

Report of an Archaeological Heritage Assessment along Hamersley Road, Fitzgerald River National Park, Western Australia



A REPORT PREPARED FOR BRAD GOODE AND ASSOCIATES AND MAIN
ROADS WESTERN AUSTRALIA

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EXECUTIVE SUMMARY

Main Roads Western Australia (MRWA) proposes to upgrade Hamersley Road that passes through the Fitzgerald National Park, Western Australia, between Culham and Hamersley Inlet. The proposed upgrade involves asphaltting of the existing un-paved track, associated construction activities (20 metres either side of the current road), and extraction of gravels from quarries established nearby within the Park and on private land.

In compliance with the Aboriginal Heritage Act (1972), MRWA commissioned an ethnographic and archaeological assessment to determine whether the proposed works will impact any cultural features/places, and to determine the extent of heritage sites and features within the proposed development area (PDA). The purpose of this type of survey is for land managers to receive enough information in order to assess their development plans and potential to avoid impacts upon heritage features and sites.

David Guilfoyle was contracted by Brad Goode and Associates to conduct an archaeological assessment of the proposed development area (PDA). The survey took place on November 14th to 16th of November, 2009, by David Guilfoyle, Cat Morgan, Wayne Webb and Toni Webb and a subsequent field day on the 21st of November, 2009. The quarry pits located on private land were surveyed on January 28th 2010.

The archaeological survey resulted in the identification of a large archaeological site complex truncated by the existing road. In addition, a previously recorded site was re-assessed that falls within the current project area. A background scatter of isolated artefacts (24) were also identified, several within the proposed gravel pit areas. The specific landform configurations of this area suggest that there is a high potential for additional cultural material to be present, currently obscured by dense vegetation and sand dunes.

The results of the survey suggest that the proposed works will have a direct impact on the archaeological resources of the area. Thus, several conditions should be adhered to relating to both the results and the limitations of the survey (ground surface visibility) and the likelihood for currently obscured archaeological material/features to be located in this area. This fact ensures that a process of management and monitoring is required, with associated recommendations.

It is recommended that the significant heritage sites – the newly recorded site “Kurda Gorge Site” and the previously recorded site West Beach - are protected from any direct or indirect disturbance, a wide area of avoidance is established, the sites are fully recorded, and a monitoring/mitigation programme established.

Given the very low ground surface visibility and potential for sub-surface cultural material, **it is recommended** that if development proceeds, the area is monitored and re-assessed by the Traditional Owners and a qualified archaeologist during the initial ground clearings and site preparation, and to assess the operation in the event that archaeological material is uncovered or impacted. Management of any heritage sites potentially impacted by the proposed development must involve discussions with the Traditional Owners, implementation of agreed management measures, and where necessary, clearance obtained under the Aboriginal Heritage Act (1972).

This report also identifies some preliminary management recommendations for the implementation of this project, including rehabilitation efforts and processes for community engagement.

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BACKGROUND

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This report also identifies some preliminary management recommendations for the implementation of this project, including rehabilitation efforts and processes for community engagement.



Figure 1. Aerial view of the survey area.

ENVIRONMENTAL CONTEXT

The Fitzgerald River National Park is noted for its geological and biological diversity. The landforms consist of uplands, gorges, plains, valleys, dunes, inlets, rivers, and swamps. The project area connects the Culham Inlet with the Hamersley Inlet, with the eastern section shadowed by the massive quartzite ranges. The environmental diversity accounts for the rich archaeological record associated with area. The following overview is taken from the FRNP Management Plan (Moore et al 1991, DEC)

The Park's diverse landscapes, with extensive vistas free of any signs of human disturbance, hold a particular appeal. These landscapes include a combination of windswept and protected beaches, rugged sea-cliffs, the steep Barren Ranges rising to 450 m, extensive plains and abrupt river valleys ending in inlets. The natural vegetation forms an important element in the appeal of the Park and is an integral part of its conservation and recreation values (Moore et al 1991:iii).

The Fitzgerald River National Park comprises of sweeping sandy plains, numerous sand dunes, rugged hills, inlets, wetlands and large river systems with many smaller creeks and tributaries. The **upland environment** is comprised of granite domes and outcrops, shallow loamy soil dotted along coastal plains. The vegetation characteristic of this environment type is open mallees such as *E. Redunca* and *E. Tetragona* and coastal heath consisting of *Allocasuarina*, *Acacia* and *Grevillea*. These sloping granite domes are well drained and slightly susceptible to flooding due to the sloping of the domes and the shallow soil associated with them.

The Plains are formed by spongolites and siltstones and are characterised by shallow loamy soils, colluvial sands and clay pans. The plains are generally flat, can become inundated during winter rains and the vegetation consists of open mallee woodlands of *E. Decipiens*. The fine silt soils are highly susceptible to wind and water erosion due to poor drainage, while the disturbance of water-logged areas can create soil structure break down. The sandy plains close to coastal areas are highly vulnerable to erosion and so it is necessary to stabilise these areas by restricting access to the area and revegetating.

The valleys of the region are steep sided and formed by spongolite and siltstones, the soil is shallow on the slopes and deeper on the valley floor where the vegetation is characterised by open mallee woodland of *E. Conglobata*, *E. Incrassata*. Low woodland characterises the slopes and rims of the valley, with open mallee on the mesas. The valley floors are generally broad, well drained with intermittent flow during winter and spring which creates small pools of water. The high slopes of the valleys are well drained, but due to shallow soils are susceptible to water erosion.

The ranges are formed by quartzite, dolomite, phyllite and conglomerates and can be comprised of steep slopes and rugged hills. Soil types are quartzite sand on quartzite, vegetation characterised by *Adenanthos* and *Banksia* scrub, or phyllitic loamy sand or schist duplex soils vegetation consisting of open shrub mallee of *E. Incrassata* and *Allocasuarina* and *Banksia*. The steep slopes and hills are well drained, however due to unconsolidated soils and rapid water run-off they are highly susceptible to erosion.

Sand dunes are formed when silicious or calcareous sands settle over spongolite or quartzite landforms. These sand dunes generally occur close to the coast, can range from 2-5m in height and the vegetation consist of mallee and shrubland which becomes denser when closer to the coast. It is well drained except for parts over limestone and due to loose soils they are highly susceptible to wind and occasionally wave erosion.

Inlets are formed in quartzite, spongolite or limestone, with saline soils deposited adjacent and some alluvium, colluvium sediments at the base of cliffs or slopes. The vegetation on the edge of the inlets consists of *Melaleuca* woodland or shrubland, and samphire heath on the flats. The majority of the inlets are formed at the base of cliffs or steep slopes and all the major rivers in FRNP terminate in these inlets, which are poorly drained and mostly blocked from the ocean. The cliffs and steep slopes are highly susceptible to erosion, especially close to the coast, while the water-logged soils of the inlet are vulnerable to degradation if not properly protected.

The rivers, swamps and lakes are formed by granites, spongolite and quartzite and are dominated by woodland of *E. Occidentalis*. The River systems are generally well drained, single channelled flowing through the uplands and plains; while the swamps are mostly on the plains and poorly drained. Silt soils which characterise river and wetland systems are vulnerable to water erosion and degradation of not protected and cared for properly.



Figure 2. An example of the rocky landscape and thick coastal heath obscuring most of the surveys carried out adjacent to the roadside.

There is evidence to suggest that people exploited the now submerged continental shelf during times of lower sea levels associated with the height of the last glacial maximum (approximately 18,000 years ago). During most of the period between 40,000 and 10,000 years ago sea levels were some 85 metres below current levels and the coastline a minimum of 80 km distant from the current coastline (based on the 50 fathom line on marine charts). By c. 7,000 to 10,000 years ago, the shoreline of that coastal plain would have been reduced to 10km from the current coastline (Smith 1993:32).

The direct evidence for utilization of the now submerged plain is in the form of stone artefacts and other cultural features located on the islands of the Recherche Archipelago. During an expedition to Middle Island in 1984, archaeologists identified stone artefacts atop the massive granite dome of Flinders Peak on Middle Island (approximately 6 kms offshore from Cape Arid) (Dortch and Morse 1984). The findings indicate that the chert and quartz artefacts, some of which were located near shallow gnamma holes, were created prior to the island's formation.

The Australian coastline did not “stabilize” to its present form until approximately 6-5000 years ago. With rising sea levels following the end of the last Ice Age, a period of environmental instability and adjustment affected human populations, altering patterns of mobility, technological adaptation, and settlement. Numerous archaeological resources can be expected to now lie submerged on the continental shelf, and also in the deep Holocene sands that are a prominent feature of the Esperance coastline today.

Geology

Fitzgerald River National Park lies on the southern edge of the Yilgarn Block and the adjoining Albany-Fraser Province. The bedrock of the northern edge of the Fitzgerald River National Park is part of an ancient (2500 - 2900 million years old), essentially stable, crustal segment known as the Yilgarn Craton. Granite and gneiss are the predominant rock types with minor enclaves of altered sedimentary and mafic igneous rocks. One such form of mafic

igneous rock is the West River greenstone belt south-west of Ravensthorpe. The somewhat younger rocks (1100- 1800 million years old) of the Albany - Fraser Province form the bedrock across the southern portion of the Park. These rocks are dominated by the metasediments of the Mount Barren Group, with smaller enclaves of slightly older granitic gneiss appearing along the coast from Bremer Bay to Point Charles.

The Mount Barren Group forms the Barren Ranges which lie along the coast from Hopetoun to east of Bremer Bay. This group consists of a folded and faulted sequence of meta-sediments of quartzite, phyllite, dolomite and conglomerate which are generally slightly altered. Development of the Barren Ranges, through folding and faulting of the Mount Barren Group, is thought to have occurred between 1100 and 1400 million years ago. Subsequent changes in sea level have led to the formation of elevated benches on various peaks within the Barren Ranges. The Plantagenet Group was deposited in shallow, warm waters near sea level 40-50 million years ago (Eocene Period). Changing sea levels led to deposition under both marine and non-marine conditions. The Werillup Formation, the lower part of the group, is composed of grey and black clay, siltstone, lignite and carbonaceous siltstone. The lignite ranges up to 3 m thick and occurs in the Fitzgerald River area and around Nornalup Inlet. The Werillup Formation is overlain by the Pallinup Siltstone, a horizontally bedded white, brown or red siltstone and spongolite. The Plantagenet Group is exposed along all the major riverlines in the Park (FRNP Management Plan, Moore et al DEC 1991).



Figure 3. Extensive Holocene sand dunes have buried ancient archaeological places that are regularly exposed in blow-outs and disturbances.

Flora and Fauna

The area is within the Eyre Botanical District of the South-West Botanical Province (Bear 1980) and is the only remaining extensive representation of the Eyre District (DEC 2001:44). The vegetation is dominated by open mallee and heath, with woodlands confined to rivers and swamps (DEC 2001: 44).

FRNP is one of the richest areas for plants in Western Australia, with 1748 identified species. About 75 of these are endemic, that is, they are found nowhere else, and some 250 species

are either very rare or geographically restricted. The Park contains 20% of the State's described species. Although endemics occur throughout the Park, the highest concentration is in the Barren Ranges. FRNP has a richer fauna than any other conservation area in the south-west of Western Australia. The following numbers of species have been identified: 184 birds (3 declared rare and 2 declared in need of special protection), 22 native mammals (7 declared rare), 12 frog species and 41 reptiles (FRNP Management Plan, Moore et al 1991, iii).

CULTURAL HISTORICAL BACKGROUND

This section provides a brief review of relevant archaeological investigations to provide a context for the archaeological assessment and also to justify the recommendations made.

To understand and model the archaeological landscape requires an appreciation of regional patterns of change and adaptation. People have occupied the South West for tens of thousands of years, evident at a number of stratified archaeological sites such as Upper Swan near Perth (Pearce 1981) and Devil's Lair near Margaret River (Dortch 1974; 1976). Excavations at the limestone cave, Devil's Lair, remains one of the longest sequences of human occupation at a single locality in Australia, with a rich archaeological assemblage that includes flaked stone artefacts, bone (animal and human) and ornaments (bone pendants, beads) (Dortch 1974; 1976). There is evidence that the site was occupied as early as 50,000 years before present (Turney et al 2001), with occupation horizons dating to 12,000 years ago, when the cave entrance was blocked by natural processes.

In South Western Australia, regional archaeological models infer a late Holocene settlement-subsistence patterns based on broad environmental zones, that compares and contrasts the associated archaeological signatures (e.g. Anderson 1984). Very little regional studies have taken place within the sproject area, though some work in the Perth and Esperance region is a useful overview characterizing aspects of the Southwest and Sout Coast archaeological landscape. Anderson (1984) compared and contrasted the available archaeological site data for the three environmental zones of the Swan Coastal Plain, the Darling Range and Darling Plateau. The results indicate that site density of the Swan Coastal Plain was three to six times as great as that estimated for the Darling Ranges and Plateau, particularly in those areas of the Swan Coastal Plain containing alluvial deposits (Anderson 1984:34). Anderson (1984) found that larger sites and site clusters located in the Swan Coastal Plain tend to be situated on elevated dunes and/or sandy ridges while those from the Darling Range and inland plateau are commonly situated on low-lying and gently sloping ground.

Mattner and Harris' (2004) synthesis of previous studies relevant to the Darling Plateau included a number of predictive statements that provide some basis for conceptualizing and interpreting this assessment.

Table 1. Archaeological site types and predictive locations of the Darling Plateau and Range, south west Australia (Mattner and Harris 2004:50-51 - text cited directly).

Feature	Prediction
Major artefact scatters (1000 pieces+)	Will occur within a radius of about 500 m, but not closer that 100m of reliable and long-lasting water sources, such as soaks, springs, swamps, and deep river pools. Major artefact scatters will be situated on open and flat or slightly sloping ground in clearings. They are more likely in areas with broad valleys and major creeks or rivers, and where granite bedrock is exposed in large domes or hills.
Medium-sized artefact scatters (100s of pieces)	Will not be numerous but may occur at a variety of locations, especially near seasonal water sources such as creeks, swamps, soaks, and possibly near granite outcrops where these contain gnamma holes or soaks. They will occur close to water sources, probably within 200m.
Small artefact scatters	Will be numerous and principally occur close to watercourses, often within 20m of the drainage channel, and close to granite outcrops. But such sites will also occur in a wide variety of locations, provided the land is reasonably level.

Artefact clusters	Consisting of a few artefacts and possibly representing butchery sites, can be expected in valleys or on the crests of ridges. They will occur on a wide range of landforms and will not be tied to water sources.
Quarries	For stone to manufacture flaked stone tools will be uncommon. They will be found at outcrops of fine grained silicified dolerite, but most dolerite outcrops will not contain quarries. Quarries will also occur where quarry veins and seams are exposed in granite domes or outcrop, but most granite exposures will not host quartz outcrops and will not be potential quarry sites.
Stone arrangements	May be expected on a small number of the granite domes, particularly in locations near ephemeral water sources that are remote from major campsites.
Lizard traps	Can be expected on some granite domes, especially those where water was available nearby, either from gnamma holes or depressions in the rock or from seasonal creeks.
Engraving sites	Will be rare. If any undiscovered examples exist, they will be located with large boulders that provide surfaces to engrave.
Painting sites	Will be rare. They are only likely to exist in protected overhands or rock shelters.
Scarred or marked trees	Will be uncommon. They are more likely to occur in woodland than forest, and likely sites are more likely to exist in clearings than in broad valleys.
Other	Other sites reported for the region, such as ochre quarries and grinding grooves are rare.
Burial sites	Are known to exist in the region. These appear to be historic and possibly the graves have markers. There are unlikely to be nay undiscovered graves but if any exist, they probably will be reasonably close to historic settlements, such as farms or timber camps.

In a regional study of the Esperance area by Smith (1993), over 200 sites were located, most classified as short-term camps, consisting of stone artefact scatters of less than 300 artefacts and less than 50m² in area. The largest sites are associated with large granite domes and/or sources of permanent freshwater.

As part of her PhD research in the 1980s, Moya Smith (1993) identified and analyzed 217 archaeological sites in an area between Esperance and Cape Arid. The great majority of sites recorded are non-stratified scatters of stone artefacts, sometimes associated with other features including gnamma holes, lizard traps, stone quarries, stone arrangements and paintings. Smith found that site location is associated with topographical features, notably granite domes or pavements, watercourses, salt lakes and swamps. In areas near the coast nearly 60% of sites are located on and around granites. As noted in conversation with Indigenous consultants, granite domes are known to provide a variety of vegetation and other food sources; they are convenient look out posts to watch for game animals and approaching people; they provide easy access to shelter from wind, rain and sun, are predictably used for gnamma holes and lizard traps and importantly have desirable water catchment properties (Morse et al 2007:3).

People adapted to, and shaped the natural environment, embedding systems of movement, settlement, and subsistence that exists today in the form of archaeological places and features that dot the landscape. Such places include stone artefact scatters, gnamma holes, lizard traps, quarry sites, scarred trees, burials, rock art sites, hearths/camps, and associated features. There is ethnographic information detailing the complex knowledge and associations of people using this area associated with hunting, fishing, settlement and seasonal movement.

More fine-grained survey and analysis is required before definite statements can be made regarding the nature of past occupation and use across the Region. It should also be noted that extensive use of fire as a food acquisition strategy, for environmental management, and also to facilitate movement through the landscape (Hallam 1975; J.Dortch 2000; Hassell and Dodson 2003) undoubtedly created a mosaic of micro-environments within any one environmental or landform unit that are not so clearly defined today.

Recent wildfires and further archaeological investigations in recent years have revealed a complex of large archaeological sites and features throughout the region, requiring greater investigation before detailed understanding of the changing settlement-subsistence patterns can be developed.

Further field study... is greatly needed in formulating a more complete conception of Aboriginal hunter-gatherer land usage and cultural history from late Pleistocene times to the historic period along the 600-km-long coastal zone between King George Sound and Israelite Bay (Dortch 2007:9).

In sum, archaeological models suggest that the area encompassing the project area was part of a seasonal settlement-subsistence pattern focused on winter occupation, and with an overall (perceived) scarcity of food resources, lack of surface water (at least seasonally), and limited ethno-historical accounts of past human use (c.f. Hallam 1975; Anderson 1984), it has been characterized as a marginal area of occupation. For this project area, the regional models suggest that this type of upland, open woodland environment to be characterized by an extensive archaeological signature comprised of small, un-structured artefact assemblages dominated by amorphous quartz artefacts. However, these environments are characterized by low ground surface visibility and have not been studied to any great extent. Regional models are very general and ignore much of the variation in landform systems, past methods of resource utilization (such as fire) that involved environmental management/manipulation, and also social processes of movement, trade and ceremony. Therefore, any predictive statement or survey result should factor in these processes.

European exploration of the South Coast began during the 1600's, and several of these expeditions noted the presence of Indigenous people on the mainland. By the early 1800s, a South Coast sealing and whaling industry had established itself though focused on the islands of the Recherche Archipelago with regular incursions to the mainland, closer to the project area, whaling and sealing concentrated on the Doubtful Islands and Bremer Bay areas. By the mid 1800's the early settlers had moved in, most often with Noongar guides. John Hassell settled at "Jarramongup" in 1850 and John Wellstead followed shortly after at Quaalup (1858),. In 1868 the Dunn's began the first permanent settlement of the Ravensthorpe District at Cocanurup. Sheep were grazed along the Fitzgerald River and the Phillips and Gairdner Rivers were used as travelling stock routes (DEC 2001:58).

Relationships between Noongar people and the earliest settlers were often hostile though some working relationships eventually developed - albeit exploitative relationships by today's standards.

In 1864, the colonial administration instituted land regulations which explicitly applied to all Crown Lands within a defined area, south of the Murchison and west of line drawn between Hopetoun and Esperance, which effectively denied the traditional relationships of Noongars to the land in the area (Forrest and Crowe, 1996). Outside of this area, the regulations

'...recognised the Noongars' right to enter, at all times, the unenclosed or enclosed but otherwise unimproved parts of the pastoral lease, for the purposed of seeking sustenance in their traditional manner' (Biskup cited in Forrest and Crowe, 1996:37).

In 1868, John Dunn took up a lease of 28,000 acres in the hills to the northwest of the current Ravensthorpe townsite (Archer, 1979). John Dunn selected a block about 20 miles up the stream 'Cocanarup' where the Noongars said that the water was always fresh (Eliza Dunn, John's sister in a letter written in 1882 or 1883, reproduced in Archer 1979:185). With the help of Noongar shepherds, John Dunn and his brothers cleared their land, and three years

later, they brought the first flocks to 'Cocanarup' (Archer, 1979). Their wagon track from Jerramungup (the Hassell's station) to Cocanarup became the road, and with a few alterations, is still the main road to Albany and Broomehill (Archer, 1979). The Dunn brothers had their goods and stores brought by boat to a place called Mary Anne Haven and Mary Anne Point, which is the area now known as Hopetoun (Archer, 1979). Around 1875, after the previous year's attempts to cart the wool by tracks to Albany had failed, the Dunn brothers built a stone hut and shearing shed about 2 miles from the harbour so that the wool could be sent to Albany by boat (Archer, 1979) (Cue et al 2008).

A series of disputes over land and sheep resulted in several altercations between the Dunns and Moirs and the local Noongar communities.

In February 1880, John Dunn was fatally speared by Aboriginals on his property 'Cocanarup'. Various news reports of the time, together with information relayed by his sister some two or three years later, suggests that Dunn was speared through the neck by a small party of Noongars alone in the bush not far from his homestead (Archer, 1979; Eades and Roberts, 1984). Oral histories of the event held by the Noongar community suggest that the spearing was necessary according to tribal law, as John Dunn had been having inappropriate sexual relations with young Noongar women when the men were away droving (Eades and Roberts, 1984; Forrest and Crowe, 1996). Other accounts from settlers say that the spearing was due to trouble with sheep stealing (Archer, 1979; Anon, 1995). Some two or three years later, John Dunn's brother James was speared, although not fatally, when relations between the Noongars and the settlers had deteriorated, again due to the continued appropriation of sheep (Eliza Dunn, cited in Archer, 1979:187). In retaliation for one or possibly both of these attacks, it appears that the remaining Dunn brothers, together with other settlers from the district and possibly police also, led a reprisal attack on the local Noongar population, killing many men, women and children (Eades and Roberts, 1984; Forrest and Crowe, 1996; Anon, 1995). The site of this massacre was on the Phillips River not far from the Cocanarup Homestead (Cue et al 2008).

Many people were progressively moved into Reserves and Missions via successive government policies aimed at controlling the lives of Indigenous people; however, the community maintains strong cultural connections to the area and surrounds, including that encompassing the current PDA.

ARCHIVAL RESEARCH

Archival research is necessary in order to determine if there are any previously-recorded Aboriginal Heritage sites located within the proposed development area that would be impacted by the operation. Additionally, the research provides an indication of the likely character and structure of archaeological resources across the area, with a review of relevant historical, environmental, ethnographic, and archaeological documents/reports. A primary resource is the Department of Indigenous Affairs (DIA) Sites Register and associated unpublished archaeological and ethnographic reports that relate to the area. There are two previously recorded archaeological sites within or in close proximity to the survey areas: Site ID 4934 West Beach and Site ID 19596 Gnamma Hole. Site ID 4934 West Beach's DIA coordinate locates the site 65m south east of the car park at West Beach. The site will be potentially affected by the proposed upgrade to the car park should the car park be widened. This site was re-located and assessed during this preliminary assessment, in terms of likely impacts and required conservation measures (see below).

Site ID 19596 is located 630m west of the south west corner of proposed gravel pit B and 560 southeast of the southeast corner of proposed gravel pit C and will not be affected by the materials extraction proposal at Lot 6382 Steeredale Road.

The name, type and indicative location of the previously recorded sites in the general area are shown in Table 2.

Table 2. Summary of Registered Aboriginal Heritage Sites in the vicinity of the project area.

SITE ID.	Status	Name	Location (AMG Zone 50)*		Site Type	Description
			East	North		
21598	L	Rav01/ Marked Trees	226675mE	6279847mN	Marked tree	Modified Tree
4671	I	Carmichael Scatter	755144mE	6265149mN	Artefacts/ scatter	Artefact scatter
4673	I	West River	755144mE	6265149mN	Man-made structure	structure
4672	I	West River Soak	755144mE	6265149mN	Artefacts/ Scatter	Artefact scatter
5620	I	Cocanarup Station	775145mE	6265149mN	Skeletal material/ burial	burial
2879	S	Kundip	238136mE	6269656mN	Ruins	Ruins
19596	L	Location G Gnamma Hole	232672mE	6244015mN	Water source	Water source
19597	L	Rivermouth Rockhole	226968mE	6243059mN	Water source	Water source
4934	P	West Beach	775142mE	6239148mN	Artefacts/ scatter	Artefact scatter
19596	L	Gnamma Hole	232672mE	6244015mN	Gnamma Hole	Water Hole

* Please note: Coordinates are indicative locations that represent the centre of sites as shown on maps produced by the DIA – they may not necessarily represent the true centre of all sites.

L – Lodged, I – Interim Register, S – Stored Data, P – Permanent Register, O – Access Open, N – File Not Restricted.

The few previously recorded sites in this wider area reflect more the lack of formal, regional archaeological survey than the actual distribution of heritage places.

SURVEY METHOD AND CONDITIONS

The survey method was designed on the basis of the proposed development with a series of UTM coordinates provided to the archaeologists prior to the survey that were uploaded to a hand-help GPS unit (Appendix B).



Figure 4. Roadside surveys were the order of the day (and the project scope).

The surveys took place on November 14th to 16th of November, 2009, by David Guilfoyle, Cat Morgan, Wayne Webb and Toni Webb and a subsequent field day on the 21st of November, 2009. The quarry pits located on private land were surveyed on January 28th 2010. The survey methodology involved pedestrian transects by the four archaeologists on either side of the road spaced ten metres apart. Observed environmental conditions were noted including ground surface visibility and other associated environmental observations. Much of the area was located in cleared tracks adjacent to the road or in thick coastal heath, also adjacent to the road which made artefact identification very difficult. Ground surface visibility was generally poor across the survey area, ranging on average from 5% – 25% with dense leaf litter and shrubs. Some areas in the low-lying flats provided moderate visibility, with patches of exposed, light grey sands.



Figure 5. Very dense coastal heath limited the effectiveness of the archaeological survey.



Figure 6. Archaeological surveys were carried out on the roadside and in vegetation adjacent to road. Note thick coastal scrub which made for low surface visibility.



Figure 7. The majority of the cultural material identified was located in localized blow-outs or washes, implying that the area contains a relatively dense archaeological signature though mostly obscured by dense vegetation or buried by sand dune systems.

This point suggests that conditions were generally not favourable for positive artefact identification within the confines of the designated survey area. At the same time, the PDA encompasses a variety of different micro-environments suggesting that archaeological resources should be present within this general area, based on previous investigations. Also, areas of more stable, sedimentation processes, such as the lower-lying flats, are likely to contain additional, un-identified sub-surface material. The specific survey conditions justify the management recommendations outlined below.



Figure 8. Archaeological survey in newly exposed/disturbed exposed areas.

Given the iconic and sensitive nature of the Park and associated biodiversity, the archaeological crew was careful to ensure that they minimized risks in the spread of Dieback, washing vehicles and boots regularly.



Figure 9. Spraying boots to reduce the risk of spreading Dieback.

RESULTS OF SURVEY

The archaeological survey resulted in the identification of a very large and significant site, the identification of a previously recorded site, a distribution of isolated finds across the PDA, and area of archaeological potential, and areas requiring rehabilitation/management.



Figure 10. Map showing the distribution of sites and monitoring/management areas.

The map shown in Figure 10 outlines the results of the field survey, discussed in more detail below. The two archaeological sites are highly significant and must be avoided from any disturbance. A mitigation/heritage site protection plan should be instigated by the proponent. The Elders noted that the newly recorded site is highly significant and should not be disturbed (see ethnographic section).

The gravel areas contain artefacts in a context of previous disturbance and dense vegetation and should be monitored during ground clearing. A meeting subsequent to the archaeological survey was to be set up between the Nyungar community in Albany to discuss the Die-back management plans for the gravel pit areas, as during the ethnographic survey the Elders expressed concern with the plan to extract gravel from areas that all ready contain die-back (see ethnographic section).

Areas dashed green are areas of archaeological potential based on the environmental configuration (water crossings, creeks, vegetation mosaic) and/or presence of isolated finds. The Elders also requested archaeological monitoring at water crossings and at the car park at West Beach that contained the previously recorded site (see ethnographic report). Areas dashed green (Waypoints 177 and 183) are areas of erosion that require management/conservation efforts (see Figure 11).



Figure 11. Stabilization of eroded areas is a positive step to minimize erosion and any disturbance to sub-surface archaeological deposits in the area.

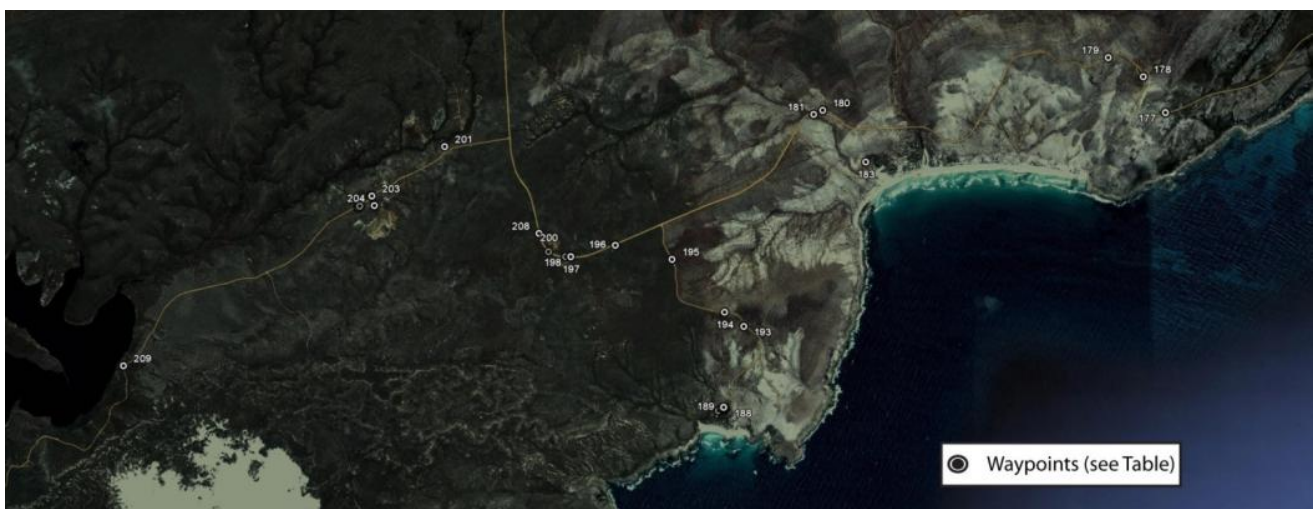


Figure 12. Map showing the distribution of waypoints associated with the survey (see Table 3).

Table 3. Waypoint data associated with Figure 12.

Waypoint No.	Easting	Northing	Description	Material	Type
177	224031	6241542	Rehab area - soil erosion, likely sub-surface archaeological material		
178	223847	6241811	Artefact see measurements	Q	FFD
179	223576	6241953	Quartz outcrop, arch potential		
180	776019	6241569	Monitoring area - good soil deposition, likely sub-surface material		
181	775948	6241540	Artefact see measurements	Q	CF
182	775950	6241539	Artefact see measurements	Q	FFMe
183	776345	6241158	Rehab area - eroding limestone ridge		
185	775186	6239280	Artefact see measurements	Q	CF
186	775183	6239277	Artefact see measurements	Q	FFD
187	775187	6239279	Artefact see measurements	Q	FFD
188	775182	6239282	Artefact see measurements	Q	FFMe
189	775177	6239286	Artefact see measurements	Q	FFMe
190	775163	6239279	Artefact see measurements	Q	CF
191	775179	6239265	Artefact see measurements	Q	FFMe
192	775184	6239267	Artefact see measurements	Q	FC
193	775351	6239909	Artefact see measurements	Q	FC
195	774806	6240445	Veg change - coastal heath to mallee woodland, arch potential		
196	774368	6240566	flat clay plan , arch potential		
197	774019	6240488	Artefact see measurements	Q	FC
198	774018	6240487	Artefact see measurements	Q	FFMe
199	773978	6240489	Artefact see measurements	Q	FFMe
200	773846	6240531	Artefact see measurements	Q	SPC
201	773061	6241368	Large artefact scatter on ridge (centre point only)		Artefact Scatter
202	772478	6241005	Artefact see measurements	Q	TBF
203	772484	6241001	Artefact see measurements	Q	FFMe
204	772501	6240927	Artefact see measurements	Q	FFMe
205	772387	6240926	Artefact see measurements	Q	FFMe
206	772376	6240918	Artefact see measurements	Q	CF
207	772374	6240916	Artefact see measurements	Q	FFD

Kurda Gorge Site (773061 E/ 6241368 N)

A large archaeological site complex was located during the survey, consisting of hundreds of stone artefacts, a variety of formal tools, and diverse lithologies. The site is located on the southern edge of an east-west running canyon and river. It measures approximately 150 metres east and west of the centre-point, 80 meters south of the centre-point (crossing the road) and an unknown distance to the north). The local terrain is relatively flat, with quartz sands and some localized clay plans that appear to have been recent blow-puts/washes, exposing dense artefact scatters, some that likely represent “knapping floors”. Two distinctive backed blades were located on site, formal implements that are said to appear in the Australian archaeological record in the early-to-mid Holocene (~10,000 – 5,000 years ago). Large quartzite boulders and heath scrub provide a dramatic setting above the shallow, yet vertical, gorge. It is expected that further surveys in the area will reveal an extremely dense and large site complex.

The site is likely to have served as a congregative area at the upper reaches of well-defined waterways that feeds into the Hamersley Inlet. It is likely that people used the flat terrain above the gorge as the main movement corridor between these different eco-tones.

Investigations were limited to the current survey project, and it was noted that the site was truncated by the existing Hamersley Road, as artefacts were found on both sides of the Road, albeit at much lower densities on the southern side of the road. The Elders identified this artefact site as highly significant and have advised that they wished the site not to be affected. The archaeological assessment likewise **strongly recommends** that no work should take place in this area, and a wide conservation buffer zone be established to ensure no indirect impacts. A full-scale archaeological assessment is required at this highly significant heritage place (see recommendations below). Further consultations are required with the Traditional Owner Group to determine the management/mitigation process, including further archaeological work, as cultural protocols of access and methods of investigation/reporting must first be established.



Figure 13. View from the road towards the gorge and site area.



Figure 14. Some of the chert artefacts identified in the large artefact scatter.



Figure 15. Diverse flake typologies and lithologies at Kurda Gorge Site.



Figure 16. Distinctive backed artifact located at Kurda Gorge Site, quartz.



Figure 17. Another distinctive backed artefact from the site, chert.



Figure 18. Traditional Owner Group examines the artefact scatter with the archaeologists and anthropologists.

Previously Recorded Site (West Beach Site ID 4934)

A number of quartz flakes were identified within the area of the previously recorded site, known as West Beach (Site ID 4934). This site is a small artefact scatter adjacent to a car park and track, set within low coastal heath near the confluence of a creekline and the beach. The site is significant in representing a distinctive site type that forms part of a regional settlement-subsistence system, in lining the coastal zone with the river ways and uplands. This area should be avoided from the current proposed works and the area monitored during any nearby on-ground works. It is recommended that the area be rehabilitated and the site fully recorded and mapped with a condition assessment made (to update the existing site file).

Isolated Finds

The survey identified 24 isolated finds along the survey corridor and within the proposed gravel pits (see Appendix A). The limited findings are attributed to the narrow corridor of disturbance that was investigated (and so reducing the likelihood of encountering cultural material) and the low ground surface visibility (dense vegetation) combined with coastal dune deposition that limits the effectiveness of surface survey. As is most common in Australian archaeology in densely vegetated environments, surface investigations are often limited to exposures of bare soil along waterways, road cuts, erosion scars or tracks (O'Halloran and Spennemann 2002:8).



Figure 19. Chert artefact WP131.



Figure 20. Quartz artefact, Waypoint 186.

Gravel Pits

In addition to the survey of the road way, four gravel pits and one sand pit were to be assessed for any archaeological material. Each pit had evidence of previous disturbance and dense vegetation that limited the effectiveness of the surface assessment. Based on the results of the overall survey, it is likely that the areas contain currently obscured cultural material. The Traditional Group identified some concerns they had on the gravel pits within the National Park and the process of extraction (documented in the associated ethnographic report). Subsequently, four additional areas were identified, located on private property.

Gravel Pit 1 (west)

A total of six quartz flakes were located within or adjacent to this gravel pit suggesting that the area is likely to contain a small artefact scatter with potentially sub-surface deposits; given that the area was densely covered with vegetation and subject to previous disturbances. The area is very close to the significant site complex located during this survey, so a clear management plan and monitoring programme must be established for this area.

It is recommended that if the area is to be disturbed, that initial ground clearing activities are monitored by Traditional Owner representatives and a qualified archaeologist.



Figure 21. Quartz artefacts found within the gravel pit area.

Gravel Pit 2 (middle)

This relatively large, rectangular area was surveyed though thick scrub limited the effectiveness of the surface assessment. In addition, an area of Dieback infestation was avoided. Three quartz artefacts were located along the roadside within this designated area. These findings suggest that there is likely to be additional cultural material located in this vicinity, with the road verge providing a small “window” into the distribution of archaeological material.

It is recommended that this area is not disturbed or used as a gravel pit given the threat of Dieback and the likely presence of archaeological material.

If the area is to be disturbed, **it is recommended** that initial ground clearing activities are monitored by Traditional Owner representatives and a qualified archaeologist.



Figure 22. Quartz core found within gravel pit area.

Gravel Pit 3 (east)

This rectangular area was surveyed and no cultural material was observed; however, thick scrub limited the effectiveness of the surface assessment. The general ware was noted for being in close proximity to a shift in the vegetation zones. Areas at the juxtaposition of diverse micro-environmental are often favourable areas of occupation and use given the diversity and proximity of resources. There is some potential that archaeological material exists within this gravel pit area, currently obscured by dense vegetation or buried by sand deposits.

If the area is to be disturbed, **it is recommended** that initial ground clearing activities are monitored by Traditional Owner representatives and a qualified archaeologist.

Gravel Pit 4 (Fisher’s Property)

Three proposed gravel pits are designated as separate blocks on Lot 3682, Steerdale Road, owned by the Fishers. These areas were surveyed on the 28th of January and one isolated quartz artefact was located with Block B (see Appendix A, Waypoint 208). However, these three areas were characterised by very dense coastal heath and previous disturbances, and so the likelihood of locating material within these areas was greatly reduced. Block B has some areas of archaeological potential with a distinct change of vegetation and

depositional environment profile, closer to the Culham Inlet, implying likelihood for buried cultural material. In general, the laterite and gravel horizons represent areas of low archaeological potential.

If the area is to be disturbed, it is **recommended** that initial ground clearing activities are monitored by Traditional Owner representatives and a qualified archaeologist.

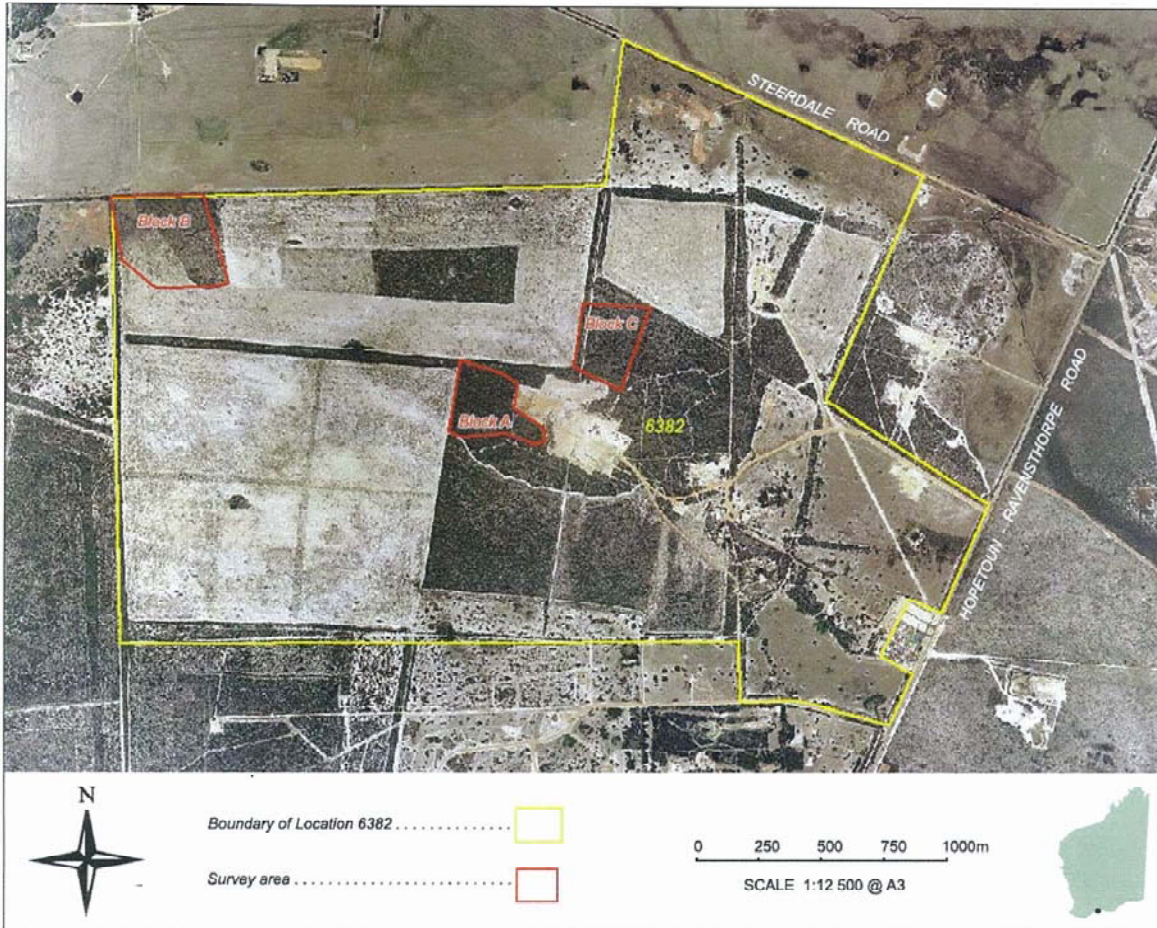


Figure 23. Aerial view of the three proposed gravel pits on the Fisher's property (see Appendix A).



Figure 24. General view across the Fisher property containing three proposed gravel pit areas.



Figure 25. Thick coastal heath obscured most of the survey area, Block A.

Sand Pit 5 (horse paddock)

A small area within a horse paddock near Culham Inlet was the final proposed gravel pit area to be surveyed. This area was a sandy dune above a gravel bench highly disturbed by horses and tracks. A quartz artifact was located within a localized blowout and appeared to have been dug out by a fox or rabbit, with an animal burrow located nearby. Thus, there is some potential here for sub-surface cultural material.

If the area is to be disturbed, it is **recommended** that initial ground clearing activities are monitored by Traditional Owner representatives and a qualified archaeologist.



Figure 26. Quartz artefact located within gravel pit area 5 that appears to have been dug out from an animal burrow (Waypoint 209).

In summary, the results and conditions of the survey suggest that the proposed works will have an impact on the archaeological resources of the area. Prior to the road's construction and extraction of the gravel pits, several conditions should be adhered to relating to both the results and the limitations of the survey (previous disturbances) and the likelihood for additional archaeological material/features to be located if the proposal proceeds, discussed below.

DISCUSSION

Previous archaeological investigations in the region indicate that this area contains a number of cultural feature and sites, and a high potential/likelihood for sub-surface archaeological material. The presence of large granite domes and headlands, abundant freshwater and a wetland system, well confined in a valley of well-drained soils and an abundance of plant and animal resources, all suggest a favourable area for past utilization. The archaeological survey was limited by dense vegetation cover and the narrow corridor investigated reduces the likelihood of encountering cultural material.

Well-watered corridors and terraces are areas of high archaeological potential and so any ground disturbance (including track construction/maintenance) should be carefully monitored. The most effective way to manage and stabilize cultural resources in this zone, aside from minimizing direct impacts, is through waterway and dune stabilization. As with the ecology of all coastal systems in an increasingly degraded and pressurized environment, associated cultural resources should be well protected.

Any undeveloped land is likely to contain archaeological sites, and development without prior survey and analysis can result in irreparable damage to fragile archaeological sites, and the loss of not only potentially valuable elements of the Australian Heritage, but also of subsequently irretrievable information about regional socio-economic systems (Smith 1984:2).

These types of environments are also characterized by low ground surface visibility that influence the effectiveness of archaeological survey; given that much of the archaeological resource is expected to be covered by leaf litter and sedimentation. Regional surveys based on pedestrian survey may reflect more the nature of the environment than the actual intensity of past use (Hall and Lomax 1996). Therefore, it is predicted that (currently obscured) cultural material exists across the area. This fact ensures that a process of management and monitoring is required, with associated recommendations.

As with the natural heritage of this iconic Park, there is a need to preserve the cultural landscape quality of the area, and protect the wilderness and heritage values of the region. The archaeological heritage assessment notes that the upgrade of the road will, if not managed properly, disturb significant cultural heritage places, and is counter to the aims of the Fitzgerald River National Park Management Plan (DEC 2001):

Fitzgerald River National Park is one of the few areas on the south coast of Western Australia that is of suitable size, terrain and condition to allow its designation as a wilderness area. "Wilderness" is essentially an undisturbed area or a 'window into the past' where management intervention is kept to an absolute minimum and where the number of visitors is low because of the area's remoteness. Visitors travel on foot (NPNCA, 1990). The "quality" of wilderness is often defined by the extent to which land or water is remote from, and substantially undisturbed by, the influence of modern technological society (CONCOM, 1986). 'Remoteness' and 'naturalness' are based on:

- remoteness from settlements or other points of permanent occupation
- **remoteness from access, in particular constructed vehicle routes**
- aesthetic naturalness or the degree to which the landscape is free from the presence of permanent structures
- biophysical naturalness or the degree to which the natural environment is free of biophysical disturbances caused by modern influences.

Owing to the unique opportunity which exists in Fitzgerald River National Park, it is highly desirable to maintain a significant cross-section of the Park as a wilderness area including coastal areas, mountains and inland gorges.

- The wilderness area should be of sufficient size and quality to meet nationally accepted criteria for wilderness designation.
-
- **Future management intervention within the wilderness zone should be strongly discouraged other than in exceptional circumstances.**

RECOMMENDATIONS

It is recommended that the significant heritage sites – the newly recorded site “Kurda Gorge Site” and the previously recorded site West Beach - are protected from any direct or indirect disturbance, a wide area of avoidance is established, the sites are fully recorded, and a monitoring/mitigation programme established.

Given the very low ground surface visibility and potential for sub-surface cultural material, **it is recommended** that if development proceeds, the area is monitored by the Traditional Owners and a qualified archaeologist during the initial ground clearings and site preparation, and to assess the operation in the event that archaeological material is uncovered or impacted. Management of any heritage sites potentially impacted by the proposed development must involve discussions with the Traditional Owners, implementation of agreed management measures, and where necessary, clearance obtained under the Aboriginal Heritage Act (1972).



Figure 27. Archaeological survey was limited by very dense vegetation.

From an archaeological heritage perspective, several management recommendations have been determined:

1. Avoid disturbance of cultural heritage places

Avoiding impacts to the surviving heritage places requires a combination of further archaeological research and modeling, education, well considered development/planning controls, and monitoring. This is to ensure that even restoration/upgrade projects minimize impacts to places of heritage value.

2. Mitigate impacts to cultural heritage places when disturbance is unavoidable

If ground disturbing activity must be undertaken, it should be undertaken in a manner that ensures that the Traditional Owner groups are provided with a detailed proposal and plan of the proposed development well before the plans are fully developed. This would provide an opportunity for the Group to influence the pattern of development/disturbance and avoids the reactive and expensive process of conducting heritage impact assessments.

3. Identify and define the distribution of cultural heritage places (tangible and intangible)

Further regional assessments should be undertaken to contribute to the understanding of the structure and changing patterns of cultural places throughout the National Park. This work is required to provide an accurate environmental impact assessment process at the regional level and to help establish whether particular cultural features are at risk, as well as the extent and severity of the risks.

4. Rehabilitate disturbed areas and the fragile environment

A direct management recommendation is to instigate a community driven process of rehabilitation and protection. Where there are natural and human-induced disturbances to the natural ecosystem, rehabilitation of these areas will be necessary to minimize on-going adverse effects. It also provides the pathway for

ensuring that traditional practice of *Caring for Country* is being supported by local government and government agencies.

In the protection of archaeological resources and heritage values associated with The National Park, management processes should focus on the dual conservation of the natural and cultural features. In many ways, this simply means integrating the actions required to maintain the ecological and biodiversity values of the local system with the integrated cultural heritage landscape. This also means providing opportunities for community-driven rehabilitation, management, and education.

Incorporate information on Aboriginal occupation and use in interpretive programs for the Park (FRNP Management Plan, DEC 2001)

The most cost effective way to implement such works is to engage the Traditional Owner community in the construction project which provide a number of associated, positive outcomes, including increasing Traditional Custodians' involvement with the land, conserving sites and minimising disturbance to any cultural features, and providing opportunities for education and interpretation on the regional cultural heritage values across the Park. Under this scenario, heritage specialists and the Traditional Owner Group assist with the on-ground activities, and so manage the interface of on-ground works and heritage legislation/protocols compliance. Such a community-level mechanism provides a more culturally-appropriate, not to mention, cost-effective, method for undertaking land care activities.

The proponents are reminded of their obligations and responsibilities under the *Aboriginal Heritage Act (1972)*.

APPENDIX A: ARTEFACT DATA

Waypoint No.	Easting	Northing	Material	Type	L (mm)	W (mm)	T (mm)	PW (mm)	PT (mm)	Platform Shape	Plat Surface	PFA/Ridge	Term.
178	223847	6241811	Q	FFD	12.5	19.61	7.34						
181	775948	6241540	Q	CF	11.29	9.27	2.6	6.29	3.24	wide	flat	b	f
182	775950	6241539	Q	FFMe	16.43	15.01	11.1						
185	775186	6239280	Q	CF	14.25	13.06	5.11	7.46	4.43	wide	flat	side	
186	775183	6239277	Q	FFD	18.73	31.74	9.93						f
187	775187	6239279	Q	FFD	11.03	12.15	4.55						
188	775182	6239282	Q	FFMe	21.76	24.21	4.53						
189	775177	6239286	Q	FFMe	14.1	14.9	4.24						
190	775163	6239279	Q	CF	46.16	16.81	10.05	7.54	5.56	focal	flat	b	step
191	775179	6239265	Q	FFMe	19.76	8.62	4.22						
192	775184	6239267	Q	FC	20.57	17.22	12.34						
193	775351	6239909	Q	FC	23.99	18.75	13.98						
197	774019	6240488	Q	FC	34.43	22.98	9.52						
198	774018	6240487	Q	FFMe	17.07	17.09	5.81						
199	773978	6240489	Q	FFMe	11.46	19.82	8.65						
200	773846	6240531	Q	SPC	33.43	29.65	18.18						
202	772478	6241005	Q	TBF	33.03	38.05	17.05	22.45	14.18				
203	772484	6241001	Q	FFMe	20.79	38.32	15.62						
204	772501	6240927	Q	FFMe	15.71	20.1	13.28						
205	772387	6240926	Q	FFMe	24.79	15.31	9.91						
206	772376	6240918	Q	CF	55.6	20.68	13.35	13.94	7.14	GW	flat	behind	step
207	772374	6240916	Q	FFD	9.48	15.15	5.91						step
208	232044	6244947	Q	FC	32.08	26.57	14.04						
209	230141	6242286	Q	FFMe	26.50	27.71	17.4						

APPENDIX B: COORDINATES OF THE SURVEY AREA

Coordinates of the survey lines (labeled as 'end points', Zone 51).

HR101	226445	6242683
HR102	226247	6242714
HR103	226059	6242767
HR104	225895	6242862
HR105	225720	6242766
HR106	225535	6242692
HR107	225469	6242519
HR108	225384	6242345
HR109	225225	6242228
HR110	225044	6242147
HR111	224918	6242010
HR112	224788	6241860
HR113	224615	6241774
HR114	224423	6241721
HR115	224236	6241650
HR116	224048	6241581
HR117	223858	6241518
HR118	223795	6241691
HR119	223777	6241877
HR120	223620	6241969
HR121	223426	6241918
HR122	223231	6241926
HR123	223036	6241970
HR124	222847	6241930
HR125	222728	6241776
HR126	777270	6241605
HR127	777148	6241446
HR128	777028	6241329
HR129	776847	6241392
HR130	776658	6241431
HR131	776458	6241431
HR132	776260	6241444
HR133	776078	6241524
HR134	775887	6241570
HR135	775763	6241421
HR136	775659	6241251
HR137	775522	6241106
HR138	775361	6240991
HR139	775173	6240923
HR140	774985	6240854
HR141	774797	6240786
HR142	774610	6240715
HR143	774423	6240643
HR144	774236	6240572
HR145	774050	6240500
HR146	773855	6240512
HR147	773727	6240655
HR148	773696	6240850
HR149	773644	6241042
HR150	773548	6241215
HR151	773507	6241410
HR152	773317	6241406
HR153	773120	6241380
HR154	772946	6241283
HR155	772767	6241194
HR156	772583	6241116
HR157	772417	6241005

HR158	772243	6240907
HR159	772069	6240826
HR160	771936	6240676
HR161	771780	6240552
HR162	771602	6240465
HR163	771408	6240419
HR164	771212	6240381
HR165	771015	6240345
HR166	770830	6240273
HR167	770714	6240111
HR168	770599	6239947
HR169	770471	6239794
HR170	770416	6239613
HR171	770317	6239462
HR172	770245	6239282
HR173	770126	6239139
HR174	769945	6239188
HR175	769759	6239211
HR176	769648	6239054
HR177	769490	6238993
HR178	769407	6238820
HR179	769269	6238688
HR180	774660	6240720
HR181	774736	6240536
HR182	774786	6240343
HR183	774833	6240152
HR184	775011	6240071
HR185	775203	6240016
HR186	775362	6239901
HR187	775394	6239713
HR188	775275	6239559
HR189	775183	6239403
HR190	775079	6239257
HR191	775766	6241420
HR192	775916	6241291
HR193	776067	6241161
HR194	776237	6241065
HR195	777209	6241508
HR196	222737	6241387
HR197	222866	6241235

UTM Co-ordinates given for the proposed gravel pits to be used during the development within the National Park.

001	772337	6240922
002	772368	6240929
003	772415	6240954
004	772475	6240990
005	772527	6241040
006	772549	6241050
007	772543	6240936
008	772516	6240910
009	772476	6240854
010	772430	6240828
011	772377	6240839
012	772335	6240849
013	773706	6240838
014	773710	6240334
015	774115	6240334
016	774109	6240832
018	773781	6240669
019	773779	6240663

020	773777	6240658
021	773759	6240640
022	773778	6240599
023	773815	6240553
024	773841	6240541
025	773869	6240549
026	773896	6240570
027	773909	6240596
028	773903	6240634
029	773889	6240651
030	773864	6240652
031	773844	6240648
032	773827	6240666
033	773804	6240672
034	774394	6240636
035	774392	6240437
036	774701	6240440
037	774698	6240502
038	774666	6240555
039	774655	6240591
040	774650	6240637

UTM Coordinates for proposed gravel pit, Block A, Fisher's property.

006	233346	6244025
007	233392	6244323
008	233584	6244267
009	233638	6244218
010	233621	6244127
011	233741	6244056
012	233751	6243989
013	233704	6243971
014	233581	6244016
015	233409	6244004
016	233346	6244025

UTM Co-ordinates for proposed gravel pit, Block B, Fisher's property.

017	231980	6244981
018	232361	6244991
019	232464	6244622
020	232394	6244607
021	232163	6244603
022	232019	6244719
023	231980	6244981

UTM Co-ordinates for proposed gravel pit, Block C, Fisher's property.

001	233853	6244290
002	233891	6244556
003	234174	6244541
004	234055	6244190
005	233853	6244290

UTM Co-ordinates for proposed gravel pit, Area 5, Horse Paddock.

001	230116	6242348
002	230158	6242352
003	230202	6242355
004	230230	6242343
005	230239	6242308
006	230226	6242270
007	230188	6242261
008	230136	6242256
009	230116	6242348

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