A REPORT OF AN ARCHAEOLOGICAL SURVEY OF A PROPOSED MINE AT CLOVERDALE, NEAR CAPEL

PREPARED FOR ILUKA PTY LTD

By Wayne Glendenning BA (Hons)
WESTERN HERITAGE RESEARCH PTY. LTD
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EXECUTIVE SUMMARY

In December 2005, Iluka Pty Ltd (the proponent) commissioned Western Heritage Research Pty Ltd to undertake an archaeological survey of a proposed sand mine at Cloverdale, approximately ten kilometres southeast of Capel. Archaeologist Wayne Glendenning conducted the survey between the 21st and 22nd of December, 2005.

As a result of the archaeological survey two scarred trees, *Cloverdale Scarred tree 1* (50J 368894E; 6278816N) and *Cloverdale Scarred Tree 2* (50J 368859E; 6278787N), were located.

The proponent will need to avoid disturbing the scarred trees located within the project area. However, if the proponent intends to disturb the two scarred trees, it will need to obtain consent from the Minister for Indigenous Affairs under Section 18 of the *Aboriginal Heritage Act 1972* ("The Act") prior to any such activity occurring.

It is contingent upon the proponent to advise personnel and contractors of the location of the two scarred trees in order to avoid them.

It is also possible skeletal material may be uncovered during the development of the project area. If skeletal material is uncovered, work is to cease immediately and the police and a qualified archaeologist are to be notified.

It is therefore recommended:

- The proponent avoids disturbing the scarred trees, *Cloverdale Scarred tree 1* (50J 368894E; 6278816N) and *Cloverdale Scarred Tree 2* (50J 368859E; 6278787N);
- That if the proponent intends to disturb the scarred trees it obtains consent from the Minister for Indigenous Affairs under Section 18 The Act, prior to the disturbance occurring; and
- If any skeletal material is uncovered, work is to cease immediately and the police and a qualified archaeologist are to be notified.

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1 INTRODUCTION

In December 2005, Iluka Pty Ltd (the proponent) commissioned Western Heritage Research Pty Ltd to undertake an archaeological survey of a proposed sand mine at Cloverdale, approximately ten kilometres southeast of Capel. Archaeologist Wayne Glendenning conducted the survey between the 21st and 22nd of December, 2005.

The area surveyed encompasses the mining tenements (see attached map). The archaeologist met with farmer Greg Norton for permission to access his properties.

The archaeological survey comprised three components:

- Archival research;
- Field inspection; and
- Reporting of survey results.

A handheld *Garmin eTrex* Global Positioning System (GPS) unit using the GDA 94 datum was used to record all coordinates on each of the surveys.

2 ENVIRONMENTAL BACKGROUND

2.1 CLIMATE

The climate of the Cloverdale area[1] is described, using the modified Koppen system of climate classification, as temperate with a distinctly dry and hot summer (Stern; de Hoedt, and Ernst, 2000). Average temperatures range from a January maximum and minimum of 30.9°C and 15.6°C respectively, to a July maximum and minimum of 16.7°C and 8.0°C respectively. Annual average rainfall is 974.4mm, which falls primarily from May through to October (Bureau of Meteorology, 2005).

2.2 GEOMORPHOLOGY AND GEOLOGY

The survey area is situated within the geological unit known as the Swan Coastal Plain. The Swan Coastal Plain in turn lies upon the geological structure known as Perth Basin, which is described as a deep trough filled with Phanerozoic sediments. The Perth Basin averages approximately 65 kilometres in width and approximately 15 kilometres in depth and extends for approximately 1,000 kilometres from the Badgerrada Range to south of Pemberton (Playford, Cockbain and Low, 1976:40).

Beneath the Phanerozoic sediments lies a basement complex consisting of Archaean and Proterozoic igneous and metamorphic rocks; constituents, also, of the Yilgarn Block geological feature immediately to the east of the Perth Basin (Playford, Cockbain and Low, 1976:41). The Yilgarn Block, comprising gneissic and granitic rocks, covers an area of approximately 657,000 km^2 (Trendall, 1975:31-32). Overlying the Phanerozoic sediments of the Perth Basin are the Quaternary sediments, which range from 20 metres to 150 metres in thickness (Playford, Cockbain and Low, 1976:206).

The Quaternary sediments comprise a series of parallel geomorphic elements, which include the coastal Quindalup Dunes, the Spearwood Dunes, the

[1] Readings taken from the Busselton Meteorological Station

Bassendean Dunes, the alluvial Pinjarra Plain, and the Ridge Hill Shelf, (McArthur and Bettenay, 1960:7).

The survey area is situated on the Pinjarra Plains geomorphic unit of the Swan Coastal Plain According to McArthur and Bettenay (1960), the soils of the Pinjarra Plain unit and the survey area are primarily alluvial from degrading rock and laterite from the Darling Scarp.

2.3 VEGETATION

The survey area lies upon the southeastern edge of the Swan Coastal Plain, which is situated within the Drummond Botanical sub-district of the Darling Botanical district. This, in turn, is a component of the South-West Botanical Province (Beard, 1980; 1981, 1990). Landform and soil type are the prime determinants of vegetation type on the Swan Coastal Plain (Heddle, Lonergan and Havel 1980).

According to Beard (1980; 1981) the vegetation type for the survey area is typically that of the Pinjarra Plain geomorphic unit, which is characterised by *Eucalyptus calophylla* woodland on well drained land and on higher ground associated with *E. wandoo and E. marginata*. Along the Ludlow River, *E. rudis* may be found growing and in areas subject to inundation, *Melaleuca rhaphiophylla and M. preissiana* are likely to be found growing.

2.4 LAND INTEGRITY

The survey area is generally flat, sloping gently towards the Ludlow River, which bisects the survey area. The land surface of the survey area has been highly disturbed through pedoturbation by dairy cattle. Apart from a small patches of *Eucalyptus*, *Melaleuca* and *Agonis flexuosa* most of the original vegetation has been removed for farming purposes.

3 ARCHAEOLOGICAL SURVEY

3.1 ARCHAEOLOGICAL BACKGROUND.

An awareness of the regional archaeological background of a given survey area enables the archaeologist to make predictive statements about the nature of archaeological material, which may be encountered within that area. The regional background is augmented by the results of previous research undertaken for archaeological surveys and information held in site files at the Department of Indigenous Affairs (DIA).

Archaeological research within the southwest of Western Australia has revealed some of the oldest dates for artefact assemblages in Australia. Pearce and Barbetti (1981) excavated a stratified site at Upper Swan and identified artefacts in association with charcoal that was dated to 38,000 B.P[2]. Schwede (1983) excavated a stratified site at Helena River and obtained a date of 29,000 B.P., again from charcoal found in association with artefacts.

Nearer to the PDA, several archaeological sites have evidence of Aboriginal subsistence of similar antiquity. Several caves with a stratigraphic component have evidence of human subsistence of a considerable time-depth. Devil's Lair, a limestone cave situated on the Leeuwin-Naturaliste block has artefacts within the deposit radiocarbon dated up to 33,000BP (Dortch 1974; Dortch 1979a; Dortch 1979b; Dortch and Merrilees 1972; Glover *et al* 1978; Glover 1979). At Tunnel Cave a radiocarbon date of 22,000BP was obtained from charcoal associated with artefacts from within the cave's deposit (J. Dortch 1996).

Artefact scatters in the region have also indicated great antiquity. Quininup Brook, a complex of six artefact scatters with stratigraphic components, has been dated to 18,500±1,700 BP, whilst at the Arumvale site, a Pleistocene open-air occupation site with a stratified component, artefacts in association with charcoal have been radiocarbon dated to 18,400±540 BP (Dortch and McArthur 1985; Dortch 1986; Ferguson 1981).

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[2] Before the Present

There have been two regional studies of Aboriginal subsistence on the Swan Coastal Plain and adjacent Darling Ranges prior to European settlement. Hallam's (1986) Swan Coastal Plain study was the first regional archaeological research project in the upper southwest region. Although her focus was primarily on Aboriginal subsistence within the Swan Coastal plain, the study also incorporated data from the Darling Scarp and Darling Plateau.

In short, Hallam's study is an analysis of archaeological sites found in different ecological zones[3] within a transect stretching across the Perth metropolitan area from the coast to the Darling Range, in order to determine their relative usage by Aboriginal people (Hallam, 1986). The basis of this study was previous research she had undertaken in the Perth metropolitan area. From her research, Hallum (1986) concluded that the Darling Scarp and Darling Plateau appeared to have little use owing to the dearth of sites in those zones.

Anderson (1984) undertook a more comprehensive regional study of the southwest. In her paper, titled *Between Plateau and Plain*, Anderson synthesised ethnohistorical, ethnographic, archaeological and environmental data in order to reconcile discrepancies that could lead to different interpretations of Aboriginal occupation in the three ecological zones: the Swan Coastal Plain, the Darling Scarp, and the Darling Plateau (*Jarrah* forest).

The purpose of Anderson's study was to develop a land use model, which considers the exploitation of the jarrah forest by Aboriginal people in the context of the relationship between the three environmentally distinct zones, for the purpose of defining the contrasts and explaining the pattern of usage in which economic, social, and ceremonial factors were significant (Anderson, 1984:1).

Anderson (1984:20) compared the characteristics of archaeological sites on the Swan Coastal Plain, the Darling Scarp and the Darling Plateau. This included Anderson's own work conducted at South Canning, North Dandalup, Avon River, and Perth Airport, as well as surveys at Perth Airport undertaken by Hallam

[3] Based upon the soils zones of the Swan Coastal Plain, namely: the Quindalup Dunes; the Spearwood Dunes (comprising the Cottesloe limestone overlain by the Karrakatta sands); the Bassendean Dunes; the Pinjarra Plain alluvium; the Foothills, Darling Scarp and the Darling Plateau.

(1972), and at Collie by Veth (1983) and Pearce (1981a), and at Boddington by Pearce (1981b). The results are shown in Table 1.

Survey	*Area (km^2)*	*Site density per km^2*	*Dominant site locations*	*Major sites*	*Intermediate sites*	*Minor sites*
South Canning	25	0.8	<100m from streams. Low ground	-	15	85
North Dandalup	8	1.3	Close to streams. Low ground	-	20	80
Collie (Pearce)	25	2.0	Near damp or swampy areas on gentle slopes	-	-	100
Collie (Veth)	10	5.0	Close to drainage channels on flat ground	-	<25	>75
Boddington	255	0.8	Near water courses or swamps on gently sloping ground	7	2	91
Perth Airport (Anderson)	6	6.5	Sand ridges near water	5	21	74
Perth Airport (Hallam)	14	3.0	Sand ridges near water	29	29	42
Avon	10	1.7	Close to river, tributaries and lake. Single large artefacts on slopes away from water	6	18	76

Table 1: Comparison of site data (from Anderson, 1984)

From this data, Anderson (1984:25) identified a dichotomy between the Swan Coastal Plain and the two Darling Range zones. On the Swan Coastal Plain quartz was the dominant lithic type. Fossiliferous chert was also found in site assemblages, decreasing as a proportion of the assemblage total further away from the coast, possibly due to its source now offshore, as were other lithic materials, mainly dolerite, silcrete and mylonite. Sites on the Darling Range were comprised almost exclusively of quartz artefacts, with dolerite as a very minor component.

Anderson (1984) concluded that the archaeological data indicated much less use of the Darling Range environments by Aboriginal people than the Swan Coastal Plain environment. There were no major sites found within the *Jarrah* forest and they were ten times less likely on the Darling Plateau than on the Swan Coastal Plain. Artefact densities are two to three times greater on the Swan Coastal Plain than in the *Jarrah* forest.

Site distribution is also different for each zone. For the *Jarrah* forest, the minor nature of sites is representative of places where people rested whilst passing through, whereas on the Swan Coastal Plain, due to the greater number of artefact types and debitage, sites were more permanent, or visited more frequently (Anderson 1984:34).

According to Anderson (1984:34) the distribution of sites is a function of actual resource availability and the time of year of resource availability. Seasonal movement of people from the Plain to the Darling Range in winter and early spring is reflected in the small size of the sites found on the Darling Scarp. Swan Coastal Plain resources sustained relatively large populations for most of the year, and are reflected in the major sites found on the plain.

As result of her research, Anderson (1984:37) proposed a land use model for the three ecological zones:

a) Aboriginal groups based on the Swan Coastal Plain and on the Darling Scarp are associated with core territories;

b) There is seasonal movement of groups depending on resource availability. In summer and autumn Swan Coastal Plain groups are concentrated on the coast and waterways (this results in large archaeological sites). In winter and spring, times of scarce coastal resources, some Swan Coastal Plain groups either move to the *Jarrah* forest, or stay and travel more widely in search of resources. In spring there is a movement of people back to the Swan Coastal Plain;

c) Groups inhabiting the *Jarrah* forest are generally more nomadic, and there is less distinct seasonal movement;

d) Plateau groups exploit swamp and waterway environments and large mammal populations;

e) There is a continual, generalized, sporadic movement of people from the Darling Plateau to the Swan Coastal Plain, and vice-versa, for ritual and social purposes.

3.2 PREVIOUS ARCHAEOLOGICAL RESEARCH

The regional archaeological background discussed in the previous section can allow the archaeologist to make certain predictive statements about the types of sites that may be encountered within a given region. In addition, previous research undertaken for archaeological surveys and information held in site files at the Department of Indigenous Affairs (DIA) can also add to the archaeological knowledge base of the area.

The search of the DIA library revealed five archaeological consultancy surveys have been conducted within a notional 5 kilometre radius of the survey area (see Greenfeld 2002; McDonald, Hales and Associates 2001; 2002; Quartermaine 1995; 1996)). The search of the DIA site file database revealed five previously recorded archaeological sites within the same area. Details of these sites are as follows:

ID 19362 Tutenup Mine artefact cluster 0364739E; 6271030N

This site is a described as a sparse cluster of 3 quartz artefacts located within Sussex Location 1787 within an area measuring 5 metres by 4 metres. The site is located on a sandy firebrak/track. It is situated 1.28 kilometres south of Oates Rd and 1.84 kilometres west of Williamson/Thomsett Rd.

ID 4932 Korilya Stud 0355139E; 6275148N

This site is described as a burial located in a dune deflation. The precise location of the site is unknown.

ID 5147 Grindstone site 0375140E; 6285148N

This site is described as comprising a grinding stone of 'dimpled appearance' located in a farm paddock. Neither the precise location of the artefact nor more information regarding the site is in the site file.

ID 5864 Ludlow River 0355139E; 6275148N (same coordinates as Korilya Stud)

Little information exists regarding this site other than it is a small artefact scatter comprising three quartz artefacts eroding from the face of an old dune approximately 200m north of the Ludlow River. The precise location is unknown.

ID 5865 Capel 0363639E; 6284648N

This site is described as an artefact scatter comprising three quartz artefacts, located approximately 2km south west of Capel. The precise location is unknown.

3.3 SURVEY METHODOLOGY

Prior to the commencement of the survey, the archaeologist conducted an initial reconnaissance of the survey area in order to familiarise himself with the local conditions and establish an effective survey methodology.

Archaeological visibility within the survey area was typically very low, typically <10% due to thick cover of grass over most of the area. On tracks and firebreaks, the general visibility rose to between 20% and 50% depending on the amount of vegetation on the track. On sand patches and erosion surfaces, the surface and archaeological visibility increased to between 70% and 90%.

Photograph 1: Typical vegetation of the Cloverdale survey area.

A survey methodology was established taking into account both the regional archaeological signature noted in previous research in the area and the given characteristics of the survey area.

The focus of the survey was on areas of high archaeological visibility, as well as on areas of high archaeological potential, such as areas contiguous with the Ludlow River and sand blowouts and tracks. In order to effectively survey the area, two sampling strategies were employed:

- Systematic pedestrian transects spaced 2 metres apart on tracks and firebreaks; and
- Purposive pedestrian inspection of areas with a high possibility of artefactual material being present, such as land contiguous with creeklines, tracks and sand patches.

It is estimated that by using this methodology approximately 5% of the survey area was surveyed.

3.4 RESULTS OF THE ARCHAEOLOGICAL SURVEY

Two archaeological sites were identified as a result of this survey. The sites are both scarred trees, although both have been highly damaged. Details of the scarred trees are as follows:

Cloverdale Scarred Tree 1 – 50J 368894E; 6278816N

The scarred tree has a shield scar approximately 1m in height; 25cm width. The scarred tree is located in a grove of trees on an elevated dune above the Ludlow River.

Photograph 2: Scarred Tree 1 showing scar.

Cloverdale Scarred Tree 2 - 50J 368859E; 6278787N (JPG 174)
The scarred tree has a scarred base with cut marks. Most of the rest of the tree and much of the scar has been burnt away. The scar is approximately 1.5metres in height and approximately 1metre wide. It is located approximately 35 metres southwest of Scarred Tree 1 and in the same context.

Photograph 3: Scarred Tree 2 showing remnants of the scar.

4 DISCUSSION AND RECOMMENDATIONS

In December 2005, Iluka Pty. Ltd. (the proponent) commissioned Western Heritage Research Pty Ltd to undertake an archaeological survey of a proposed sand mine at Cloverdale, approximately six kilometres southeast of Capel. Archaeologist Wayne Glendenning conducted the survey between the 21st and 22nd of December, 2005.

As a result of the archaeological survey, two scarred trees, *Cloverdale Scarred tree 1* (50J 368894E; 6278816N) and *Cloverdale Scarred Tree 2* (50J 368859E; 6278787N), were located on a dune above the Ludlow River.

No other artefactual material was located, which is likely to be a function of both the high level of disturbance due to farming activities within the survey area and the generally very low archaeological visibility.

As it is an offence to disturb an Aboriginal heritage site under Section 17 of the *Aboriginal Heritage Act 1972* ("The Act") the proponent will need to avoid the scarred trees.

However, if the proponent intends to disturb the two, scarred trees located within the project area, it may do so if it obtains consent from the Minister for Indigenous Affairs under Section 18 The Act, prior to any such activity occurring.

It is also possible skeletal material may be uncovered during the development of the project area. If skeletal material is uncovered, work is to cease immediately and the police and a qualified archaeologist are to be notified.

It is contingent upon the proponent to advise personnel and contractors of the location of the two scarred trees in order to avoid them.

It is therefore recommended:

- The proponent avoids disturbing the scarred trees, *Cloverdale Scarred tree 1* (50J 368894E; 6278816N) and *Cloverdale Scarred Tree 2* (50J 368859E; 6278787N);

- That if the proponent intends to disturb the scarred trees it obtains consent from the Minister for Indigenous Affairs under Section 18 The Act, prior to the disturbance occurring; and
- If any skeletal material is uncovered, work is to cease immediately and the police and a qualified archaeologist are to be notified

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6 APPENDIX

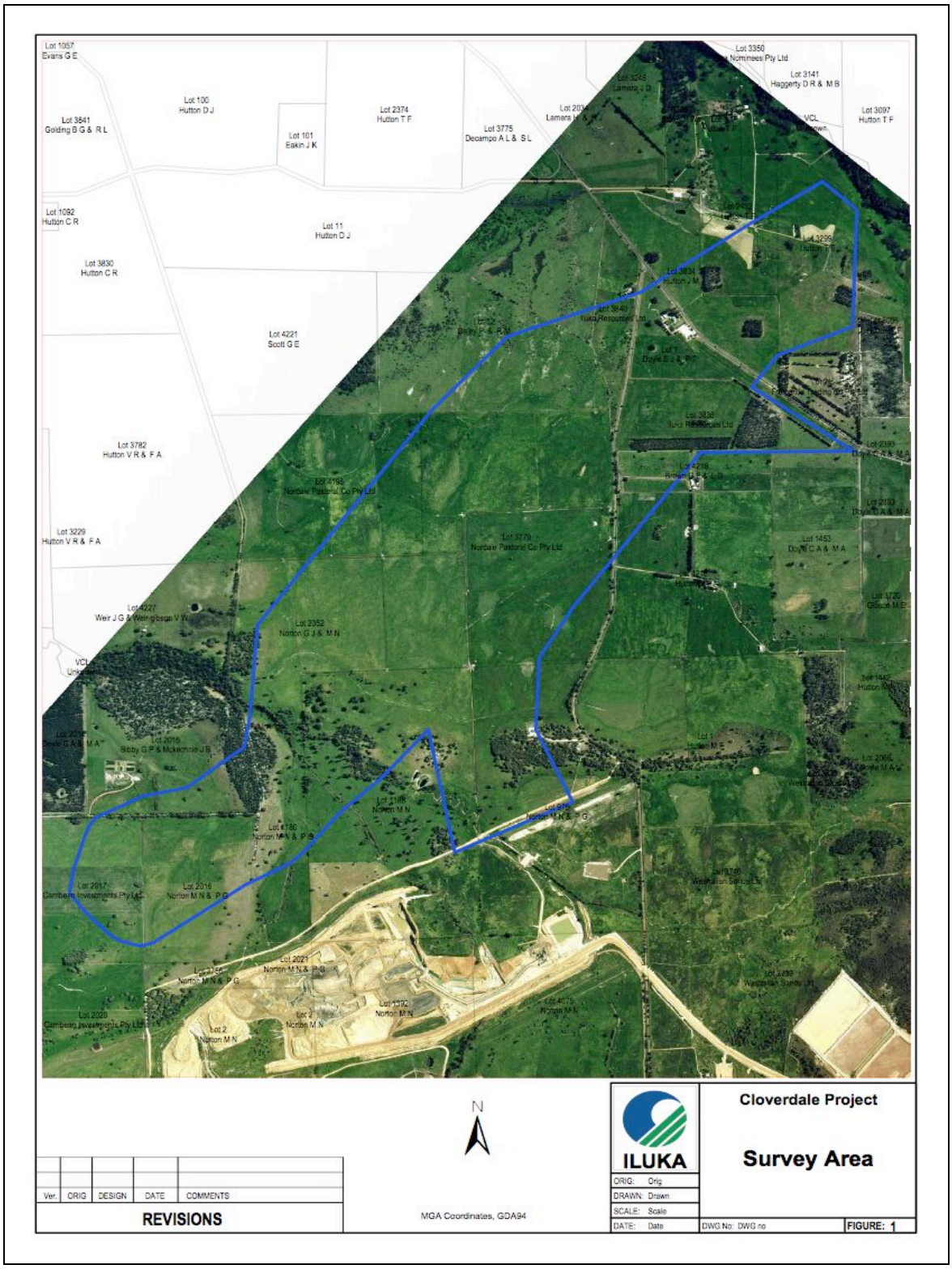

Figure 1: Diagram of the Cloverdale survey area.