



**REPORT ON AN
ARCHAEOLOGICAL
SURVEY OF THE
PROPOSED FLAT
ROCKS WIND
FARM PROJECT,
WA**

**On behalf of R. & E.
O'Connor Pty Ltd**

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REPORT ON AN ARCHAEOLOGICAL SURVEY OF THE BROOMEHILL WIND FARM PROJECT, KOJONUP, WA

i) EXECUTIVE SUMMARY

Moonies Hill Energy (MHE) is planning to construct a wind farm near Kojonup, in Western Australia's South-West. R. & E. O'Connor Pty Ltd employed John Cecchi Heritage Management Consultancy to undertake an archaeological survey of the proposed project area. The survey aimed to identify, demarcate and assess areas of Aboriginal significance within the project area and make recommendations for their management and integration within the proposed plan. There are not any registered sites within the project area and the survey resulted in no archaeological sites being identified. Two isolated quartz artefacts were located. The report makes the following statements (the Recommendations) regarding the management of archaeological sites during ground disturbing works and associated processes.

ii) Recommendations

- The location of the turbines do not impact any known Aboriginal site
- No Aboriginal sites were located in the wider survey area
- As most turbines are located within heavily disturbed contexts monitoring is suggested only for ground disturbing works that will occur within native bushland areas or in the vicinity of watercourses.
- All staff involved in ground disturbing works should be inducted in Aboriginal heritage and the sanctions and penalties under the Act.
- If ground disturbing works were to uncover artefacts, works should cease and the Aboriginal stakeholders and one heritage professional should be consulted. In the case that human skeletal remains are uncovered the W.A. Police should be contacted.



1. INTRODUCTION

Moonies Hill Energy is planning to construct 75 wind turbines on some 6 kilometres square of farmland located between Kojunup and Broomehill. An archaeological survey was undertaken by John Cecchi of John Cecchi Heritage Management in August-September 2010 in order to assess the requirements, if any, that are to be considered by MHE so as to comply with the Aboriginal Heritage Act 1972 (WA) (the Act).

The Act states that all Aboriginal sites are protected and cannot be disturbed without Ministerial consent (s18). Additionally under s38 sites must be reported and recorded into the Aboriginal Site Register.

The archaeological survey aimed to identify sites of aboriginal heritage, described in s6 of the Act as follows:

- (1) Subject to subsection (2a), this Act applies to all objects, whether natural or artificial and irrespective of where found or situated in the State, which are or have been of sacred, ritual or ceremonial significance to persons of Aboriginal descent, or which are or were used for, or made or adapted for use for, any purpose connected with the traditional cultural life of the Aboriginal people past or present.*
- (2) Subject to subsection (2a), this Act applies to objects so nearly resembling an object of sacred significance to persons of Aboriginal descent as to be likely to deceive or be capable of being mistaken for such an object.*

This archaeological report consists of several subsections. Prior to fieldwork a desktop research gathered information on the archaeological context of the area, including the assessment of sites listed under the Department of Indigenous Affairs (DIA) Aboriginal Heritage Register. The survey methodology will be discussed in detail below, followed by a discussion of the findings and the recommendations arising as a result.



2. PROJECT BACKGROUND

R. & E. O'Connor Pty Ltd was engaged by MHE in order to identify and assess potential aboriginal heritage requirements imposed under the Act and provide recommendations for their management. An archaeological survey was undertaken by John B. Cecchi in August-September 2010 followed by an anthropological survey (see O'Connor Anthropology report).

As presented in the DIA' website:

The main objective of the Ethnographic and Archaeological Aboriginal Heritage Investigation will be to:

- *Identify any known or potential Aboriginal heritage issues that may affect the proposed development.*
- *Undertake research and/or consultation that may be required to meet the requirements of the Aboriginal Heritage Act 1972.*
- *Locate/record Aboriginal sites and any other Aboriginal heritage issues.*
- *Make recommendations regarding the management of the above sites, including any further research and/or consultation that may be required during or after the works component of the project.*

2.1 OBJECTIVE OF HERITAGE SURVEY REPORT

The survey aimed to locate, demarcate and assess archaeological Aboriginal sites within the project area, also addressing potential heritage issues and proposing appropriate guidelines.

As put in the DIA website:

The purpose of archaeological research is to:

- *Establish whether a given piece of land contains physical evidence of past Aboriginal occupation and land use (archaeological sites).*
- *To record, assess and make recommendations regarding the management of archaeological sites.*
- *To provide a developer with sufficient information on which to base development planning decisions.*

2.2 SURVEY AREA

The survey area (Appendix A, Fig.1) is located approximately 20 kilometres east of Kojonup, south of the Kojonup Broomehill Rd and comprises several hundred hectares of farm land dedicated to the grazing of sheep and cattle and crop growing (mainly oats, canola, and wheat). The survey area is divided into several paddocks belonging to four individual parties, inside a polygon encompassing an area 6 kilometres east west by approximately 15 kilometres north-south.

In order for the archaeological research to be as productive and accurate as possible an appropriate survey methodology needs to be applied. Contextual knowledge of key environmental and archaeological factors relevant to the study area must be studied in order to incorporate that body of knowledge in the search and analysis of archaeological Aboriginal sites.

A summary of the survey area' environmental and archaeological background is discussed below.

3. ENVIRONMENT

The section below describes the geographical location of the survey area and the surrounding environment. The soil, vegetation and climatic conditions influence the predictions made on the probability and types of archaeological Aboriginal sites to be found within the survey area and the plausible interpretation that can be gained from these.

3.1 Climate

Classified as Mediterranean the South West exhibits dry summers and wet winters, with rainfalls averaging of 528mm per year and mean maximum daily temperatures ranging from 16°C in July to 29°C in February. The highest period of rain occurs between the months of May and September (Australian Government Bureau of Metereology).



3.2 Geography

Geographically the area is hilly, highly industrialised and fairly well watered. During the survey it became clear that 80-90% of the total land had been completely cleared of native vegetation, excluding granite ridges and rocky outcrops. Rivers and creeks tend to be mostly void of native vegetation, with the remaining understory being moderately disturbed by grazing cattle (in instances where the paddock has been used for grazing). The remaining 10-20% of land exhibited high density forest with moderate to dense understory and negligible ground visibility. Occasionally salt pans and washouts occur where the water table has risen causing soil erosion, allowing for very good ground visibility.

Although several creek lines intersect the survey area, Aboriginal occupation of the area would have focused around the Pallinup River, east of the survey area. Satellite camps, or travelling stops might be located by the present archaeological survey.

3.3 Soils and Vegetation

Coloured brown to grey-brown, the soils within the survey area consist of lateritic gravelly sandy loams or sandy loams produced by granite and gneissic bedrocks.

Jarrah and Marri open forest with an understory of Peppermint and Blue Banksia commonly grow on leached sands and clay loams overlain by sands.

Within swampy areas paperbark and tea-tree thickets prevail, with Jarrah woodlands found on sandy patches (Dortch 1999). The South-west region is home to some 8000 taxa of plants, amounting to 80% of plant life found in WA (Beard 1990)

4. ARCHAEOLOGICAL RESEARCH

The archaeological report includes the desktop research aimed at analysing the type and character of recorded Aboriginal sites in the region. This serves to better assess the potential location and interpretation of archaeological sites within the survey area. The archaeological context of the survey region highlights present knowledge guiding the assumptions made on site identification potential, site type, site density, site location, artefact assemblage, raw resources available and more.

The archaeological context provides valuable information not only during the formulation of an appropriate survey methodology, but also as comparative data to be juxtaposed with the results of the survey.

The archaeological context also forms the basis for the theoretical foundations on which assessments of a site's significance are made and consequently affecting the range of recommendations arising from this report.

These areas of discussion are addressed in the subsequent sub sections.

4.1 Desktop

A search of the Aboriginal Heritage Inquiry System within polygon MGA Zone 50 526000/626000, 56000/626000, 560000/6230000, 526000/6230000, resulted in the identification of five registered sites. Only two of these sites are found within a few kilometres of the survey area, namely DIA Site ID 5354 and DIA Site ID 5738. A brief description of these two sites is given below.

DIA Site ID 5354, Tambellup Gnamma Hole

Labelled a water source on the Permanent Register under Open access the gnamma hole is located at 537640/6236647. This site is a few kilometres south-east from the survey area and will not be impacted by the proposed developments.

DIA Site ID 5738, Tambellup

This site consists of an artefact scatter and is placed on the Permanent Register under Open access. Located at 541640/6236647 the site is also described as an Aboriginal camp and water source, and a known former corroboree ground (O'Connor Rory, pers. comm.). This site is well outside the project area.

Both of these sites are located a significant distance from the survey area and will not be disturbed. They do however provide evidence for traditional occupation of the area, especially in areas associated with fresh water bodies. In order to accurately view the known data, it should be noted that the locations of recorded sites can be in a lot of cases directly related to areas that have undergone previous heritage surveys, therefore representing skewed statistics from which to gain spatial information from (i.e.. site type and density).

4.2 Archaeological Context

The archaeological context will influence the approach of an archaeological survey within defined areas.

Within the wider region in which the survey area is located (i.e. the South West), archaeological sites have been dated to 30,000 years BP in well stratified

deposits, while Aboriginal occupation in the upper Swan has been dated to as early as 38,000 years BP (Pearce and Barbetti, 1981).

Several archaeological surveys in the South West have sought to explicate the economic and technological adaptation over periods of varying climate and sea level changes (Dortch et al. 1984, Lilley 1993).

The archaeological site named Devil's Lair has provided dates for Aboriginal occupation in the range of 30,000 years before present (Dortch 1979), with excavations highlighting a decline in Aboriginal use of the cave from about 12,000 years ago until 5,000 years ago. The decline in use has been associated to the very dry climate which dominated the period between 20,000 and 15,000 years ago. In this period Aboriginal populations would have been restricted to well-watered areas (Lilley 1993).

It is predicted that Aboriginal sites may be found in association with water sources (Hammond 1933, O'Connor 1989) although intensive farming in the area has most likely disturbed, and or, camouflaged many existing archaeological sites. A seasonal subsistence pattern proposed by Anderson (1984) and Pearce (1982) argues that highly mobile hunting groups, who did not establish large camps were the likely inhabitants of these once forest areas, utilising locally sourced stone, quartz being the most common. If this framework is used then the survey should expect small artefact scatters of mainly quartz to be found in relative closeness to water sources.

The lack of shelters and the high ground disturbance diminishes the potential for well stratified archaeological deposits to have accumulated and still be discovered in situ.

4.3 Ethno-Archaeological Accounts

Several accounts exist, depicting traditional Aboriginal people and society, recorded at the early onset of European colonisation. These texts, diagrams, maps and drawings can be studied and used to further our potential to recognise and to explicate the archaeological remains of past human behaviour. It has become well known that Aboriginal people concentrated their movements and occupation patterns around wetlands, swamps, rivers and estuaries and that this is been reinforced by following ethnographic and archaeological studies (O'Connor et al. 1989).

Although tribal customs potentially vary from neighbouring parties, and marked trees are featured widely within the regional archaeology, a further insight into the kind of knowledge that can be gathered from ethnographic sources is found in Scott Nind' 1831 paper (Green 1979) which narrates that during burials:

[the] mourners carve circles in the bark of the trees that grow near the grave, at the height of six or seven feet from the ground'.

From this description of South West tribal burial tradition it may be implied that the survey methodology included surveying of tree trunks, especially around deep, sandy soils.

It was also noted that Aboriginal people of the South West preferred to camp on higher open ground, i.e. ridges, presumably to create a buffer zone from potential intruders (Green 1979).

4.4 Assessing Site Significance

'The significance of archaeological sites is equal to its potential to answer specific research questions. A site' uniqueness adds to its significance as it can provide answer to questions others may not' (Bowdler 1984).

From this theoretical approach site significance is objective and highly dependant on current theories and technological methods of inquiry. Consequently, where possible, priority should be given to avoidance of all archaeological sites.

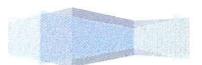
Current research questions relevant to the survey area focus on discovering the antiquity of Aboriginal occupation within the South West, the sequence of economic adaptations to varying climates and sea-levels changes and the technological changes over time and space.

5. ARCHAEOLOGICAL SURVEY METHODOLOGY

The survey methodology employed aimed to maximise and accurately assess the project area's archaeological reality and potential. The framework aimed to analyse samples of specific geographical zones in relation to their hypothesised archaeological potential. Several factors were integrated in the formulation of the survey methodology, including hypothesised ground visibility, archaeological and ethno historical context and sample size.

The survey area was located by use of GPS in collaboration with different scale geographical, street and project maps of the area.

All co-ordinates are given using WGS 84.



5.1 Predictive Modelling Sampling

Prior to entrance in the field, geographic maps were analysed in order to implement a sampling survey strategy that would appropriately assess the archaeological potential of the area and mitigate factors such as:

- Thorough survey of the location for the wind turbines,
- High percentage of disturbed land and negligible ground visibility,
- Low potential to identify sites within forested areas,
- The high potential for Aboriginal sites to be located in the vicinity of fresh water bodies, ridges and rocky outcrops,
- The total size of the survey area.

Accordingly a survey sampling strategy was revised which incorporated all of the above issues. The survey aimed to carry out transects over at least 30% of the total survey area, including all the proposed areas for the wind turbines, and covering over 65% of those areas assessed as having a high potential to yield sites. To combat bias and reinforce the theoretical assumptions a small survey sample was dedicated to surveying areas deemed low in archaeological potential.

The proposed location for the wind turbines was located by use of GPS in correlation with project maps and geographical maps. These areas were arrived at by use of a 4wd vehicle driven along tracks and within paddocks. Subsequently pedestrian transects at these locations were undertaken.

Whilst driving to the various wind turbine locations all areas providing good ground visibility (i.e. salt pans, washouts, river sides, rocky outcrops, edges of tracks) were surveyed on foot or via a slow moving 4wd. The latter method allowed for more extensive areas of land to be surveyed, whilst pedestrian transects were taken when more intensive examination of a zone was deemed appropriate. Through the use of geographical maps, ridges and creek lines were identified and a 25% sample of these features was taken via pedestrian transects. Particular attention was given to the examination of tree trunks.

5.2 Field Survey Results

Proposed locations for the wind turbines were surveyed by pedestrian transect without any sites being recorded.

The survey methodology aimed to identify sites within areas assessed as having high archaeological potential, and this resulted in no sites being located.

The survey also addressed areas of low archaeological potential in order to diminish bias, and as a result no sites were found.

One isolated quartz artefact (for a definition of terms see Appendix B) was located at 533982/6249906, within a salt pan extending 30 metres by 70 metres, intersected by a north-south drainage line (Appendix A, Figure 2).

One isolated quartz artefact was located at 532851/6251719 on the upper slopes of a creek line.

At 535238/6247567 a small water body 15 metres by 10 metres was recorded (Appendix A, Figure 3) and could potentially have been a water source prior to European settlement, but this can not be ascertained. A few large blocks of white quartz were uncovered around the edges but no signs of flaking or other traditional use could be identified.

6 DISCUSSION

It was predicted that small artefact scatters or scarred trees might be encountered in the survey, especially in proximity to water bodies or within ridges and forested, deep, sandy soils. No Aboriginal sites were discovered. The result of the survey is not surprising due to the extremely disturbed context of the survey area and negligible ground visibility.

The location of the wind turbines, almost all of them within heavily farmed paddocks, favoured the survey results hereby presented. Most of the turbines were located within grazing/crop growing fields which at the time of the survey were either completely covered by green grass or crops, with low ground visibility. A few large trees had been kept within these areas and they were examined to assess the presence of any Aboriginal heritage.

Ridges and rocky outcrops allowed good ground visibility as the shallow nature of the soil reduces potential for vegetation growth, and additionally these areas were the least disturbed by human action, although moderate to high soil disturbance by cattle was observed in most instances. The granitic nature of the

ridges and the heavy disturbance by farming equipment in close proximity, such as at 536331/6248259, resulted in areas of moderate to high visibility, although the fragmentation of granite and quartz called for a very close inspection of what appear to be flaked stones and stone chips.

No aboriginal sites were identified within this geographical area.

Creeks were assessed as having a high to moderate potential to yield archaeological sites. During the course of the survey it was observed that devegetation and deforestation had occurred in many instances right up to the creek banks, and on occasion the latter had been fenced off along their course. In the northernmost part of the survey area a single quartz artefact was located 15 m from the bank of a creek on a higher level. Here smaller trees had been left on the side of the creek although the native understory had been extensively cleared.

In areas of steeper landscape gradient water erosion allowed for areas of good ground visibility, although stone artefacts in this context would most likely have been transported from higher ground levels, and therefore discovered in a disturbed context.

River and creek paths followed were generally highly vegetated with green grass at time 30cm or more high as in the case of north south creek line located at 535283/6248194. In these occasions ground visibility was negligible.

7 CONCLUSIONS

Although archaeological sites were not identified in the course of this survey it is important to consider that the survey area holds some potential for undisturbed subterranean sites. Areas that may hold archaeologically significant sites are those that exhibit archaeological material within deep and well defined layers of sediment. It may be said that sites found on sandy areas (i.e. dunes) tend not to withhold much stratigraphy and therefore have a low potential to answer research questions. The soils found within the survey area may yield archaeological sites of significance in undisturbed areas, especially in valley floors adjacent larger, more permanent water sources

It is likely that areas of Aboriginal heritage are present in the survey area especially in spatial proximity to water bodies, swamps and creeks. Conjointly there is a high likelihood that a great percentage of these have been disturbed by the farming developments over the past several generations, eradicating land integrity which is essential if a site is to have scientific value.

It has been noted in the past that ground disturbing works in the South-West have resulted in the identification of sites not visible during heritage surveys.

The types of sites likely to be uncovered are small to medium artefact scatters resulting from short period camps of small hunting groups seasonally stemming from the Pallinup River and its tributaries. Another possible hypothesis is that small artefact scatters could be found in association with permanent water bodies or travelling routes to currently known and unknown water sources. In conclusion although no archaeological sites of Aboriginal heritage were identified in the present survey attention should be paid to the constraints in visibility and probability of underground deposits being encountered during ground disturbing works.

8 RECOMMENDATIONS

In consideration of these conclusions the recommendations provided by this report are as follows:

- The location of the turbines do not impact any known Aboriginal site
- No Aboriginal sites were located in the wider survey area
- As most turbines are located within heavily disturbed contexts monitoring is suggested only for ground disturbing works that will occur within native bushland areas or in the vicinity of watercourses.
- All staff involved in ground disturbing works should be inducted in Aboriginal heritage and the sanctions and penalties under the Act.
- If ground disturbing works were to uncover artefacts, works should cease and the Aboriginal stakeholders and one heritage professional should be consulted. In the case that human skeletal remains are uncovered the W.A. Police should be contacted.



APPENDIX A- FIGURES

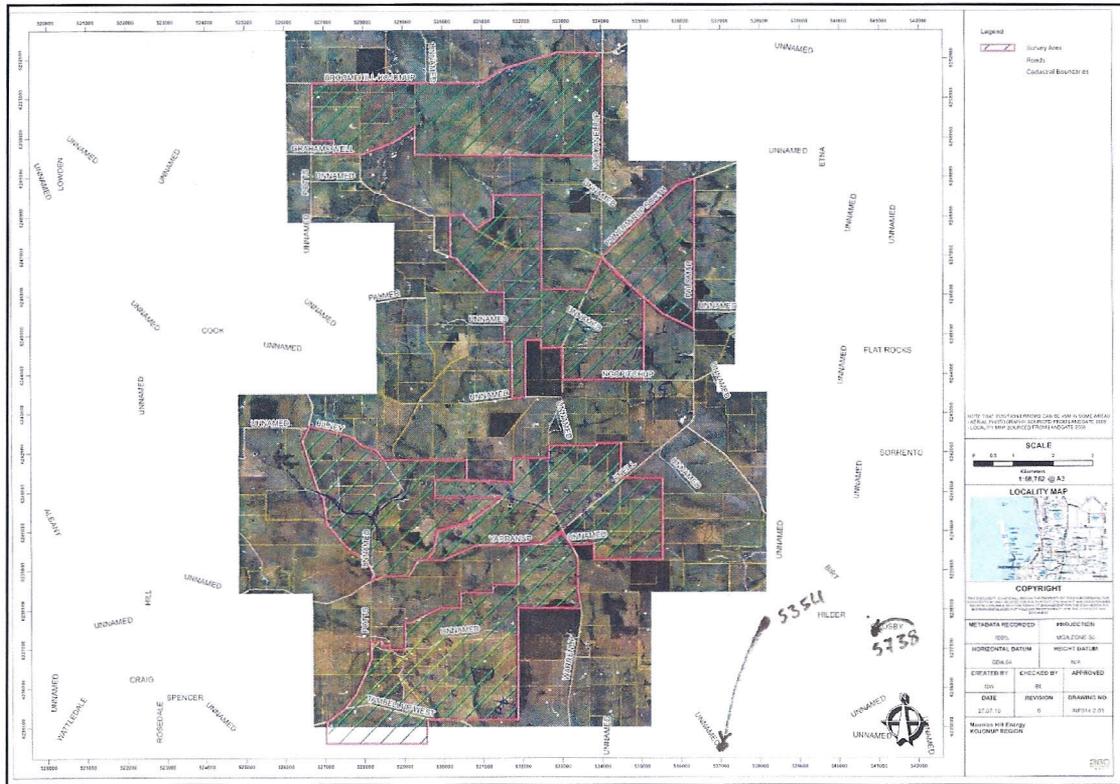


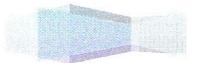
Figure 1 Map of Survey Area. DIA Site ID 5354 and 5738 shown on map.



Figure 2 Quartz Flake found at 533982/6249906.



Figure 3 Water source located at 535238/6247567



APPENDIX B- DEFINITION OF ARCHAEOLOGICAL TERMS

Stone artefacts are stone material which have been flaked, grinded or used by Aboriginal people in the past. Because rocks and minerals can fracture as a result of geomorphic or other natural processes flaked stones are classified as 'artefacts' if they exhibit one or more of the following features (Holdaway & Stern 2004: 108-9):

- A positive or negative ring crack
- A negative or positive bulb of percussion
- An érraillure scar below the point of percussion
- Negative flake scars or ridges

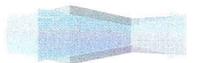
Flakes, Cores and Retouched flakes (Tools), are the three main categories of artefacts and their features are detailed below (Hiscock 1984: 129):

Flakes must exhibit at least one of the following traits:

- A ring crack
- A positive bulb of percussion
- An érraillure scar below the point of percussion

Cores exhibit negative flake scars marking the place where previous flakes were struck. A core may be described as Unidirectional, Bidirectional, Bifacial or Multidirectional depending on the orientation of the flake scars and location of the striking platform (Holdaway & Stern 2004:180-2).

Retouched Flakes, also classified as Tools, are stones that show signs of flake scars across their ventral surface and display a ring crack.



REFERENCES

Anderson, J 1984, *Between Plateau and Plain*, Occasional Papers in Prehistory, No. 4 A.N.U., Canberra.

Beard, J. 1990, *Plant life of Western Australia*. Kangaroo Press, Kenthurst, New SouthWale.s

Bowdler, S. 1984, "Archaeological significance as a mutable quality", in S.Sullivan and S. Bowdler (eds), *Site Surveys and Significance Assessment in Australian Archaeology*, pp. 1-9. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University.

Dortch, C.E. 1979, "Devil's Lair, an example of prolonged cave use in Western Australia", *World Archaeology* 10 (3):258-281.

Dortch, C.E., G. Kendrick and K. Morse, 1984 Aboriginal Mollusc exploitation in south-western Australia, *Archaeology in Oceania* 19:81-104.

Dortch, J. 1999, *Survey for Archaeological Sites along Fisher Road (Kudardup to Molloy Island), Leeuwin-Naturaliste Region, Western Australia*, report n.1029093, Western Australian Department of Indigenous Affairs, Perth.

Green, N. 1979, *Nyungar: The People*, Creative Research, Perth, WA.

Hammond, J.E. 1933, *Winjan's People*, Imperial Printing Company, Perth, WA.

Hiscock, P. 1984, "A preliminary report on the stone artefacts from Colless Creek Cave", Northwest Queensland. *Queensland Archaeological Research*, 1:120-151.

Holdaway, S. & Stern, N. 2004, *A Record in Stone: The Study of Australia's Flaked Stone Artefacts*, Museum Victoria, Melbourne.

Lilley, I. 1993, "Recent research in southwestern Western Australia: a summary of recent findings", *Australian Archaeology* 36:34-41.

O'Connor, R., Quartermaine G. and Bodney C. 1989, *Report on an Investigation into Aboriginal Significance of Wetlands and Rivers in the Perth-Bunbury Region*, Western Australian Water Resources Council, Leederville, WA.

O'Connor, R., Quartermaine, G. & Yates, A. 1995, *An Investigation into the Aboriginal Significance of Wetlands and Rivers in the Busselton – Walpole Region*, Prepared for Water Authority of Western Australia.

Pearce, R.H. & Barbetti, M. 1981, "A 38,000 year old archaeological site at Upper Swan, Western Australia", *Archaeology in Oceania*. 16:173-178.

Pearce, R.H. 1982, *Archaeological sites in the jarrah forest at South-western Australia*, *Australian Archaeology* No. 14, 18-24.