, Ben's Surprise, Tom's Kitchen, Shine E, The Gap, Onga Extension, Lister/Gobo, Brak G, Brak South, Skeksi, Terapod East, Mystic, Weave and Horse & Pebbles PDAs should be made aware of the location and boundaries of all heritage sites identified therein and be clearly instructed to restrict access and works to areas that KML has clearance to utilise.**

   Under Section 17 of the Act it is an offence to disturb an Aboriginal heritage site without prior written permission to do so under Sections 16 or 18 of the Act. Heavy financial penalties may be applied against individuals or corporations who disturb a site, whether knowingly or unknowingly.

   It is recommended that KML employees and contractors are fully briefed on their obligations regarding cultural heritage sites and materials under the Act, attend cultural awareness training if available, and are clearly instructed to confine their activities to those areas that KML has clearance to utilise.

3. **It is recommended that KML commission archaeological test-pitting to be undertaken in the area surround the newly identified sates TKAS13-01, TKAS13-02, TKAS13-03 and previously recorded site MJGAS12-01.**

   Due to the nature of the location of the above mentioned sites, it is likely that the boundaries of the surface expressions will change over time due to taphonomic processes typical of floodplains. Terra Rosa CRM recommends that archaeological test-pitting be undertaken here, under Section 16 of the Act, in order to clearly and accurately define the limits of cultural material in this area. Doing such would provide KML with the certainty to undertake works in the area and increase what is currently known about the effects of taphonomic processes on sites in the broader region.

4. **KML is advised to engage two Widi Mob Traditional Owner group representatives to monitor all ground disturbing works within proximity to heritage sites identified within the PDAs.**

   The presence of monitors in close proximity to heritage sites is suggested so as to ensure that any cultural material associated with such sites that may be revealed through the clearing of vegetation, or unearthed during ground disturbing works, is managed appropriately.

5. **If KML proposes to utilise areas in which heritage sites have been identified, KML is advised to consult with the Widi Mob Traditional Owners and apply to disturb the sites under Section 18 of the Act.**

   As noted above in Item 2, it is an offence to disturb an Aboriginal heritage site without prior written permission to do so under Sections 16 or 18 of the Act. Heavy financial penalties may be applied against individuals or corporations who disturb a site, whether knowingly or unknowingly.

   Section 18 of the Act details the statutory provision for applications to be made to the Minister to utilise areas in which Aboriginal heritage sites may exist. Approval to utilise areas in which Aboriginal heritage sites may exist is subject to evaluation by the ACMC and the conditions of the Act.

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APPENDIX 1

Artefact Recording Codes and Glossary

A1.1 ARTEFACT RECORDING CODES

Artefact Type

Artefact types were identified in accordance with the site identification method outlined above. The following abbreviations have been employed in this Report.

ADB	*Burin Adze*	**LBFL**	*Longitudinally Broken Flake – Left*
ADT	*Tula Adze*	**LBFM**	*Longitudinally Broken Flake – Medial*
BL	*Blade*	**LBFR**	*Longitudinally Broken Flake – Right*
BGF	*Basal Grind Fragment*	**MPC**	*Multi-Platform Core*
BGS	*Basal Grindstone*	**MU**	*Muller*
CF	*Core Fragment*	**MF**	*Muller Fragment*
CT	*Core Tool*	**RUP**	*Re-touched/Utilised Piece*
F	*Complete Flake*	**SPC**	*Single Platform Core*
FF	*Flake Fragment*	**SR**	*Scraper*
GM	*Geometric Microlith*	**TBFD**	*Transverse Broken Flake – Distal*
HS	*Hammer Stone*	**TBFM**	*Transverse Broken Flake – Medial*
HSF	*Hammer Stone Fragment*	**TBFP**	*Transverse Broken Flake – Proximal*

Lithology

Lithology describes the material from which the artefact was manufactured. The following abbreviations have been employed in this Report.

B	*Bone*	**IS**	*Ironstone*
BS	*Basalt*	**KAL**	*Kaolinite*
BIF	*Banded Iron Formation*	**LM**	*Limestone*
CA	*Canga*	**LT**	*Laterite*
CH	*Chert*	**MUD**	*Mudstone*
CQ	*Crystal Quartz*	**SIL**	*Silcrete*
CY	*Chalcedony*	**SL**	*Siliceous Limestone*
DOL	*Dolerite*	**QI**	*Quartzite*
GR	*Granite*	**QZ**	*Quartz*

APPENDIX 2

Site Boundary Coordinates

Table 15: TEQU12-01 boundary coordinates

Easting (mE)	Northing (mN)
488673	6778196
488673	6778197
488677	6778202
488684	6778211
488687	6778223
488664	6778229
488650	6778229
488641	6778221
488637	6778208
488640	6778197
488635	6778189
488645	6778173
488657	6778177
488668	6778187
488674	6778185
488681	6778178
488684	6778164
488702	6778146
488711	6778149
488709	6778168
488699	6778172
488690	6778171
488684	6778180
488673	6778196

Table 16: TGAS12-01 boundary coordinates

Easting (mE)	Northing (mN)
493858	6807483
493850	6807494
493842	6807504
493828	6807512
493813	6807518
493801	6807514
493795	6807503
493807	6807490
493812	6807480
493824	6807470
493832	6807467
493841	6807469
493853	6807466
493862	6807472
493858	6807483

Table 17: TKAS13-01 boundary coordinates

Easting (mE)	Northing (mN)
492546	6814110
492555	6814127
492565	6814134
492565	6814153
492577	6814150
492591	6814141
492602	6814131
492617	6814127

Easting (mE)	Northing (mN)
492610	6814116
492602	6814106
492590	6814105
492575	6814103
492554	6814106
492546	6814110

Table 18: TKAS13-02 boundary coordinates

Easting (mE)	Northing (mN)
492686	6814302
492698	6814292
492706	6814272
492723	6814269
492718	6814243
492721	6814226
492725	6814213
492737	6814199
492734	6814189
492713	6814183
492702	6814204
492677	6814207
492666	6814193
492663	6814182
492654	6814191
492631	6814202
492631	6814227
492634	6814252

Easting (mE)	Northing (mN)
492641	6814269
492654	6814277
492659	6814282
492670	6814298
492686	6814302

Table 19: TKAS13-03 boundary coordinates

Easting (mE)	Northing (mN)
492821	6814388
492842	6814415
492835	6814425
492816	6814439
492797	6814429
492786	6814420
492781	6814411
492765	6814399
492778	6814383
492790	6814375
492796	6814355
492804	6814338
492829	6814347
492843	6814354
492833	6814370
492821	6814388

Table 20: WVST13-01 boundary coordinates

Easting (mE)	Northing (mN)
489794	6792944
489793	6792949
489789	6792953
489784	6792954
489779	6792953
489775	6792949
489774	6792944
489775	6792939
489779	6792935
489784	6792934
489789	6792935
489793	6792939
489794	6792944

Table 21: HPQU13-01 boundary coordinates

Easting (mE)	Northing (mN)
491172	6796298
491173	6796303
491175	6796310
491177	6796316
491185	6796320
491193	6796319
491199	6796313
491207	6796311
491214	6796310
491220	6796304

Easting (mE)	Northing (mN)
491217	6796293
491212	6796290
491204	6796292
491201	6796288
491189	6796282
491179	6796285
491180	6796292
491172	6796298

APPENDIX 3

Isolated Artefact Data

Table 22: Isolated Artefact Data, KML Regional Exploration Priorities Project Area

Type	Lithology	Retouch or Utilisation	Coordinate (mE / mN)
F	DOL	N	492533 / 6814135
F	QZ	N	492533 / 6814135
F	QZ	N	492546 / 6814136
F	QZ	N	492530 / 6814110
F	QZ	N	492581 / 6814174
MPC	QZ	N	492619 / 6814208
F	QZ	N	492619 / 6814208
TBF-P	QI	N	492633 / 6814199
F	DOL	N	492459 / 6814206
MUF	GR	N	492463 / 6814239
F	QI	N	492454 / 6814241
F	QI	N	492454 / 6814241
F	QI	N	492454 / 6814241
F	GR	N	492453 / 6814234
SPC	CQ	N	492450 / 6814237
F	CQ	N	492461 / 6814252
F	CQ	N	492461 / 6814252
F	QZ	N	492461 / 6814252
F	DOL	N	492461 / 6814252
MCP	CQ	N	492602 / 6814350
F	QZ	N	492735 / 6812534
FF	BIF	N	492735 / 6812534
F	CQ	N	480056 / 6772315
FF	CQ	N	490897 / 6795602
SCPR	QZ	N	490001 / 6793080
F	QZ	N	492578 / 6814076

Type	Lithology	Retouch or Utilisation	Coordinate (mE / mN)
TBF-D	SIL	N	492577 / 6814080
F	CH	N	492579 / 6814086
RUP	CH	N	492454 / 6814241
F	CH	N	492467 / 6814236
LBF-R	CH	N	492473 / 6814243
TBF-P	CH	N	492473 / 6814243
F	SIL	N	492474 / 6814253
F	QI	N	492617 / 6814105
F	DOL	N	492589 / 6814145
F	DOL	N	492590 / 6814150
MPC	CQ	N	0492599 / 681444
F	CQ	N	492619 / 6814140
F	SIL	N	492635 / 6814123
F	CH	N	492614 / 6814187
F	DOL	N	492614 / 6814187
TBF-P	SIL	N	492622 / 6814206
LBF-R	SIL	N	492622 / 6814206
F	DOL	N	490951 / 6791375
CF	DOL	N	490952 / 6791374
F	DOL	N	490955 / 6791377
SPC	DOL	N	490972 / 6791385
F	SIL	N	491065 / 6791568
FF	DOL	N	491039 / 6791639
F	SIL	N	491073 / 6791575
FF	QI	N	491081 / 6791577
F	BIF	N	491075 / 6791600
CF	BS	N	491052 / 6791683

Type	Lithology	Retouch or Utilisation	Coordinate (mE / mN)
F	CH	N	491128 / 6791685
F	GR	N	491438 / 6792454
SPC	DOL	N	491576 / 6792412
BGF	GR	N	419518 / 6792414
F	DOL	N	491473/ 6792511
F	QI	N	491512 / 6792567
F	DOL	N	491586 / 6792630
F	QI	N	491603 / 6792637
SPC	GR	N	490706 / 6790982
CF	CQ	N	491177 / 6796279
FF	CQ	N	491177 / 6796296
F	QZ	N	480281 / 6772549
F	QZ	N	480636 / 6772632
F	QZ	N	480455 / 6772408
F	QZ	N	493054 / 6795232
F	QI	N	491147 / 6796217
F	QI	N	491177 / 6796294
F	QI	N	491176 / 6796292
F	QI	N	491186 / 6796304
F	QZ	N	492338 / 6793904
F	QZ	N	492361 / 6794165
F	QZ	N	491176 / 6796293
TBF-P	QZ	N	491176 / 6796293
F	BIF	N	489863 / 6792948
F	BAS	N	489774 / 6791634
F	QZ	N	489693 / 6792307
F	QZ	N	489767 / 6791812

Type	Lithology	Retouch or Utilisation	Coordinate (mE / mN)
CF	CQ	N	491174 / 6796280
MPC	QZ	N	487125 / 6780013
F	QZ	N	487125 / 6779113
SPC	CH	N	48658 / 6778082
CF	BAS	N	488652 / 6777877
F	QZ	N	493195 / 6797160
F	BAS	N	493195 / 6797162
F	BAS	N	493195 / 6797162
F	CH	N	492816 / 6796639
F	CH	N	488721 / 6778119
F	QI	N	488726 / 6778117
F	QI	N	488726 / 6778118
F	QI	RU	488720 / 6778115
LBF-R	QI	N	488690 / 6778109
F	BAS	N	494017 / 6807330
F	BAS	N	494018 / 6807330
F	BAS	N	494020 / 6807333
F	DOL	N	493800 / 6807454
F	QZ	N	489826 / 6820974
F	BAS	N	489911 / 6820834
F	CH	N	489933 / 6820899
F	QZ	N	490033 / 6821175
F	BAS	N	494139 / 6808586
F	BAS	N	494146 / 6808593
F	QI	N	494147 / 6808592
BGF	BAS	N	494161 / 6808636
SC	BAS	N	492366 / 6814620

Type	Lithology	Retouch or Utilisation	Coordinate (mE / mN)
TBF-D	BAS	N	492359 / 6814633
SPC	CH	N	492353 / 6814625
F	CQ	N	492351 / 6814619
MUF	BAS	N	492423 / 6814372
F	CQ	N	492433 / 6814343
F	CH	N	492435 / 6814341
HS	GR	N	492423 / 6814309
F	CQ	N	492461 / 6814326
F	BIF	N	492465 / 6814282
BGF	GR	N	492463 / 6814276
BGF	GR	N	492460 / 6814276
SPC	QZ	N	492705 / 6814058
F	DOL	N	492679 / 6514160
F	BAS	N	492667 / 6814208
F	IS	N	492665 / 6814246
F	GR	N	492643 / 6814250
F	CH	N	492643 / 6814253
F	CH	N	492647 / 6814265
F	GR	N	492650 / 6814268
TBF-P	CH	N	492649 / 6814267
SPC	CH	N	492649 / 6814268
LBF-R	CH	N	492657 / 6814272
F	GR	N	492661 / 6814284
F	DOL	N	492510 / 6814783
F	DOL	N	492520 / 6814839
F	BAS	U RLM	492564 / 6814770
SPC	QI	N	492564 / 6814773

Type	Lithology	Retouch or Utilisation	Coordinate (mE / mN)
TBF-P	DOL	N	492592 / 6814784
F	QI	N	492579 / 6814804
TBF-P	CQ	N	492735 / 6814695
F	QZ	N	492747 / 6814689
F	CH	R	492781 / 6814296
F	CH	N	492811 / 6814297
TBF-P	QI	N	492629 / 6814315
F	QZ	N	492629 / 6813955
TBF-D	CH	N	492445 / 6813965
F	CQ	N	492445 / 6813971
F	CQ	N	492696 / 6813643
F	CH	R	492931 / 6813048
F	QI	N	488755 / 6778182
MPC	QI	N	488757 / 6778181
MPC	QI	N	488760 / 6778187
SPC	QI	N	488700 / 6778155
MPC	QI	N	488702 / 6778153
MPC	CH	N	488702 / 6778153
SPC	CH	N	488708 / 6778148
FT	CH	N	488708 / 6778149
F	CH	N	488698 / 6778150
FF	QI	N	494033 / 6807332
FF	QI	N	496812 / 6807458
F	QZ	N	493816 / 6807466
CF	QI	N	493793 / 6807488
F	QI	N	493796 / 6807488
F	QZ	N	493873 / 6807492

Type	Lithology	Retouch or Utilisation	Coordinate (mE / mN)
F	QZ	N	490029 / 6821051
F	QI	N	490039 / 6821004
F	QI	N	494298 / 6808633
MUL	BAS	N	494227 / 6808639
LBF-L	QI	N	494227 / 6808638
FF	BIF	N	494234 / 6808643
F	QZ	N	494234 / 6808643
MPC	QI	N	494216 / 6808901
F	CH	U LLM	490198 / 6821205
CF	CH	N	492748 / 6812519
CF	CH	N	492670 / 6814686
CF	CH	N	493005 / 6813309
CF	CH	N	492671 / 6814691
CF	CH	N	492668 / 6814846
CF	CH	N	492609 / 6814887
CF	CH	N	492771 / 6814318
F	CH	N	492497 / 6814018
FF	CH	N	492494 / 6814394
F	CQ	N	492400 / 6814700
F	CQ	N	492744 / 6814369
F	CQ	N	492759 / 6814300
FF	CQ	N	492771 / 6814318
TBF-D	CQ	N	492347 / 6814119
CF	BIF	N	492214 / 6814670
F	CQ	N	492772 / 6814314
F	CQ	N	492894 / 6814485
F	QZ	N	492740 / 6812526

Type	Lithology	Retouch or Utilisation	Coordinate (mE / mN)
F	BAS	N	492711 / 6814730
F	BAS	N	492689 / 6814820
F	CH	N	492680 / 6814699
F	CH	N	492715 / 6814806
F	CH	N	492715 / 6814803
F	CH	N	492630 / 6814823
F	CH	N	492911 / 6814296
F	CQ	N	492298 / 6814313
F	DOL	N	492692 / 6814689
F	DOL	N	492697 / 6814693
F	IS	N	492633 / 6814916
F	QI	N	492822 / 6814738
F	QZ	N	492336 / 6814198
F	QZ	N	492907 / 6814382
F	QZ	N	492898 / 6814410
F	QZ	N	492796 / 6814871
F	QZ	N	492910 / 6814381
F	SIL	N	492675 / 6814694
FF	BAS	N	492559 / 6813935
FF	CH	N	492298 / 6814317
FF	IS	N	492685 / 6814696
FF	QZ	N	492550 / 6814033
FF	QZ	N	492759 / 6814299
F	QZ	N	492738 / 6812527
FF	QZ	N	492738 / 6812527
BGS	SIL	N	492597 / 6815094
BGF	IS	N	492964 / 6814067

Type	Lithology	Retouch or Utilisation	Coordinate (mE / mN)
LBF-L	BAS	N	492636 / 6814827
LBF-R	CH	N	492666 / 6814692
MF	BAS	N	492964 / 6814067
MPC	CH	N	492698 / 6814856
F	QI	N	492887 / 6814449
FF	QI	N	492771 / 6814318
FF	QI	N	492780 / 6814233
F	QI	N	492706 / 6812630
F	QZ	N	492715 / 6812589
F	QZ	N	492737 / 6812486
TBF-D	QZ	N	492657 / 6812822
CF	QZ	N	492579 / 6813758
F	QZ	N	492335 / 6814200
F	QZ	N	492756 / 6814386
F	QZ	N	492756 / 6814387
F	QZ	N	492769 / 6814328
F	QZ	N	492519 / 6814009
F	QZ	N	492527 / 6813967
F	QZ	N	492713 / 6813147
F	QZ	N	492516 / 6813974
F	QZ	N	492538 / 6814123
F	QZ	N	492686 / 6813287
F	QZ	N	492711 / 6813148
F	QZ	N	492721 / 6813115
F	QZ	N	492735 / 6812530
F	QZ	N	492529 / 6814165
F	QZ	N	492497 / 6814288

Type	Lithology	Retouch or Utilisation	Coordinate (mE / mN)
F	QZ	N	492485 / 6814358
F	QZ	N	492693 / 6814803
F	QZ	N	493118 / 6813607
FF	QZ	N	492556 / 6814073
FF	QZ	N	492521 / 6813999
F	QZ	N	492729 / 6812522
F	QZ	N	492729 / 6812522
FF	QZ	N	492729 / 6812522
LBF-R	QZ	N	492403 / 6813957
TBF-D	QZ	N	492360 / 6814056
TBF-D	QZ	N	492567 / 6813996
LBF-L	QZ	N	492502 / 6813981
LBF-R	QZ	N	492550 / 6813831
TBF-D	BAS	N	492679 / 6815247
TBF-P	IS	N	492495 / 6814393
F	QZ	N	492517 / 6813974
LBF-L	QZ	N	492505 / 6813981
FF	MS	N	488704 / 6778158
LBF-R	BAS	N	488704 / 6778158
TBF-D	BIF	N	488702 / 6778158
FF	CH	N	488690 / 6778162
F	CH	N	488694 / 6778168
MUF	GR	N	488632 / 6778184
F	QI	N	492822 / 6796977
F	QI	N	494009 / 6808725
F	BS	N	494179 / 6808622
F	DOL	N	492331 / 6814615

Type	Lithology	Retouch or Utilisation	Coordinate (mE / mN)
BGS	GR	N	492390 / 6814471
F	BS	N	492382 / 6814467
MUF	GR	N	492370 / 6814449
F	BIF	N	492375 / 6814318
TBF-P	QZ	N	492390 / 6814249
F	CQ	N	492369 / 6814270
F	CQ	N	492393 / 6814189
F	CQ	N	492402 / 6814103
FF	CQ	N	492473 / 6814060
MUF	GR	N	492501 / 6813994
F	QZ	N	492606 / 6814053
F	QZ	N	492606 / 6814053
F	DOL	N	492542 / 6814229
BGF	GR	N	492451 / 6814703
CF	CH	N	492654 / 6814797
F	DOL	N	492654 / 6814797
F	CH	N	492654 / 6814797
F	QZ	N	492528 / 6815073
F	BS	N	492762 / 6814665
SPC	SIL	N	492762 / 6814665
CF	BS	N	492762 / 6814665
MUF	GR	N	492921 / 6813994
F	CH	N	492894 / 6814017
F	BS	N	492833 / 6814263
ADZE	CH	N	492833 / 6814263
F	DOL	N	492834 / 6814351
HSF	GR	N	492970 / 6811981

Type	Lithology	Retouch or Utilisation	Coordinate (mE / mN)
MUF/HS	QI	N	493026 / 6812323