

2.0. ENVIRONMENT AND INDIGENOUS LAND USE

The environmental setting of a region is important to analysing past human settlement behaviour and interpreting archaeological features and site patterns. Geomorphology, geology and vegetation of the study area are significant factors in understanding prehistoric archaeological patterns in the landscape. Changes in the landscape may have an influence on the types of archaeological material found and subsequent visibility.

2.1. *Geology and Geomorphology*

The creek and river crossings examined in this report are located within the greater Victoria River Plateau, which is a partly dissected plateau underlain by siltstone, sandstone and the carbonate rocks of the Auvergne and Bullita Groups (Sweet 1972:6). The area is dominated by the imposing escarpments of Stokes Range, part of Gregory National Park to the immediate south. These escarpments rise over 100 meters to Stokes Range, a sedimentary formation capped by weathering resistant sandstone.

The geology of the Stokes range area is dominated by the Jasper Gorge Sandstone formation, which includes quartz sandstone, minor conglomerates and greyish green siltstone. Nearer to Joe Creek, the Wondoan Hill formation, predominantly massive basal quartz sandstone, green and buff siltstone and some minor conglomerates dominate the area. The Stubb formation borders on the Lost and Sandy Creek catchment areas. This formation is predominantly grey and purple micaceous siltstone and shale with sandstone near the top of the escarpment (Sweet 1972: 10). These formations were deposited in shallow marine conditions during the Proterozoic era and have undergone a number of uplifting and erosion events followed by further sedimentary deposition before being uplifted to their present position.

The Fitzroy Range to the north of Stokes Range and south of the Victoria Highway is dominated by the Wondoan Hill formation. This formation consists of blocky to tabular cross-bedded sandstone, some of which contains glauconite, hematite bands and pebble lag deposits (Beier *et al* 2002:9). The flanks of the Fitzroy Range are dominated by the Bynoe Formation. The lithology of this formation consists primarily of medium to massive bedded micaceous dolomitic siltstone, minor mudstone and dolarenite (Beier *et al* 2002:8).

Lost, Sandy and Joe Creeks are some of a number of intermittent watercourses dissecting the Stokes Range massif to the south of the Victoria Highway. These creeks flow north to join the Victoria River. It appears unlikely that any permanent water holes exist on any of the creeks in the vicinity of the study area.

2.2. Land Systems and Vegetation

The area of interest is located within the rugged stony country of the Pinkerton land system (Gregory 1995:6). This system is characterised by rocky sandstone outcrops and skeletal soils closer to the escarpments grading to deeper alluvial soils on the flood plains of the Victoria and the lower reaches of the tributary creeks. The upper reaches of the catchment areas are dominated by open eucalypt woodland and spinifex species. Downstream, soils change and the area is dominated by northern box-bloodwood woodland (*E. tectifera*, *E. foelsheana*, *E. latifolia*) (Gregory 1995:6).

2.3. Indigenous Use of Environmental Resources

Subsistence strategies of Aboriginal peoples have always been a principal component of archaeological research. Northern Australia has been the centre of ethnographic accounts on the subsistence strategies of Aboriginal groups. Ethno-historical accounts are heavily relied upon in explanations of past human behaviour (Meehan 1977, 1988; Schrire 1972, 1982). The following authors, Schrire (1982), Baker (1981), Meehan et al (1985), Brockwell (1989); Brockwell et al (1995), and Hodgson (1991) can provide more detailed descriptions of Aboriginal ecological ethnography.

Freshwater areas of Northern Australia tend to provide exceptionally diverse food resources. Wetland areas generally consist of black soil plains, freshwater swamps and lagoons. The black soil plains are seasonally inundated and are only accessible in the dry season. As the waters recede, wild rice (*Oryza rufipogon*) and the spike rush (*Eleocharis dulcis*) were utilised and several plants with edible tap roots or tubers are found on the plains (Jones 1980:114; Brockwell 1989:254; Schrire 1972:658). Goannas (*Varanus gouldii*) and long necked terrapins (*Chelodin* sp.) were hunted.

Freshwater swamps and lagoons vary in size from small depressions which dry up soon after the end of the wet to large swamps several kilometers in size and lagoons which carry water right through the dry. Edible water lilies (*Nymphaeaceae*) and *Eleocharis dulcis* were harvested at certain times of the year, particularly the early dry (Jones 1980:114; Jones and Bowler 1980:18; Brockwell 1989:249; Meehan et al 1985:119; Hodgson 1991). Freshwater areas also attract large numbers of fauna, crocodiles, water snakes, turtles, fish and shellfish and waterfowl and also more terrestrial animals like the agile wallaby (Finlayson et al 1988). As these animals tend to congregate around diminishing water sources as the dry season moves on, this invariably presents easily caught prey (Jones 1980:114; Jones and Bowler 1980:18; Schrire 1972:658; Meehan 1988:6; Brockwell 1989:249; Hodgson 1991). Plant resources that were utilised by Indigenous hunter-gatherers include yams, water lilies from lagoons, fruits of the cycads, pandanus, *Terminalia* and *Eugenia* species, the shoots of young palms and bamboo (Dahl 1927:17). Animal resources mentioned by Dahl include snakes, lizards, bandicoots and other small mammals, kangaroos, and bird's eggs. Lagoons and billabongs provided turtles, crocodile, crayfish and mussels (Dahl 1927:17-18).

According to ethnographic information water plant foods, turtles, file snakes, waterfowl and their eggs and various fish species were exploited by Indigenous communities (Brockwell 1989:255; Meehan 1988; Hodgson 1991). Brockwell (1989:255) states that during the wet season possums and wallabies were hunted while yams and wet season fruits were gathered.

Baker (1981:60) states that the ethnographic histories of Northern Australia stress the importance of plant foods in Aboriginal economies. Meehan et al (1985) and Brockwell (1988) make these same inferences. Ethnographic information has tended to be the determining factor in positing models for Aboriginal. Seasonality is the main ecological factor that is addressed by previous authors in their explanations of Aboriginal behaviour.

These studies are applicable in the Victoria River region, with their distinctive meandering channel systems feeding into the main river. This pattern of utilisation of wetlands and billabongs, along with use of wider plains areas for hunting and foraging was repeated along the Victoria River and its tributaries. This pattern of use should be reflected in the archaeology of the region, with extensive rather than intensive use of the river channel areas (i.e. should be reflected by extensive background scatters over high use sites).

3.0. BACKGROUND ARCHAEOLOGICAL INFORMATION

3.1. *Types of archaeological material*

According to Burke and Smith (2004:63) an archaeological site is defined as “any place that contains the physical evidence of past human activity” which can take on an “enormous variety of forms”. Archaeologists often make a distinction between relatively dense, localised concentrations of archaeological material and the sparsely distributed materials that surround them. In many areas of Australia there is a continuous scatter of stone artefacts often called “background artefact scatter” or “off-site archaeological material”. The density of background artefact scatter varies in response to the nature and amount of past human activity. The geomorphic context of artefacts also affects their visibility and the conclusions that can be drawn about their deposition: for example, artefacts covered in sediment are not visible, and artefacts moved by erosion have a distorted relationship with their original location. As a result, background scatter of archaeological debris is often very important in the reconstruction of prehistory. Within a landscape littered with archaeological material, archaeologists also call unique or rare types of debris or especially dense concentrations of archaeological material “archaeological sites.” These sites are taken to reflect that this point was a focus of particular activities, and their identification is usually regarded as important for management purposes.

There are a variety of archaeological site types previously recorded as occurring in the region that are documented in the Northern Territory Archaeological Site Register. According to Burke and Smith (2004:63) the two broadest categories of archaeological site types can be defined as Indigenous archaeological sites and non-Indigenous archaeological sites (more commonly referred to as European or historical sites. Many of the previously recorded sites have been recorded over several decades and the recorders have most likely used different definitions for each site type. For this reason the authors have described these site definitions in the broadest sense. The following site definitions can also occur in conjunction with other types. Site types that are known to occur in the Victoria River region are as follows:

- Artefact scatters may contain flaked or ground artefacts and hearthstones. Artefact scatters may occur as surface scatters of material or as stratified deposits where there have been repeated occupations. These scatters do not necessarily imply that prehistoric people actually camped on the site; rather, they may only indicate that some type of activity was performed there.
- Stone Quarry. A site where stone for flaked or edge-ground artefacts have been extracted from an outcropping source of stone. This is a broad definition of a stone quarry and there are further subdivisions of this site type (Hiscock and Mitchell 1993). According to Hiscock and Mitchell (1993) most surface hard stone quarries have associated reduction sites.
- Knapping locations consisting of one or more knapping floors are discrete scatters of artefacts, anywhere in the landscape, resulting from stone being worked at that spot. The criteria for a knapping floor are that the original block of stone can be at least partially reconstructed from scattered flaked stone pieces.

- Stone Arrangements can range from simple cairns to more elaborate arrangements. Some stone arrangements were used in ceremonial activities and represent sacred or totemic sites. Other stone features were constructed by Aboriginal people as route markers, territory markers, and walls of huts, animal traps, hides, or seed traps.
- Rock Art sites, include two main types of rock art, engravings and pouncing's where the pattern is one of relief and the pictures were apparently produced by removing material from the rock surface and drawings, stencils and paintings where the material was added to the rock surface (Clegg: 1983). Can also include wax designs.
- Rockshelter occupation sites, which contains a deposit of cultural material that has built up over time containing flaked or ground stone artefacts, faunal material and other various items of Aboriginal material culture including ancestral human skeletal remains, wax designs, rock art, grinding hollows, and caches of material culture objects.

3.2. Historical background

The first European to reach this part of the Victoria River was the British maritime surveyor John Stokes (Hordern 2002: 186). Stokes walked overland to a point 70 kilometres upstream of Timber Creek adjacent to the Fitzroy Range to the west of Joe Creek. Although he didn't reach the Range named for him, later explorers labelled their maps Stokes Range.

AC Gregory and other traversed the area in 1856, naming many of the features we know today, including many of the creeks west of the Victoria River Crossing (Favenc 1998: 247). Thirty years after Gregory's exploration of the Victoria River district, pastoralists and miners moved into this part of northern Australia. This inaugurated an era of change for the Aboriginal people of the district, as traditional economies disintegrated under the combined impact of loss of lands and access to resources. Heritage features of the frontier era are common in the Victoria River District including carved boabs, the remains of timber stockyards, historic homesteads, lone graves and river crossings are some of the relics of this era.

A number of investigations of historic cultural heritage within the Victoria River region help to characterise the type of historic features likely to be encountered within the study area. The early European settlement of the Northern Territory was largely characterised by mining in the Pine Creek region and the development of the pastoral industry in the Katherine, Daly, and Victoria River districts. The Vestey's cattle empire controlled a chain of cattle stations that stretched from Victoria River, crossing the Daly River and through to Katherine and Brocks Creek. The Daly River region also saw the establishment of several Missions. These historical developments had significant impacts on traditional Aboriginal life and occupation within the region. Aboriginal families and groups gravitated towards these various settlements and pastoral stations. World War II developments were mostly concentrated along the Stuart Highway. Intrusion from World War II in the remote areas was mostly limited to patrols by the North Australia Observer Unit (NAOU) and aircraft crashes.

This report uses the historic thematic framework established by Heritage Surveys (2000) for the Northern Territory. For a more detailed explanation of the rationale for this framework please see the report titled *Northern Territory Historic Thematic Framework Project* by Heritage Surveys (2000). According to Heritage Surveys (2000) there are a number of historic themes that can be explored and applied to the heritage of Northern Territory. The following table illustrates the six broad historic themes that are applicable to this project.

Table 2. Historic Thematic Framework for the Northern Territory (Heritage Surveys 2000:30-32).

Theme	Description
Making a Profit	This theme relates to commercial and economic activities in the Northern Territory, with the sub-theme of 'commerce' including retailing, manufacturing and service industries including the provision of financial services. This theme also incorporates all activities related to primary production and primary extraction including pastoralism and other agriculture, mining and fishing.
Imposing Authority	The development of political authority and the application of law and order by the nation state are encompassed within this theme. Sub-theme 2A includes places reflecting government administration, government utilities and the administration of the justice system, while sub-theme 2B is related to the exploration and surveying of the Northern Territory.
Defeating Distance	Isolation is a constant thread through the Northern Territory history. Defeating distance relates to mechanical communications such as the overland telegraph and transportation including aviation, marine navigation, navigation, and road transport.
Serving the Community	This theme relates to the wide range of community services provided by colonial, state and commonwealth governments, community organisations and cultural and religious groups
Making a Home	Northern Territory homes are the focus of this theme, which deals with government and private housing.
Conflict	The first sub theme recognised under the theme conflict relates to conflict associated with Aboriginal resistance to the development of European control. Australia's front line encompasses heritage sites relating to the defence of northern Australia by the nation state, and is principally, although not exclusively, concerned with military activities during the Second World War.

It is important to note that Heritage Surveys (2000:32) does not attempt to recognise ethnicity as a separate historic theme. As Heritage Surveys (2000:32) explains, the creation of such categories leads to the risk of reinforcing undesirable stereotypes, and the use of any ethnic category would involve the arbitrary decision regarding which ethnic group to include and exclude. These themes are also created without recognising any specific time period in order that historic places may be viewed with the "...perspective of their entire existence" (Heritage Surveys 2000:32)

Many of the historic themes documented by Heritage Surveys (2000) should be applicable to historic places identified in the subject area. The Australian Heritage Commission developed a guide to *Australian Historic Themes: A framework for use in heritage assessment and management 2001*. This historic theme framework will be utilised to assess historic places within a national context.

The history of the region has been influenced by the general themes identified by Heritage Surveys (2000) in the Northern Territory's history. Therefore it is expected that historic places likely to be encountered within the area of interest will be related to the pastoral industry, mineral exploration, and places of historic occupation by Aboriginal people. The density of historic heritage is expected to increase in the areas in the vicinity of established pastoral stations, the river and the Victoria Highway.

3.3. Archaeological Research in the Victoria River Region

The Victoria River Crossing area is part of the Wardaman country, which stretches from Flora west of Katherine to Timber Creek (Tindale, 1974: 237). This language group consists of a large number of clan groups who in previous times moved across the Victoria River landscape in seasonal migration patterns. It is not within the scope of this report to present a thorough ethnographic description of the area. It is sufficient to report that the area is rich in archaeological materials, a fact borne out by the large number of entries for the place on both the Register of Archaeological Places and the Sacred Site Register. It is important to realise the Victoria River area has a continuous Aboriginal relationship with the land.

In the past, archaeological research in the Victoria River area has traditionally focused on the area's rich rock art. A number of researchers have studied in the area. A considerable quantity and significant diversity of rock art sites occur throughout the Victoria River region (Flood and David 1994; Lewis 1984; Lewis and McCausland 1987; McNickle 1991; McWilliam 2002; Tacon 1999). According to Josephine Flood (1990:102), the Victoria River rock art style appears stylistically as a hybrid between the Kimberley Wandjina style and the Top End 'x-ray' style

There have been numerous studies in the Victoria River region that provide valuable information regarding archaeological site types and distribution in the landscape. The most recent of these having been the important investigation and synthesis of Indigenous (pre and post contact) settlement patterns in the Victoria River region by Gregory (1998). This thesis analyses the past 30 years of archaeological research in the Victoria River region and provides the basis of the majority of this chapter.

In the Victoria River region there has been considerable archaeological research that has characterised the archaeological chronology and development of human habitation in the region (David *et al* 1990a; David *et al* 1990b; Gregory 1998; Lewis 1988; McNiven *et al* 1992). To the north of the Victoria River, archaeological studies have been largely confined to the excavation and analysis of the Ingaladdi Rockshelter, first excavated by Flood in the late 1960s with the assemblage subsequently studied in later years (Cundy 1990; Flood 1970; Gregory 1998). Archaeological investigations in Wardaman country to the west of Katherine have been conducted since the 1930's through to the 1990's (Davidson 1935; Flood 1970, David *et al* 1990a, 1990b, Flood 1991; Flood and David 1994, Flood *et al* 1992, McNiven *et al* 1992). Flood and David (1994:9) predict that the Wardaman region was likely to have human occupation of a similar antiquity to that of Western Arnhemland where occupational debris, including stone artefacts and pieces of ochre, has been dated to +50,000 years BP. Chronology of archaeological deposits in the Victoria River region have largely been dated to the Pleistocene-Holocene transition circa 15,000 to 10,000 years BP with major changes occurring within the stone tool technology of the region over the past 10,000 years (Flood and David 1994:9). These changes accompanied a dramatic increase in the amounts of charcoal, animal bone, stone artefacts, shellfish, and ochre deposited in these rockshelters. Flood and David (1994:9) have dated the introduction of stone points to approximately 3000 years ago.

3.4. Archaeological Surveys of the Victoria Highway

The Victoria River Highway has been extensively researched in the last 20 years by a succession of archaeological consultants surveying road and bridge works, as well as the Telecom optical fibre cable which was installed in the mid 1990s. Robin Gregory and Daryl Guse documented a number of surveys in March 1995 for the Heritage Unit, Conservation Commission of the Northern Territory. This document, *A Review of Archaeological Surveys along the Victoria Highway, Northern Territory*, lists the work leading up to 1995 and makes recommendations as to the areas of the road reserve that do not require further surveying. This report suggests that within the road corridor from chainage 185km to 220km that no further archaeological surveys are warranted.

The report also documents the bridge crossings that have been surveyed in the past, including Sandy Creek to the west of Joe Creek. These surveys were carried out by Kinhill Engineers (1992), Mitchell (1994), Veth (1991), Thorley and Warren (1991) and Gregory (1994). These works have located a large number of Aboriginal archaeological places including rock art, petroglyphs, stone tool quarries, artefact scatters, isolated artefacts and hawk hunting hides.

3.5. Archaeological Site Patterns in the Victoria River Region

Gregory (1998) has undertaken, to date, the most comprehensive review of the Victoria River region archaeological record. Gregory (1998) divided the Ord-Victoria River region into primary geographical zones by which to investigate the archaeological settlement patterns. The three primary geographic zones consist of the Lowlands, Uplands, and the Inland Plains. The current study area is located wholly within the region Gregory (1998) identifies as the Uplands. Therefore the archaeological patterns of this environmental region will be described in this report. The Uplands geographic zone is defined by Gregory (1998:20) as:

Uplands: The majority of the Ord-Victoria River region consists of rugged dissected sandstone country incorporating part of both the Kimberley Plateau and Ord-Victoria geomorphic regions. The plateau consists of a series of structural plateau and benches, cuerdas, mesas and buttes, hogbacks, and vales formed of Carpentarian siltstone, sandstone and volcanics. The Victoria River Plateau is a large dissected plateau formed of Adelaidian sediments and rarely exceeds 300m AHD. The topography consists of rounded hills, tablelands, rugged scarps and ridges. The rugged topography results from numerous small streams dissecting the plateau. (After Gregory 1998:20).

3.5.1. Uplands Archaeology

Gregory (1998:130) examined 385 previously recorded archaeological sites in the uplands zone. Sites occurred most frequently on river/stream banks (31.1%), rock outcrops (18.5%), escarpments (17.8%), and slopes (9.6%). The majority of sites were located in rockshelters (63%) on the rock outcrops, escarpments, and slopes. Over half of the uplands sites are located within 200 meters of an ephemeral stream. Archaeological site components consist of rock art, stone artefacts, grinding features, stone and ochre quarries, stone arrangements, modified trees, middens and burials. Mean site size (n=176) is approximately 12,000m² with a range from 1m² to 600,000m². Mean site artefact density (n=33) is 1.5/m² with a minimum site

artefact density of $0.01/m^2$ to a maximum of $11.2/m^2$. The majority of sites consist of a single archaeological features, however some are recorded in various combinations. Quartzite and chert are the most commonly represented raw material types.

3.6. Archaeological Predictive Site Models for the Ord-Victoria River

Archaeological investigations elsewhere in the Northern Territory have shown that there is a relationship between the location of archaeological sites and the environmental features of the landscape (Hiscock and Mitchell 1991; Kinhill 1992a; 1992b; Gregory and Guse 1995; Guse and Gregory 1995).

Predictive archaeological models based on land systems have proven to be useful in the Northern Territory for indicating which area should be subject to intensive archaeological survey (Gregory 1998; Gregory and Guse 1995; Guse and Gregory 1995; Guse 1998; Guse 1999; Kinhill 1992a; 1992b). Kinhill (1992a) developed a predictive model of archaeological site distribution for approximately 800 kilometres along the Victoria Highway while working on a project for a Telstra optic fibre cable. Kinhill (1992a: 5-2) proposed that archaeological sites would occur more frequently where several features in the landscape converged. Kinhill (1992a: 3-5) also stated that the most archaeologically sensitive locations would be in those areas exhibiting the highest degree of land feature diversity. Therefore, land systems or land units which describe particular areas based on land feature diversity are a useful basis for archaeological modelling in the Northern Territory.

Gregory (1998) developed a predictive model assessment of the archaeological settlement patterns in the Ord-Victoria River region. Drawing from Binford and others, Gregory (1998) has developed her predictive model on concepts of hunter-gatherer mobility. The methodology is similar to the application of a diversity model as proposed by Thomas (1989) and Kintigh (1989). These authors propose that diversity, or richness, of the artefact assemblage can be used to distinguish variability in the archaeological record. This model has had an important role in recent archaeological interpretation (Kintigh 1989:25). The concept of archaeological richness has several properties.

- It is used when discussing variation in a nominal variable, such as stone-tool type, design element or ceramic type.
- It is typically a comparative property of archaeological material culture distributions.

Following the usage in mathematical ecology, it may be considered to have two dimensions. These are the numbers of different classes present in an assemblage, and their evenness, which is the uniformity of the distribution of different classes. (Kintigh 1989:26).

Thomas (1989:86) proposes that the overall relationship between number of implement classes and number of individual tools is influenced by ecological, technological, informational and scheduling factors and describes three types of sites that can be distinguished by using richness of the artefact assemblage. Gregory (1998) proposed to distinguish these differences by defining type 1 and type 2 mobility patterns, which are defined below:

- **Type 1 Mobility Pattern:** Movement from one residential base to another. A high level of type 1 mobility can be characterised as frequent movements between base camps. Low level of type 1 mobility is characterised as long term occupation of a base camp. Type 1 mobility pattern results in the formation of ‘base camps’ or ‘residential sites’ across the landscape. (Gregory 1998a:85-86)
- **Type 2 Mobility Pattern:** Daily movement undertaken from a residential base camp in order to obtain resources. A high level of type 2 mobility is characterised by travelling greater distances during the daily and/or frequent movements between resource patches, whereas a low level of type 2 mobility involves travelling less distances (i.e. not far from the base camp) and targeting fewer resources. Type 2 mobility pattern results in the formation of ‘resource procurement sites’ across the landscape. (Gregory 1998a:85-86).

3.6.1. Settlement patterns of the Uplands

The following is an excerpt from Gregory (1998:275) describing the predicted settlement patterns of the Uplands:

“Initial occupation of the uplands occurred in the Pleistocene and is evident in the late Holocene and contact periods. Examining temporal changes in settlement prior to contact is difficult owing to a lack of dates from stratified sites, nevertheless a few observations may be made. It appears the intensity of site use in the uplands fluctuated before generally increasing in the most recent past. Territorial range appears to have varied as did the mobility patterns linked to use of the shelters at different times. The use of areas adjacent to water and rock shelters was associated with both type 1 and 2 mobility patterns. Macropods are likely to have been a key resource although aquatic taxa such as crocodile and fish were also exploited. Raw material procurement and use strategies varied in the uplands. During the contact period use of rock shelters appears to have increased and was accompanied by the incorporation of European items such as glass into the toolkit.”

3.7. Summary

Therefore the types of archaeological places likely to be encountered in the Victoria River region include shell middens (near the coast), stone artefact scatters, stone quarries, rockshelters, rock art, rock engravings, stone arrangements (i.e. hawk hunting hides) burials, contact sites, and a more or less continuous background scatter of stone artefacts across the landscape. Raw materials that have been documented in the region include basalt, chalcedony, chert, dolerite, fine grained sedimentary (siltstone & mudstone), glass, quartz, quartzite, sandstone, silcrete, tuff, and other volcanics, and are likely to be represented in artefact assemblages (Gregory 1998b:135). Many of these site features typically occur in combinations throughout the Victoria River landscape.

4.0. METHODOLOGY

4.1 Heritage Management Principles

Heritage management in Australia is directed from two chief sources, State and Commonwealth heritage legislation, and the ethics and principles established by the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (hereafter referred to as the Burra Charter). Legislative basis for the protection and conservation of Indigenous archaeological places and objects can be found in Appendix 3. Definitions from the Burra Charter (Maquis-Kyle and Walker 1992:69) are listed below:

Place means site, area, building or other work, group of buildings or other associated works together with associated contents and surrounds.

Cultural Significance means aesthetic, historic, scientific, or social value for past, present or future generations.

Fabric means all the physical material of the place.

Conservation means all the processes of looking after a place so as to retain its cultural significance.

Restoration means returning the EXISTING fabric of a place to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.

Reconstruction means returning a place as nearly as possible to a known earlier state and is distinguished by the introduction of materials (new or old) into the fabric. This is not to be confused with either recreation or conjectural reconstruction, which are outside the scope of this Charter.

Once the Burra Charter (Maquis-Kyle and Walker 1992:69) has defined these terms it applies a set of conservation principles of which Article 2 states;

The aim of conservation is to retain the cultural significance of a place and must include provision for its security, its maintenance and its future.

The principles that are set out in the Burra Charter (Maquis-Kyle and Walker 1992) are those by which the assessment of significance was concluded. As stated above, Cultural Significance means aesthetic, historic, scientific, or social value for past, present or future generations. Significance assessments are a helpful tool in the management of archaeological resources by allowing managers to make informed decisions especially in land use issues. Definitions of these concepts of significance are listed below (Maquis-Kyle and Walker 1992:73)

- **Aesthetic Value.** This includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture, and material of the fabric. The smells and sounds associated with the place and its use.
- **Historic Value.** This encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out here. A place may have historic value because it has been influenced, or has been influenced by, an historic figure, event, phase, or activity.
- **Scientific Value.** The scientific value or research potential of a place will depend upon the importance of the data involved, on its rarity, quality, or representativeness, and on the degree to which the place may contribute further substantial information.
- **Social Value.** Social value embraces the qualities for which a place has become a focus of spiritual, political, national, or other cultural sentiment to a majority or minority group.

These values can be applied to the assessment of significance of archaeological sites in the Victoria River region. Overall the recommendations set out in this report follow the principles of heritage place management that are described in the Burra Charter.

4.2. Artefact identification

A requirement for successful archaeological projects involves the accurate identification of archaeological materials as highlighted by Burke and Smith (2004). Since the identification of stone artefacts is basic to the accurate recognition and measurement of the archaeological record it is imperative that people undertaking archaeological surveys be able to differentiate between natural objects and artefacts. Principles of artefact identification employed in this survey follow those recommended by Hiscock (1984) and Holdaway and Stern (2004).

Each time sufficient force is placed on the surface of an isotropic rock it will fracture into two pieces. The fragment that has been struck contains the ring-crack, where fracture was initiated, and is called the flake. The flake is usually the smaller of the two pieces of stone. The larger fragment, from which the flake has been removed, is called the core. On both the flake and the core the surface that is struck is called the platform. Flakes are identified by the distinctive surface created when they are removed from the core. The classification of artefacts in this survey was based on identifiable characteristics outlined by Hiscock (1984, 1989). For an object to be classed as a flaked artefact, it needed to possess one or more of the following characteristics:

- A positive or negative ring crack;
- A distinct positive or negative bulb of percussion;
- A definite erailure scar in an appropriate position beneath a platform;

- Remnants of flake scars (dorsal scars and ridges).

These characteristics indicate the application of an external force to a core. Artefact morphologies will be described by using the four types of artefacts as defined by Hiscock (1984:128-129):

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

Other artefacts and implement types that have been identified in the region are listed below following characteristics as outlined by McCarthy (1976), Cundy (1989), Kamminga (1982) and Holdaway and Stern (2004) include:

- **Unifacial Points** are flakes that have been retouched along the margins from one surface (either dorsal or ventral) to give or enhance its pointed shape. These unifacial points are sometimes symmetrical or leaf shaped.
- **Bifacial Points** are retouched onto both ventral and dorsal surfaces of a flake to enhance or give the artefact its point shape. These points may have the platform removed and the proximal end rounded.
- **Serrated Points** are bifacial flaked points that have serrated margins.
- **Edge ground axes.** Classified primarily by the shaping process of flaking, pecking and polishing. These generally have only one working edge that has been ground to a sharp margin but there are also examples with two leading edges.
- **Grindstones** are characterised by a worn and abraded surface ('s). The surface may either have concave depression of a convex surface.
- **Hammerstones** show use wear on the surface in the forms of abrasion, pitting and edge fracturing with some negative scarring from the process of producing stone tools.
- **Pounders** are artefacts that are used primarily for processing food and plant materials.

4.3. Raw Material Identification

Certain stone raw materials are chosen over others for manufacture of stone tools. The identification of these stone raw materials is an important factor in the recording of archaeological sites. Distinguishing between raw material types is useful in the interpretation of stone tool technologies and past Indigenous settlement and mobility patterns. Definitions of different stone raw material types commonly found in the Northern Territory can be found below:

- **Chalcedony:** Chalcedony is a microcrystalline translucent variety of the quartz, in which microscopic crystals have arranged themselves in layers of slender upright fibres, often in parallel bands (Pough 1988:270). Chalcedony is very hard (Mohs Hardness 6.5-7) with a smooth conchoidal fracture, transparent when colourless, otherwise translucent to opaque as colours get darker (Mottana et al 1978:245). Chalcedony is precipitated from silica bearing solutions and often forms cavity linings, veins and replacive masses in a variety of rocks (Bishop et al 2001:133). There are many varieties of chalcedony, including agate and jasper. The microcrystalline matrix that cements chert is a type of chalcedony.
- **Chert:** Chert is a microcrystalline sedimentary rock composed of primarily of quartz (chalcedony SiO_2). Chert has a microcrystalline granular texture, but rarely exhibits banding or translucency, thus often forming dull opaque masses. Usually chert has appreciable quantities of impurities, including water, with lustres ranging from earthy to sub-glassy to matte. Chert is also often tinted by ochre or haematite. Chert forms as the result of precipitation of silica bearing solutions in massive form or in nodules. Chert is frequently found in limestone, where microfossils such as radiolarians are often evident under a hand lens. (Pough 1988:270; Mottana et al 1978:245)
- **Hornfels:** A term for a group of compact fine-grained metamorphic rocks that form as a result of contact between sedimentary country rocks and a magma intrusion. There are usually roughly circular zones of lessening alteration with distance from the source of heat, solutions, and gas. Hornfels varies considerably in mineral composition, however mica and pyroxene are common (Pough 1988:35). Porphyroblasts of pyroxene, cordierite or andalusite are often developed. The high degree of recrystallisation that has occurred usually removes any original sedimentary structures. (Pellant 1992:218)
- **Quartzite:** Formed by metamorphism of sandstone. Since quartz grains, large or small, hot to cold, are about the same, heating and squeezing does little to sandstone except make a very hard rock. With deep burial and cementation, the sand grains eventually become so tightly welded that any fracture breaks across the grains instead of around, as in loosely bound surfaces of a sandstone. Quartzite is amongst the hardest and most resistant of all rocks. They show the same colours as sandstones: brown, yellow, grey, reddish, or white. Resistant to weathering, hard and brittle, outcrops lack the mellow rounding of sculptured sandstone or the fluting of soluble limestone, so they are not too hard to recognize (Pough 1988:34).
- **Basalt:** A basic volcanic rock consisting of calcic-plagioclase feldspar and pyroxene. Apatite and magnetite are always nearly present while olivine may occur. Basalt is the most abundant of all lava types. A fine grained rock, basalt has crystals which are both

euohedral and anhedral. The crystals are not easy to see even with a hand lens. (Pellant 1992:202).

- Siltstone: By definition, siltstone is a fine grained sedimentary rock. It usually contains more quartz than either mudstones or shales. Siltstones are commonly laminated, due to variations in grain size. Organic content or amounts of calcium carbonate. The individual rock fragments and mineral grains in siltstone are too small to be visible to the naked eye (Pellant 1992:232). Post-depositional lithification of siltstone, such as silicification and/or laterization, is often termed porcellanite (Langford-Smith, 1978:3).
- Mudstone: This rock consists of a mixture of clay minerals, together with detrital quartz, feldspar, and mica. Iron oxides are also often present. Mudstone is a very fine grained rock, and the grains cannot be seen with the naked eye. It shares many characteristics with shale and may contain fossils, though it has less well defined lamination compared to shale. (Pellant 1992:232)
- Silcrete: Silcrete is regarded as a lithological term for a very brittle, intensely indurated rock composed mainly of quartz clasts cemented in a matrix of well crystallized quartz, cryptocrystalline quartz or amorphous (i.e. chalcedony or opaline) silica (Langford-Smith, 1978:3). Silcrete is formed by precipitation of siliceous solutions in a host rock such as siltstone or sandstone, and the removal of non-quartz minerals. Silcrete results from the weathering processes in host rocks in savannah regions of the world (common in Australia and South Africa). Hence the massive sandstone or siltstone deposits such as found in the Victoria River region in the Pinkerton land system are common hosts for silcrete. Silcrete is termed a duricrust, forming resistant caps in the mesa- plateau systems such as those found within the Victoria River region. Silcreted vary in colour, however light grey is most common. Grain sizes in silcreted reflect the host rock. Silcreted have a conchoidal fracture. The 'quality' of silcreted as a stone tool making rock varies from region to region and sometimes outcrop to outcrop.

4.4. Site definition

For the purposes of this project it was necessary to define site boundaries for description and mitigation. Indigenous archaeological sites can contain a wide variety of cultural materials and features. Boundaries of sites that are based on geographical features, such as a rockshelter, can be easily defined. Other sites such as shell middens also have definable limits to the extent of the cultural material. Documenting the start and end of stone artefact scatters and quarries can prove to be difficult to distinguish against the background scatter and the site proper. According to Burke and Smith (2004:220) the decision on defining the extent of an open site depends largely on the research and survey objectives. For this survey it is important to define site boundaries for the purpose of site management and mitigation in relation to the proposed development, an archaeological open site is defined as a concentration of cultural material with a moderate density relative to the background density of similar types of cultural debris at those or similar points in the landscape. This definition particularly applies to stone artefact densities.

Due to the presence of a background density of stone artefacts in the general area, clusters of stone artefacts can be defined as a site when an average density of artefacts in the site is more than 10 times greater than the average density of the background scatter.

A site can also be defined where there is an identifiable boundary to a site where either artefact densities diminish sufficiently to be classified as a background scatter or environmental features, such as a creek line or escarpment, determine a boundary.

4.4.1 Definition of ‘Background Scatters’ and ‘Isolated Artefacts’

Off-site archaeology is utilised to better inform archaeologists on the manner of land use and settlement patterns by Indigenous hunter-gatherer populations. It has been widely recognised that a strictly site based approach to the documentation of archaeological patterns does not adequately reflect the nature of Indigenous land use strategies and mobility. It is generally accepted that the definition of archaeology is the more or less continuous distribution of material culture across the landscape. Off-site archaeology employs this fundamental principle.

Off-site archaeology is defined by Foley (1981:10) as the study of the archaeological record on a regional scale, based on an assumption of underlying spatial continuity of archaeological materials, in the context of both behavioural and geomorphological properties. Foley (1981:10) states that there are four structural components essential to the analysis of off-site archaeology. These consist of behaviour, discard, accumulation and post-depositional factors (Foley 1981:10). The off-site archaeological approach uses a behaviour-discard approach in which the ecology, geology, and geomorphology are considered to influence the patterns of artefact discard by hunter-gatherers (Foley 1981b:2). Foley’s (1981) study of Amboseli archaeology in Africa diagrammatically highlighted areas of high artefact density that were more intensively utilised and inhabited and other areas that had lower and intermediate artefact densities, which indicated less frequent occupation and specific utilisation of land resources. Therefore by recording the densities of artefacts through a systematic survey, such density patterns may reveal much more about the utilisation of an area than the distribution of sites themselves. It is the principle of this theory that is adopted for use in any archaeological survey in the Northern Territory.

Isolated artefacts and background scatters of artefacts are recorded in the following manner:

- Manufacturer’s specifications for hand held GPS receivers are constrained to a 15 metre accuracy, which the manufacturer warns can be greater depending on satellite coverage and other factors.
- Groups of stone artefacts that were identified in the landscape, that were not in great enough densities to constitute a ‘site’ according to the definition, but are located within a 20 metre diameter area, are defined as a **background scatter of isolated artefacts**.
- Owing to the technological constraints of hand held GPS, it is not feasible to accurately record the grid reference of each isolated artefact that is within a 20 metre diameter area or a similar sized geographic feature that physically created a boundary for the background scatter (i.e. erosion scour).
- Therefore a group of isolated artefacts can be designated with the same ID number (i.e. E4-01) and the same grid reference.

- Artefacts found apart in distances greater area than 25 metres were given a new ID number and grid reference.
- This method allowed the effective recording of small groups of isolated artefacts in a time efficient manner.

Isolated artefacts and background scatters are dealt with in a similar manner to an archaeological site owing to legislative requirements where isolated artefacts require permission from the Minister for the Environment to be disturbed or destroyed. Whether it is technically correct according to the *Heritage Conservation Act* or not, the current administrative regime employed by the Northern Territory Government requires sufficient location detail of isolated artefacts similar to that of an archaeological site in order to process Ministerial consent to disturb or destroy. The method described above has been successfully utilised to the approval of the Northern Territory Government statutory administrative body, Heritage Conservation Services.

Archaeologically this does not mean that background scatters or isolated artefacts constitute an 'archaeological site'. An archaeological site is an arbitrary definition employed by archaeologists in an attempt to be able to analyse past Indigenous land use and settlement patterns. It is important to classify groups of archaeological materials into manageable units that can be compared and contrasted, and that may reflect different activities and uses of the landscape. This is sometimes easy to identify as in the case of a rock shelter, or stone arrangement. However sometimes it is much harder to define these boundaries when dealing with high densities of stone artefacts along an area such as the Victoria River terraces. This is why arbitrary definitions of an 'archaeological site' and 'background scatter' are employed to be able to distinguish between higher and lower artefact densities in the landscape.

The purpose of recording background scatters of isolated artefacts was to aid in the identification of Indigenous mobility and land use at a macro-scale according to land systems and land units. Land systems cover very large and broad areas, and land unit categories, such as river terrace, escarpment, can also cover broad areas. The purpose of this survey was not to specifically identify micro-scale archaeological land use, but use the macro-scale environmental information to help inform an assessment of archaeological patterns in the region.

For the purposes of mapping archaeological materials within the project area, background scatters of isolated artefacts can be dealt with in a similar fashion as another category of archaeological site.

4.5. Taphonomic Processes in the Victoria River Region

Gregory (1998) investigated in detail the taphonomic processes at work on archaeological sites in the Victoria River region. Gregory (1998:123) found that a range of disturbance processes operate on archaeological sites, which include those associated with humans, animals, plant, wind, and water action. Overall, Gregory (1998:123) noted that fluvial action was primarily responsible for post-deposition disturbance. Gregory (1998:20) found that the wet season inundation of northern Australia has a large impact on the representation of artefact size classes on open archaeological sites. Therefore sheet wash and inundation are

likely to “substantially modify” open archaeological sites in north Australia (Gregory 1998:123).

5.0. RESULTS

5.1. Introduction

The survey of the proposed gravel and fill extraction area was conducted in the first week of November 2006. Ground surface visibility within the survey area was generally averaging 60%. The gravel and fill extraction area is located on the lower slopes at the base of a sandstone escarpment. The area in the north of the gravel and fill extraction area generally had a sand surface with some gravel, and dense open woodland and shrubs. The area is bisected by a creek channel with a sparse riparian zone and associated alluvial deposits. The southern end of the study area is predominantly rocky sandstone gravel outcrop, sparse woodland, and bounded by a creek to the south. The area had been previously tested for gravel (probably during Victoria Highway construction 15 years ago). A portion of the northern section of the gravel and fill extraction area had been previously disturbed by gravel extraction.

The proposed gravel and fill extraction area is 296 hectares. A total of 19 kilometres of pedestrian survey transects were undertaken over the proposed gravel and fill extraction area over two days. It is estimated that this constitutes a ground surface coverage of approximately 47 hectares, or approximately 15% of the total survey area.

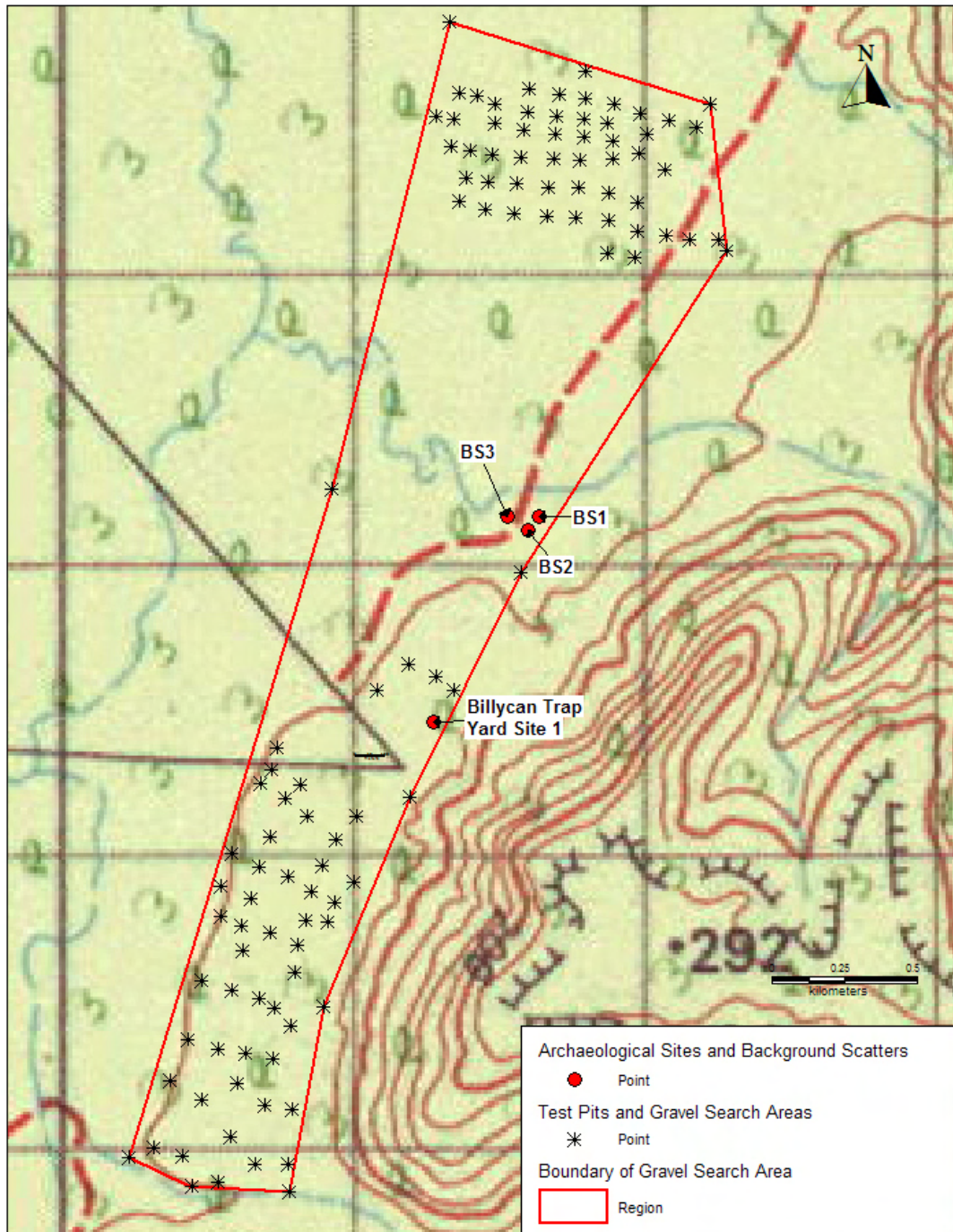
A search of the Northern Territory Archaeological Database found no previously recorded archaeological sites within the proposed gravel and fill extraction area.

The archaeological survey located three background scatters of isolated artefacts along a creek line and one archaeological site which are listed in the table below.

Table 3. List of archaeological sites and background scatters located during the survey

Name	Zone	Easting	Northing	Description	Location
BS1	52	711756	8268308	1 chert retouched flake 2 Quartzite flakes	Along northern side of central creek on laterite and gravel surface
BS2	52	711720	8268259	1 chert flake 1 quartzite flake	Along northern side of central creek on laterite and gravel surface
BS3	52	711648	8268308	1 quartzite retouched flake	Along northern side of central creek on laterite and gravel surface
Billycan Trap Yard Site 1	52	711392	8267598	Artefact scatter	located on top of a sandstone rocky knoll of small ridge line from main escarpment at the northern portion of the southern group of gravel and fill waypoints.

Figure 4: Location of archaeological sites and background scatters within the gravel and fill extraction area.



Billycan Trap Yard Site 1

Grid Reference (GDA94): 711392E 8267598N

Map 1; Site Sketch Map 1; Site Photos 1

Site Location:

The site is located on a sandstone ridge spur that comes off the main sandstone escarpment. The Ridge trends to the south west. This spur is located at the northern end of the southern cluster of gravel and fill extraction test pits. A creek is located less than 500m to the north of the spur line. The ground surface of the site is composed of sandstone small boulders, cobbles, and gravel with some grass, sparse shrubs, and thin skeletal soils.

Site Description:

The site consists of an artefact scatter located on an open flat area on the spur line. The site is relatively small in size measuring 22m north-south by 25m east-west. Artefacts include quartzite flakes, basalt flakes, chert flakes, silcrete flakes, quartzite retouched flakes, chert retouched flakes, silcrete retouched flakes, meta-sandstone cores, and a sandstone muller stone. Artefact densities ranged from 5/m² to 0.25/m². The average artefact density across the site is 1.5/m². The majority of flakes have distal breakage. Potlids from heat treatment were noted on chert artefacts. A high proportion of retouched was noted in the artefact assemblage. Also of note was the presence of large meta-sandstone cores that are greater than 200mm in length.

Relationship to Proposed Development:

Test Pits 127, 128 and 129 are located between 110m and 210m to the north of the site. A track has been created to access the area on the eastern edge of the site. The site is located in a rocky area which is unlikely to be suitable for gravel and fill extraction material.

Figure 5: Sketch map of Billycan Trap Yard Site 1

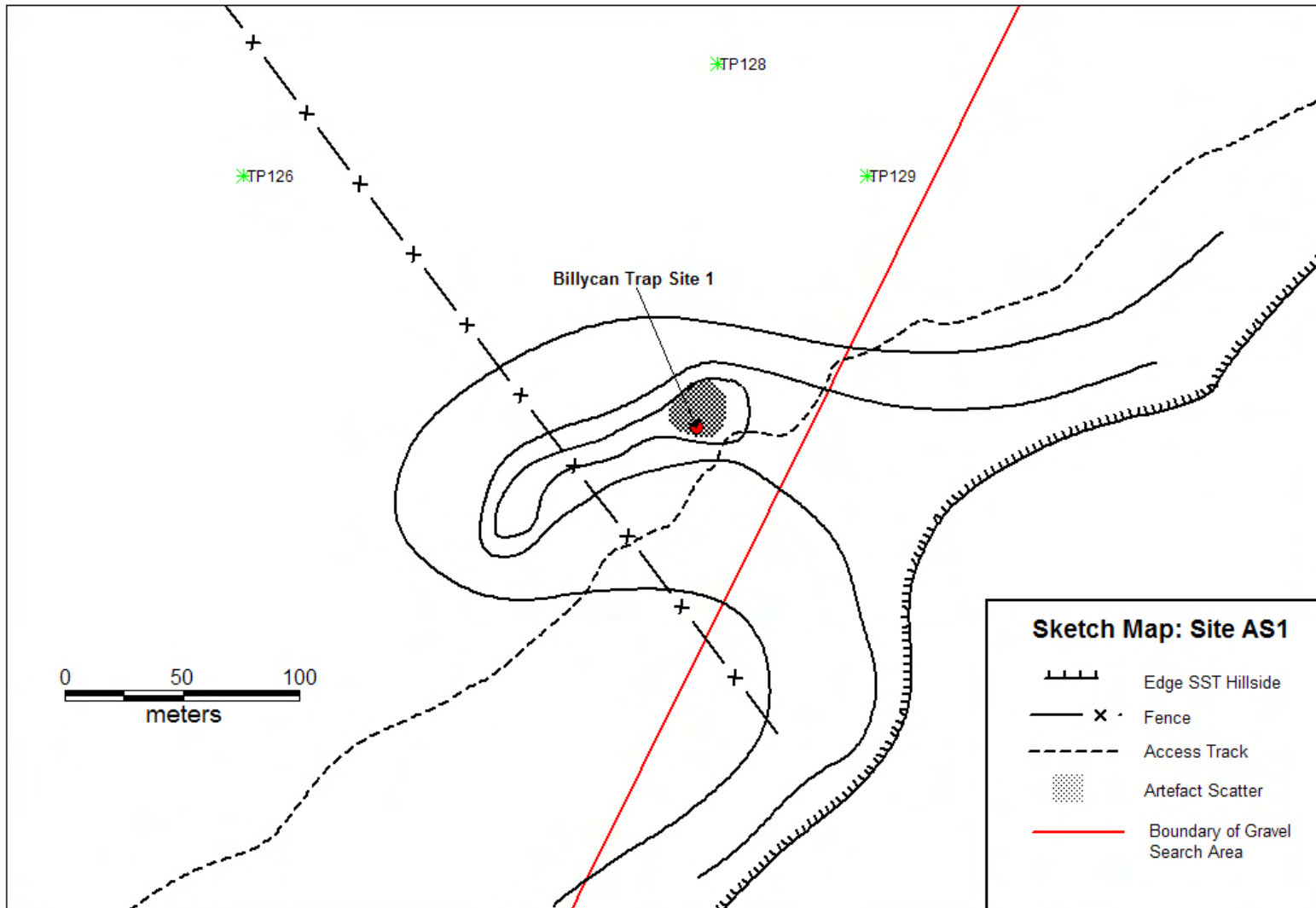


Figure 6. Billycan Trap Yard Site 1 locality photographs



View of the site looking north east



View of the site looking to the south west



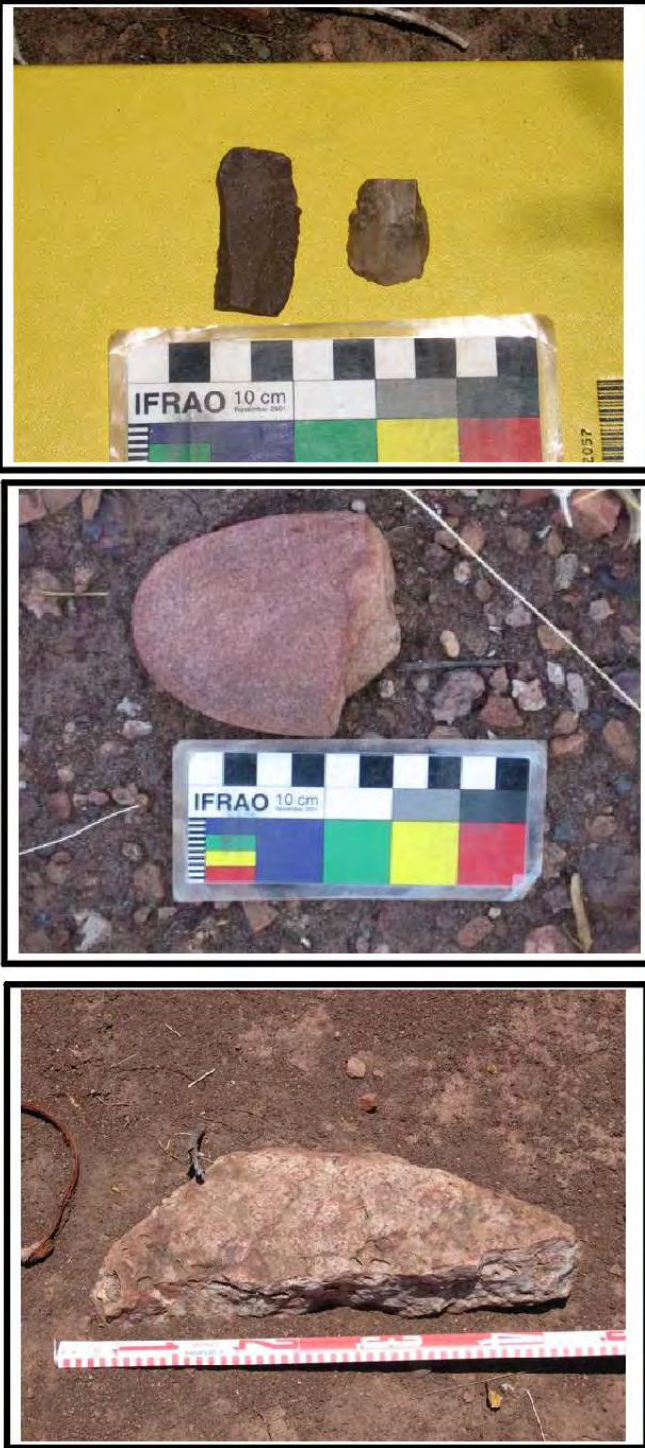
View of the area of main artefact density



Project: Archaeological survey of additional gravel search areas for the Victoria Highway
Site Photographs: Site AS1
Earth Sea Heritage Surveys



Figure 7. Billycan Trap Yard Site 1 artefact photographs




Quartzite flake and chert retouched flake

Meta-SST Muller stone

Flaked meta-sandstone core

Project: Archaeological survey of additional gravel search areas for the Victoria Highway
Site Photographs: Site AS1
Earth Sea Heritage Surveys



6.0. Discussion and Heritage Assessment

The results of the archaeological survey are consistent with the risk management model presented by Guse and Woolfe (2006) and the settlement and subsistence models proposed by Gregory (1998). The archaeological materials recorded in this study have been located near creeks and rocky outcrops. The flaked stone assemblage documented on the sites is reflective of the typical stone tool technologies that have been previously summarised by Gregory (1998). Stone raw materials documented in this study are also consistent with those documented at other sites. Raw materials recorded on the archaeological sites tend to be available in the local area either as cobbles in the Victoria River gravel beds, or the hard quartzites from the nearby sandstone escarpments. Mobility patterns represented by the archaeological site and the background scatter are representative of high levels of Indigenous mobility as described by Gregory (1998).

Bowdler (1984:1) asserts that significance should be assessed according to timely and specific research questions and representativeness and that these qualities are fluctuating. Other factors that may be utilised in the assessment of the significance of an archaeological place include aesthetic, historic, scientific or social significance (Pearson and Sullivan 1995). Scientific significance for example, of an artefact scatter depends on site components, location, and representativeness.

However there are still general principles of archaeological research that can be applied to the archaeological materials recorded in this survey. In a broad sense, the archaeological sites documented in this report have the potential to contribute to further understanding of the following areas:

- Settlement and mobility of Indigenous people through time and space
- Nature and distribution of archaeological sites
- Technological change and variability in artefact assemblage
- Adaptation to changing environments through time
- Nature and influence of the culture contact period of the Victoria River region

As stated earlier, the results of this study are consistent with Gregory's (1998) description of the archaeological patterns of the Uplands in the Victoria River region. Artefact scatters recorded in this survey are known to occur widely in the Uplands geographical zone as described by Gregory (1998). Gregory (1998:130) notes that there are 385 previously recorded archaeological sites in the Uplands zone. Artefact scatters are represented in 43.1% of the archaeological sites in the Uplands zone (Gregory 1998:130). Gregory (1998:131) notes that sites with grinding features, stone quarries, and modified trees are recorded less frequently. Gregory (1998:131) found that artefact scatters located adjacent to water sources tended to have lower artefact densities than sites on higher ground in this particular geographical zone.

The artefact scatter and stone artefact assemblages recorded in this study are widely represented in the Victoria River region and could not be considered as rare. The site is a moderately significant representative example of a typical stone artefact scatter in the region.

The archaeological materials recorded in this survey have been affected by erosion and disturbance from pastoral industry use of the Victoria River area. The archaeological integrity of these sites is somewhat diminished owing to these impacts. Isolated artefacts tended to be found on eroded exposures. Therefore it is likely that there are sub-surface archaeological materials that are not detectable unless significant erosion has occurred.

Therefore the archaeological Billycan Trap Yard Site 1 is likely to have a moderate level of archaeological and cultural heritage significance.

The background scatters of isolated artefacts have a low level of archaeological and cultural heritage significance.

7.0. Recommendations

The results of this archaeological survey have located one archaeological site and three occurrences of background scatters of isolated artefacts. The archaeological site, Billycan Trap Yard Site 1, has been recorded and assessed as having a moderate level of cultural heritage significance. Recommendations in this section apply to the potential gravel extraction activities in the Victoria Highway area. The archaeological materials are considered significant within the terms of the *Northern Territory Heritage Conservation Act 1991* (HCA) and all Indigenous archaeological sites and isolated artefacts are protected under Section 39 of the HCA and as such appropriate mitigation strategies are required.

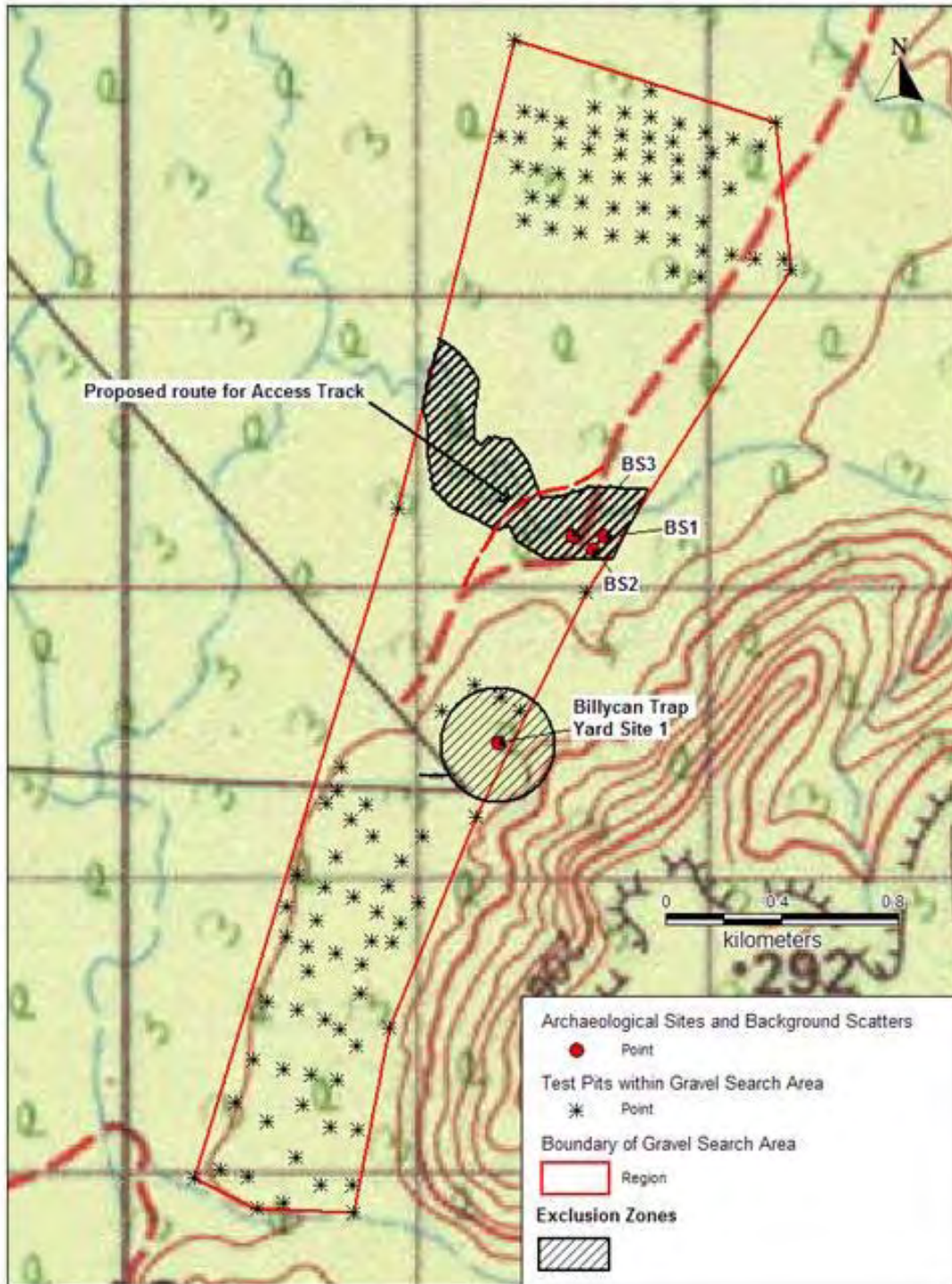
Billycan Trap Yard Site 1

It is recommended that gravel extraction activities avoid any impact to Billycan Trap Yard Site 1. An exclusion zone of a 200m radius from the site centroid is recommended to be enforced for any significant earth moving activities as shown in Figure 8. The site can be easily avoided with haul road access to the southern portion of the proposed gravel extraction located along the western margin of the gravel extraction area. Use of the current access track should be discontinued. The boundary of the site should be temporarily flagged and fenced for the duration of the gravel extraction activities.

Background Scatters 1 to 3

It is recommended that no gravel extraction works should be undertaken in vicinity of Background Scatters 1, 2, and 3 and along the nearby creek. There is a high likelihood that there are other sub-surface and surface archaeological materials located in this zone. This should not present any significant impediment to the use of the main north and south gravel extraction areas. It is recommended that a 100m zone either side of the creek that bisects the gravel extraction area is avoided by any major earth moving activities. However use and maintenance of a haul road across the creek is recommended at the existing location as shown in Figure 8 where it is proposed there will be the least likelihood of disturbing archaeological materials.

Figure 8. Map illustrating exclusion zones recommended avoiding impacts on archaeological sites.



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