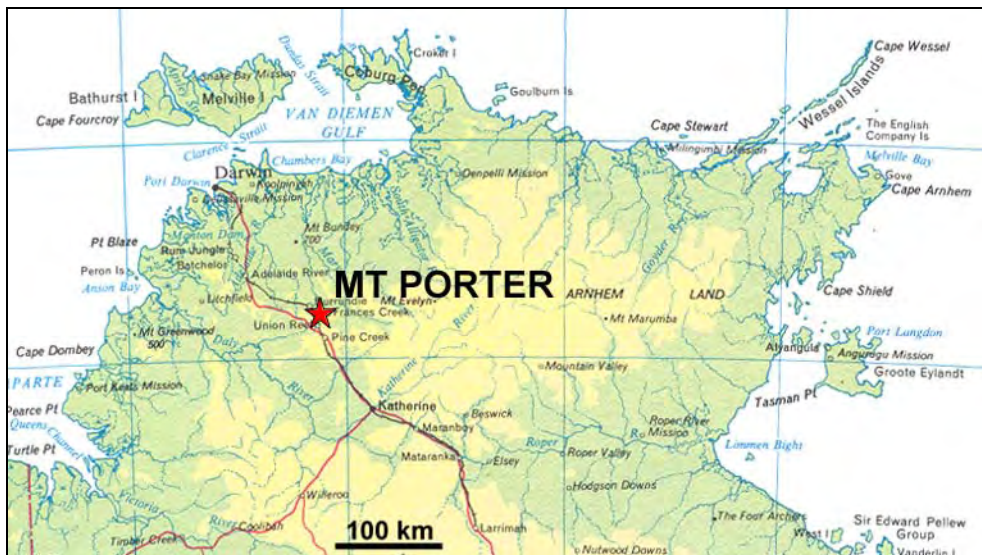


MT PORTER GOLD MINE SITE, Pine Creek, NT:

ARCHAEOLOGICAL SURVEY



A report to

MBS Environmental, Perth
for
Arafura Resources Ltd, Perth

by

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Abstract

An archaeological survey and assessment of the proposed Mt Porter mine site, near Pine Creek, Northern Territory, was undertaken for MBS Environmental, Perth, on behalf of the developer Arafura Resources. Fifteen previously recorded sites within the development area were assessed and a further six sites located and assessed along the haul road corridor (Figure 1).

The survey found the area to be rich in archaeological sites and material with 21 sites being recorded within the present development area. It was recommended, from an archaeological perspective, that the project be permitted to proceed, but with some limitations and restrictions.

Five sites were accorded a HIGH archaeological significance and should be avoided by the development and protected from any or further disturbance or damage.

Seven sites were accorded medium significance and should be avoided wherever possible but could be disturbed following permission from the Office of Environment and Heritage and further archaeological study including the collection of all surface artefacts.

Nine sites were found to be of low significance and should be avoided wherever possible but could be disturbed following permission from the Office of Environment and Heritage.

Site	Archaeological Significance
MP03	HIGH
MP07	HIGH
MP34	HIGH
MP48	HIGH
MP49	HIGH
MP02	Medium
MP06	Medium
MP25	Medium
MP42	Medium
MP47	Medium
MP51	Medium
MP50	Medium
MP04	Low
MP05	Low
MP08	Low
MP19	Low
MP20	Low
MP21	Low
MP22	Low
MP23	Low
MP46	Low

Acknowledgements

The project was supervised, at different stages, by Kristy Sell, Edward Clerk and Janine Prosser, of MBS Environmental. Gerard Niemoller, Office of Environment and Heritage, Darwin, provided the results of a background search of the Territory's Site Register.

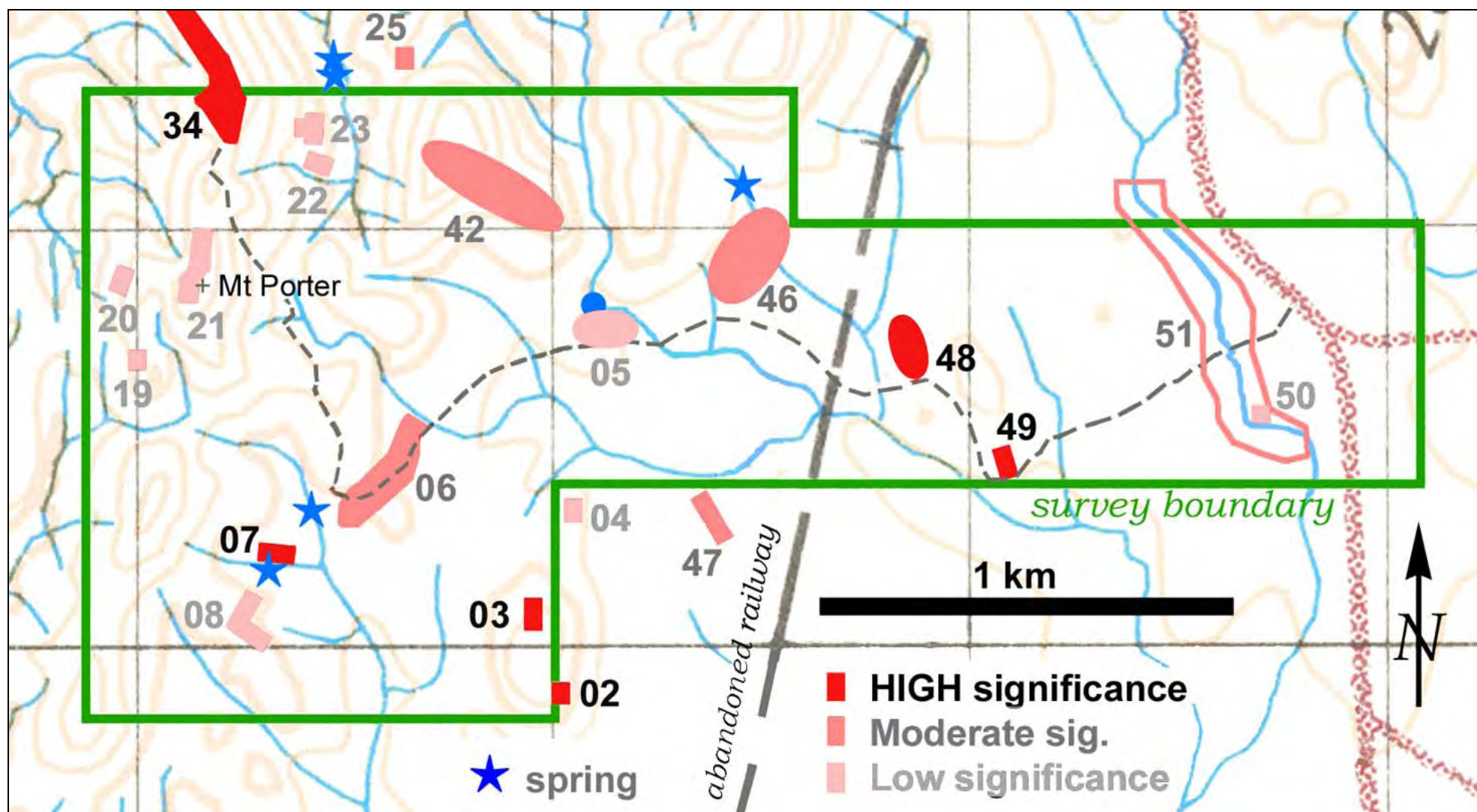


FIGURE 1: Location of archaeological sites recorded and their ascribed significance

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1 INTRODUCTION

Arafura Resources propose to mine gold reserves at Mt Porter, near Pine Creek, in the Northern Territory. As part of the preliminary approval process, an archaeological survey and assessment of the proposed site was required. A previous survey had been conducted over a large portion of the project area for a previous applicant, Pine Creek Goldfields Ltd (Mulvaney 1993), and consequently a full survey was not required. The location of the previously recorded sites needed verification however, and an additional area to the east required investigation.

2 AIMS

The archaeological survey had three principal aims:

- **document the precise location** of prescribed archaeological places and objects protected under the *Heritage Conservation Act* (1991) in relation to the proposal,
- undertake a **desktop review** of the previous archaeological survey and provide a significance assessment and recommendations for previously recorded sites. The review may also require reassessment of these sites for their current condition and integrity, and
- undertake **further survey** of areas not covered by the previous survey to ensure that unrecorded sites, which are also protected by the Act, are not included in the development area.

3 BACKGROUND

3.1 Location

The Mt Porter Gold Project is located approximately 20 km north of the Pine Creek township, adjacent to the existing Frances Creek Iron Ore Mine (Front cover and Figure 2). The site is within the Mary River West Pastoral Lease (PPL815, NT Portion 1630). No pastoral activities currently occur in the immediate vicinity of the proposed mine site.

Mt Porter, at 292 m asl, is the highest hill in an area of rugged and steeply dissected hills and ridges. To the south of Mt Porter however, the hills give way to an undulating countryside interspersed with granite outcrops.

The climate is tropical with monsoonal rainfall and high humidity (90%) from November to April of around 1200 mm per annum (Mulvaney 1993). The watercourses around Mt Porter are ephemeral and no rockholes or other water reserves are known. The days are generally hot all year round (around 33°C), but nights can be cool in the dry season, May to October, when the humidity is lower (20-30%).

The vegetation consists of a eucalypt woodland of salmon gum, round-leaf bloodwood and Darwin woollybutt, with an understorey of sorghum grass. The grasses can grow to over 2 m in height and it was required that this be burnt off prior to the survey so as to permit the ground surface and any artefacts to be visible.

3.2 Geology

The Mt Porter gold deposit is a stratiform gold mineralisation hosted in metasedimentary rocks of the Palaeoproterozoic Koolpin Formation, which is characterised by carbonaceous and sulphidic shales.

The previous survey (Mulvaney 1993) found that lithic resource exploitation was a major activity in the area, and consequently, that geology was the principal determinant of site locations. Mulvaney summarises the geological potential as particularly rich:

“Much of the lithics associated with [the geological] formations are suitable for artefact manufacture, and in this area, it is primarily the siltstone and tuff being targeted....Quartz, one of the most common lithics utilised by Aborigines, occurs through this area as veins outcropping along the ridges and slopes ...Chert is also reported to occur ... within the beds of the Koolpin Formation” (p. 5).

He also identified the band of intrusive Zamu Dolerite as a potential source of exploitable stone (p.6).

From the results of drilling, the siltstone was identified as a hard, flinty, silicified black carbonaceous siltstone (John Goulevitch, Arafura Resources NL; pers. com. 2005).

3.3 Mining

Arafura Resources propose to mine the Mt Porter deposit by conventional open-cut methods (Figure 3). There is the potential for the identification of further ore reserves and satellite pits within the Mineral Lease.

Mining operations for the proposed pit design will produce large quantities of waste rock and overburden, which will be placed in a purpose built waste dump adjacent to the open pit. The waste rock is expected to include both non-acid forming oxide rock and potentially acid generating primary waste. The operator proposes to encapsulate potentially acid generating material using the oxide rock.

This development will inevitably require the destruction of any archaeological sites within the mining area but supplementary infrastructure should be located to minimise the impact on other surrounding sites.

4 PREVIOUS INVESTIGATIONS

4.1 Regional studies

Mulvaney (1993) details the previous studies in the area in detail and so only relevant summaries will be presented here.

The hills around Pine Creek appear to be rich in stone quarries, exploiting a wide variety of stone types, including diorite, hornfels, chert and quartzite (Mulvaney 1993: 6-8). The quarries tended to occur on high ground adjacent to water reserves. Other site types occurring peripheral to the quarries include artefact scatters, located along creek lines or on elevated along ridges or on saddles, and occasional rock art and occupation shelters.

Artefact types included blade flakes, other flakes, cores, unifacial and bifacial points, stone axe-heads (bifacially flaked and some edge-ground), retouched blades and flakes (scrapers and knives).

4.2 The previous Mt Porter study

An archaeological survey was undertaken of Mt Porter and immediate surrounds by Mulvaney in 1993. His five square kilometre survey area included the majority of the present study area and formed the basis for the present study. He located 45 archaeological sites (MP 01-45: Figure 4). Twenty-three related to bedrock quarrying, twenty (including two rock shelters) consisted of worked stone material away from the quarries, while the other two (MP06 and MP42) contained evidence of both quarrying and occupation. MP06 was an occupation site around a small outcrop of quartz that had been flaked. MP42 contained a production area at the crown of the hill above and within the quarried outcrop (1993: 11). Although small numbers of chert and quartzite artefacts were found throughout the area, MP03 was the only site in which they occurred in any number.

He also found a background scatter of isolated artefacts occurred throughout the area, though these tended to more common between the quarrying sites.

Quarries:

The size of the quarries was directly proportional to the size of the targeted rock outcrop (Mulvaney 1993: 13-15). The largest was MP34 that extended for 900 m along the ridge crest. In general, quarries tended to be around 350 along the ridge and around 100 m wide. The smallest was 40 x 15 m. Artefact density was similarly variable, ranging from one artefact per 100 m², to over 100 artefacts per 1 m². Within any site, the artefacts tended to occur in one or more central concentrations, with the density decreasing with distance away from these centres. Cores at the quarries could be either cobbles or bedrock outcrops. Both single and multi-platform cores were present. The principal artefact being produced seems to have been the long "leilira" blade, with examples up to 20-30 cm in length. Bifacially worked "preform" axe blanks were also produced.

Artefact scatters:

Concentrations of stone artefacts not associated with quarry sites were primarily located on granite surfaces (1993: 16-17). They varied in size and density but generally contained smaller cores, with a higher proportion of points than the quarries, regular blade-flakes, retouched flakes, and amorphous flakes in Koolpin siltstone, and silcrete and other fine-grained siliceous rock types. The retouch artefacts consisted primarily of bimarginal, unifacial points, and end &/or side-scrapers on blade flakes (Figure 5). The contents of these scatters however were not consistent, with some adjacent sites containing distinctly different assemblages. For this reason, while treated unilaterally as "campsites", they can exhibit a range of different occupational activities.

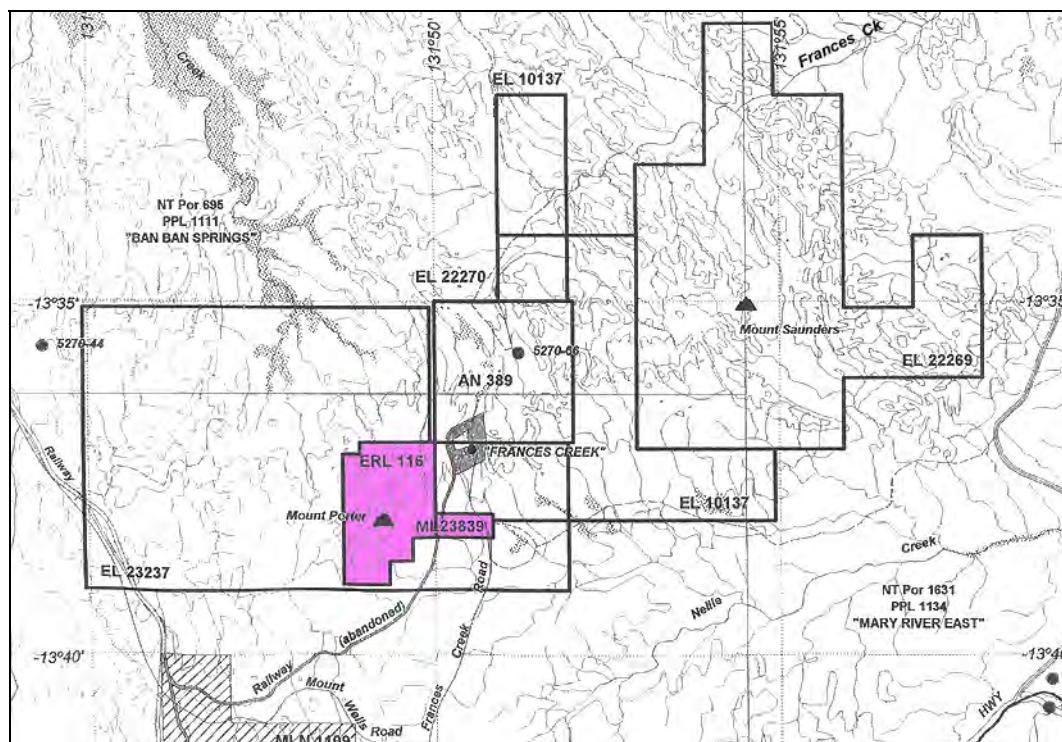


FIGURE 2: Location of the Mt Porter Mining Lease
(Map supplied by MBS Environmental)

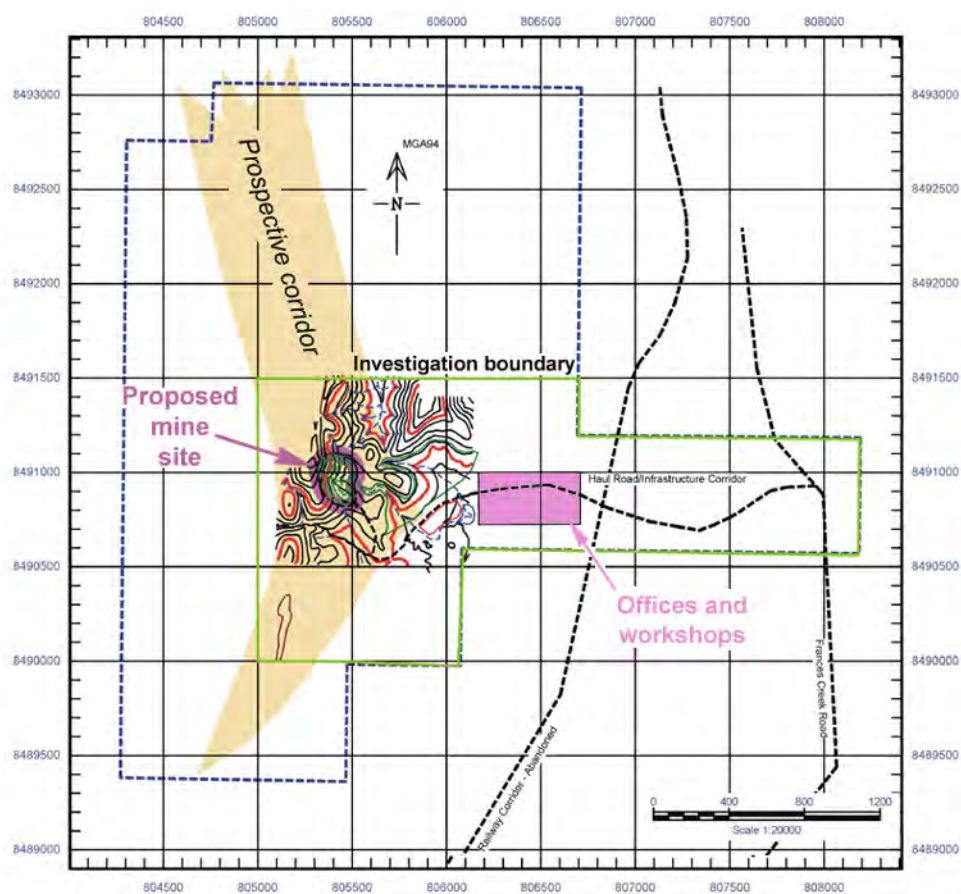


FIGURE 3: Location of the prospective corridor and proposed mine site
(Compiled from maps supplied by MBS Environmental)

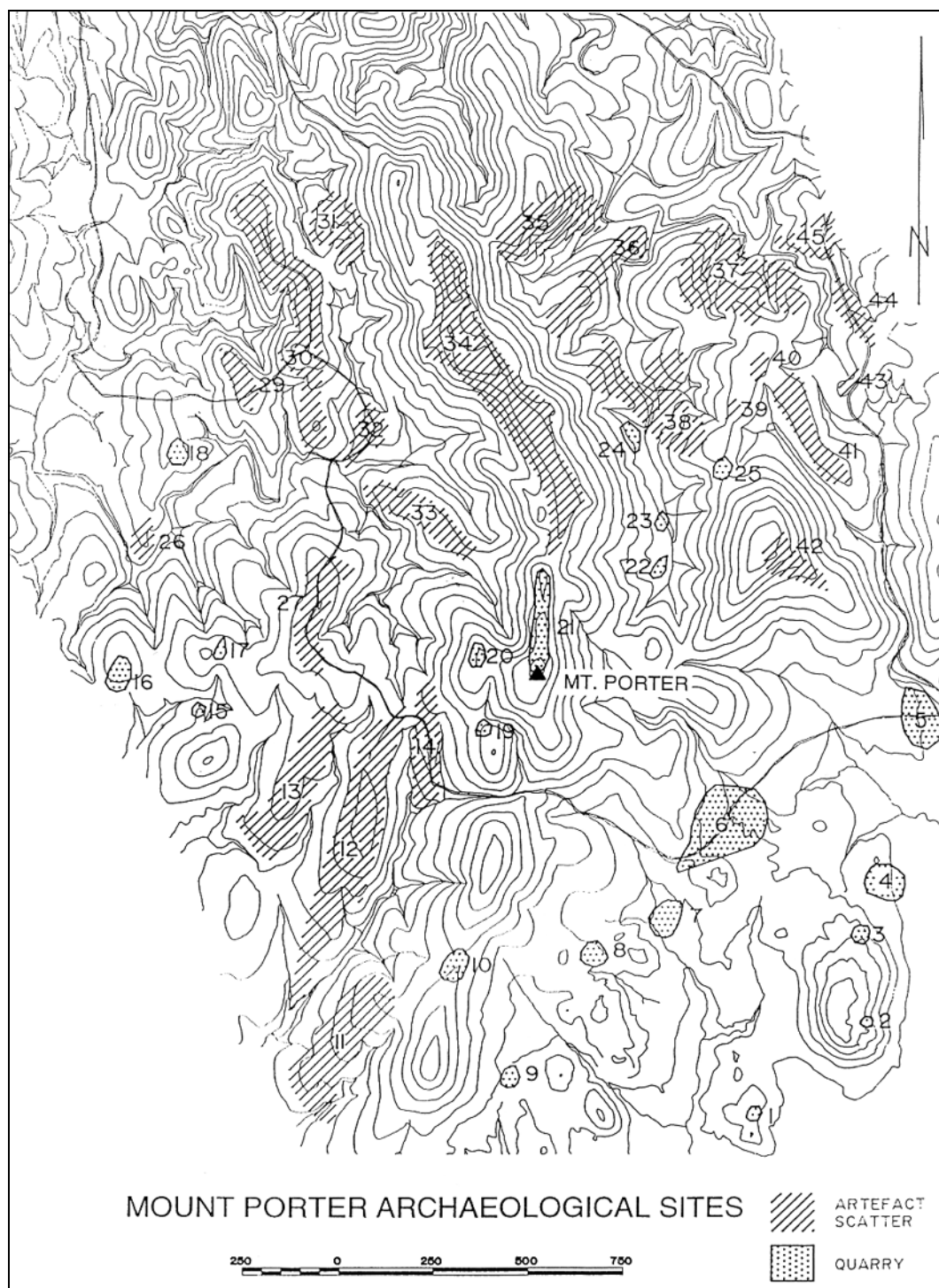


FIGURE 4: Sites previously recorded at Mt Porter (from Mulvaney 1993: 28)

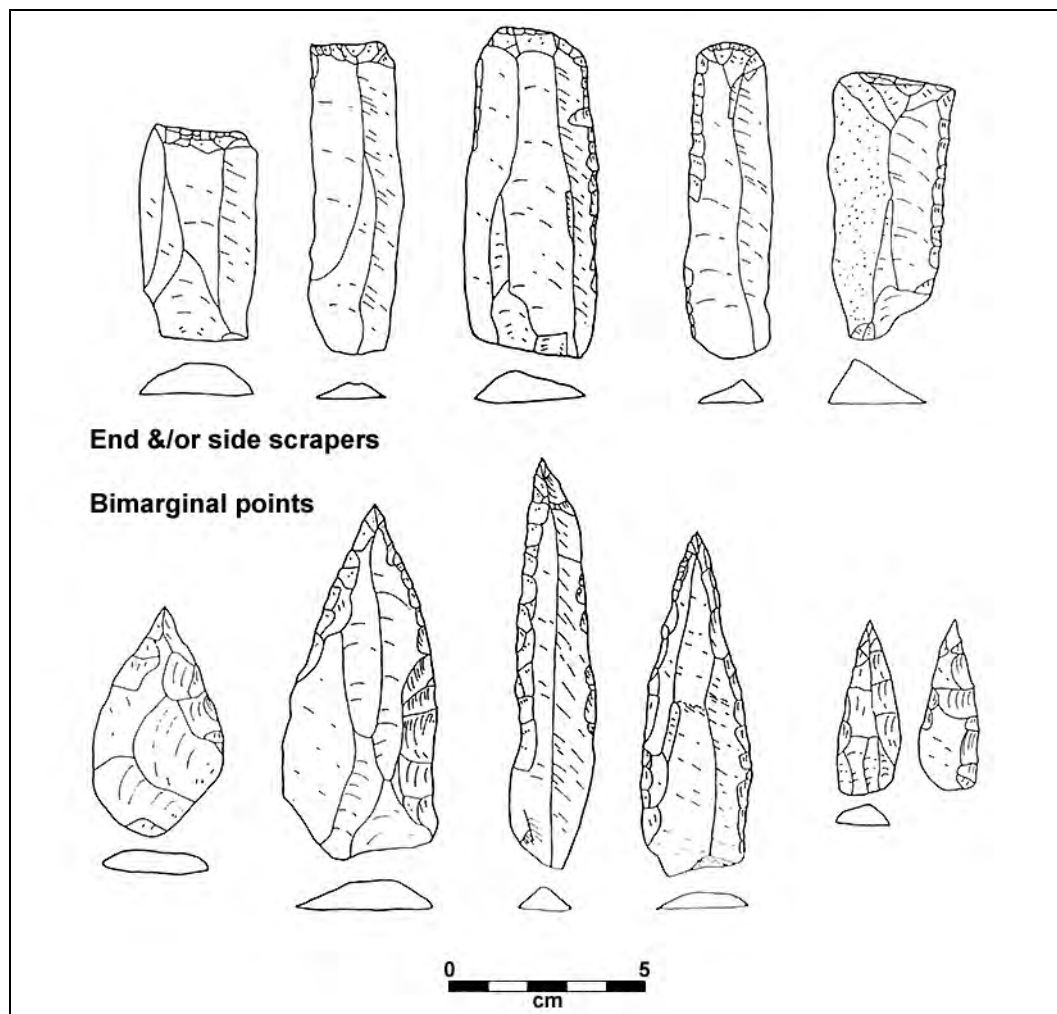


FIGURE 5: Major retouched artefact types (from Mulvaney 1993: 18-19)

Mulvaney (1993) recorded two rock shelters in granite outcrops, both were small in size and held very few artefacts ($<3/\text{m}^2$), and another in within the extensive diorite quarry (MP34), which held artefacts but little deposit. These open and shelter sites were found to be similar to others within the broader region.

Artefact forms:

Mulvaney (1993) recognised two distinct artefact forms here: points and end and/or side scrapers (Figure 5; Plates 1 & 3). Both forms were produced from blade flakes and most were made of siltstone (diorite). The points consisted of both bifacial and unifacial types. These, along with suitably shaped unmodified blades, were used as knives, spear points and in fighting picks.

Axe-blanks (ovate but roughly shaped, bifacially trimmed, cobbles or flakes) were found throughout the study area (Plates 2 & 4), although Mulvaney found they were notably less common here than around quarry sites closer to Pine Creek (Mulvaney 1993: 20). Two of the examples he recorded had had their cutting edges finished by grinding.

The cores, from which flakes had been struck, ranged in size but all but one was readily transportable [assumed here to be less than 30 cm diameter]. Most were only lightly used with 3-7 scars per core. Large flakes (flaked pieces) were also utilised as cores and these mostly had less than 3 flake scars.



PLATE 1: Unifacial, bimarginal points (silicified siltstone) from site MP47 and isolated artefact MPIA2



PLATE 2: Bifacially trimmed core and/or “chopper”



PLATE 3: Unifacial, bimarginal point from MP48



PLATE 4: Bifacially trimmed axe-blank (MP47)

5 METHODS

5.1 Methodology

5.1.1 Cultural property and Custodians rights

Aboriginal archaeological sites are acknowledged to be the cultural property of the respective Aboriginal Custodians or Communities in whose lands they occur. The Mt Porter development appears to be on lands unrepresented by any local Aboriginal body (see 5.2 below).

5.1.2 Archaeological sites

Aboriginal archaeological sites reflect Aboriginal use of the landscape. Through the analysis of the location and content of these sites and comparison with other known sites within the region, a partial picture of the lifestyle of the people who left these surviving objects or features can be developed (c/f Thomas 1975, Dunnell & Dancey 1983). This picture will however, always be a small glimpse of the whole and, while additional studies may further elaborate our knowledge, the picture will never be complete. Our comprehension however, can only improve with an increase in such studies.

5.1.3 Archaeological Significance

Significance is an academic construct that reflects the values and ideologies of the archaeological and Aboriginal Communities that can and will change over time (see Smith 1996). Significance assessment is however, essential in justifying the implementation of practices in management, conservation and interpretation.

5.2 Consultation

Assistance was sought from the Jawoyn Association, Aboriginal Areas Protection Authority, and the Northern Land Council, as well as from local Jawoyn and Wagiman communities at Pine Creek prior to the survey but no Traditional Owners could be identified.

5.3 Survey Methods

5.3.1 Survey strategy

The survey aimed to find those sites recorded by Mulvaney (1993). These were located from his descriptions and map and their locations and extent replotted, their contents examined and their archaeological significance reassessed.

An additional survey was undertaken of the lease area east of 806000E (Mulvaney 1993). Following on from the results of the survey, attention was given to any rocky outcrops, including pavements, and along creek-lines.

5.3.2 Survey methods

The consultant undertook the survey on foot following creek-lines and traversing from one rocky outcrop to the next (Appendix 2).

5.3.3 Site Recording

Sites were described by landform and contents (including rock and artefact types). Examples of the assemblages and exceptional items were photographed. The location and extremities of the sites were recorded by GPS with a hand-held GPS (Magellan Sport-track) using the AUS84 datum. The AUS84 datum was used to verify locations recorded by Mulvaney and to assist plotting onto the 100,000 mapsheet. Following the survey, MBS Environmental converted these grid references to GDA94 for this report.

Photographs were taken with a Fuji S5500 digital camera using a variety of lens (35 - 350 mm) and lighting (daylight, flash) combinations. All photographs have been copied to CD and deposited with the Office of Environment and Heritage, Darwin.

5.3.4 Significance Assessment

Three aspects have been recognised which must be considered in the assessment of the significance of archaeological artefacts, sites or site complexes:

- Aboriginal significance
- Academic (Archaeological) significance
- Heritage significance

These need not be mutually exclusive nor need they agree in their statements [see Bowdler 1983:39-40; Sullivan & Bowdler 1984; Smith 1996].

Aboriginal significance reflects the importance of the site or area to the Traditional Owners, other local Aboriginal people and/or the relevant Community representatives. The statement should incorporate its relevance to both traditional and/or contemporary culture.

Academic (principally Archaeological) significance assesses the site's research potential and representativeness (Bowdler 1983: 39-40, Craib 1999: 50-51). The first describes its probable capacity to answer present or future research questions. As, obviously, the questions of the future are unknown today, there is a strong case for the allocation of equally high significance to all sites. In practice however, this is usually taken to mean the foreseeable, or at least imaginable, future. The second criterion, representativeness, requires that a "representative" sample of all archaeological site types be preserved in perpetuity. As a corollary, the more unique a site is the higher its significance (ibid.). The basis for recognising uniqueness lies in comparing each site with others within an archaeologically (or culturally) meaningful region (Witter 1984). Hence, before the representativeness of any one site can be established, a representative sample of the sites and site types from the region needs to have been recorded and an overview produced. The previous surveys in the region provide such an overview (see section 4 above). Bowdler (1983:40) notes that in some areas, especially with short-term consultancies such as this one, it may not be possible "to quickly and decisively establish the significance of a given site" (ibid.). She therefore concluded that it was unrealistic for management bodies to ask for a definitive assessment of archaeological significance in those areas where no such regional framework exists.

Craib (1999) questions the usefulness of representativeness as a significance criterion, as true probabilistic sampling methodologies are rarely used in contract surveys due to the problems of definition and sampling in such a restricted sampling universe. He therefore argues that scientific significance should be discussed in terms of landscape rather than individual sites. Throughout Australia, archaeological sites tend to occur in geographic clusters that are often composed of a range of different site types. As a consequence, several authors (Vinnicombe 1984, Ross 1996, Gunn 1997) have also argued for the use of site clusters as the basic unit for assessment, rather than the individual site. This aspect will also be addressed in this report.

Heritage Significance takes into account its present use and appreciation by the general public (recreational, aesthetic, economic, etc), its potential for public education and or appreciation, any historical associations and its capacity for management to achieve these potentials (development, conservation, preservation, presentation and interpretation). As with Academic Significance, the concept of representativeness is also important, especially if sites are to be nominated for registration to the National Estate.

5.4 Fieldwork

The fieldwork was undertaken from the 31st May – 3rd June 2005 (inclusive). The weather was warm to hot (30°-36°C) and dry. The area to the north of the access track had been burnt for clearer ground visibility. The area to the south of the track, particularly within the survey area east of 806000E, was not burnt and retained a very dense grass cover (and up to 2 m high). Consequently, in this area surface visibility was very limited and hand clearing was undertaken in locations considered to have archaeological potential.

6 RESULTS

6.1 New sites

Six sites (MP46-51) were recorded (Figure 1; Appendix 1). These were mostly artefact scatters but one, MP49, also contained the only example of rock art yet recorded in the vicinity (Plates 5-6). The artwork occurs on a near-vertical granite wall on the south side of a large tor. The wall is five meters tall and seven meters wide and sits some four meters above the plain. The artwork consisted of a single red, painted, cross-shaped motif, 86 x 63 cm. It is in very poor condition and was hidden behind a tall vine-bedecked shrub. However, due to its poor condition it is no longer possible to determine whether it was a geometric shape or a stylized animal or human figure.

This is the only known art site in the immediate area, but more extensive sites have been recorded in the mesas to the west of Pine Creek (Pearce 1983), and in the Tolmer Sandstones to the west at Umbrawarra Gorge and Litchfield National Park (Gunn 2003). The remnant motif is consistent with the earlier red phase paintings found in the Tolmer sandstone sites, rather than the artwork of Western Arnhem Land to the east (Chaloupka 1993). Because of its position and exposure to the elements, the motif is unlikely to be of any great antiquity (i.e. it is probably less than 3000 years old).

Of the other newly recorded sites, MP48 and MP51 were also of particular interest. MP48 is a very dense artefact scatter focused on a low granite knoll but extending north to a second low outcrop (Plates 8-9). The artefacts incorporate a high proportion of silicified siltstone blade flakes, points and retouched blades, within a context of other silicified siltstone flakes and smaller numbers of flakes in quartz and an unidentified fine-grained siliceous material. Although surrounded by a low to moderate density scatter, the focus area on top of the low knoll, contains three areas (N = 1 x 1 m; E = 3 x 1.2 m; and S = 3 x 1.7 m) with an extremely high density of artefacts (c. 500/m²). This site was delineated by yellow flagging tape.

Site MP51 consisted, unusually, of a very light scatter of primarily silicified siltstone artefacts running almost continuously for some 800 m along both sides of a creekline. Most artefacts were within 10 m of the creekbed. The density of artefacts per square meter is very low (max 5/m²) and would in most instances be regarded as a background scatter of isolated artefacts. However, given their almost continuous distribution and close proximity the area is accorded greater significance than that suggested by an "isolated artefact" site or "background scatter". The site incorporates the denser scatter of site MP50. The pattern suggests that the creekline, the largest in the survey area and with numerous ephemeral waterholes, was a consistent location for short-term occupation, such as a transit stop into or out from the Mt Porter quarries.

Sites MP46, 47 and 50 are small artefact scatters (Plate 7), and are consistent with those previously recorded in the area by Mulvaney (1993).

6.2 Previously recorded sites

Where site extent, contents and features were found to correspond to the recordings of Mulvaney (1993: Appendix 1) full site descriptions are not reiterated here.

An important element not recorded by the previous survey (Mulvaney 1993) was the presence of freshwater springs around the base of Mt Porter and other large hills. While it is unknown whether these are permanent or ephemeral, their presence at this time of year (June) after an exceptionally dry wet season suggests that if not permanent, in a normal year they would run well into the dry season. Such springs would have certainly been a focus of Aboriginal use of the area, particularly if the quarries were exploited during the dry season. Their use is born out by the presence of artefact scatters (campsites) adjacent to all but one of the springs. They are therefore seen as an important aspect of the archaeological record in the Mt Porter area.

Site MP03, recorded as a surface scatter, also contained a group of granite rocks that may be the remains of a stone arrangement but as this has no definable form it cannot be recorded as such.

Site MP07 was previously recorded as a surface scatter. The site consists of a broad scatter in and around a low granite outcrop with an adjacent spring and a rock hole where the spring flows over the granite rock bench. This survey also located three grinding grooves and four grinding patches on flat areas of the bedrock (Table 1, Plates 10-13). The grooves are consistent with the byproduct of axe grinding (sharpening or polishing) from elsewhere in Australia, where they can often occur in large numbers on a single rockface (cf. D. J. Mulvaney 1975). They are by definition at least twice as long as wide and usually 10-20 mm deep. Patches tend to be more circular in shape but without depth

consistent with a circular motion used in grinding foodstuffs. Three of the patches here however, have similar widths to that of the grooves, and it is likely that they were initiated grooves that had not been used long enough to develop any depth. The location of these grooves indicates that axe grinding took place at this site, presumably using silicified siltstone from the adjacent quarries. It is unusual to find axe-grinding grooves in granite, as they tend to favour softer stones such as sandstone.

Elsewhere in the survey area, the site contents are consistent with that recorded by Mulvaney (1993). One site, (MP04), however could not be relocated due to the area of the site remaining unburnt. The tall and dense grass-cover prohibited reassessment of the site but, given its previously ascribed low significance (Mulvaney 1993) and the fact that it was outside any proposed development area, this was not seen as a setback for this study. Consequently, its level of significance was maintained as low.

TABLE 1: MP07 grinding groove and patch sizes (mm)

Feature	Length	Width	Depth
Groove 1	230	110	10
Groove 2	360	140	20
Groove 3	210	100	5
Patch 1	250	110	0
Patch 2	230	230	0
Patch 3	260	110	0
Patch 4	260	120	0

TABLE 2: List of sites recorded and assessed

Site No	Site Type	Easting (GDA94)	Northing	Significance
MP02	Rock shelter	806149	8490087	Medium
MP03	Artefact scatter	806092	8490277	HIGH
MP04	Artefact scatter	806173	8490512	Low
MP05	Artefact scatter	806238	8490955	Low
MP06	Quarry	805754	8490621	Medium
	Artefact scatter			
MP07	Grinding grooves	805497	8490383	HIGH
	Artefact scatter			
MP08	Artefact scatter	805420	8490221	Low
MP19	Artefact scatter	805160	8490871	Low
MP20	Artefact scatter	805113	8491049	Low
MP21	Artefact scatter	805286	8491051	Low
MP22	Artefact scatter	805601	8491323	Low
MP23	Artefact scatter	805574	8491420	Low
MP25	Artefact scatter	805782	8491573	Medium
MP34	Quarry	805345	8491493	HIGH
	Artefact scatter			
MP42	Quarry	805938	8491347	Medium
	Rock shelter			
	Artefact scatter			
MP46	Artefact scatter	806583	8491102	low
MP47	Artefact scatter	806531	8490488	Medium
MP48	Artefact scatter	806956	8490860	HIGH
MP49	Art site	807189	8490641	HIGH
	Rock shelter			
	Artefact scatter			
MP50	Artefact scatter	807793	8490741	Medium
MP51	Artefact scatter	807532	8491255	Medium
		807897	8490659	

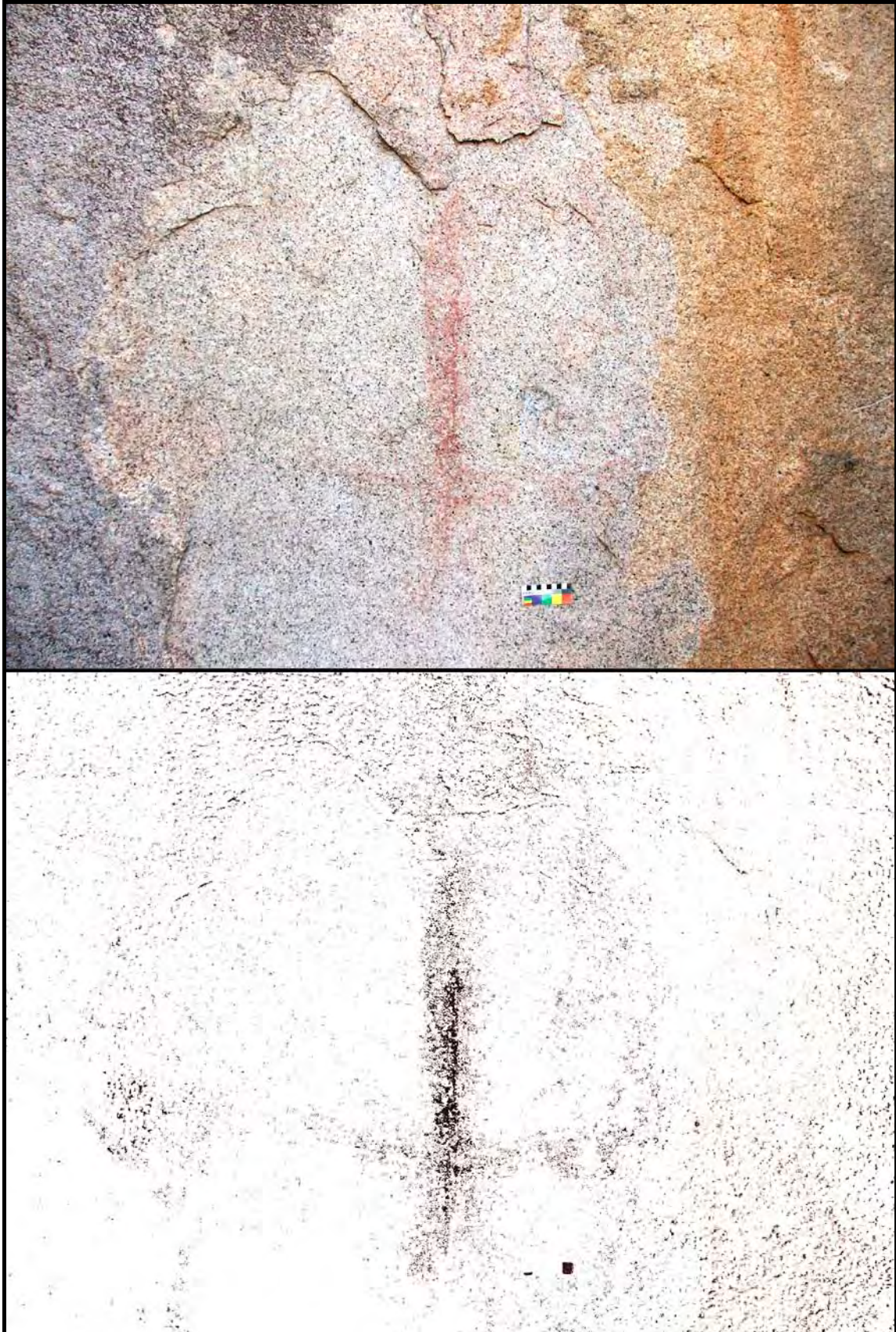


PLATE 5: MP49 artwork: photograph and digitally reduced image



PLATE 6: MP49 art site

X = artwork. Stone artefacts on talus and foreground flat



PLATE 7: MP46. Eastern artefact scatter (MP46b) in foreground, spring centre background



PLATE 8: MP48 artefact scatter S



PLATE 9: MP48 detail of artefact scatter E



PLATE 10: MP07 showing the location of the lower grinding grooves (G) in relation to the waterhole (W)



PLATE 11: MP07 bench above waterhole (W) showing location of grinding groove (G) and patches (P)



PLATE 12: MP07 axe-grinding groove 1



PLATE 13: MP07 axe-grinding groove 2

6.3 Site assessments

The following assessments are based on the findings of the present study and utilise the criteria for significance listed in section 5.3.4 above. The findings are summarised in Table 2.

MP02

Small rock shelter with few artefacts and minimal deposit. One of only two recorded shelters in the area.

Aboriginal significance:	low
Archaeological significance:	medium
Heritage significance:	low

MP03

Open artefact scatter with a high number of retouched blades and unifacial points as well as the occurrence of exotic lithics. At the time of initial recording this was the only site with retouched artefacts in material other than quartz. This is not now the case as others have been recorded on MP46. The site also contains a collection of rocks that may or may not have been a stone arrangement.

Aboriginal significance:	low
Archaeological significance:	HIGH
Heritage significance:	low

MP04

Open artefact scatter (40 x 30 m) with a very low artefact density ($<1/m^2$). Flakes mostly in siltstone (silicified siltstone) with a few of quartz. [Site not relocated by this survey].

Aboriginal significance:	low
Archaeological significance:	low
Heritage significance:	low

MP05

Open artefact scatter (150 x 60 m) with a low artefact density (max $3/m^2$). Primarily silicified siltstone flakes with notable side-scrapers on silicified siltstone blades and a silicified siltstone axe-blank. Site cut by access track.

Aboriginal significance:	low
Archaeological significance:	medium
Heritage significance:	low

MP06

Open artefact scatter (300 x 100 m) with a low artefact density (max $4/m^2$). Primarily silicified siltstone with notable silicified siltstone blade flakes, side-scrapers on blades and axe-blanks. Site also contains a quarried quartz vein with small numbers of quartz and FGS flakes. A single granite grindstone was also located 4 m north of the access track that cuts through the site.

Aboriginal significance:	low
Archaeological significance:	medium
Heritage significance:	low

MP07

Initially recorded as a minor artefact scatter (60 x 30 m), the presence of grinding grooves and patches on bedrock adjacent to the spring rockhole provides a revised interpretation of the site. Maximum artefact density (max $2/m^2$). Flakes primarily of silicified siltstone.

Aboriginal significance:	low
Archaeological significance:	HIGH (upgraded from Mulvaney 1993)
Heritage significance:	medium

MP08

Open artefact scatter (65 x 45 m) with a very low artefact density (max $<1/m^2$). Primarily silicified siltstone flakes, with a relatively higher proportion of smaller (<50 mm) flakes.

Aboriginal significance:	low
Archaeological significance:	low
Heritage significance:	low

MP19

Open artefact scatter (4 x 2 m) on ridge crest with a very low artefact density (max 1/m²). Three silicified siltstone cores and few flakes.

Aboriginal significance: low
 Archaeological significance: low
 Heritage significance: low

MP20

Open artefact scatter (20 x 5 m) on ridge crest with a very low artefact density (max 1/m²). A small number of silicified siltstone retouched blades (scrapers) and a few flakes.

Aboriginal significance: low
 Archaeological significance: low
 Heritage significance: low

MP21

Open artefact scatter (250 x 30 m) on the ridge crest of Mt Porter. The site has a very low artefact density (max <1/m²) but with the conspicuous presence of a small number of retouched blade flakes (mostly side-scrappers) in silicified siltstone.

Aboriginal significance: low
 Archaeological significance: low
 Heritage significance: low

MP22

Open artefact scatter (50 x 30 m) at the base of Mt Porter. A very low artefact density (max 1/m²) of silicified siltstone flakes with a few retouched pieces.

Aboriginal significance: low
 Archaeological significance: low
 Heritage significance: low

MP23

Open artefact scatter (15 x 10 m) at the base of Mt Porter. A moderate artefact density (max 5/m²) of silicified siltstone flakes, with blades and a few retouched pieces.

Aboriginal significance: low
 Archaeological significance: low
 Heritage significance: low

MP25

Open artefact scatter on low saddle and above spring. Initially recorded as 6 x 5 m, now extended to 15 x 10 m. A moderate artefact density (max 5/m²) of primarily silicified siltstone flakes and blade flakes, with a small number of FGS flakes. A bifacially worked "chopper" or axe-blank in a brown FGS.

Aboriginal significance: low
 Archaeological significance: medium
 Heritage significance: low

MP34

Extensive quarry and artefact scatter along the ridge top north of Mt Porter, some 900 m long and from 30 m to 100 m wide. A high artefact density (max 60/m²) of silicified siltstone flakes, blade flakes, leilira blades, retouched blades (scrapers and points), and cores. The site also contains quarrying pits and a small rock shelter with numerous flakes but no floor deposit. The track along the crest (present in 1993 but apparently recently regraded) cuts through the full length of the site and has caused considerable damage. The size of the site still guarantees the sites a high archaeological significance.

Aboriginal significance: low
 Archaeological significance: HIGH
 Heritage significance: medium

MP42

Extensive quarry and artefact scatter along the hillcrest (30 x 50 m). A moderate artefact density (max 20/m²) of silicified siltstone flakes, blade flakes, retouched blades (scrapers and points), and cores (including unidirectional, "prismatic" types). The site also contains a rock shelter (7 x 3 x 4 m), with a small number of flakes and a shallow floor deposit.

Aboriginal significance: low
 Archaeological significance: medium
 Heritage significance: low

MP46

Two discrete open artefact scatters (50 x 25 m and 15 x 10 m) on either side of a creekline, downstream from a spring. Light scatter (max 5/m² and 15/m² respectively, but most <2/m²). Mix of silicified siltstone and FGS flakes and retouched pieces.

Aboriginal significance: low
 Archaeological significance: low
 Heritage significance: low

MP47

Open artefact scatter (100 x 50 m) with a very high maximum artefact density (>100/m²) in the central area (4 x 4 m), although for most of the site it was around 5/m². Artefacts were primarily in silicified siltstone (including 2 long leilira blades and a bi-marginal point), with small numbers of FGS (flakes and a bi-marginal point). Retouched flakes were common but widely spaced

Aboriginal significance: low
 Archaeological significance: medium
 Heritage significance: low

MP48

Open artefact scatter (80 x 50 m) in two sections. The southern section consists of three small patches around a rock pavement (10 x 5 m) on top of a low knoll. The patches less than 3 x 2 m but have a very high artefact density (max >500/m²). These are almost entirely silicified siltstone flakes with a very few FGS and quartz flakes. The second area is a very light scatter (20 x 10 m), 50 m to the north (max 4/m²). A light scatter joins the two areas.

Aboriginal significance: low
 Archaeological significance: HIGH
 Heritage significance: low

MP49

Rock art site (1 poorly preserved red motif) with open artefact scatter (30 x 20 m). This is the only rock art site recorded in the vicinity. The artefact scatter has a maximum density of 50/m², consisting primarily of silicified siltstone flakes with a small number of quartz and FGS flakes. The only formal tools observed were a bi-marginal point and a side-scraper in silicified siltstone.

Aboriginal significance: low
 Archaeological significance: HIGH
 Heritage significance: low

MP50

Open artefact scatter (15 x 10 m) with a very low artefact density (max 2/m²). Most silicified siltstone flakes and scrapers with a few FGS flakes. The site is a concentration of artefacts within the greater site MP51.

Its significance is as part of MP51 and not intrinsic to itself.

Aboriginal significance: low
 Archaeological significance: medium
 Heritage significance: low

MP51

Open artefact scatter that runs for 800 m along both sides of a small but locally major creekline. Artefact density is low (max 2/m²) but given the extent of the site the total number of artefacts is likely to be extensive. The artefacts are mostly silicified siltstone flakes and scrapers, with a few FGS flakes. A concentration of artefacts on a topographic feature was designated a distinct site (MP50). The extensive spread of the site indicates that it is of a different scale to others recorded within the area and consequently it is accorded a higher significance than its density would suggest.

Aboriginal significance: low
 Archaeological significance: medium
 Heritage significance: low

6.4 Overall assessment

The archaeological sites around Mt Porter can be seen as a single complex of a number of different site types, all of which are related to the exploitation of the silicified siltstone seam on the ridge north of Mt Porter (site MP34). As such they provide a record of the overall land use of the area incorporating specialist quarrying (including leilira blade production), specialist working of the raw material into particular artefacts (points and straight-edged scrapers), opportunistic use of other stone outcrops (quartz and fine grained siliceous), stone axe-head production sites (grinding grooves), and general campsites.

As such the site complex here has the potential to greatly improve our knowledge of the Aboriginal use of the area. However, as such site complexes are common across the Mt Todd-Pine Creek-Mt Bundy-Adelaide River region (Ken Mulvaney, pers. comm., 2005), the complex is not unique and similar conclusions could be drawn from study of these other complexes. It is in light of this conclusion that the recommendations here have been couched.

6.5 Adverse impacts

Mining, by its very nature of extracting a rock body, will destroy archaeological sites within its area of mining. Sites in the vicinity of its associated developments (buildings, roads, and other infrastructure) however, can be threatened but in many cases, once located, sites can be avoided or damage mitigated.

As Mulvaney (1993) found, only two sites are likely to be directly impacted by the mine site: MP21 and, less so, MP34. While MP21 is of low significance and may be destroyed (granted permission), all effort should be made to avoid any further damage to the major quarry site MP34.

The development of the "Offices and workshops" in the currently proposed location (Figure 3) may impact on sites MP05 and MP46. This is unclear however, as the map supplied places the MP05 some 200 m west of the recorded location and consequently well clear of the development area.

The access track passes within 30 m of art site MP49. At this distance, dust raised by passing traffic could be detrimental to the artwork (cf. Watchman 1998) and mitigating works will need to be undertaken if the current track is to be used as the haul road.

7 CONCLUSION

The survey of the proposed Mt Porter Gold Mine site located and assessed 21 archaeological sites. These comprised 15 recorded sites, located during a previous survey (Mulvaney 1993), and six sites located beyond Mulvaney's survey area. A significance assessment of all of these sites was provided and recommendations for their ongoing management were proffered.

In summary, five sites were found to be of high archaeological significance and should be avoided by the development. The other 16 sites may be disturbed or destroyed following permission from the Office of Environment and Heritage and further archaeological study if warranted.

8 RECOMMENDATIONS

It is recommended, from an archaeological perspective, that the project proceed as planned but with the following limitations and restrictions:

1. All archaeological sites be disturbed as little as possible.
2. A 50 meter diameter exclusion zone be provided for the protection of sites
MP03
MP07
MP48 (excluding the current access track)
MP49 (excluding the current access track)
3. The access track passing MP49 be covered and compacted with a coarse gravel to prevent dust building up over the art panel.
4. Any further disturbance to sites MP06, MP42 or MP50 be preceded by further archaeological study, including the systematic collection of all artefacts within the proposed disturbance area.
5. If required, sites MP05, MP08, MP19-23 and MP46, may be destroyed without further archaeological study.
6. Should disturbance of any sites be necessary and unavoidable, prior to such disturbance, the developer must obtain the consent in writing of the Minister for Environment and Heritage, or a designated representative, to disturb or destroy the site.

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APPENDICES

Appendix 1: Sites recorded in 2005

SITE SURVEY NUMBER **MP46**

Site type Artefact scatter

Grid reference **AUS84** 806450E 8490941N
GDA94 806583E 8491102N

Location At the south-east base of a high hill, on either side of a small spring-fed creek, 1 km east of Mt Porter and 100 m north of the access road.

Description: Artefacts occur in two clusters on flat ground around and within two low granite outcrops, 100 m apart and 100 m south of the spring (Figure 6, Plates 14-17). A number of flat “terraces” adjacent to the spring were also investigated but only a single flake was located. As visibility was similar over the entire area, the distribution of artefacts indicates that the selection of camping areas was not restricted to proximity to the spring.

The flakes were made primarily from a pale sedimentary rock, with notably fewer silicified siltstone flakes. Retouched flakes and formal tools were also notably few in number. Most flakes lengths were in the range 10 – 40 mm.

MP46a covered a sandy area 50 x 50 m with a maximum density of 5/m².

MP46b consisted of a collection of artefacts caught between low granite domes. It covered an area 25 x 25 m with a maximum density of 15/m².

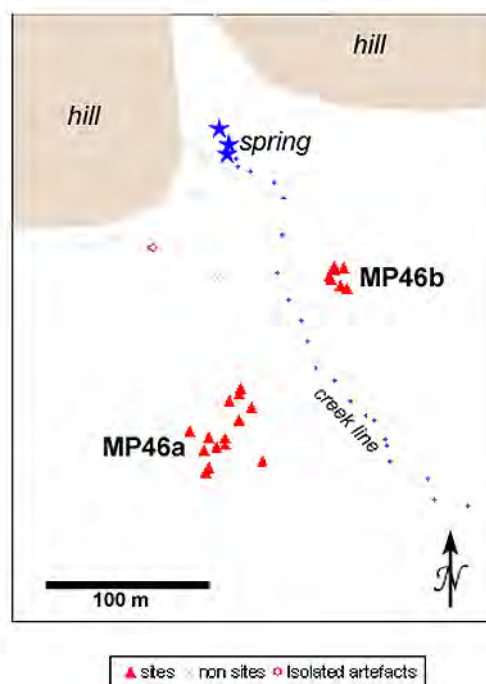


FIGURE 6: MP46 plot of features



PLATE 14: MP46a view. Artefacts are concentrated on the flat area between the to rock outcrops



PLATE 15: MP46b looking north towards the spring. Stone artefacts are concentrated around the granite outcrop



PLATE 16: MP46 dense artefact concentration



PLATE 17: MP46 select artefacts

SITE SURVEY NUMBER **MP47**

Site type Artefact scatter

Grid reference **AUS84** 806398E 8490327N
 GDA94 806531E 8490488N

Location Focused on a rock pavement on the north side of a low granite outcrop, 1 km ESE of Mt Porter and 400 m south of the access road.

Description: Artefacts are concentrated around a flat and elevated granite pavement but extend throughout the rocks on the northern side of the outcrop. Isolated artefacts occur between this outcrop and a smaller concentration some 50 m to the north-west.

The flakes were made primarily from silicified siltstone, a fine-grained siliceous stone, and quartz. The central area was around 4 x 4 m with a density of >100/m², although elsewhere it dropped to around 15/m². A sample 1 m square had silicified siltstone dominant in a ratio of 10:1. This sample also included 2 long blades in silicified siltstone, a bi-marginal point (41 x 20 x 6 mm), a bi-marginal point and a concave scraper in FGS. Retouched flakes were common but widely spaced. Most flakes lengths were in the range 10 – 30 mm. The north-western assemblage, while mostly a light scatter of silicified siltstone, also contained a bifacially worked axe-blank in a pale green stone, possibly hornfels (Plate 18).



PLATE 18: MP47 site view



PLATE 20: MP48 from the west showing location of artefact concentrations E & S



PLATE 21: MP48 artefact scatter S



PLATE 22: MP48 artefact scatter E



PLATE 23: MP48 artefact scatter E detail showing stone types and high proportion of silicified siltstone blade-flakes

SITE SURVEY NUMBER **MP49****Site type** Rock art site and Artefact scatter**Grid reference** **AUS84** 807056E 8490480N
GDA94 807189E 8490641N**Location** The boulder slope and flat at the southern tip of a long and prominent ridge, 1.9 km east of Mt Porter and skirted by the access track.

Description: A large granite boulder near the crest of the ridge has a near vertical face used to produce a large but now indistinct red painting (Figure 7, Plates 24-27). The artwork occurs on a near-vertical granite wall on the south side of a large tor. The wall is five meters tall and seven meters wide and sits some four meters above the plain. It faces out to the south-east (130°), over the campsite area. While not a shelter as such, as it has no overhang, the wall provides good shade from the sun and an elevated position. A very low shelter, which can only be accessed by crawling, occurs on the north-east side of the boulder but this contained no signs of use. The floor in front of the wall, and the talus leading down to the flat contains a medium density scatter (max 10/m²), primarily of silicified siltstone flakes.

The artwork consisted of a single red, painted, cross-shaped motif, 86 x 63 cm. It is in very poor condition and cannot be reliably interpreted. It is positioned within an exfoliated surface that receives maximum protection from water flowing down the face. However, because of its position and exposure to the elements, it is unlikely to be of any great antiquity (i.e. it is probably less than 3000 years old). The motif was located behind a tall vine-bedecked shrub, which was subsequently removed, as not only did the shrub hide the artwork, it was also rubbing against it and was a potential threat to its preservation.

The artefact scatter on the flat below the art wall covered an area some 40 x 20 m (Figure 7). The density of artefacts varied greatly but with a maximum density of around 50/m². The artefacts were made mostly from silicified siltstone, with small numbers in quartz and FGS. Most were flakes from 10-40 mm in length with occasional longer blades. Formal artefacts were few but included a silicified siltstone bi-marginal point and a side-scraper on a blade.

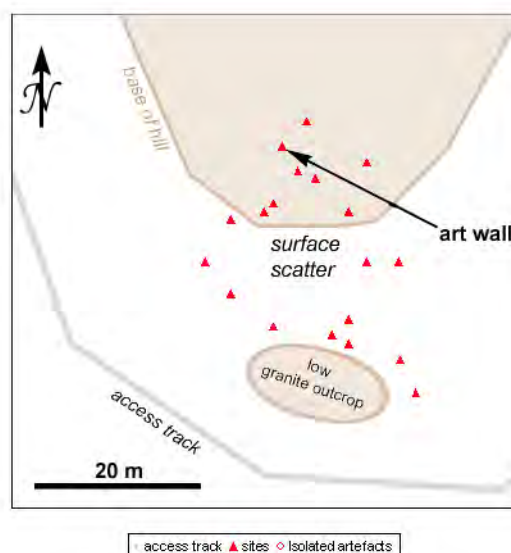
**FIGURE 7: MP49 schematic plan and plot of features**



PLATE 24: MP49 art-wall above and behind a slope and flat with artefact scatter



PLATE 25: MP49 artwork



PLATE 26: MP49 profile of the art wall



PLATE 27: MP49 area of artefact scatter in front of art wall

SITE SURVEY NUMBER **MP50**

Site type Artefact scatter

Grid reference **AUS84** 807660E 849058N
GDA94 807793E 8490741N

Location On a local “headland” on the east side of a major drainage line,
2.5 km east of Mt Porter and 200 m south of the access track.

Description: A light concentration of artefacts on the bank above the creekline where the creek does a “U” bend and forming a natural camping place (Figure 8). The concentration was loosely limited to the shape of the “headland”, an area 15 x 10 m.

Although with a potential deposit, most of the artefacts occur around the perimeter of the site where the ground slopes away to the creek. They appear to be eroding from a layer 3-5 cm below the surface but, if excavated, the total number of artefacts is unlikely to be high nor the deposit substantial.

The flakes were mostly of silicified siltstone with a pale fine-grained sedimentary rock (FGS). Retouched flakes and formal tools were also notably few in number. Most flakes lengths were in the range 10 – 30 mm. Maximum artefact density was 2/m².

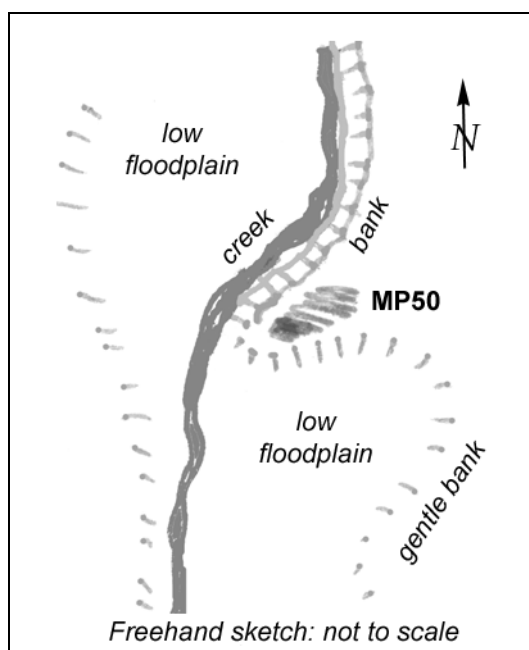


FIGURE 8: MP50 plan of site location

SITE SURVEY NUMBER MP51**Site type** Artefact scatter

Grid reference **AUS84** from 807399E 8491094N
 to 807399E 8490498N
 GDA94 from 807532E 8491255N
 to 807897E 8490659N

Location Along both sides of a north-south trending creekline at the far east of the survey area, 2.5 km east of Mt Porter and bisected by the access track.

Description: The site consists of a very light but extensive scatter of stone artefacts running almost continuously for some 800 m along both sides of the creekline (Figure 9). Most artefacts were within 10 m of the creekbed with occasional examples up to 50 m out from the creek. The horizontal distance from the creek was generally dependent on the slope of the land, with closer concentrations along the steeper banks. The scatter doubtless continues along the creek to both north and south of the study area. The site incorporates the denser surface scatter of MP50.

At any one point along the creek the artefacts never occur in concentrations denser than 2/m² and each occurrence only rates as an isolated artefact site. However given their almost continuous distribution and close proximity the area must be accorded greater significance than that suggested by an “isolated artefact” site. Also, the scatter was mostly concentrated along a singular contour of the creek cutting, suggesting that it was derived from sub-surface erosion. However, like MP50, if excavated, the total number of artefacts is unlikely to be neither high nor the deposit substantial. Artefacts have also been exposed in the access track on both sides of the creek crossing suggesting the presence of shallow sub-surface material.

The pattern suggests that the creekline, with its numerous ephemeral waterholes, was a consistent location for short-term occupation, such as a transit stop into or out from the Mt Porter quarries. The artefacts were primarily silicified siltstone flakes, with notably few quartz or FGS flakes. Retouched flakes and formal tools were also few in number but several silicified siltstone examples were noteworthy. These included long blade flakes, a backed blade (64 x 18 x 12 mm), a bifacial point, a bi-directional “chopper” and a pebble core. Most flakes lengths were in the range 10 – 40 mm.

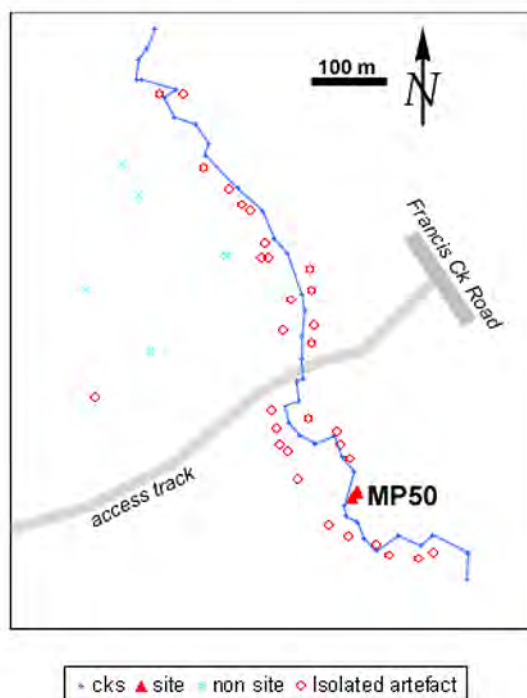
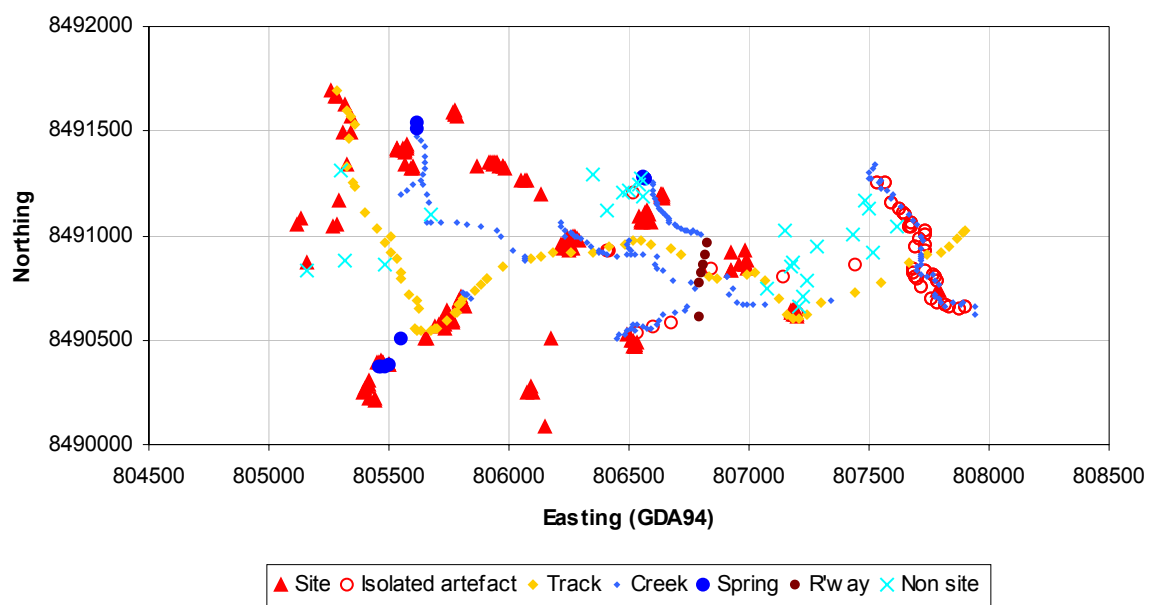


FIGURE 9: MP51 plot of isolated artefact locations

Appendix 2: Plot of recorded sites and features

(R'way = the north-south route of the embankment of the dismantled Francis Creek railway)