APPENDIX 5 ABORIGINAL HERITAGE SURVEY REPORT

ABN 47 065 099 228 Aboriginal Heritage

Draft Report on the Results of Archaeological and Ethnographic Surveys of Lot 50 Mundijong Road, Mundijong

Prepared for Peet Limited

By Edward M. McDonald (Ethnosciences) and Jo-Anne Thomson (Thomson Cultural Heritage Management)

August 2012

PO Box 121, MELVILLE WA 6956 Phone (08) 9339 8431; Fax: (08) 9438 1717; Mobile: 0419 957 140 Email: <u>dredward@iinet.net.au</u>

ABN 47 065 099 228 Aboriginal Heritage

Disclaimer

The results, conclusions and recommendations contained within this report are based on information available at the time of its preparation. Whilst every effort has been made to ensure that all relevant data has been collated, the authors can take no responsibility for omissions and/or inconsistencies that may result from information becoming available subsequent to the report's completion.

© Ethnosciences, TCHM & Peet Limited 2012

Abbreviations

ACMC:	Aboriginal Cultural Material Committee
AHA:	Aboriginal Heritage Act 1972
AHIS:	Aboriginal Heritage Inquiry System
Bilya:	Bilya Noongar Organisation
DIA:	Department of Indigenous Affairs
GKB:	Gnaala Karla Booja Native Title Claimants
MHA:	McDonald, Hales and Associates
SAAS:	Swan Area Archaeological Survey
SWALSC:	South West Aboriginal Land & Sea Council
TCHM:	Thomson Cultural Heritage Management
WAC:	Winjan Aboriginal Corporation
WAGR:	Western Australian Government Railway

ABN 47 065 099 228 Aboriginal Heritage

Summary and Recommendations

Ethnosciences was commissioned by Peet Limited to undertake an Aboriginal heritage assessment of Lots 9000, 98 and 37 Bishop Road and Lot 50 Mundijong Road, Mundijong. Ethnosciences contracted Thomson Cultural Heritage Management (TCHM) to undertake the archaeological field survey of the Peet Lots.

This report presents the findings of the desktop and ethnographic and archaeological field surveys in relation to Lot 50 Mundijong Road, Mundijong. The findings in relation to the remaining land will be reported under a separate cover.

Edward McDonald and Lois Hall (Ethnosciences) undertook the desktop research and McDonald carried out the ethnographic field research. Jo-Anne Thomson (TCHM) undertook additional archaeological desktop research and undertook the archaeological field survey with the assistance of Christine Martin.

The study area is located within the Gnaala Karla Booja (WC98/58) Native Title Claim for which the South West Aboriginal Land and Sea Council (SWALSC) is the representative body. SWALSC was contacted about the Mundijong project in late 2011; however, the Council was unable to respond to the request to nominate Aboriginal consultants or to have the matter considered by the Gnaala Karla Booja Working Party in a timely fashion. In order to avoid unacceptable delays to the project, it was decided to contact two regionally-based Aboriginal groups – the Bilya Noongar Organisation (Bilya) and the Winjan Aboriginal Corporation (WAC) – whose members are GKB claimants and have demonstrated associations with, and knowledge of, the Aboriginal heritage values of the country encompassing the survey area. These two groups were invited to nominate consultants for the survey. The ethnographic survey involved eight Aboriginal consultants drawn from these two groups and was undertaken on 12th and 13th April 2012 with Bilya and Winjan respectively.

PO Box 121, MELVILLE WA 6956 Phone (08) 9339 8431; Fax: (08) 9438 1717; Mobile: 0419957140 Email: <u>dredward@iinet.net.au</u>

The search of the Register of Aboriginal Sites revealed that there are no previously recorded ethnographic sites on Lot 50. No ethnographic sites were reported on the land during the ethnographic survey which involved representatives of Bilya and WAC Corporation who have long-standing associations with the region. Two of the WAC consultants had actually lived in Mundijong for a period and had attended primary school in town. Both recall use of the area's natural resources by Nyungars living in town, on farms and in fringe camps in the area.

One archaeological site (MJ-06), an artefact scatter, was located on Lot 50 during the archaeological survey. MJ-06 is a small, medium-density, open quartz artefact scatter situated on a Bassendean sand dune above seasonally inundated wetlands. The site represents either the by-products of task specific activities or a short term or infrequently used occupation site.

It is the opinion of the authors that MJ-06 constitutes a site within the meaning of Section 5(a) of the *Aboriginal Heritage Act* 1972. However, MJ-06 is assessed as currently being of low archaeological significance. No further recording of the surface assemblage of MJ-06 is required.

The consultants of both groups were of the view that Site MJ-06 — the artefact scatter identified on Lot 50 during the archaeological survey — was of low cultural significance and did not oppose Peet Limited applying for Section 18 consent for the site. However, they differed in how the site should then be treated. The former wants the material left *in situ*; the latter wants the material salvaged and appropriately stored. At present, it is not possible to reconcile these opposing views.

Recommendations

- 1. It is recommended Peet's proposed development of Lot 50 Mundijong Road, Mundijong proceed.
- 2. It is recommended that Peet and its contractors are:
 - a. advised of the existence and location of archaeological site MJ-06; and

PO Box 121, MELVILLE WA 6956 Phone (08) 9339 8431; Fax: (08) 9438 1717; Mobile: 0419957140 Email: <u>dredward@iinet.net.au</u>

ABN 47 065 099 228 Aboriginal Heritage

- b. informed that the *Aboriginal Heritage Act* 1972 (s5) may apply to MJ-06 and therefore it should not be impacted upon in any way without Ministerial consent under Section 18 of the AHA or the authority of the Registrar under Section 16.
- 3. It is recommended that Ministerial consent be given for the land on which archaeological site MJ-06 (artefact scatter) is located.
- 4. It is recommended that further consultation is undertaken with the Bilya Noongar Organisation and the Winjan Aboriginal Corporation regarding the disposition of the artefactual material in site MJ-06.

ABN 47 065 099 228 Aboriginal Heritage

Table of Contents

Introduction
Part 1: Ethnographic Survey
Ethnographic Survey & Consultation Methods6
Previous Surveys
Selecting the Aboriginal Consultants
Ethnographic Background10
Ethnographic Survey Results
Results of the Desktop Research17
Results of the Ethnographic Field Survey17
Consultation Regarding the Archaeological Findings
Part 2: Archaeological Survey
Archaeological Scope of Work
Environmental Context
Archaeological Background
Archaeological Methodology
Archaeological Assessment Results
Part 3 - Conclusions and Recommendations
Recommendations
References
Appendix 1 – DIA Aboriginal Heritage Information System Search Results 102
Appendix 2 – Archaeological Site Type Definitions 115
Appendix 3 – Artefact Identification and Recording 118

List of Tables

Table 1: Details of Registered Aboriginal Sites with archaeological of located within 5 km of the project area	components 37
Table 2: Details of Other Heritage Places with archaeological compone within 5 km of the project area	ents located 42
Table 3: Archaeological survey areas, Lot 50 Mundijong Road, Mundijong	ç 54

PO Box 121, MELVILLE WA 6956 Phone (08) 9339 8431; Fax: (08) 9438 1717; Mobile: 0419957140 Email: <u>dredward@iinet.net.au</u>

ABN 47 065 099 228 Aboriginal Heritage

Table 4: Definition of degrees of archaeological significance	. 64
Table 5: Isolated artefacts located within Lot 50 Mundijong Road, Mundijong	. 78
Table 6: MJ-06 artefact data	. 84

List of Figures

Figure 1: General location of Peet's Lot 50 Mundijong Road development area	2
Figure 2: The Peet project area, Lot 50 Mundijong Road, Mundijong archaeological survey areas and Aboriginal Site located	with 3
Figure 3: Peet's concept plan for Lot 50 Mundijong Road, Mundijong (Source: 1 May 2012)	Peet, 4
Figure 4: Geomorphic wetland regimes (Source: SMEC 2009: 84)	5
Figure 5: MJ-06 artefact types and quantities	81
Figure 6: MJ-06 artefact lithologies and quantities	81
Figure 7: MJ-06 artefact weights	82
Figure 8: MJ-06 flaked artefact cross-sectional shape	83
Figure 9: MJ-06 Site Plan	86

List of Plates

Plate 1: Members of the Bilya survey team (from left): John Abraham, Barbara Abraham, Clarry Walley and Mary Walley
Plate 2: Members of the Winjan survey team (from left): Harry Nannup Jnr, Harry Nannup Snr, Franklin Nannup and Harry Nannup III
Plate 3: Lot 50 Mundijong Road survey area 1, view south 66
Plate 4: Lot 50 Mundijong Road survey area 2, view north 67
Plate 5: Lot 50 Mundijong Road survey area 3, view north 68
Plate 6: Lot 50 Mundijong Road survey area 3, view west
Plate 7: Lot 50 Mundijong Road survey area 4, view northwest
Plate 8: Lot 50 Mundijong Road survey area 5, view east
Plate 9: Lot 50 Mundijong Road survey area 5, view east-northeast
Plate 10: Lot 50 Mundijong Road survey area 6, view east

ABN 47 065 099 228 Aboriginal Heritage

74
77
89
90
91
92
93
94
1al 18
dal 18

Introduction

Ethnosciences was commissioned by Peet Limited to undertake an Aboriginal heritage assessment of Lots 9000, 98 and 37 Bishop Road and Lot 50 Mundijong Road, Mundijong.

This report presents the findings of the desktop and field surveys in relation to Lot 50 Mundijong Road, Mundijong, which lies approximately 40km southwest of Perth (Figures 1 and 2). Peet Limited proposes to develop 0.6943 sq km (64.93 hectares) of land on Lot 50 for a residential subdivision (see Figure 1). The findings in relation to the remaining land will be reported under a separate cover.

Edward McDonald and Lois Hall (Ethnosciences) undertook the desktop research and McDonald carried out the ethnographic field research on 12th and 13th April 2012. Archaeologist Jo-Anne Thomson of Thomson Cultural Heritage Management (TCHM) was subcontracted to undertake the archaeological field survey of the Peet Lots, including and Lot 50 Mundijong Road. The archaeological field survey was undertaken by Jo-Anne Thomson and Ms Christine Martin on 3rd and 4th April 2012.



Figure 1: General location of Peet's Lot 50 Mundijong Road development area



Figure 2: The Peet project area, Lot 50 Mundijong Road, Mundijong with archaeological survey areas and Aboriginal Site located

ABN 47 065 099 228 Aboriginal Heritage



Figure 3: Peet's concept plan for Lot 50 Mundijong Road, Mundijong (Source: Peet, May 2012)

ABN 47 065 099 228 Aboriginal Heritage



Figure 4: Geomorphic wetland regimes (Source: SMEC 2009: 84)

ABN 47 065 099 228 Aboriginal Heritage

Part 1: Ethnographic Survey

Ethnographic Survey & Consultation Methods

The ethnographic survey and consultation was undertaken in the following stages:

- Desktop research;
- Selection of the Aboriginal consultants;
- Ethnographic survey and consultation regarding the archaeological sites; and
- Report preparation.

Edward McDonald and Lois Hall undertook the desktop research which in the first instance involved an examination of the Register of Aboriginal Sites using the DIA's online Aboriginal Heritage Inquiry System (AHIS).

A review of previous consultancy reports and other published and unpublished ethnographic research material was also undertaken. This included reports of previous heritage studies conducted in the area. Of particular relevance are the reports of heritage surveys undertaken by McDonald, Hales and Associates (see Blockley & Greenfield 1995; Blockley *et al* 1996); Edwards & McDonald (1999); and Western Infrastructure (2001).

Previous Surveys

The Mundijong area has been subjected to previous ethnographic and archaeological surveys.

Report of an Aboriginal Heritage Survey: South-East Corridor Structure Plan

In May 1995, the Ministry for Planning commissioned McDonald, Hales and Associates (MHA) to undertake detailed Aboriginal Heritage investigations for the proposed Tonkin Highway extension easement (PTEE), with the proposed urban village (PUV) developments at both Byford and Mundijong to be covered at the overview level.

The focus of this heritage research within the South-East Planning Corridor consisted of a corridor approximately 20km long and 100m wide extending from Ranford Road in the north to Mundijong Road in the south. The PUV sites were expected to cover approximately 2,263 hectares of land surrounding the already existing Byford and Mundijong townsites. The area covered by the heritage study had historically been used for agricultural purposes and urban development which, as a consequence, had resulted in the original native vegetation being cleared and introduced species gaining dominance.

Representatives from Winjan Aboriginal Corporation, Nyungah Land Council, Murray Districts Aboriginal Corporation and Ballaruk Community Incorporated, as well as five members of the Nyoongar Circle of elders were consulted (Blockley & Greenfield 1995:71). One previously recorded ethnographic site (DIA Site No. S2602 Wungong Brook) was located and two new ethnographic sites (DIA Site Nos. S2960 Camping and Meeting Place & S2961 Camping Area) were recorded. However, none of these places are located within the present survey area.

The authors of the report recommended that a 30m buffer zone around water sources such as Manjedal Brook be observed. Manjedal Brook is not located in the present study area.

Revised Report of an Aboriginal Heritage Survey: South-East Corridor Structure Plan

This is essentially an extension to the previous report by MHA, instigated by the Aboriginal Cultural Material Committee (ACMC) in response to an application lodged by Main Roads Western Australia with regards to the PTEE. As a result, the Ministry for Planning commissioned further research with emphasis on the preferred alignment option 1C (Blockley *et al.* 1996).

Recommendations were made that included plaques being erected to acknowledge Aboriginal occupation of the area. It was also recommended that 30m buffer zones around the water sources of Cardup Brook, Manjedal Brook and the south branch of

Wungong Brook be implemented to ensure that they, and the surrounding vegetation, were not disturbed. If this was not feasible, then it was recommended that Section 18 applications for Ministerial permission to disturb the watercourses be sought and granted. It was further recommended that when specific plans had been developed for the PUVs, that a comprehensive heritage survey be conducted in those areas.

<u>Report of an Aboriginal Heritage Survey: Proposed Tonkin Highway Extension and</u> <u>Mundijong Road Realignment Project</u>

BSD Consultants commissioned this study by Edwards and McDonald, on behalf of Main Roads Western Australia, in September 1998. It covered the areas of the proposed Tonkin Highway extension and the Mundijong Road Realignment Project.

Selecting the Aboriginal Consultants

Under subsection 1.10 of the DIA's new *Cultural Heritage Due Diligence Guidelines*, the DIA and ACMC identify four categories of "relevant Aboriginal people" to be considered for consultation in relation to projects that have the potential to impact Aboriginal Sites. They are:

- 1. Native Title Holders;
- 2. those who are registered Native Title Claimants;
- 3. persons named as informants on Aboriginal site recording forms held on the Register of Aboriginal Sites at the DIA; and
- 4. any other Aboriginal persons who can demonstrate relevant cultural knowledge in a particular area (DIA 2011).¹

A search of the National Native Title Tribunal's online schedule and register was conducted in order to determine which Native Title Claims overlap the study area. This search found that the study area is located within the Gnaala Karla Booja

¹ The latest guidelines can be accessed on the DIA's website: <u>http://www.dia.wa.gov.au/Documents/HeritageCulture/Heritage%20management/AHA</u> <u>Due_Diligence_Guidelines.pdf</u>

(WC98/58) claim area. The South West Aboriginal Land & Sea Council (SWALSC) is the representative body for the Gnaala Karla Booja (GKB) Native Title Claimants.

SWALSC was initially contacted about the Mundijong project in late 2011. However, the Council was unable to respond to the request to nominate Aboriginal consultants or to have the matter considered by the Gnaala Karla Booja Working Party in a timely fashion. As a result, it was likely that unacceptable delays to the project would occur, as had been experienced in a number of other projects Ethnosciences has worked on in the past year in the Metropolitan area and the wider South West region. As a result, it was decided to contact two regionally-based Aboriginal groups: (the Bilya Noongar Organisation (Bilya) and the Winjan Aboriginal Corporation (WAC)) whose members are GKB claimants and have demonstrated associations with, and knowledge of, the Aboriginal heritage values of the country encompassing the survey area. These groups were invited to nominate consultants for the survey.

The ethnographic survey involved eight Aboriginal consultants drawn from these two groups. Clarry Walley led the team from the Bilya which included John Abraham, Barbara Abraham and Mary Walley while Harry Nannup Snr headed the WAC team, the other members being Franklin Nannup, Harry Nannup Jnr and Harry Nannup III (Plate 1 & Plate 2). The ethnographic survey was undertaken on 12th and 13th April 2012 with Bilya and Winjan respectively.

The ethnographic survey, which was conducted by Edward McDonald, employed a site identification methodology:

In this type of survey, sites are located and documented and the spatial extent and significance of sites to Aboriginal people is recorded. This information may be made available to the proponent in report form, subject to agreement from the relevant Aboriginal people. Alternatively, confidential information may be presented in a restricted report to the ACMC, usually via the DIA. The report should contain recommendations on steps to be taken by the proponent to ensure compliance with the AHA (Department of Indigenous Affairs 2002:17).

The survey party inspected the survey by 4WD vehicle and on foot. The proposed development was explained by McDonald and the results of the desktop research and archaeological field survey were outlined.

Ethnographic Background

Berndt (1979), drawing on Tindale (1974), concludes that at the time of British colonisation, the South West was occupied by thirteen 'tribes' or, as Berndt prefers, socio-dialectal groups, which formed a discrete socio-cultural bloc. Aboriginal people in this area now generally refer to themselves as *Nyungar*.

Traditionally, the area around Perth, these researchers suggest, was part of the territory of the *Whadjuk* or *Whadjug* (Tindale 1974; Berndt 1979). Tindale (1974) describes this group's territory as extending:

[From the] Swan River and northern and eastern tributaries inland to beyond Mount Helena; at Kalamunda, Armadale, Victoria Plains, south of Toodyay, and western vicinity of York; at Perth; south along the coast to near Pinjarra.

According to Tindale (1974:256), the territory of the *Pindjarup* was located to the south of the survey area. Bates (1985), on the other hand, uses the term *Bibbulmun* to refer to people who would today refer to themselves *Nyungar*. However, Tindale (1974) and Berndt (1979) reserve the use of the term *Pibelmen/Bibelmen* for a tribe on the Lower Blackwood River and the south coast of Western Australia. Bates (1985:52–54) says that the Aboriginal people of the Perth/Swan River area were known as the *Yabbaru Bibbulmun* [northern Bibbulmun] or *Illa kuri wongi*.² She reports that the people of the Murray District were the *Kuri wongi*. Bates (1985:53) gives the Serpentine River as the boundary between the Swan and Murray River people. This roughly corresponds to the boundary noted by Tindale (1974, see also Australia S.W. Sheet – Tribal Boundaries Map).

² From the words for coming directly = *Illa kuri* and speech or talk = *wongi* .In other words the group that has the phrase "*Illa kuri*" in their dialect.

Keen (1997:261) has recently suggested that anthropologists should "get away from the idea of discrete Aboriginal 'societies' 'cultures', 'groups' or 'communities' as basic elements, and to substitute a more regional perspective." He (1997:261, 273) notes that most ethnography is based on the assumption that Australia was divided into a number of discrete 'cultures', 'societies' or 'tribes' and that the 'tribe' model "has been found wanting". The works of Tindale and Berndt are clearly based on such a model, though the latter presents a different picture with respect to the Western Desert. In contrast, Keen's (1997:272–73) concept of 'focused networks' and 'regional system(s)' focuses on:

A nexus of adjacencies, of chains of connection, and of a dynamic, open, and transforming systemic network, broken here and there by fissures and lesions. A 'local system' becomes defined in a relative way. It is possible that somewhat uniform and reproduced systems of interconnected practices might be detected, but on the other hand, what might be found is a pattern of continuous variations in one place, or a mosaic of overlapping differences in another. Whatever the pattern, any local system must be set in its wider context.

The differences between Tindale/Berndt's and Bates' descriptions may result from Bates' fuller appreciation of the 'focused networks' which characterised Nyungar social organisation. While Bates (1985) uses the term 'tribe' to discuss the social organisation of the South West and other parts of the State, her actual description would seem to be closer to the model outlined by Keen with all its apparent contradictions of 'continuous variations' and 'mosaic of overlapping differences'.

The social organisation of west coast Nyungar groups, such as the *Whadjug/ Illa kuri wongi*, included matrilineal moieties, with two exogamous clans in each (Bates 1985; see also Berndt 1979 on 'Perth' type of social organisation). Clans had totemic associations connecting their members to their physical and biological environments. However, ritual affiliations to sites occurred through an individual's father. Berndt

(1979) adds that there may have been local patrilineal descent groups, which focussed on particular totemic sites in defined stretches of country.³

The basic unit of Nyungar social organisation was the family, while the fundamental economic unit was the band, typically comprised of two or more family units. However, the actual numbers making up the band at any one time depended on a range of seasonal and social factors. Early settlers quite often referred to bands as 'tribes' and imposed further European concepts in describing both territorial affiliations and the description of Aboriginal 'leaders'. Various 'territories' have been described in which these social units were principally located and moved.

According to Lyon (in Green (ed.) 1979), the survey area lies within the Aboriginal country known as *Beeliar*, which was associated with the band that included legendary Aborigines Midgegooroo and his son Yagan. To the south, marked by a line from Mangle's Bay to the Darling Range, was the land of the band headed by Banyowla (Lyon in Green 1979). Other early commentators (e.g., Armstrong and Symmons) paint a somewhat different picture of land holdings and band composition shortly after colonisation (Hallam & Tilbrook 1990 discuss some of these differences; see also Brown 1983). Armstrong (1836, cited in Hallam & Tilbrook 1990), for example, wrote of the "Canning Tribe" (see Figure 2 in Brown 1983). These differences may have resulted from a lack of understanding of the complex nature and fluidity of Nyungar social organisation on the one hand and changes due to Aboriginal adjustments to the usurpation by colonists on the other. Hallam (1975) points out that this emerging picture of Aboriginal life contradicted European observers' focus on geographic areas and patrilineal relationships. A more accurate description is that of a system of overlapping sets of ritual and social connections

³ Berndt's classification of South West social organisational types has been criticised on a number of grounds. Importantly, it suffers from marrying the broad mapping of social organisational types by Radcliffe-Brown with the specific boundaries of Tindale's tribal map (see McDonald & Christensen n.d.).

with land usage rights based on both patri- and matri- filiation. Individuals, families and bands moved between areas, generating a fluid local population size and composition.

The ethnohistorical evidence shows that rivers, creeks and wetlands in this region were most intensively occupied, given the availability of fresh water and food resources. In particular, the alluvial plains and the associated *warran* or native yam grounds and riparian resources such as *Typha* were of crucial economic importance to Aborigines (Hallam 1975). This conclusion is supported by the archaeological data. The history of contact and conflict between Aborigines and colonists in the Armadale and surrounding areas also demonstrates the importance of watercourses and wetlands to Aboriginal social and economic life (see, for example, Popham 1980; Cooper & McDonald 1988). Coy (1984:4), on the other hand, reports that according to oral history the relations between colonists and Nyungars in the Serpentine area were more peaceful than that experienced on the Canning or Murray rivers.

Wetlands and rivers were connected by a series of pads (*bidi*) that extended through this territory and from the present-day Perth area south to Mandurah and Pinjarra on the Murray River and north to Cockleshell Gully (Jurien Bay) and beyond (Bates 1985; Hammond 1933). A number of major roads in the South West follow the general alignment of the original Aboriginal pads. For example, Popham (1980:17) notes that Albany Highway follows a route surveyed by Hillman in 1836 which "followed the worn pathways of the Aboriginals (sic) and the course of the Neerigen Brook". Similarly, Coy (1984:4) reports "[t]he South Western Highway, known originally as the Foothills Track, vaguely follows a major *Nyungar* walking pad, which ran from the Perth Causeway to Pinjarra, then southwards to the Blackwood."

European colonisation heralded the destruction of Aboriginal social organisation, beginning in the Perth area and expanding relentlessly into the South West. The Nyungar population was decimated during this process. Epidemics, shootings by Europeans and draconian policies introduced by the colonial administration (e.g., forced exclusion from urban areas, concentration on reserves, restrictions on

movement and labour and so on) resulted in the attenuation of traditional ties with the land and with sites (Berndt 1979; see also Hammond 1933; Popham 1980; Coy 1984; McDonald & Copper 1988). As a result of this dislocation, there has been some loss of traditional mythological and ceremonial associations with the land along with the knowledge which underpins these connections. However, there are still some members of the Nyungar community who hold knowledge of mythological and other sites.

The ravages wrought by the European presence upon Nyungar society did not destroy Nyungar social bonds or identity completely. Nyungars did not merely disappear into history as is the impression given by a number of historical discussions, including the local histories cited in this report. Typically, local historical works discuss Aboriginal prehistory, culture and "contact" history (colonisation) in the early chapters and then rarely, if ever, mention them again. For example, McDonald & Copper's (1988) *The Gosnells Story* does not have an indexed listing of "Aborigine" after Chapter 3 (pp. 36–46) dealing with the period 1833 to 1865. The other local histories fair little better.

Rather than disappearing, Aboriginal people continued to play a part, albeit marginal, in local social and economic life. Popham (1980:18) reports that in the Kelmscott area Aboriginal people were working in the colonial economy as domestics, herders, trackers and guides. Pope (1993:57–77) documents how Aboriginal people in the South West, particularly men, were employed as mail carriers between the early 1830s and the early 1850s. Coy (1984:65) makes a similar note in respect of the mail delivery in the Serpentine area in 1846. Aboriginal involvement in the local economy also meant that Aboriginal people lived in or on the fringes of the local community(s).

The history of Aboriginal post-colonial habitation and participation in the local economy is not documented in as much detail for the south metropolitan region, including the survey area(s), as say in the Swan Valley and surrounding areas (Bourke 1987; Carter 1986, see also Biskup 1973). Nevertheless, Nyungars were part

of the wider community south of the Swan River and participated in the local economy. There was also considerable movement of Nyungars between the Perth Metropolitan area and country locations. Their social and economic position, however, was further eroded by the introduction of the *1905 Aborigines Act* (Haebich 1988).

Nyungars were camping, for example, in a number of locations near Armadale in the 1930s and 1940s. Camps were located, for instance, in Forrestdale, Cardup, Bedfordale and so on. From camps such as these, Nyungars were employed seasonally on farms or in local industry or were engaged in marginal economic activities such as stick cutting (for clothes line props and crayfish pots). Popham (1980:120) reports Aborigines exchanging "the scraped-off wood of zamia palms, which were used as pillow filling in exchange for tea and flour" at the turn of the twentieth century. A number of the archaeological sites in the Armadale area show evidence of post-contact habitation (e.g., use of bottles for flaking blades) (Edwards & McDonald 1999). Further research is required to detail Aboriginal habitation in the Serpentine area from the commencement of colonisation to the 1970s. Aboriginal history is also reflected in the continuing use of Nyungar placenames in the region (albeit often modified).

The adversity faced by Nyungars strengthened a sense of common identity and social bonds. New links with the country have been forged based on biographical and historical associations. In the last three decades, there has been a growing movement to reconstruct Nyungar culture. This has been made through efforts at cultural retrieval or revitalisation as well as re-invention. These two strands have been fused, often in the crucible of political and economic interest in response to various governments' policies concerning native title.

Some Nyungars report that they can feel the presence of spirits at sites of significance. Typically, the presence of sites in these circumstances is accompanied by empirical evidence, stories and names of people accompanied with the movement 'run' or site. Blockley and Greenfield point out that archaeological sites are becoming

increasingly important in this regard, often being seen as physical evidence for these movements (Blockley & Greenfield 1995). Notably, this was demonstrated by some of the Aboriginal Consultants involved in heritage surveys of the areas under scrutiny in this particular project. They believe that the artefactual remains that have been previously catalogued are concrete evidence of these historical 'runs' (Blockley & Greenfield 1995).

ABN 47 065 099 228 Aboriginal Heritage

Ethnographic Survey Results

Results of the Desktop Research

A search of the AHIS revealed that no ethnographic sites are listed within Lot 50. A review of the previous heritage reports and the ethnohistorical literature also indicated that there were no previously recorded heritage values that might reasonably be considered to the (ethnographic) Aboriginal sites on the land.

Results of the Ethnographic Field Survey

No ethnographic sites were reported on the land by the Bilya or WAC in the present survey area.

Two of the Aboriginal consultants from the WAC team (an uncle in his sixties and nephew in his fifties) reported that they lived and attended primary school in Mundijong. They reported that their families and other kin lived in and around the town including in bush camps. Apparently, there was a fairly large Western Australian Government Railway (WAGR) line gang based in the town which, according the Winjan consultants, was almost entirely Nyungar.

Others, including the senior WAC consultant's father, worked on farms in the area. The Nyungar population of the area were reported to use the bush to hunt and forage. However, neither of the senior men recalled any particular use of Lot 50 during their time in Mundijong.

Consultation Regarding the Archaeological Findings

As noted above, the archaeological survey undertaken by TCHM discovered one archaeological site within Lot 50 Mundijong Road. Site MJ-06 comprises a stone artefact scatter eroding out of a deflation in an elevated white sandy lens. The surface expression of the site is approximately 70m (N–S) x 83m (E–W). A sample of fourteen quartz flaked stone artefacts was recorded on the surface within the site.

Both the Bilya consultants and the WAC representatives were of the view that Site MJ-06 was of low cultural significance, particularly when compared to DIA Site ID 3648 located in the southeastern corner of Lot 9000 Bishop Road, adjacent to the two freshwater lakes and Manjedal Brook to the north.⁴ This land is also part of Peet's larger Mundijong development plans. However, development will occur at a later date and results of the ethnographic and archaeological surveys pertaining to DIA Site ID 3648 and other archaeological sites will be reported under a separate cover.

The preferred position of both Bilya and the WAC is that, where possible, other archaeological sites be avoided and preserved. In the event that sites cannot be avoided, both groups support Peet lodging a Notice under Section 18 of the AHA for Ministerial consent to use the land on which the site is located. However, both groups differ in their view regarding mitigation (e.g., salvage and storage). Bilya's consistent view is that once any necessary detailed recording has been undertaken, the archaeological material should be left *in situ* and developed over. The WAC, on the other hand, is in favour of material being salvaged and appropriately stored.

⁴ Refer to the archaeological section of this report for further information regarding DIA ID 3648 Soldier's Road.

ABN 47 065 099 228 Aboriginal Heritage



Plate 1: Members of the Bilya survey team (from left): John Abraham, Barbara Abraham, Clarry Walley and Mary Walley

ABN 47 065 099 228 Aboriginal Heritage



Plate 2: Members of the Winjan survey team (from left): Harry Nannup Jnr, Harry Nannup Snr, Franklin Nannup and Harry Nannup III

ABN 47 065 099 228 Aboriginal Heritage

Part 2: Archaeological Survey

Archaeological Scope of Work

The objectives of the archaeological survey were to:

- 1. conduct an archaeological survey and assessment of the proposed Peet Lot 50 Mundijong Road residential subdivision, to locate any Indigenous archaeological sites that may be defined as Aboriginal Sites under Section 5 of the *Aboriginal Heritage Act* 1972 (AHA);
- 2. record any Indigenous archaeological sites located to Section 18 standard;
- 3. make recommendations regarding the archaeological significance of any sites located; and
- 4. make recommendations for the management, mitigation or salvage of any sites located within Peet's Mundijong residential development.

Environmental Context

Location

Peet's residential land development is located at Lot 50 Mundijong Road, Mundijong. Lot 50 is located to the west of the Mundijong town site, on the northern side of Mundijong Road and to the east of Adams Road (see Figure 2).

Mundijong is located in the Shire of Serpentine-Jarrahdale, approximately 40km southeast of Perth's Central Business District, 16km south of the Armadale Regional Centre and 25km east of the Rockingham Regional Centre. It is located approximately 25km east of the Indian Ocean coastline and approximately 3.5km from the foot of the Darling Scarp.

This development will comprise 410 residential lots, five public open spaces and a proposed primary school site (see Figure 3).

<u>Physiography</u>

The project area is located at the base of the Darling Scarp on the Swan Coastal Plain physiographic unit, which is a narrow 20–30km wide strip generally low in relief and comprised mainly of Quaternary and Aeolian sediments (Anderson 1984).

SMEC (2009:68) reports that there are three soil complexes within the Mundijong-Whitby Structure Plan study area including Forrestfield, Pinjarra and Bassendean. Within the current project area, the Pinjarra and Bassendean soils are predominant. SMEC (2009:99) describes the Pinjarra soils within the study area as comprising "alluvial materials deposited across the plain extending from north to south adjacent to the Forrestfield group, including through the centre of the Shire to its Western boundary". They also note that in isolated pockets, the alluvial soils are overlain by windblown sand typical of the Bassendean System.

SMEC (2009) identify three types of geomorphic wetland present within the Mundijong/Whitby Structure Plan study area, including:

- Plausiplain a seasonally waterlogged flat;
- Sumplands a seasonally inundated basin of variable size and shape; and
- Creeks a seasonally inundated channel.

A significant proportion of the current project area is comprised of plausiplain wetland (see Figure 4), interspersed by elevated sandy rises or dunes of Bassendean sands.

Flora and Fauna

The project area is situated within the Drummond Sub District vegetation system of the South West Botanical Province (Beard 1990). SMEC (2009:25) describe the general vegetation of the Pinjarra plain as represented by *Corymbia calophylla* (marri) open forest and the Bassandean System by banksia low woodland, generally *Banksia attenuata* (slender banksia), *Banksia menziesii* (firewood banksia), *Banksia ilicifolia*

ABN 47 065 099 228 Aboriginal Heritage

(holly leaf banksia), *Eucalyptus todtiana* (coastal blackbutt) and *Nuytsia floribuna* (native Christmas tree).

SMEC (2009:16) report that the current project area includes only remnants of the Guildford and Forrestfield vegetation complexes due to previous land clearing. SMEC (2009:31) characterise the vegetation complexes present within the current project area as follows.

- Forrestfield vegetation system: ranges from open forest of *E. calophylla E. Wandoo – E. Marginata* to open forest of *E. Marginata – E. Calophylla – C. Fraseriana – Banksia sp.* Fringing woodland of *E. rudis* in the gullies that dissect this landform; and
- Guildford vegetation system: comprises a mixture of open forest to tall open forest of *E. calophylla – E. Wandoo – E. marginata* and woodland of *E. wandoo* (with rare occurrences of *E. lane-poolei*). Minor components include *E. rudis – M. rhaphiophylla*.

SMEC (2009:47) indicated that despite the previous vegetation clearance, local flora studies suggest that to the east (towards the base of the Darling Range) a rich and diverse suite of faunal assemblages still exists. Key fauna identified include the Brushtail Possum, Brush-tailed Phascogale, Chuditch and Western Grey kangaroo.

<u>Hydrology</u>

No significant watercourses are located within the current project area. Two small wetland lakes and Mandejal Brook are located approximately 1.8km to the northeast. Cardup Brook and Gingagup Brook lie approximately 2.8km kilometres further to the northeast and Medulla Brook is approximately 2.3km to the southeast of the project area.

Both SMEC (2009) and GHD (2009:8) highlight that the Mundijong-Whitby area is known to experience regular waterlogging in the low-lying areas of the study area, such as on the plausiplains. This inundation is due to a combination of persistent winter rainfall elevating the shallow water table which rises to the surface and inundates vast areas of the flat terrain, as well as sparse drainage, with insufficient

capacity that does not allow runoff to leave the area. There is also the potential for wetlands within the study area to receive additional flood water from outside their natural catchment by overtopping of drains and watercourses.

Previous Land Use

SMEC (2009) report that approximately 87% of the land within the Mundijong/Whitby Structure Plan study area has been previously cleared of vegetation. Within the project area agriculture has been the primary land use since European colonisation.

In a review of historic aerial photos from 1953 to 2006, SMEC noted that during the 1950s and 1960s, land use within the project area predominantly comprised low density agriculture with some residential development. Past and current agricultural activity has included land clearing, ground excavation of some areas for landfill and rubbish dumps, construction of tracks, fences, farm infrastructure and buildings, running of stock and growing crops. SMEC note the historical presence of dairy and poultry farms and a timber mill. Other noted changes in the use of the landscape included the extension of residential housing along Paterson Street in Mundijong in the 1970s, the appearance of pine plantations in the 1980s and extension of residential developments in the 2000s.

The project area has been previously cleared of vegetation and has been subject to agricultural activities. In addition, some of the sandy rises located in the project area have been excavated and the sand spread across the low lying plausiplain areas.

ABN 47 065 099 228 Aboriginal Heritage

Archaeological Background

Regional Archaeological Theory and Research

Three regional level studies relating to the archaeology of the Swan Coastal Plain have all presented predictions relating to site location on the Swan Coastal Plain (Hallam 1987; Anderson 1984; Strawbridge 1987). To date, the majority of archaeological consultancy work conducted on the Swan Coastal Plain has not refuted these predictions, though they have been refined. A brief overview of each is presented below.

Swan Area Archaeological Survey (SAAS)

Hallam conducted the earliest systematic regional level investigation on the Swan Coastal Plain in the 1970s. This study, known as the Swan Area Archaeological Survey (SAAS), involved the examination of a 420 sq km transect across the Perth metropolitan area from the coast to the foot of the Darling scarp (Hallam 1987:22).

The aim of the study was to relate population to resources by mapping demographic patterns across different ecological zones and sub-zones for successive phases of Aboriginal occupation of the Swan Coastal Plain and its immediate hinterland (Anderson 1984:1). Hallam combined ethnographic data with archaeological survey and excavated data in order to adopt a social rather than exclusively and mechanistically environmental approach to changing Aboriginal adaptations and life patterns (Strawbridge 1987:11).

During the SAAS, over 400 sites were recorded, with more than half being interpreted as indicative of ephemeral usage of the landscape by small groups. The remainder of sites included large sites comprised of tens of thousands of surface artefacts such as retouched artefacts, cores, debitage and grinding and percussion material, with the latter few types being interpreted as reflecting the presence of

women and family groups. Thus the large sites were seen as representing occupation for long periods of time by large groups of Aboriginal people (Edwards 2008:5).

Due to the lack of dateable archaeological sites within the Swan Coastal Plain, Hallam developed a relative dating scheme for surface artefact scatters based on the presence/absence of temporal markers such as fossiliferous chert. Hallam defined four primary phases of occupation:

- Early (pre-5000 BP) assemblages containing artefacts made of Eocene fossiliferous chert;
- Middle (5000–1000 BP) assemblages containing backed artefacts and elements of the 'Australian Small Tool Tradition';
- Late (post-1000 BP) quartz-rich assemblages with high proportions of waste flakes; and
- Final (post-contact) artefacts made on European materials such as glass or ceramics.

Analysis of the SAAS data indicated the following spatial and temporal patterns in site distribution (Hallam 1987:20):

- in all phases, virtually no sites within the zone of the most seaward dunes (Quindalup);
- the limestone belt (Spearwood) has relatively few sites, most of those are towards its eastward margin;
- the majority of sites lie to the east, on the coastal sand plain (Bassendean Sands) and on the alluvium of the Pinjarra Plain;
- the foothills appear to be well used, but the small sample of the scarp and uplands showed little use.

In addition, Hallam examined the distribution of sites according to artefact population and noted that densities were initially similar in the sand plain and alluvial zones, with the alluvial zone showing higher density in the Middle Phase. The Late Phase saw an increase in numbers on the sand plain due to an increase in smaller sites, whilst the alluvial zones displayed greater concentration of usage into larger sites. Final Phase figures show Europeans becoming the resource and

Aboriginal usage of the landscape peaking around homesteads and in the fertile alluvial zone (Hallam 1987:20–23).

The conclusions from the SAAS indicated that the Swan Coastal Plain with its lakes and swamps, along with the alluvial zone with similar wetlands and rich alluvial soils, attracted the heaviest use and exploitation over time. However, Hallam argues that at all periods the seaward margin failed to show significant usage, and although detail shifts between phases, the general picture of densities highest near the scarp and lowest towards the sea holds throughout (Hallam 1987:23).

Anderson's Land Use Model

Anderson's (1984) study used additional data from surveys at North Dandalup, South Canning, Perth Airport, Avon headwaters and the Canning River catchment area to build on the results of the SAAS project. Anderson proposed a land-use model that "delineates a flexible but structured usage of the resources of the Swan Coastal Plain, the central and northern jarrah forest, and the western plateau area, and which allows for the movement between areas required by social and ritual activities" (Anderson 1984:37).

Anderson (1984:34) found that the archaeological evidence indicated a greater exploitation, spatially and/or temporally, in the coastal environment than in either the forest or plateau areas. Site density on the Swan Coastal Plain was three to six times greater than forested areas and two to four times that at the Avon headwaters. Sites were mainly located adjacent to water sources across all areas; however whilst sites on the plateau were situated on low-lying and gently sloping ground, sites on the coastal sand plain are commonly located on elevated dunes or sand ridges. The major sites on the Swan Coastal Plain contained grinding stones, a broader range of raw materials and more recognisable tool forms, and large amounts of debitage which indicates more permanent and/or more frequently visited camp sites where artefact manufacture also took place (Anderson 1984:34).
The range of lithic types present on the Swan Coastal Plain is also much broader than in the forest or on the plateau, but relative proportions vary at different sites. Quartz is nearly always dominant, except at a very few sites of the post-contact period where European glass only is found, or where fossiliferous chert (the next most prevalent material) occurs in high concentrations. The variable proportion of the latter is attributed to both distance of sites from the probable source of the chert to the west of the present coastline, and to its unavailability when the sea reached its present level in mid-Holocene times. Dolerite and mylonite both occur to a much lesser extent, the former usually as larger tools like steep-edged scrapers, hammerstones or grinding material, and the latter possibly as a replacement for fossiliferous chert when it became unobtainable. Silcrete is represented only in very minor quantities. Anderson also notes that except for the fossiliferous chert, all lithic materials had to be transported or traded from beyond the Yilgarn block or from other distant areas (Anderson 1984:25).

Anderson (1984:34) interpreted the distribution of site types and sizes in the three environmental zones as reflecting actual resources available to Aboriginal people in those respective environments; the period of the year when they were obtainable; and the more intangible facets of the Aboriginal life way which laid such stress on social and ritual activities. The Swan Coastal Plain had food resources to sustain a relatively large population for most of the year, which would explain the existence of the major sites found on the plain (Anderson 1984:35).

Anderson's model proposed that during summer and autumn, Aboriginal groups gathered on the coastal plain around estuaries, wetlands, swamps and other water sources in order to exploit their resources. Hence, the major sites on the Swan Coastal Plain were generated as a result of annual visits to the area. During winter and spring, groups would disperse into the forest and plateau areas in order to relieve pressure on the water-based resources. The relatively small size of sites within those two areas is seen as reflecting high group mobility necessitated by less predictable

resources and pursuit of game animals. During spring, groups gradually moved back to the coastal areas (Anderson 1984; Edwards 2008).

Perth Metropolitan Region Planning Strategy Analysis

In 1987, Strawbridge undertook the collation and computer analysis of the data generated by Hallam's SAAS project as part of the Perth Metropolitan Region's planning strategy. The analysis identified a number of key environmental factors relating to the location and distribution of archaeological sites on the Swan Coastal Plain. In summary, sites are (after Edwards 2008:10):

- most likely to be situated on sandy, well drained dune ridges;
- most likely to be located within 350m of a potential water source, including (in decreasing frequency) swamps, creeks, rivers, lakes, surface water, springs and soaks;
- unlikely to be located in low-lying, poorly drained or seasonally inundated areas; and
- unlikely to be located more than 350m away from potential water sources.

Strawbridge (1987:16–17) also formulated a set of research questions relating to the themes of site formation processes, site distribution and environmental change, and stone tool technological change, which are frequently used in contemporary archaeological assessments.

Pinjarra Plains Geomorphic Unit

The Pinjarra Plains geomorphic unit has generally been considered in conjunction with the Bassendean Sands and, as Hallam identifies above, is commonly assumed to contain a significant proportion of the Swan Coastal Plain's archaeological sites. Three recent studies in the Pinjarra Plains unit have identified a distinct spatial patterning of the location of sites.

Tempus Archaeology (2006) conducted an archaeological survey for a proposed residential development at Byford in 2005. The project area was located within

Guildford formation sandy clay soils (a unit of the Pinjarra Plain alluvials) which were overlain by a thin veneer of Bassendean Sands. Tempus (2006:1) indicated that the vast majority of the project area would have "formed part of a vast seasonal wetland extending between the Foothills to the east and the Bassendean Dunes to the west" prior to colonisation. Similar to the current project area, the Byford survey area had been cleared of the majority of vegetation and used for agricultural purposes. The Tempus survey examined an area of 367 hectares by a combination of intensive systematic pedestrian survey and purposive pedestrian survey. Eight sites were located, all of which were found within either elevated sand dunes or rises, or on lower-lying sand lenses within the sandy clay formations.

Additional surveys were conducted at Lot 2 Nettleton Road Byford by Tempus Archaeology in 2006 (Edwards 2007). This survey examined 38 hectares of land which consisted of Bassendean sand dunes and think lenses of Bassendean sand overlaying Guildford formation plausiplain and alluvials. The survey employed both systematic pedestrian survey transects and additional purposive transects of all fire breaks, tracks and other areas of relatively high ground surface visibility. In total, six archaeological sites were located in the survey area, all of which comprised open flaked stone artefact scatters and all situated on either deflating Bassendean sand dunes or thin lenses of Bassendean sand overlying the alluvial deposits.

Further to this, a survey conducted by Thomson (2011) at Pinjarra, approximately 40km south of the current project area, provides a specific examination of site distribution within the Pinjarra Plain plausiplains geomorphic system. This survey examined an area of 3.457 sq km (345.7 hectares) which consisted of low-lying wetland subject to seasonal inundation, interspersed with elevated white Bassendean sand rises and remnant dunes. Similar to the current project area, the Pinjarra survey area had been previously used for agricultural purposes. This area was intensively surveyed by systematic pedestrian transects spaced at 20m apart, with additional purposive examination of all elevated sand rises and dunes. The survey not only confirmed the association of artefact scatters and sites with elevated sand rises and

dunes within the Pinjarra Plain plausiplain geomorphic context, but further elucidated that within these sand dunes, surface artefacts were consistently exposed on the tops and eastern slopes of the sand rises and dunes. Very few isolated artefacts were located within the low-lying plausiplain areas.

Considering the consistency in results between these studies and also with Strawbridge's GIS-based predictions that sites are mostly likely to be situated on sandy, well-drained dune ridges and unlikely to be situated within in low-lying, poorly drained or seasonally inundated areas, it is more than plausible to hypothesise that within the Pinjarra Plains geomorphic unit, all elevated Bassendean sand dunes, hills and rises overlaying the alluvial plausiplain will have high potential for containing archaeological material, whilst the low-lying plausiplain areas will conversely have low potential for locating any archaeological material.

Previous Excavations

Bowdler, Strawbridge & Schwede reported in 1991 that thirty five sites had been testpitted within the Swan Coastal Plain, of which 74% were located on the Bassendean Sands. They note that there is a

consistent lack of good stratified sites. This has been verified not only by a considerable amount of mitigation work, but also by recent purposive efforts by post-graduate students (Schwede, Anderson) to locate such sites (Bowdler et al. 1991:21).

and they conclude from their analysis that

Sufficient test-pits... have now been excavated in archaeological sites on Bassendean Sands to warrant the conclusion that any more would be a complete waste of time and money... there are very few stratified archaeological sites in this region... With respect to open sites, only three to five are known with any kind of stratigraphic integrity, and these are not all straightforward cases (Bowdler et al. 1991:24).

Of the five sites referred to, four were located within the Swan River Alluvial Deposits and the fifth (Walyunga) was located in a unique geomorphic context in "a sand dune part of the Yoganup formation, comprising fossil shoreline sands on the

Ridge Hill Shelf" (Bowdler et al. 1991:24). Bowdler *et al* highlight the impact of the nature of the Bassendean Sands on the integrity of sites, stating that because the Bassendean Sands dune system consisted of a stable core with a superficial mobile layer of continually reworking sands, artefacts which may have been deposited over a long period of time will have become mixed on one level due to continual deflation and reworking. Adding to this, the impacts of European farming practices have further served to disturb any site integrity.

Two sites that have been excavated within the vicinity of Mundijong are DIA Site ID 3648 Soldier's Road Mundijong and DIA ID 3405 Baldivis Road, Baldivis.

DIA Site ID 3648 Soldier's Road Mundijong

This site is located approximately 2.4km to the northeast of the project area. DIA Site ID 3648 is situated within a white Bassendean sand dune adjacent to two freshwater lakes to the north of Mandejal Brook, north Mundijong. The site was investigated by Pearce in 1979 who excavated a stepped 1 x 1m trench and collected surface artefacts from six 5 x 5m sample squares. Pearce recovered 1,781 artefacts from the trench which was excavated to a depth of 75cm. The artefacts were mainly comprised of quartz debris measuring less than 15mm long. Eleven backed tools were found in the lower half of the trench. The density of artefacts was not uniform in the deposit with two peaks at 20cm and 60cm depth. Pearce attributed this to two potential reasons including changes in density of occupation or changes in the rates of erosion and accumulation of sand. Ochre was also located in the trench and one charcoal sample from the 10–20cm spit returned a date of 1620 ±105 bp (SUA 646).

DIA Site ID 3405 Baldivis: Baldivis Road

DIA Site ID 3405 is located approximately 14.6km west-southwest of the current project area. The site was located within a high Bassendean sand dune, which had been partially disturbed. Thomson and Slack (2011) conducted mitigative test pitting of the site as part of a Section 18 consent. Five 1 x 1m test pits were excavated, targeting the periphery of the disturbed area in order to determine how much of the site remained. Three artefacts were recovered from the test pits, of which two were located in near surface contexts. One small proximal quartz flake was found at a depth of approximately 50–60cm. Thomson and Slack concluded that the internal structure of the site was highly disturbed and consequently no dating was

ABN 47 065 099 228 Aboriginal Heritage

attempted. The results were thus congruent with Bowdler et al.'s (1991) conclusions outlined above.

Local Archaeological Investigations

The Department of Indigenous Affairs' (DIA) Aboriginal Heritage Inquiry System (AHIS) indicates that there have been eight previous archaeological surveys undertaken within approximately 5 m of the current project area:

- Quartermaine (1986) Dampier to Perth gap pipeline: Carnarvon gas pipeline lateral.
- O'Connor & Quartermaine (1989) Byford-Collie and Ongerup-Jerramungup sections of the Perth to Adelaide optic fibre route. Involved vehicle transects with pedestrian spot checks at regular intervals and at all watercourses along two corridors approximately 140km and 70km in length by 100m wide. Three new sites were located.
- ◆ Quartermaine & Heine (1996) road works at Mundijong Road.
- Blockley & Greenfeld (1995) South-East corridor structure plan. Archaeological survey of a 20km long by 100m wide corridor from Ranford Road in Armadale to Mundijong Road, plus 2,263 hectares around Byford and Mundijong town sites. Included vehicle transects along existing roads and tracks and pedestrian inspection of elevated areas, rivers and other prominent features. Located six previously recorded and four new sites, all artefact scatters. All archaeological material, including isolated artefacts, was located on deflated or disturbed sand dunes.
- Blockley et al. (1996) South-East corridor structure plan, revised report. Reexamined the survey corridor previously surveyed by Blockley & Greenfeld (1995) in further detail. Located seven new sites, all artefact scatters.
- McDonald, Hales & Associates (Prince et al. 1996) Byford village, Byford. Located nineteen archaeological sites, all artefact scatters. Sites primarily located on elevated sand rises, dunes or exposed areas.
- ♦ McDonald, Hales & Associates (Burke et al. 1998) Byford village, Byford.
- Edwards & McDonald (1999) Proposed Tonkin Highway extension and Mundijong Road realignment project. Comprised pedestrian transects walked in a zigzag pattern along the length of the corridor, spaced at 10–20m apart, with additional purposive investigation of areas with higher ground surface visibility. Estimated 30% of survey area investigated in total, with poor ground surface visibility (<30%). Sixteen new artefact scatters, seven</p>

ABN 47 065 099 228 Aboriginal Heritage

previously recorded sites and 11 isolated artefacts were located. Edwards and McDonald conclude that the locations of sites conform to Anderson's predictions regarding site location and composition; that is, larger more complex stone artefact scatters are located in well-drained and relatively elevated topographic positions, often in close proximity to wetlands or other drainage features. The isolated artefacts were found mainly in disturbed areas.

Whilst not all surveys conducted comprised systematic pedestrian surveys, collectively the results of the surveys all indicate that archaeological sites, in particular artefact scatters, are most likely to be located on or within elevated sand rises, hills or dunes, and within approximately 300m of a water source.

Previously Reported Aboriginal Sites

A search of the DIA's AHIS was undertaken on 6 March 2012 to confirm the number and nature of any previously located Aboriginal Sites within a 5 km radius of the survey area. The search boundary was defined by a box with the following diagonally opposite corner points (GDA94, MGA Zone 50):

2. 409908 mE 6421013 mN

The search identified that 58 sites, including 29 Registered Aboriginal Sites and 29 Other Heritage Places are located within 5 sq km of the project area (see Appendix 1). No Aboriginal Sites are located within or intersect with the current project area.

Archaeological Site Characterisation

Of the 29 Registered Aboriginal Sites and 29 Other Heritage Places, 57 have archaeological components. Only limited information was available about these sites at the time of preparation of this report (see Table 1 and Table 2). Using this limited data, the following characterisation of archaeological sites within the search area was made.

ABN 47 065 099 228 Aboriginal Heritage

- ✤ The most dominant type of archaeological site, or more precisely archaeological feature, are artefact scatters (n=54, 94.75%), with single occurrences of archaeological deposit (n=1, 1.75%), shell (n=1, 1.75%) and a modified tree (n=1, 1.75%);
- Artefact scatters are predominantly minor in size (less than 7500 sq m);
- Artefact scatter assemblages are typically dominated by quartz (over 90%) with minor (less than 10%) amounts of fossiliferous chert, mylonite, dolerite, crystal quartz, quartzite, silcrete, basalt, granite and glass;
- Previous studies have indicated a pattern of larger sites being closer to water sources, with larger sites being less than 300m from a water source and smaller sites being further than 300m;
- Regional archaeological research and assessments have indicated that artefact scatters on the Swan Coastal Plain are more commonly minor in size, lowmedium density, dominated by quartz with some potential for fossiliferous chert, dolerite, granite, silcrete, crystal quartz, quartzite or glass, and comprised predominantly of debitage with very few specialised or 'formal' tool types.

Pinjarra Plains Predictive Model

As outlined above, a predictive model was developed for the current project area based upon previous archaeological studies undertaken on the Swan Coastal Plain and within the Pinjarra Plains geomorphic unit. The model hypothesised that:

- all elevated sand dunes, hills and rises will have high potential for containing archaeological material;
- low-lying plausiplain areas will conversely have low potential for locating any archaeological material.

Non-Indigenous Heritage

SMEC's (2009:136–37) environmental assessment report reviewed the Register of Heritage Places and Municipal Inventory for non-Indigenous historical places. This review indicated that there are no sites listed on the Register of Heritage Places within the study area. Thirteen sites were listed on the Shire of Serpentine-

ABN 47 065 099 228 Aboriginal Heritage

Jarrahdale's municipal heritage inventory; however, none of these sites are located within the Survey Area.

DIA Site ID	Site Name	Site type	Dimensions	Site size (sq m)	distance to water (m)	Topographic unit	Physiographic unit	Site integrity	Artefact density (per sq m)	Assemblage character
396	South-East Corridor 07 / Cardup Siding	Artefact scatter	240 x 65m	15600	180	Low sand dune ridge	Bassendean sands overlying Guildford formation	-	-	-
448	South-East Corridor 01	Artefact scatter	100 x 60m	600	700	Eroded dune ridge	Bassendean sands	-	13	Artefacts = flake (n= 7), flake fragment (n=3), core fragment (n=1), transverse broken flake (n=1), backed blade (n=1) Lithologies = quartz (n=8), fine grained sedimentary material (n=5) also noted at site metamorphic, silcrete, glass
449	South-East Corridor 02	Artefact scatter	15 x 5m	75	430	Low sand dune	Bassendean sands	Disturbed	7	Artefacts = flake (n=3), core fragment (n=3), transverse broken flake (n=1) Lithologies = quartz (n=7)
450	South-East Corridor 03	Artefact scatter	100 x 150m	20670	420	White sand dune	Bassendean Sands	Partially disturbed	20-85	Artefacts = flake (n=4), core fragment (n=1), Transverse broken flake (n=6), longitudinal broken flake (n=5), cores (n=2), grinding implement (n=1) Lithologies = quartz (n=13), fine grained sedimentary material (n=4), Quartzite (n=1), medium grained sedimentary material (n=1)
3648	Soldiers Road, Mundijong	Artefact scatter Archaeological deposit	50 x 30m	1500	0	White sand dune	Bassendean Sands	Partially disturbed	20.8	Artefacts = wide variety of cores, scrapers, bipolar flakes, bipolar cores, flakes and debris Lithologies = quartz, metamorphic, fossiliferous chert, mylonite

Table 1: Details of Registered Aboriginal Sites with archaeological components located within 5 km of the project area

DIA Site ID	Site Name	Site type	Dimensions	Site size (sq m)	distance to water (m)	Topographic unit	Physiographic unit	Site integrity	Artefact density (per sq m)	Assemblage character
16089	Byford 01	Artefact scatter	2 x 5m	10	450	Sandy exposure	Bassendean sands	Partially disturbed	0.8	Artefacts = 8 artefacts Lithologies = quartz (n=5), glass (n=3)
16090	Byford 02	Artefact scatter	3 x 5m	15	570	Sandy exposure	Bassendean sands	Partially disturbed	0.27	Artefacts = 4 artefact Lithologies = quartz (n=4)
16091	Byford 03	Artefact scatter	2 x 2.5m	5	500	Sandy exposure	Bassendean sands	Partially disturbed	1.4	Artefacts = 15 artefacts Lithologies = quartz (n=15)
16092	Byford 04	Artefact scatter	1 x 2m	2	450	Sandy exposure	Bassendean sands	Partially disturbed	2	Artefacts = 4 artefacts Lithologies = quartz (n=2), glass (n=2)
16093	Byford 05	Artefact scatter	3 x 5m	15	460	Sand dune deflation	Bassendean sands	Partially disturbed	1.8	Artefact = 27 artefacts Lithologies = chert (n=1), quartz (n=26)
16094	Byford 06	Artefact scatter	-	-	590	Sandy exposure	Bassendean sands	Disturbed	-	Artefacts = hammer stone (n=1), flaked pieces (n=6) Lithologies = granite (n=1), quartz (n=6)
16095	Byford 07	Artefact scatter	2 x 2.5m	5	550	Sandy exposure	Bassendean sands	Disturbed	2	Artefacts = 10 artefacts Lithologies = quartz (n=9), silcrete (n=1)
16096	Byford 08	Artefact scatter	200 x 50m	10000	300	Sandy exposure	Bassendean sands	-	0.4	Artefacts = 66 artefacts Lithologies = quartz (n=62), riverine quartz (n=1), chert (n=1), dolerite (n=1), basalt (n=1)

DIA Site ID	Site Name	Site type	Dimensions	Site size (sq m)	distance to water (m)	Topographic unit	Physiographic unit	Site integrity	Artefact density (per sq m)	Assemblage character
16097	Byford 09	Artefact scatter Shell	-		690	Sandy exposure	-	-	-	1 piece of abalone shell and 8 quartz artefacts
16098	Byford 10	Artefact scatter/ reduction area	1 x 2m	2	500	Gravel exposure	-	-	5	10 dolerite flaked pieces. Non-conjoins
16099	Byford 11	Artefact scatter	1 x 2m	2	640	Gravel exposure	-	-	1.5	3 quartz artefacts
16100	Byford 12	Artefact scatter	4 x 10m	40	250	Sandy exposure	Bassendean sands	-	0.075	**Duplicate of DIA Site ID 22056 3 quartz artefacts
16101	Byford 13	Artefact scatter	-	-	100	Sandy firebreak	Bassendean sands	Partially disturbed	-	**Duplicate of DIA Site ID 22057 13 quartz artefacts
16102	Byford 14	Artefact scatter	-	-	15	-	-	-	9	Artefacts = flakes pieces (n=8), hammer stone (n=1) Lithologies = quartz (n=1), riverine quart pebble (n=1)
16103	Byford 15	Artefact scatter	-	-	-	Escarpment above tributary	-	-	-	13 artefact recorded

DIA Site ID	Site Name	Site type	Dimensions	Site size (sq m)	distance to water (m)	Topographic unit	Physiographic unit	Site integrity	Artefact density (per sq m)	Assemblage character
16104	Byford 16	Artefact scatter	-	-	-	Sandy exposure	Bassendean sands	Disturbed	-	Artefacts = hammerstone (n=1), undescribed (n=1) Lithologies = riverine quartz pebble (n=1), quartz (n=11)
16105	Byford 17	Artefact scatter	-	-	-	White sandy deposit	Bassendean sands	-	-	19 quartz artefacts
16106	Byford 18	Artefact scatter	-	-	-	Sandy patch	Bassendean sands	-	-	17 artefacts recorded
16107	Byford 19	Artefact scatter	1 x 2m	2	-	Sandy surface	Bassendean sands	-	5	Artefacts = quartz (n=8), mylonite (n=1), crystal quartz (n=1) No indication of artefact types or size
18187	Tonkin Highway - Mundijong Road Scatter #11	Artefact scatter	-	-	270	Low sandy rise	Bassendean sands overlying Guildford formation	Disturbed	0.02	Artefacts = Debitage (n=16) Artefact size = maximum dimensions rang 6.4 – 23.3mm, mean = 14.6mm Lithologies = all artefacts made from quartz
18188	Tonkin Highway - Mundijong Road Scatter #12	Artefact scatter	50 x 40m	200	100	North face of low sand dune ridge	Bassendean sands overlying Guildford formation	Partially disturbed	0.12	Artefacts = debitage (n=23), core fragment (n=1) Size = mean maximum dimension 16.8mm Lithologies = quartz (n=23), mylonite (n=1)
18191	Tonkin Highway - Mundijong Road Scatter #15	Artefact scatter	-	_	40	-	Unidentified loamy sediment unit	Partially disturbed	0.2	Artefacts = total of 8 Lithologies = chert (n=3), quartz (n=3), chalcedony (n=1), silcrete (n=1)

DIA Site ID	Site Name	Site type	Dimensions	Site size (sq m)	distance to water (m)	Topographic unit	Physiographic unit	Site integrity	Artefact density (per sq m)	Assemblage character
23917	Byford archaeological survey 004	Artefact scatter	20 x 15m	300	110	Low sandy rise	Bassendean sands overlying Guildford formation	Disturbed	0.9	Artefacts = debris (n=23), flake fragments (n=12), complete flakes (n=5), broken flakes (n=3), bipolar flake (n=1), bipolar core (n=1), manuport (n=1) Lithologies = quartz (n=43), rose quartz (n=1), greenstone (n=1), igneous (n=1)

Table 2: Details of Other Heritage Places with archaeological components located within 5 km of the project area

DIA Site ID	Site Name	Register status	Site type	Dimen- sions	Site size (sq m)	distanc e to water (m)	Topographic unit	Physiographic unit	Site integrity	Artefact density (per sq m)	Assemblage character
3310	Cardup	Stored	Artefact scatter	-	-	-	-	-	-	-	-
3313	Mundijong	Insufficient information	Artefact scatter	-	-	-	-	-	-	-	-
3590	Whitby	Insufficient information	Artefact scatter	30 x 10m	300	100	Sandy-clay exposure on road verge	-	Disturbed	-	Numerous stone flakes mainly quartz
3591	Yarrabah	Insufficient information	Artefact scatter	40 x 40m	1600	850	Sandy-clay exposure on road verge	_	Disturbed	-	Numerous stone pieces including quartz flakes and retouched scrapers as well as quartz and mylonite backed tools.
17923	If #2	Stored	Isolated artefacts	-	-	-	-	-	-	-	-
18189	Tonkin Highway – Mundijong Road Scatter #13	Stored	Artefact scatter	30 x 20m	600	410	Low sandy rise	Bassendean Sands	-	0.23	No detailed artefact information given

DIA Site ID	Site Name	Register status	Site type	Dimen- sions	Site size (sq m)	distanc e to water (m)	Topographic unit	Physiographic unit	Site integrity	Artefact density (per sq m)	Assemblage character
18190	Tonkin Highway – Mundijong Road Scatter #14	Stored	Artefact scatter	Not given	2	1100	Not given	Not given	Disturbed	1.0	Four artefacts recorded, not likely in original context
18192	Tonkin Highway - Mundijong Road Scatter #16	Stored	Artefact scatter	100 x 2m	200	170	Not given	Bassendean sands	Disturbed	0.03	No details
21305	Byford village isolated finds	Stored	Isolated artefacts	-	-	-	-	-	-	-	-

DIA Site ID	Site Name	Register status	Site type	Dimen- sions	Site size (sq m)	distanc e to water (m)	Topographic unit	Physiographic unit	Site integrity	Artefact density (per sq m)	Assemblage character
23914	Byford archaeologi cal survey 001	Stored	Artefact scatter Modified tree	33 x 19m	625	80	Low sandy rise	Bassendean sands overlying Guildford formation	Partially disturbed	0.25-1.25, average = 0.05	Artefacts = debris (n=17), complete flakes (n=6), flake fragments (n=6), broken flakes (n=3), possible manuports (n=2) Small in size, ranging between 6.4mm - 29mm (mean = 13.1m) All artefacts made from quartz Artefacts clustered around erosion areas Modified tree = Marri (?) tree with two scars, had been felled.

DIA Site ID	Site Name	Register status	Site type	Dimen- sions	Site size (sq m)	distanc e to water (m)	Topographic unit	Physiographic unit	Site integrity	Artefact density (per sq m)	Assemblage character
23915	Byford archaeologi cal survey 002	Stored	Artefact scatter	6 x 12m	12	20	Sandy exposure/lens	?Pinjarra Plain colluviums	Partially disturbed by stock movement	0.5	Artefacts = Debris (n=3), complete flakes (n=2), bipolar broken flake (n=1) Artefact size = maximum dimension range 5.2- 21.3mm, mean size is 11.6mm All artefacts manufactured from quartz
23916	Byford archaeologi cal survey 003	Stored	Artefact scatter	20 x 12m	240	115	Low sandy rise	Bassendean sands overlying Guildford formation	Disturbed	0.1	Artefacts = debris (n=7), complete flakes (n=3), flake fragments (n=2), bipolar flakes (n=1), SPC (n=1) Size = maximum dimension range 7.6- 41.3mm, mean = 16.9mm Lithology = all artefact manufactured from quartz

DIA Site ID	Site Name	Register status	Site type	Dimen- sions	Site size (sq m)	distanc e to water (m)	Topographic unit	Physiographic unit	Site integrity	Artefact density (per sq m)	Assemblage character
23918	Byford archaeologi cal survey 005	Stored	Artefact scatter	36 x 12m	436	90	Low sandy rise	Bassendean sands overlying Guildford formation	Partially disturbed	0.05	Artefacts = debris (n=10), flake fragments (n=6), bipolar flakes (n=4), bipolar core (n=1), manuport (n=1) Artefact size = maximum dimension range 5 - 25.5mm, mean = 14.6mm Lithologies = all artefacts manufactured from quartz
23919	Byford archaeologi cal survey 006	Insufficient information	Artefact scatter	80 x 3m	240	140	Low sandy rise	Bassendean sands overlying Guildford formation	Partially disturbed	0.125	30 quartz flaked stone artefacts
23920	BAS / Iso - 001	Stored	Isolated artefacts	-	-	-	-	-	-	-	-

DIA Site ID	Site Name	Register status	Site type	Dimen- sions	Site size (sq m)	distanc e to water (m)	Topographic unit	Physiographic unit	Site integrity	Artefact density (per sq m)	Assemblage character
23921	BAS / Iso - 002	Stored	Isolated artefacts	-	-	-	-	-	-	-	-
23922	BAS / Iso - 003	Stored	Isolated artefacts	-	-	-	-	-	-	-	-
23923	BAS / Iso - 004	Stored	Isolated artefacts	-	-	-	-	-	-	-	-
23924	BAS / Iso - 005	Stored	Isolated artefacts	-	-	-	-	-	-	-	-
23925	BAS / Iso - 006	Stored	Isolated artefacts	-	-	-	-	-	-	-	-

DIA Site ID	Site Name	Register status	Site type	Dimen- sions	Site size (sq m)	distanc e to water (m)	Topographic unit	Physiographic unit	Site integrity	Artefact density (per sq m)	Assemblage character
24979	Nettleton Road 19- 09-07/001	Stored	Artefact scatter	3 x 1.5m	4.5	10	Gravel and sand exposure	Bassendean sands overlying Guildford formation	-	0.88	Artefacts = flake fragments (n=2), complete flakes (n=1), debris (n=1) Lithologies = greenstone (n=2), quartz (n=2)
24980	Nettleton Road 19- 09-07/002	Stored	Artefact scatter	4 x 1m	4	123	Sandy firebreak	-	Partial disturbance	0.75	Artefacts = flakes (n=1), flake fragments (n=1), debris (n=1) Lithologies = quartz (n=3)
24981	Nettleton Road 19- 09-07/003	Stored	Artefact scatter	18 x 9m	162	150	Deflated dunes	Bassendean sands overlying Guildford formation	Partial disturbance	0.07	Artefacts = flakes (n=1), broken bipolar flakes (n=1), flake fragment (n=1), debris (n=1) Lithologies = quartz (n=4)
24982	Nettleton Road Isolated Finds	Stored	Isolated artefacts	-	-	-	-	-	-	-	-

DIA Site ID	Site Name	Register status	Site type	Dimen- sions	Site size (sq m)	distanc e to water (m)	Topographic unit	Physiographic unit	Site integrity	Artefact density (per sq m)	Assemblage character
24983	Nettleton Road 1-06	Stored	Artefact scatter	35 x 5m	175	147	Deflation area within dunes	Bassendean sands overlying Guildford formation	-	0.03	Artefacts = flakes (n=4), manuport (n=1) Lithologies = quartz (n=4), igneous (n=1)
24984	Nettleton Road 2-06	Stored	Artefact scatter	30 x 9m	270	342	Sandy exposure	Bassendean sands	Disturbed	0.06	17 flaked quartz stone artefacts
24985	Nettleton Road 3-06	Stored	Artefact scatter	13 x 10m	130	490	Sandy exposure	Bassendean sands	Disturbed	0.06	8 quartz flaked stone artefacts

ABN 47 065 099 228 Aboriginal Heritage

Archaeological Methodology

Research Design

The following research questions are posed in order to guide field investigations and assessment of archaeological significance. The questions are intended to assist in articulating the archaeological signature of the area including the spatial distribution of sites, site types and activities undertaken within the sites and the local region, as well as the effects of taphonomic and other disturbances on the archaeological record and resource use. The research questions will also assist in the assessment of archaeological significance. The following questions were developed based on the review of the regional archaeological context, Thomson (2011) and Strawbridge (1987).

Site Location

- Is the hypothesis that sites are located on elevated Bassendean white sand dunes or rises and/or adjacent to water sources supportable?
- Is Thomson's (2011) finding that artefacts within sites located on sandy rises and dunes are predominantly located on the top and eastern slopes supportable?
- Is there an association between dune aspect or erosion surface orientation and artefact types/densities?
- Is there an association between dune altitude and artefact types and/or densities?
- ✤ How does the density of sites within the survey area compare with the regional context?
- ✤ What does the apparent site distribution indicate? To what degree is it skewed by concentrated urban development? (after Strawbridge 1987).

Site Content and Function

- What is the variability between sites in terms of artefact type, lithology and size?
- What activities can be identified at the site? What was the site function(s)? Are there any identifiable links with local ethnographic places or sites?

ABN 47 065 099 228 Aboriginal Heritage

- Is the level of reduction of fossiliferous chert greater away from the coast (the predicted source location)?
- Does the amount of fossiliferous chert within an assemblage decrease or increase with proximity to the coast (i.e. the proposed source), or proximity to other water sources?
- What is the level and character of variability between sites classified according to Hallam's four phases?

Taphonomic Issues

- What are the effects of ploughing and agricultural-related ground disturbance on the subsurface deposit?
- What is the relationship between the yellow and white sands and is there any association between either sand type or the presence of artefacts?
- Is the size and type of artefacts found within subsurface deposits a function of taphonomic processes or site function?
- How does the surface distribution and composition of artefacts compare to the artefact distribution and composition of the subsurface deposit?
- Does the surface artefact distribution and composition relate to erosion and visibility or is it different?
- Is there any size selection/grading of artefacts within the subsurface deposit?

Subsurface Deposits

- What lithologies are located in the subsurface deposit?
- Can we identify any relic dune systems between sites? Can these systems be identified in multiple sites? Is it possible to date sites or occupation episodes relative to other sites?
- Are all sites contemporary and were they being used during the same time periods? What can be said about population density over time?
- Does the site contain stratified subsurface cultural material in an undisturbed context? Is the deposit dateable? If so:
 - Are Hallam's four phases of occupation supportable?
 - What changes are there over time in the density of artefacts? How far can this be taken as an indication of population changes or technological innovations?

ABN 47 065 099 228 Aboriginal Heritage

- Are there any detectable technological changes in the assemblage that correspond with the decline in supply of fossiliferous chert (after Strawbridge 1987)?
- Can sites within Hallam's four phases of occupation be further characterised in terms of artefact types, density, lithology, location and evident technologies?
- What stone tool technologies (i.e. reduction sequences) were being employed during the early phase on the Swan Coastal Plain?
- If the supply of fossiliferous chert found on sites was lost when the sea level rose, can we detect technological changes in assemblages as a result of the decline of this stone resource (after Strawbridge 1987)?

Archaeological Survey Methods

Based on the scope of work, results of the desktop review and other previous archaeological surveys within the local region, and taking into consideration the limited timeline and budget allocated to complete the archaeological assessment, the archaeological assessment employed a purposive sample, pedestrian survey methodology.

A proposed sampling methodology was provided to the DIA's Heritage and Culture Branch for comment in early March 2012. A meeting was held with DIA staff Dr Kathryn Przywolnik (Registrar of Aboriginal Sites), Ms Christine Lewis (Manager Heritage South) and Mr Aidan Ash (Senior Heritage Advisor) on 7 March 2012 to discuss the methodology. A subsequent email from Ms Lewis following the meeting (12 March 2012) indicated that DIA regarded the proposed methodology to be "a reasonable approach to the proposed heritage work and the research questions it raises are considered relevant for section 18 purposes".

Identifying Survey Sample Areas

Results of previous surveys undertaken within the Pinjarra Plains geomorphic unit all indicated a strong spatial site distribution pattern, with all archaeological sites being associated with and located upon lenses or dunes of white Bassendean sands which overlay Pinjarra alluvial soils and plausiplains. This predictive model was

used to inform the selection of areas for pedestrian survey. Sample areas thus comprised:

- all areas of high archaeological potential including all elevated sand rises, hills and dunes located within the project area; and
- two control sample areas within areas of low archaeological potential; that is, within the low-lying plausiplain areas.

Aerial photography, topographic, environment and soil maps were examined in order to identify areas of high and low archaeological potential. In addition, some of the survey areas were designed so that the transition area between the sand rises and the alluvial soils were also examined. Table 3 below identifies the location of the selected sample survey areas.

In total, 0.2203 sq km (33.9%) of the project area was examined by intensive pedestrian survey. Of this, 0.1673 sq km (25.7%) comprised areas of high archaeological potential and 0.053 sq km (8%) comprised areas of low archaeological potential. See Figure 2.

Survey Methods

The archaeological survey of the sample areas of high and low archaeological potential involved intensive pedestrian survey, with approximately parallel transects spaced between 5–10 m apart and oriented north–south.

ABN 47 065 099 228 Aboriginal Heritage

Survey Area	Archaeological Potential	Area (sq km)	Node	Easting (mE)	Northing (mN)
1	Low	0.023	1	403328	6426244
			2	403328	6426403
			3	403471	6426244
			4	403471	6426403
2	Low	0.03	1	403313	6426550
			2	403313	6456765
			3	403456	6456765
			4	403456	6426550
3	High	0.0438	1	402962	6426398
			2	402962	6426598
			3	403181	6426598
			4	403181	6426398
4	High	0.077	1	402930	6426686
			2	402930	6426967
			3	403205	6426967
			4	403205	6426686
5	High	0.0465	1	403464	6426495
			2	403698	6426495
			3	403699	6426193
			4	403595	6426217
			5	403594	6426362
			6	403469	6426379
			7	403464	6426402

Table 3: Archaeological survey areas, Lot 50 Mundijong Road, Mundijong

ABN 47 065 099 228 Aboriginal Heritage

Survey Area	Archaeological Potential	Area (sq km)	Node	Easting (mE)	Northing (mN)
6	High	0.018	1	403397	6426838
			2	403610	6426837
			3	403611	6426762
			4	403455	6426761
			5	403456	6426765
			6	403336	6426766

Archaeological Site Identification and Recording Methods

The scope of work requires that all sites located during the survey will be recorded to Section 18 level, which comprises sufficient detail about each site to aid the DIA and ACMC in the decision-making process under Sections 5 and 39 of the *Aboriginal Heritage Act* 1972. Specific recording methods and variables are determined by several factors including comparability and the relevance and appropriateness of site and artefact variables recorded to answer or contribute to the research questions identified above.

Site Type

From previous research undertaken within the Swan Coastal Plain, the following archaeological site types or features may be expected:

- ✤ Artefacts/scatter
- ✤ Historic
- ✤ Skeletal remains/burial
- Modified tree
- ✤ Archaeological deposit

See Appendix 2 for full definitions of site types.

In Western Australia, distinctions are often drawn between artefact scatter 'sites' (i.e. dense, localised concentrations of archaeological material) and 'isolated artefacts' or 'background scatter' (random, sparse distributions of artefacts present within a landscape). Within the Swan Coastal Plain, the commonly accepted definition of a 'site' is where two or more different artefacts, or different classes of artefacts, are present within a radius of 5m of each other. Isolated artefacts are defined as being spatially discrete and are unlikely to reflect any purposeful activity (Edwards 2008:13).

Site Scale

The following definitions were used during the assessment to classify sites.

Site size

- Small: sites that measure less than 7,500 sq m
- ♦ Medium: sites that measure between 7,500 sq m and 50,000 sq m
- ✤ Large: sites that measure >50,000 sq m

Artefact density

- ✤ Low: <0.1/m²
- ✤ Medium: 0.1 1/m²
- ✤ High: >1/m²

Raw material diversity

- ✤ Low: >90% of one raw material
- ✤ Medium: two raw material types >10% each
- ✤ High: three or more raw material types >10% each

Site Recording

Section 18 level recording entails sufficiently detailed information about each site to enable an accurate assessment of its archaeological significance. Specifically, the following information will be recorded in line with the standards outlined in the

ABN 47 065 099 228 Aboriginal Heritage

DIA's *Draft Guidelines for Aboriginal Heritage Assessment in Western Australia* and *Draft Spatial Standards,* and the proposed research questions identified above:

- location and boundary of the site, including multiple GPS coordinates to define a polygon representative of the site's boundary;
- site type;
- environmental context;
- site description including nature of site, major cultural features, site dimensions, orientation and size;
- a sample of the artefact assemblage including artefact density, lithology, types and metrics;
- ✤ an estimate of the total number of artefacts within the site;
- ✤ assessment of the site's potential for stratified subsurface deposit;
- site condition and integrity including the nature and origin of any disturbance to the site;
- ✤ site plan and profile; and
- photographs of the site and its context.

Site boundaries of artefact scatters are defined by the placement of a systematic grid of 1m by 1m sample squares spaced at 2m intervals across the site. The site's boundary is thus determined where no artefacts occur in two or more consecutive sample squares along any given axis. The potential for subsurface deposit is assessed based on the topographic and geomorphologic contexts and the physical integrity of the site.

Artefact Identification and Recording Methods

Identification

The primary types of artefacts that may be expected to be located during the survey include:

- flaked stone artefacts;
- ground stone artefacts;
- manuports;

ABN 47 065 099 228 Aboriginal Heritage

✤ shell material.

An overview of artefact identification and methods for recording the main types of artefacts is included in Appendix 3.

Analysis

Based on the research questions identified above, the following artefact analysis methods will be employed:

- Total estimated artefact count is calculated using the minimum number of flakes (MNF) formula: MNF = C+T+L, per raw material.
- The assemblage character of each site is generated by quantifying the ordinal value of artefact types, lithology and size (including length, width and weight).
- Site size comparison is undertaken using MapInfo data gained from the DIA and available unpublished survey reports. Site size is classified according to the categories outlined above.
- Density is calculated using the following formula Density = MNF/Area (where area = total recorded ground surface in sq m). Average density of artefact scatters can then be compared to other sites on the Pinjarra Plain and within the local region.
- Distance to water is calculated from the centre of the recorded site to the closest potable water source (namely swamp and lake areas). This analysis is undertaken using MapInfo and datasets obtained from DIA and the Australian Government Office of Spatial Information. Topographic data was only available at the scale of 1:250,000 at the time of analysis.
- The level of retouch within assemblages at each site is generated by quantifying the ordinal value of the number of retouched artefacts and level of invasiveness of the retouch, calculated by measuring the area of the negative flake scars identified as retouch in relation to the overall flake.

Archaeological Significance Assessment

Archaeological Significance in the Australian Context

Heritage significance is the degree to which a place, object or activity possesses a certain valued attribute. Current definitions of significance acknowledge that value is not inherent in objects or places but rather people attribute value to these entities (Thomson 2012:10). Further, cultural heritage will often have multiple values which can be contested (Truscott 1992; Tunbridge & Ashworth 1996; Greer & Henry 1996; Harrington 2004).

In Australian cultural heritage management practice, the Burra Charter (Australia ICOMOS 1999) model is commonly adopted for significance assessments of heritage places. This model divides significance into four types: aesthetic, historical, scientific and social. Although none of these categories are mutually exclusive, the scope of this report requires primarily the assessment of the scientific significance of any archaeological sites located. The Burra Charter states that "the scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality or representativeness, and on the degree to which the place may contribute further substantive information" (Byrne et al. 2003).

In Western Australia, the ACMC determines whether a place is an Aboriginal Site according to Section 5 of the AHA. Under Section 5, places must be shown to have an importance or significance distinct from their surroundings. Further, the ACMC is directed by Section 39(2) to have regard to the following in evaluating the importance of places and objects:

- (a) any existing use or significance attributed under relevant Aboriginal custom;
- (b) any former or reputed use or significance which may be attributed upon the basis of tradition, historical association, or Aboriginal sentiment;
- (c) any potential anthropological, archaeological or ethnographical interest; and
- (d) aesthetic values.

Section 39(3) also states that "Associated sacred beliefs, and ritual or ceremonial usage, in so far as such matters can be ascertained, shall be regarded as the primary considerations to be taken into account in the evaluation of any place or object for the purposes of the Act".

When providing recommendations with regards to the archaeological significance of a place, the DIA requires the following attributes to be considered and articulated in archaeological reports:

- Research potential the potential of an Aboriginal site to contribute to timely and specific research questions. This depends on a number of factors including its state of preservation and the range of past human activities reflected at that site.
- Representativeness the extent to which the archaeology of a particular Aboriginal site is represented at other localities within the region. Unusual or unique sites are normally accorded a higher archaeological significance than sites that are very common.⁵

These requirements are based on Bowdler's framework for significance assessment which recommends that "...the significance of archaeological resources should be assessed according to 'timely and specific research questions' on the one hand, and representativeness on the other. The latter takes care of the argument that we cannot predict next year's or next century's research capabilities and interests, but itself requires research" (Bowdler 1981:129). Bowdler further highlights that archaeological significance "is a mutable, even transformational, quality, which changes as the subject changes" (Bowdler 1984:7).

Bickford and Bowdler (in Bowdler 1984:1–2; Bickford & Sullivan 1984:23–24; Sullivan 1983) developed the following set of questions to aid with the assessment of research potential:

1. Can this site contribute knowledge which no other site can?

⁵ See http://www.dia.wa.gov.au/en/Section-18-Applications/Heritagemanagement/Aboriginal-heritage-surveys/Guidelines-for-preparing-Aboriginal-heritagesurvey-reports/#13

- 2. Can this site contribute knowledge which no other resource, such as documents or oral history or previous research can?
- 3. Is this knowledge relevant to specific or general questions about human history or behaviour or some other substantive topic?

It should be noted, however, that the two concepts of research value and representativeness are not unproblematic (see Thomson 2012). The use of research questions or agendas has been criticised, amongst other things, for their inherent biases and failure to predict or cater for unanticipated or future research questions (Bruier & Mathers 1997; Smith 2004; Dixon 1977; Dunnell 1984; Raab & Klinger 1979). The concept of representativeness was conceived as a solution to these problems; however, as Smith (1994:27–28; 2004:119–20) has demonstrated, every site is unique in some respect and every site in a group of sites will be different. Hence, defining representativeness actually depends on the research questions asked and the criteria used to assess the resource.

Smith's (1991) research on defining a site type profile for artefact scatters determined that any move towards a representative sample must include sites from different time periods, different environmental units, different cultural and land management units and that the sample should also include different sized sites (based on artefact numbers and densities), sites containing different percentages of raw materials and artefact types, and that such variations should be considered for each time period, environmental, cultural and land management unit (Smith 1994:28). Smith highlights the practical issue of how viable, in a logistical sense, are representative samples and questions whether any of these attributes have any meaning in the context of archaeological theory and research (Smith 1994:28; Thomson 2012:12–13). Smith (1994:28–29) also emphasises Bowdler's point that the archaeological 'resource' and archaeological values are highly dynamic and change over time.

Further, it should also be noted that there are significant issues with the data available to inform assessments of representativeness. As McDonald, Hales and Associates (2001:34–35) note, the process of assessing representativeness is

predicated on the availability of high quality and up-to-date information. The main source of data is the DIA's AHIS which has several issues including very broadly defined site types which do not facilitate identification of sub-classes of sites (for example, different types of artefact scatters or shell scatters). Secondly, data on sites that have been destroyed in a region either through official sanction or illegally is not available. This lack of information can dramatically skew determinations of representativeness in a region. Thirdly, as some Aboriginal people, landowners and consultants choose not to submit consultancy reports to the DIA for a variety of reasons, the AHIS does not contain a complete record of surveys and site information in some regions. There is also significant variability in the quality and detail of information submitted to DIA as a result of the varying skills and experience of the site assessor; variation in technical, methodological or definitional differences between consultants; and differences in the timing, location and intensity of archaeological research (MHA 2001:34-35; see also Mathers et al. 2005). This variability can result in the incomparability of data and lead to a limited number of factors (such as site type) that can be compared in the assessment of representativeness (Thomson 2012:28).

Archaeological Significance Assessment Methodology

Any sites located during this inspection will be assessed for archaeological significance in terms of research potential in reference to the research questions outlined above and in reference to Bickford and Bowdler's questions also outlined above. In addition, research potential is also considered in light of a site's integrity, internal complexity, ability to be placed into a temporal context, and its potential for technological, spatial and microscopic analysis (such as residue and use wear analysis) and its connectedness to other sites within the local and regional context.

As consideration of representativeness is currently required by DIA, a very limited examination of a site's representativeness will be undertaken. However, it is employed and acknowledged as a flawed concept and will not be given precedence

in the assessment process. Available site variables used to compare sites for the purpose of representativeness include site type, site size, site location, artefact density, artefact assemblage composition and artefact assemblage raw material diversity.

It is re-emphasised here that evaluating archaeological significance is always contextual and will depend on and be determined by what the contemporary research agenda at the time is; what the current regional profile of representativeness of a particular site type is; and what scale the assessment is being made at. As Bowdler (1984) identified, archaeological significance is a 'mutable' and changeable quality and therefore the significance attributed to a site today may be subject to change in the future.

Degrees of Archaeological Significance

Within Western Australian archaeological grey literature⁶, it is common to rank significance using designations such as low, medium and high, or similar. Although there is some conjecture about assigning levels of significance to heritage places or objects, it is currently deemed a useful tool to assist the ACMC in determining the value of a site in relation to other sites.

The following guiding principles will be used in this assessment to determine the degree of archaeological significance of a site (see Table 4). It should be noted, however, that these are not definitive and any level of significance will be explained within the significance assessment of each individual site. It should also be noted that a site possessing low archaeological significance does not imply non-significance.

⁶ Unpublished archaeological reports and data including consultancy reports, theses etc.
ABN 47 065 099 228 Aboriginal Heritage

Table 4: Definition of degrees of archaeological significance

Degree of archaeological significance	Principles							
Low	 no or limited ability to provide information not available from other sources or sites 							
	• no or limited ability to contribute to or answer any pertinent research questions							
	common site represented at other localities within region							
	low total artefact assemblage							
	low artefact diversity and/or density							
	relatively disturbed							
Medium	• some ability to provide information not available from other sources or sites							
	• some ability to contribute to or answer any pertinent research questions							
	medium artefact diversity and/or density							
	moderate to good preservation							
	depth of archaeological deposit							
High	• good ability to provide information not available from other sources or sites							
	• good ability to contribute to or answer any pertinent research questions							
	rare site type							
	sites with features not commonly found together							
	good depth of archaeological deposit							
	relatively undisturbed							
	• potential for high scale of significance – i.e. state or national importance							

Archaeological Assessment Results

Archaeological Survey

The archaeological survey was undertaken by Ms Jo-Anne Thomson and Ms Christine Martin of TCHM on 3 and 4 April 2012.

The six sample survey areas totalled 0.2203 sq km (22.03 hectares, 33.9% of the total project area), of which 0.1673 sq km (16.73 hectares, 25.7% of project area) comprised areas of high archaeological potential and 0.053 sq km (5.3 hectares, 8% of project area) comprised areas of low archaeological potential. The survey areas were bounded by the MGA coordinates listed in Table 3 above (see also Figure 2). Pedestrian transects were spaced 5–10 m apart and walked on a north-south orientation across each of the six survey areas.

The majority of the project area consisted of flat, low-lying plausiplain alluvial soils, which become seasonally inundated, interspersed with occasional white Bassendean sand dunes or rises, overlaying the plausiplain. In some parts of the project area the sand rises have been excavated and sands deposited across the plausiplain.

The project area currently comprises farming paddocks and has been previously cleared and used for agricultural purposes. Several fences and vehicle tracks dissect the project area and a demolished cattle yard and sheds were located along the eastern boundary of the property. Cattle were present in some of the paddocks at the time of the survey and several animal burrows were also noted in the northeast of the project area.

Remnant vegetation, comprising *Eucalyptus sp.* trees, exists along the northern and eastern boundaries of the property (see Figure 2). Ground cover consisted of low grasses. Visibility was reasonably low and consistent across all survey areas, ranging between 5 and 15% and averaging approximately 10%.

ABN 47 065 099 228 Aboriginal Heritage



Plate 3: Lot 50 Mundijong Road survey area 1, view south



Plate 4: Lot 50 Mundijong Road survey area 2, view north



Plate 5: Lot 50 Mundijong Road survey area 3, view north

ABN 47 065 099 228 Aboriginal Heritage



Plate 6: Lot 50 Mundijong Road survey area 3, view west



Plate 7: Lot 50 Mundijong Road survey area 4, view northwest

ABN 47 065 099 228 Aboriginal Heritage



Plate 8: Lot 50 Mundijong Road survey area 5, view east



Plate 9: Lot 50 Mundijong Road survey area 5, view east-northeast



Plate 10: Lot 50 Mundijong Road survey area 6, view east

ABN 47 065 099 228 Aboriginal Heritage



Plate 11: Lot 50 Mundijong Road survey area 6, view north of animal burrow

Archaeological Sites Located

One archaeological site (MJ-06), an artefact scatter, was located during the survey. A detailed site description is provided below.

Isolated Artefacts Located

Five isolated artefacts were located and recorded in detail during the survey (see Table 5). All of the isolated artefacts comprised small quartz flaked pieces, all weighing less than approximately 5g (see Plate 12 & Plate 13).

No retouch was observed on any of the pieces. These five isolated artefacts are considered by the author, and are recommended to the ACMC, as **not** constituting an Aboriginal Site under Section 5 of the AHA.



Plate 12: Isolated artefact IA-02, survey area 6



Plate 13: Isolated artefact IA-03, survey area 6

ABN 47 065 099 228

Aboriginal Heritage

Table 5: Isolated artefacts located within Lot 50 Mundijong Road, Mundijong

Artefact	Easting	Northing	Artefact	Lithology	Artefact Dimensions			Platform	Platform D	imensions
#	(mE)	(mN)	Туре					Туре		
					Length	Width	Depth		Length	Width
IA-01	403066	6426859	FP	WQ	34.5	16.4	6.6	-	-	-
IA-02	403422	6426818	FP	PQ	15.5	15.6	6.1	-	-	-
IA-03	403420	6426811	FP	WQ	15.9	8.8	9.4	-	-	-
IA-04	403576	6426771	FP	WQ	13.5	10.7	7.9	-	-	-
IA-05	403476	6426766	FP	WQ	8.4	5.2	4.7	-	-	-

Artefact #	# Dorsal flake scars	Cortex%	Parallel Arrises	Retouch/ Utilisation?	R/U Location	R/U Length	Weight (g)
IA-01	1	0	0	Ν	-	-	5.1
IA-02	1	0	0	Ν	-	-	2
IA-03	2	0	0	Ν	-	-	1.5
IA-04	1	15	0	N	-	-	2.3
IA-05	1	0	0	N	-	-	0.2

ABN 47 065 099 228 Aboriginal Heritage

Archaeological Site Description

MJ-06 – Artefact scatter

Grid References

1.	403114 mE	6426523 mN	6.	403154 mE	6426488 mN
2.	403130 mE	6426527 mN	7.	403144 mE	6426479 mN
3.	403149 mE	6426519 mN	8.	403121 mE	6426483 mN
4.	403158 mE	6426513 mN	9.	403109 mE	6426496 mN
5.	403160 mE	6426503 mN	10.	403108 mE	6426516 mN

Location

MJ-06 is located in the central western portion of Lot 50 Mundijong Road, Mundijong. It is approximately 750m west of Adonis Street and 410m north of Mundijong Road (see Figure 2).

Environment

The artefact scatter is located on a white Bassendean sand dune surrounded by lowlying plausiplain. The dune is approximately 5m high with an elevation of 34.5m at the highest point of the dune and 29.6m at its base. Sand has been excavated out of part of the eastern face of the dune and it has subsequently formed a deflation area. The dune has been previously cleared of vegetation. Three *Eucalyptus sp.* trees line the eastern base of the dune and the base of the deflation is densely grassed. The rise is relatively intact, with the exception of the deflation area, and the site has been subject to some minor disturbance by pastoral activities and grazing stock. The ground surface comprises fine white sand and visibility at the time of recording was approximately 50% (see Plate 14 & Plate 19).

The nearest potable water source to MJ-06 is Mandejal Brook, located 1.89km to the north. Medulla Brook is located 2.9km to the southeast. The surrounding low-lying plausiplain would have been inundated seasonally during the winter months.

Description

MJ-06 comprises a small stone artefact scatter with a medium artefact density and a low level of raw material diversity. Artefacts are visible over an area of 52m (east-west) by 48m (north-south), or 1877 sq m, in an east-facing deflation within the sand dune. A 5.3% sample of the site's surface expression was examined and 15 artefacts were recorded.

Based on the data collected from 99 sample squares (1 x 1m in size), the average artefact density is medium (0.15/sq m) and the estimated total surface artefact population is 282 artefacts. Artefact types recorded within the site included debris (n=7, 50%), flaked pieces (n=6, 42.9%) and one flake (n=1, 7.1%) (see Figure 5).

The majority of artefacts were manufactured from white quartz (n=13, 92.9%) with one artefact made from crystal quartz being recorded (n=1, 7.1%) (see Figure 6). The majority of artefacts were also small in size, with 13 (92.9%) artefacts weighing less than 1 gram (Figure 7).

The cross-sectional shape of the artefacts varied, with wedge-shaped (n=4, 28.6%) and irregularly-shaped (n=4, 28.6%) artefacts being most common, followed by lenticular (n=3, 21.4%), tabular (n=2, 14.3%) and triangular (n=1, 7.1%) (see Figure 8).

No retouch was noted on any of the recorded artefacts.

See Table 6 for full artefact metrics.

ABN 47 065 099 228 Aboriginal Heritage



Figure 5: MJ-06 artefact types and quantities









ABN 47 065 099 228 Aboriginal Heritage



Figure 8: MJ-06 flaked artefact cross-sectional shape

Table 6: MJ-06 artefact data

Sample	Artefact	Artefact	Lithology	Cross-	Artefact Dimensions			Platform	Platform D	imensions
square	#	Type		section	Length	Width	Depth	Type	Length	Width
W16	1	FP	WQ	W	9.1	9	3.3	-	-	-
W16	2	FP	WQ	L	11.8	8.3	1.5	-	-	-
W16	3	DB	WQ	W	6.8	2.6	1.3	-	-	-
W17	1	DB	WQ	W	4.1	3.3	1.1	-	-	-
E11	1	FP	WQ	Ι	15.1	6.4	3.7	-	-	-
W27	1	DB	WQ	ТВ	6.1	3.4	0.8	-	-	-
W20	1	DB	WQ	L	4.6	2.5	1	-	-	-
E15	1	DB	WQ	Ι	11.7	10.2	2.6	-	-	-
W37	1	DB	WQ	W	9.7	4.6	4.4	-	-	-
W40	1	DB	CQ	TG	6.8	4.5	2.1	-	-	-
W52	1	FP	WQ	Ι	10.7	8.3	3.3	-	-	-
W50	1	FP	WQ	ТВ	14.5	7.9	2.6	-	-	-
W50	2	FP	WQ	Ι	16.2	11.1	2.9	-	-	-
-	"F"	F	WQ	L	16.8	13.8	3.7	FO	-	-

Sample square	Artefact #	Termination	# Dorsal flake scars	Cortex%	Parallel Arrises	Retouch/ Utilisation?	R/U Location	R/U Length	Weight (g)
W16	1	-	2	0	0	Ν	-	-	0.3
W16	2	-	1	5	0	Ν	-	-	0.3
W16	3	-	-	0	0	Ν	-	-	0.3
W17	1	-	-	0	0	Ν	-	-	< 0.1
E11	1	-	-	0	0	Ν	-	-	26
W27	1	-	-	0	0	Ν	-	-	< 0.1
W20	1	-	-	0	0	Ν	-	-	< 0.1
E15	1	-	-	0	0	Ν	-	-	0.5
W37	1	-	-	0	0	Ν	-	-	0.2
W40	1	-	-	0	0	Ν	-	-	< 0.1

Sample	Artefact	Termination	# Dorsal	Cortex%	Parallel	Retouch/	R/U	R/U	Weight
square	#		flake		Arrises	Utilisation?	Location	Length	(g)
W52	1		1	0	0	Ν	-	-	0.4
W50	1	-	2	0	0	Ν	-	-	0.3
W50	2	-	2	0	0	Ν	-	-	0.6
-	"F"	-	1	0	0	Ν	-	-	0.9



Figure 9: MJ-06 Site Plan

Site Interpretation

Based on the dominance of debris and flaked pieces in the site, the absence of formal tools or retouched pieces, the density and the low raw material diversity, and the long distance to any major water source, MJ-06 is interpreted as representing either the by-products of task-specific activities or a short-term or relatively infrequently utilised occupation site, reflective of high residential mobility. The assemblage at this site reflects a technological process of on-site manufacture of cores and/or other artefacts prior to their removal and use in other parts of the landscape, leaving the discarded debitage component behind. Following Hallam's relative dating scheme, the site could be classified as a Late Phase site as it is comprised of a quartz-rich assemblage with a high proportion of waste flakes.

MJ-06's assemblage composition may also be influenced by the periodic erosion of the sand dune and additional impacts by agricultural activities. As identified by Anderson (1983 in Bowdler et al 1991:25), the Bassendean dune system consists of a stable core with a superficial mobile layer of continually reworking sands, within which artefacts may have been deposited over time, but which became completely mixed on one level due to continual deflation. Therefore, the assemblage's current appearance, consisting of relatively small debitage, may in fact be a product of taphonomic processes and subsequent disturbance of the site.

Based on the nature of the landform unit within which MJ-06 is situated, there is some potential for the dune to contain subsurface archaeological materials; however, noting the results of other excavations within the Bassendean Sands unit and the local region, it is unlikely that the site will contain stratified or dateable subsurface deposit.

It is the opinion of the authors that MJ-06 constitutes a site within the meaning of Section 5(a) of the *Aboriginal Heritage Act* 1972.

Archaeological Significance Assessment

The data that has been collected from this site can contribute to a significant proportion of the research questions identified above relating to site location, in that it supports the hypothesis that sites are located in deflations on the eastern and top of elevated Bassendean white sand dunes or rises. Beyond site distribution, data from the site can only contribute to questions regarding the variability of artefact assemblages and site function (from a strictly technological perspective).

Whilst MJ-06 is able to contribute information and data towards answering many of the identified research questions, the site is relatively low in complexity and the collected data does not provide any substantially different information or new data in comparison with the existing knowledge base. The potential for technological analyses of the artefact assemblage is also limited as the assemblage comprises mainly debris from which very little can be determined with regards to manufacturing processes and stone tool technology. On a microscopic scale, whilst it may be possible to extract residue samples from the artefacts or conduct use-wear analyses, it is unlikely given that much of the assemblage comprises very small debitage and debris that such investigations will reveal much.

The excavation of sand and erosion of the dune within which the site occurs has reduced the ability to investigate research questions relating to the subsurface deposits or temporal aspects. However, other parts of the dune outside the deflation are still relatively intact and therefore the site's potential to contribute further information regarding subsurface deposit has not been completely affected by the disturbance.

There is little evidence of the connectedness of MJ-06 with other sites in the region and it does not constitute part of a site complex.

The representativeness of MJ-06 can only be assessed, due to limited available data, in terms of site type, topographic location, site size, distance to water, artefact assemblage composition (including artefact types, size and lithology) and artefact

density. MJ-06 comprises the most common site type located both within the local region (5km radius) and on the Swan Coastal Plain. MJ-06 can be regarded as very typical of open flaked stone artefact scatters, both within the local region and on the Swan Coastal Plain, as it is small in size, of medium density, over 300m away from a water source, is located in a partially disturbed context on Bassendean sands and its assemblage is dominated by small-sized quartz debitage.

In light of the above, MJ-06 is assessed as having relatively low archaeological research potential and as being a typical example of a common site type. MJ-06 is assessed, therefore, as currently being of **low archaeological significance**.



Plate 14: Site MJ-06, view west



Plate 15: Site MJ-06, view northwest



Plate 16: Site MJ-06, view north



Plate 17: Site MJ-06, sample square E11



Plate 18: Site MJ-06 quartz artefact in sample square E11



Plate 19: Site MJ-06, quartz flake

ABN 47 065 099 228 Aboriginal Heritage

Part 3 - Conclusions and Recommendations

The search of the Register of Aboriginal Sites revealed that there are no previously recorded ethnographic sites on the land.

No ethnographic sites were reported on the land during the ethnographic survey which involved representatives of the Bilya Noongar Organisation and Winjan Aboriginal Corporation, both of which have long-standing associations with the region and whose membership are claimants in the Gnaala Karla Booja (WC98/58). Two of the WAC consultants had actually lived in Mundijong for a period and had attended primary school in town. Both recall use of the area's natural resources by Nyungars living in town, on farms and in fringe camps in the area.

One archaeological site (MJ-06), an artefact scatter, was located on Lot 50 during the archaeological survey. Five isolated artefacts were also located and recorded.

MJ-06 is a small, medium-density, open quartz artefact scatter situated on a Bassendean sand dune above seasonally inundated wetlands. The artefacts are located within a deflation in the sand dune, which appears to have been previously excavated during agricultural activities. The site represents either the by-products of task specific activities or a short term or infrequently used occupation site. It is the opinion of the authors that MJ-06 constitutes a site within the meaning of Section 5(a) of the *Aboriginal Heritage Act* 1972. However, MJ-06 is assessed as currently being of low archaeological significance. No further recording of the surface assemblage of MJ-06 is required.

The consultants of both groups were also of the view that Site MJ-06 was of low cultural significance and do not oppose Peet Limited applying for Section 18 consent in relation to this site. They differed, however, in how the site should then be treated. The former wants the material left *in situ*, while the latter wants the material salvaged and appropriately stored. At present it is not possible to reconcile these opposing views.

ABN 47 065 099 228 Aboriginal Heritage

Recommendations

- 1. It is recommended Peet's proposed development of Lot 50 Mundijong Road, Mundijong proceed.
- 2. It is recommended that Peet and its contractors are:
 - a. advised of the existence and location of archaeological site MJ-06; and
 - b. informed that the *Aboriginal Heritage Act* 1972 (s5) may apply to MJ-06 and therefore it should not be impacted upon in any way without Ministerial consent under Section 18 of the AHA or the authority of the Registrar under Section 16.
- 3. It is recommended that Ministerial consent be given for the land on which archaeological site MJ-06 (artefact scatter) is located.
- 4. It is recommended that further consultation is undertaken with the Bilya Noongar Organisation and the Winjan Aboriginal Corporation regarding the disposition of the artefactual material in site MJ-06.

ABN 47 065 099 228 Aboriginal Heritage

References

- Anderson, J. (1984) 'Between Plateau and Plain: Flexible Responses to Varied Environments in Southwestern Australia' in Occasional Papers in Prehistory No. 4 Canberra: Australian National University.
- Australia ICOMOS (1999) The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter).
- Bates, D. (1985) *The Native Tribes of Western Australia*. I. White (ed.) National Library of Australia, Canberra.
- Beard, J. S. (1990) Plant Life of Western Australia. Kenthurst NSW: Kangaroo Press.
- Berndt, R. (1979) 'Aborigines of the South-west' in Berndt, R. & Berndt, C.H. *Aborigines of the West*. Nedlands: University of Western Australia Press.
- Bickford, A. & Sullivan, S. (1984) 'Assessing the Research Significance of Historic Sites' in Site Surveys and Significance Assessment in Australian Archaeology. S. Sullivan & S. Bowdler (eds.). Canberra: Department of Prehistory, Research School of Pacific Studies, the Australian National University, 19–26.
- Biskup, P. (1973) Not Slaves Not Citizens. St Lucia: University of Queensland Press.
- Blockley, E. & Greenfeld, P. (1995) Report of an Aboriginal Heritage Survey: South-East Corridor Structure Plan, West Perth: Unpublished report prepared by McDonald, Hales and Associates for the Ministry of Planning.
- Blockley, E., Greenfeld, P., Edwards, K., McDonald, E. M. & Murphy, A. (1996) Revised Report of an Aboriginal Heritage Survey: South-East Corridor Structure Plan, West Perth: Unpublished report prepared by McDonald Hales and Associates for the Ministry of Planning.
- Bourke, M. J. (1987) *On the Swan: A History of the Swan District Western Australia.* Nedlands: University of Western Press.
- Bowdler, S. (1981) 'Unconsidered trifles? Cultural Resource Management, Environmental Impact Statements and Archaeological Research in New South Wales' in *Australian Archaeology*, 12, 123–33.
- Bowdler, S. (1984) 'Archaeological Significance as a Mutable Quality' in Site Surveys and Significance Assessment in Australian Archaeology. S. Sullivan & S. Bowdler (eds.). Canberra: Department of Prehistory, Research School of Pacific Studies, The Australian National University, 1-9.
- Bowdler, S., Strawbridge, L. & Schwede, M. (1991) 'Archaeological Mitigation in the Perth Metropolitan Region' in *Australian Archaeology*, 32, 21–5.
- Brown, S. H. (1983) A Survey for Aboriginal Sites Ethnographic Investigations Relating to Some Proposed Highway and Road Developments in the Perth

ABN 47 065 099 228 Aboriginal Heritage

Metropolitan Area. Unpublished report prepared for Main Roads Department, Perth.

- Bruier, F. L. & Mathers, C. (1997) Trends and Patterns in Cultural Resource Significance: An Historical Perspective and Annotated Bibliography, Technical Report EL-97-5. Washington DC: Prepared for U.S. Army Corps of Engineers.
- Burke, S. F., Murphy, A. & Edwards, K. (1998) Report on Additional Ethnographic Consultation, Mitigative Recording, and Newly Identified Archaeological Material, Byford Village, Byford, Perth. Unpublished report prepared by McDonald, Hales and Associates for Mitchell Goff.
- Byrne, D., Brayshaw, H. & Ireland, T. (2003) Social Significance: a Discussion Paper. Hurstville: NSW National Parks and Wildlife Service.
- Carter, J. (1986) Bassendean: A Social History 1829–1979. Perth: Bassendean Town Council.
- Cooper, W. S. & McDonald, G. (1989) *A City of All Seasons: The Story of Melville*. Melville: City of Melville.
- Coy, N. J. (1984) *The Serpentine: A History of the Shire of Serpentine-Jarrahdale. Mundijong, WA*: The Shire of Serpentine-Jarrahdale.
- Department of Indigenous Affairs (2002) Draft Guidelines for Aboriginal Heritage Assessment in Western Australia. Department of Indigenous Affairs, Perth.
- Department of Indigenous Affairs (2011) *Cultural Heritage Due Diligence Guidelines*. Department of Indigenous Affairs, Perth.
- Dixon, K. A. (1977) 'Applications of Archaeological Resources: Broadening the Basis of Significance' in M. B. Schiffer & C. J. Gumerman (eds.) *Conservation Archaeology*. New York: Academia Press.
- Dunnell, R. C. (1984) 'The Ethics of Archaeological Significance Decisions' in E. L. Green (ed.) *Ethics and Values in Archaeology*. New York: The Free Press.
- Edwards, K. (2007) Report on Phase I Archaeological Survey, Lot 2 Nettleton Road, Byford, Perth. Unpublished report prepared by Tempus Archaeology for the Aspen Group on behalf of Ethnosciences.
- Edwards, K. (2008) Report on an Archaeological Survey, Proposed Marmion Avenue Extension, Eglinton, W.A. Perth: Tempus Archaeology.
- Edwards, K. & McDonald, E. M. (1999) Report of the Archaeological and Ethnographic Survey of the Proposed Tonkin Highway Extension and Mundijong Road Realignment Project, West Perth: Unpublished report prepared by McDonald, Hales and Associates for BSD Consultants.
- GHD (2009) Mundijong Whitby District Structure Plan District Water Management Strategy. Unpublished report prepared for the Shire of Serpentine-Jarrahdale.

- Green, N. (ed.) 1979 Nyungar The People: Aboriginal Customs in the Southwest of Australia. Perth: Creative Research.
- Greer, S. & Henry, R. (1996) 'The Politics of Heritage: the Case of the Kuranda Skyrail' in J. Finlayson & Jackson-Nakano, A. (eds.) *Heritage and Native Title: Anthropological and Legal Perspectives.* Canberra: Australian Institute of Aboriginal and Torres Strait Islander Studies, 15–27.
- Haebich, A. (1988) For Their Own Good: Aborigines and Government in the Southwest of Western Australia, 1900–1940. Nedlands: University of Western Australia Press.
- Hallam, S. J. (1975) *Fire and Hearth: a Study of Aboriginal Usage and European Usurpation in Southwestern Australia*. Canberra: Australian Institute of Aboriginal Studies.
- Hallam, S. J. (1987) 'Coastal Does Not Equal Littoral' in *Australian Archaeology*, 25, 10-29.
- Hallam, S. J. & Tilbrook, L. (1990) *Aborigines of the Southwest Region*. Nedlands: University of Western Australia Press.
- Hammond. J. E. (1980/1933) *Winjan's People: The Story of the South West Australian Aborigines.* Victoria Park: Hesperian Press (Facsimile Edition).
- Harrington, J. T. (2004) Being Here: Heritage, Belonging and Place Making. A Study of Community and Identity Formation at Avebury (England), Magnetic Island (Australia) and Ayutthaya (Thailand). School of Anthropology, Archaeology and Sociology, James Cook University.
- Holdaway, S and Stern, N. (2004) A Record in Stone: The Study of Australia's Flaked Stone Artifacts. Aboriginal Studies Press, Canberra.
- Keen, I. (1997) 'Continent of Foragers: Aboriginal Australia as a 'regional system'' in P. McConvell & N. Evans (eds.) Archaeology and Linguistics: Aboriginal Australia in Global Perspective. Melbourne: Oxford University Press.
- Mathers, C., Schelberg, J. & Kneebone, R. (2005) "Drawing Distinctions': Toward a Scalar Model of Value and Significance' in C. Mathers, T. Darvill & B. J. Little Gainesville (eds.) *Heritage of Value, Archaeology of Renown*. University Press of Florida, 160–91.
- McDonald & Christensen (n.d.) 'B[u]rndt Recipes A Pinch of Daisy Bates, a Large Dollop of Radcliffe-Brown, Carefully Overlaid with a Fine Mesh of Tindale: Notes on the Social Organisation of some Western Australian Tribes.' Paper read at the Anthropological Society of Western Australia meeting October 1999.
- McDonald, Hales and Associates (2001) Report of an Aboriginal Heritage Survey: Proposed Forrestdale Industrial Estate. Unpublished consultancy report prepared by McDonald, Hales and Associates for Taylor Burrell.
- O'Connor, R. & Quartermaine, G. (1989) Report on a Survey for Aboriginal Sites on the Proposed Byford-Collie and Ongerup-Jerramungup Sections of the Perth to
ABN 47 065 099 228 Aboriginal Heritage

Adelaide Optic Fibre Cable Route. Unpublished report prepared by Quartermaine Consultants for Telecom Australia.

- Pope, B. (1993) 'Aboriginal Message and Mail Carriers in South Western Australia in the Early and Mid-Nineteenth Century' in K. de Garis (ed.) *Portraits of the South West: Aborigines, Women and the Environment*. Nedlands: University of Western Australia Press.
- Popham, D. (1980) First Stage South: A History of the Armadale-Kelmscott District, Western Australia. Town of Armadale: Armadale, Western Australia.
- Prince, C., Hovingh, R., Lewington, J. & Lamond, T. (1996) Report of an Aboriginal Heritage Survey, Byford Village, Byford. Unpublished report prepared by McDonald, Hales and Associates for Mitchell Goff.
- Quartermaine, G. (1986) Addendum to Aboriginal Site Survey of Dampier to Perth Natural Gas Pipeline - Gas Lateral Facilities Carnarvon Lateral. Unpublished report prepared by Quartermaine Consultants for Dames & Moore Pty Ltd.
- Quartermaine, G. & Heine, C. (1996). Report on an Archaeological Investigation for Aboriginal Sites: Proposed Roadworks at Mundijong Road. Unpublished report prepared by Quartermaine Consultants for Halpern Glick Maunsell Pty Ltd and Main Roads WA.
- Raab, L. M. & Klinger, T. C. (1979) 'A Reply to Sharrock and Grayson on Archaeological Significance' in *American Antiquity* 44 (2): 328–29.
- SMEC (2009) Environmental Study for Mundijong/Whitby District Structure Plan. Unpublished report prepared for the Shire of Serpentine-Jarrahdale.
- Smith, L. (1991) Type Profiles: Open Campsites. Unpublished report to the Australian Heritage Commission, Canberra.
- Smith, L. (1994) 'Site Classifications and Definitions of Representativeness in Australian Cultural Resource Management' in G. Dunnett & S. Feary (eds.) *Representativeness and Aboriginal Sites*. Canberra: Australian Heritage Commission. 25–33.
- Smith, L. (2004) *Archaeological Theory and the Politics of Cultural Heritage.* London and New York: Routledge.
- Strawbridge, L. (1987) Aboriginal Sites in the Perth Metropolitan Area: A Management Scheme. A Report for Department of Aboriginal Sites, Western Australian Museum. Perth: Centre for Prehistory, University of Western Australia.
- Tempus Archaeology (2006) Report on Phase I Archaeological Investigations: Proposed Byford Residential Sub-division, Shire of Serpentine-Jarrahdale, WA. Unpublished report prepared by Tempus Archaeology for Byford Syndicate, C/-LWP Property Pty Ltd on behalf of Ethnosciences.

ABN 47 065 099 228 Aboriginal Heritage

- Thomson, J. (2011) A Report on the Archaeological Assessment of the Proposed Runoff Water Storage Areas 7 and 8 and Rezoning Area, Alcoa Farmlands, Pinjarra, Western Australia. Unpublished report prepared by Thomson Cultural Heritage Management for Alcoa of Australia Limited on behalf of Ethnosciences.
- Thomson, J. R. (2012) The Western Tension Zone: Archaeological Significance Assessments of Indigenous Stes in Western Australia in School of Built Environment. Perth: Curtin University.
- Thomson, J. R. & Slack, M. (2011) Report on a Mitigative Salvage Program at DIA Site 3405, Baldivis: Baldivis Road, Baldivis, Western Australia. Unpublished report prepared by Thomson Cultural Heritage Management on behalf of Ethnosciences for Stockland WA (Estates) Pty Ltd.
- Tindale, N. (1974) *The Aboriginal Tribes of Australia*. Berkley: University of California Press.
- Truscott, M. (1992) 'Places Can Have Conflicting Values: Concept a Challenge to ICOMOS' in *Heritage News*, 14(4), 2.
- Tunbridge, J. E. & Ashworth, G. J. (1996) *Dissonant Heritage: the Management of the Past as a Resource in Conflict.* Chichester and New York: J. Wiley.
- Western Infrastructure (2001) Tonkin Highway Extension Public Environmental Review. Unpublished Report for Main Roads Western Australia, Perth.

ABN 47 065 099 228 Aboriginal Heritage

Appendix 1 – DIA Aboriginal Heritage Information System Search Results

Department of Indigenous Affairs	Aboriginal Sites Database	
arch Criteria		
sites in a search box. The box is formed by these diagonally	opposed comer points:	
MGA Zone 50		
Northing Easting		
6434378 397460		
6421013 409908		

Government of Wester Department of Indigenou	rn Australia us Affairs	A	boriginal Heritage Inquiry System Aboriginal Sites Database	
Disclaimer				
Aboriginal sites exist that are not reco protects all Aboriginal sites in Wester	orded on the F rn Australia wh	Register of Aboriginal Sites, and nether or not they are registered.	some registered sites may no longer exist. Consultation with Aboriginal communities is on-going to identify additional sites. The AHA	
Copyright				
Copyright in the information container established and maintained under the	d herein is an e Aboriginal H	d shall remain the property of the eritage Act 1972 (AHA).	State of Western Australia. All rights reserved. This includes, but is not limited to, information from the Register of Aboriginal Sites	
Legend				
Restriction Ac	ccess	Coordinate Ac	curacy	
N No restriction	C Closed	Accuracy is sh	own as a code in brackets following the site coordinates.	
M Male access only		[Reliable]	The spatial information recorded in the site file is deemed to be reliable, due to methods of capture.	
F Female access	V Vulnerab	le [Unreliable]	The spatial information recorded in the site file is deemed to be unreliable due to errors of spatial data capture and/or quality of spatial information reported.	
Status				
L - Lodged		ACMC Decision Made		
Information lodged.	\rightarrow	R - Registered Site		
awaiting assessment		I - Insufficient information		
		S - Stored Data		
Spatial Accuracy				
Index coordinates are indicative locat based on the GDA 94 datum. The Ea	tions and may asting / Northin	not necessarily represent the co ng map grid can be across one o	ntre of sites, especially for sites with an access code "closed" or "vulnerable". Map coordinates (Lat/Long) and (Easting/Northing) are r more zones. The zone is indicated for each Easting on the map, i.e. '5000000:250' means Easting=5000000, Zone=50.	
Sites Shown on Maps				
Site boundaries may not appear on ma	aps at low zoo	m levels		
© Government of Western Australia			Report created 06 Mar 2012 16:00:17. Identifier: 892959.	Page 2

				List of 29 Registe	ered Aboriginal Sit	es with Map			
Site ID	Status	Access	Restrictio	on Site Name	Site Type	Additional Info	Informants	Coordinates	Site No
396	R	0	N	South-East Corridor 07 / Cardup Siding	Artefacts / Scatter			403514mE 6432467mN Zone 50 [Reliable]	S02959
448	R	0	N	South-East Corridor 01	Artefacts / Scatter			403350mE 6431996mN Zone 50 [Reliable]	S02953
449	R	0	N	South-East Corridor 02	Artefacts / Scatter			403039mE 6429389mN Zone 50 [Reliable]	S02954
450	R	0	N	South-East Corridor 03	Artefacts / Scatter			402915mE 6428941mN Zone 50 [Reliable]	S02955
3582	R	С	N	Serpentine River	Ceremonial, Mythological		*Registered Informant names available from DIA.	Not available for closed sites	S02407
3648	R	0	N	Soldiers Road,mundijong.	Artefacts / Scatter	Archeological Deposit, [BP Dating: 1620BP]		404714mE 6428249mN Zone 50 [Reliable]	S02329
16089	R	0	N	Byford 01	Artefacts / Scatter			407178mE 6433329mN Zone 50 [Unreliable]	
16090	R	0	N	Byford 02	Artefacts / Scatter		*Registered Informant names available from DIA.	407169mE 6433099mN Zone 50 [Unreliable]	
16091	R	0	N	Byford 03	Artefacts / Scatter		*Registered Informant names available from DIA.	407119mE 6432899mN Zone 50 [Unreliable]	
16092	R	0	N	Byford 04	Artefacts / Scatter		*Registered Informant names available from DIA.	407049mE 6432879mN Zone 50 [Unreliable]	

ite ID	Status	Access	Restrictio	n Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
6093	R	0	N	Byford 05	Artefacts / Scatter		*Registered Informant names available from DIA.	406899mE 6432879mN Zone 50 [Unreliable]	
6094	R	0	N	Byford 06	Artefacts / Scatter		*Registered Informant names available from DIA.	406479mE 6433489mN Zone 50 [Unreliable]	
6095	R	0	N	Byford 07	Artefacts / Scatter		*Registered Informant names available from DIA.	406579mE 6433489mN Zone 50 [Unreliable]	
6096	R	0	N	Byford 08	Artefacts / Scatter		*Registered Informant names available from DIA.	406429mE 6432829mN Zone 50 [Unreliable]	
6097	R	0	N	Byford 09	Artefacts / Scatter	Shell	*Registered Informant names available from DIA.	406539mE 6433359mN Zone 50 [Unreliable]	
6098	R	0	N	Byford 10	Artefacts / Scatter		*Registered Informant names available from DIA.	406729mE 6433489mN Zone 50 [Unreliable]	
6099	R	0	N	Byford 11	Artefacts / Scatter		*Registered Informant names available from DIA.	406599mE 6433399mN Zone 50 [Unreliable]	
6100	R	0	N	Byford 12	Artefacts / Scatter			407153mE 6432454mN Zone 50 [Unreliable]	
6101	R	0	N	Byford 13	Artefacts / Scatter			407100mE 6432337mN Zone 50 [Unreliable]	
6102	R	0	N	Byford 14	Artefacts / Scatter		*Registered Informant names available from DIA.	406919mE 6432399mN Zone 50 [Unreliable]	
6103	R	0	N	Byford 15	Artefacts / Scatter		*Registered Informant names available from DIA.	406819mE 6432419mN Zone 50 [Unreliable]	

ite ID	Status	Access	Restriction	n Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
16104	R	0	N	Byford 16	Artefacts / Scatter		*Registered Informant names available from DIA.	406729mE 6432419mN Zone 50 [Unreliable]	
16105	R	0	N	Byford 17	Artefacts / Scatter		*Registered Informant names available from DIA.	406789mE 6432669mN Zone 50 [Unreliable]	
16106	R	0	N	Byford 18	Artefacts / Scatter		*Registered Informant names available from DIA.	406879mE 6432649mN Zone 50 [Unreliable]	
16107	R	0	N	Byford 19	Artefacts / Scatter		*Registered Informant names available from DIA.	406929mE 6432549mN Zone 50 [Unreliable]	
18187	R	0	N	Tonkin Highway - Mundijong Road Scatter # 11	Artefacts / Scatter			402958mE 6428173mN Zone 50 [Reliable]	
18188	R	0	N	Tonkin Highway - Mundijong Road Scatter # 12	Artefacts / Scatter			402961mE 6428042mN Zone 50 [Reliable]	
18191	R	0	N	Tonkin Highway - Mundijong Road Scatter # 15	Artefacts / Scatter			406725mE 6424750mN Zone 50 [Reliable]	
23917	R	O	Ν	Byford Archaeological Survey 004	Artefacts / Scatter			403917mE 6432563mN Zone 50 [Reliable]	



				List of 29 Other He	eritage Places wit	th Map		
Site ID	Status	Access	Restrictio	on Site Name	Site Type	Additional Info Informants	Coordinates	Site No
3310	S	0	Ν	Cardup.	Artefacts / Scatter	Camp	404190mE 6432718mN Zone 50 [Unreliable]	S0020
3313	0	0	N	Mundíjong.	Artefacts / Scatter	Camp	406065mE 6426234mN Zone 50 [Unreliable]	S0020
3590	1	0	N	Whitby	Artefacts / Scatter		407195mE 6427120mN Zone 50 [Unreliable]	S0241
3591	Ú.	0	N	Yarrabah	Artefacts / Scatter		406870mE 6425980mN Zone 50 [Unreliable]	S0241
16108	S	0	Ν	Cardup Brook	Mythological		407530mE 6431805mN Zone 50 [Reliable]	
17923	S	0	N	lf #2	Artefacts / Scatter		403038mE 6427638mN Zone 50 [Reliable]	
18189	S	0	N	Tonkin Highway - Mundijong Road Scatter # 13	Artefacts / Scatter		403043mE 6427990mN Zone 50 [Reliable]	
18190	S	0	N	Tonkin Highway - Mundijong Road Scatter # 14	Artefacts / Scatter		404475mE 6425300mN Zone 50 [Reliable]	
18192	S	0	N	Tonkin Highway - Mundijong Road Scatter # 16	Artefacts / Scatter		407050mE 6424150mN Zone 50 [Reliable]	
21305	S	0	N	Byford Village Isolated Finds	Artefacts / Scatter	[Other: Multiple Isolated Finds]	406780mE 6433772mN Zone 50 [Unreliable]	

Site ID	Status	Access	Restriction	Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
23914	S	0	N	Byford Archaeological Survey 001	Modified Tree, Artefacts / Scatter			405373mE 6432652mN Zone 50 [Reliable]	
23915	S	0	N	Byford Archaeological Survey 002	Artefacts / Scatter			404363mE 6432537mN Zone 50 [Reliable]	
23916	S	0	N	Byford Archaeological Survey 003	Artefacts / Scatter			403847mE 6432559mN Zone 50 [Reliable]	
23918	S	0	N	Byford Archaeological Survey 005	Artefacts / Scatter			404185mE 6433441mN Zone 50 [Reliable]	
23919	1	0	N	Byford Archaeological Survey 006	Artefacts / Scatter			403254mE 6433533mN Zone 50 [Reliable]	
23920	S	0	Ν	Bas/iso - 001	Artefacts / Scatter			404022mE 6432479mN Zone 50 [Reliable]	
3921	S	0	N	Bas/iso - 002	Artefacts / Scatter			404809mE 6432444mN Zone 50 [Reliable]	
3922	S	0	N	Bas/iso - 003	Artefacts / Scatter			404364mE 6434301mN Zone 50 [Reliable]	
23923	S	0	N	Bas/iso - 004				404343mE 6434232mN Zone 50 [Reliable]	
23924	S	0	N	Bas/iso - 005	Artefacts / Scatter			404386mE 6434106mN Zone 50 [Reliable]	
23925	S	0	N	Bas/iso - 006	Artefacts / Scatter			404377mE 6434111mN Zone 50 [Reliable]	

Site ID	Status	Access	Restriction	Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
24979	S	0	N	Nettleton Road 19-09-07/001	Artefacts / Scatter		*Registered Informant names available from DIA.	406625mE 6434289mN Zone 50 [Reliable]	
24980	S	0	N	Nettleton Road 19-09-07/002	Artefacts / Scatter		*Registered Informant names available from DIA.	406896mE 6433922mN Zone 50 [Reliable]	
24981	S	0	N	Nettleton Road 19-09-07/003	Artefacts / Scatter		*Registered Informant names available from DIA.	406992mE 6434247mN Zone 50 [Reliable]	
24982	S	0	N	Nettleton Road Isolated Finds	Artefacts / Scatter		*Registered Informant names available from DIA.	406980mE 6434342mN Zone 50 [Reliable]	
24983	S	0	N	Nettleton Road 1-06	Artefacts / Scatter		*Registered Informant names available from DIA.	406895mE 6434284mN Zone 50 [Reliable]	
24984	S	0	N	Nettleton Road 2-06	Artefacts / Scatter		*Registered Informant names available from DIA.	407280mE 6434370mN Zone 50 [Reliable]	
24985	S	0	N	Nettleton Road 3-06	Artefacts / Scatter		*Registered Informant names available from DIA.	407357mE 6434486mN Zone 50 [Reliable]	
24991	S	0	Ν	Beenyup Brook	Mythological	Natural Feature	*Registered Informant names available from DIA.	407501mE 6433928mN Zone 50 [Reliable]	



Government of Western Australia Department of Indigenous Affairs	Aboriginal Heritage Inquiry System Aboriginal Sites Database	
Map Shov	wing Registered Aboriginal Sites and Other Heritage Places	
overnment of Western Australia	Report created 06 Mar 2012 16:00:17. Identifier; 892959.	Pag



ABN 47 065 099 228 Aboriginal Heritage

Appendix 2 – Archaeological Site Type Definitions

Artefact scatter	An artefact scatter is a place where human activity is identifiable by the presence of portable object(s) (e.g., stone, glass, bone, shell) utilised or modified by Aboriginal people in relation to traditional cultural life past or present.
Background scatter	The number of isolated artefacts (see definition below) recorded in a given area is used to calculate the density of the background scatter.
	To calculate the estimated density of the background scatter, the following formula is used:
	B = N/A1
	<i>B</i> : estimated background scatter density (expressed as number of artefacts/km ² and m ²)
	N: number of artefacts observed
	A1: is estimated area viewed (see below).
	A variety of factors can affect the survey intensity including visibility of the ground surface, limit of peripheral vision, width of transects etc. To account for these factors, the following formula is commonly used to determine the estimate the of area actually viewed (also known as survey intensity). (After Hiscock 1988: 73-79).
	A1 = LxWxV
	A1: estimated area viewed
	L: length of the survey area
	<i>W</i> : width of the area inspected (such as the width of the transect)
	V: percentage of ground surface visible
Burial (skeletal material)	A place where Aboriginal skeletal material is buried and/or where mortuary practices occurred. DIA require at least one of the following pieces of evidence to establish that the reported place is of Aboriginal origin:
	Aboriginal skeletal material is visible;
	• Aboriginal mortuary/burial markers and or ethnographic evidence about the burial/skeletal material
Engraving	A motif (either figurative or non-figurative) on a rock surface produced by percussion or abrasion. Engravings are also often referred to as petroglyphs.
Gnamma hole	A natural or artificial rock cavity which holds water after rain or is linked to the water table. May or may not include a cap stone.
Grinding material	Grinding patches or grooves are smoothed areas or grooves on rock

ABN 47 065 099 228 Aboriginal Heritage

	surfaces (non-portable) that have been created by grinding activity associated with food production such as seed milling, preparation of pigments, tool manufacture and/or maintenance and ritual.
Historical	A place that has historical associations with Aboriginal people and may or may not contain physical evidence of those associations.
Isolated artefact	Artefact(s) that are not of sufficient density or number to be determined a site.
Midden	A place where there is an accumulation of shell refuse that is derived from exploitation of a mollusc resource by Aboriginal people. Such sites may also contain artefacts, fireplaces, burnt shell and bones. Natural events (e.g. storms) may result in the formation of "midden like" features. Such features are distinguishable from middens by their lack of artefactual material, burnt shell or their composition being of non-edible mollusc species. Therefore, DIA require at least two of the following pieces of evidence to establish that the accumulation of shells is of Aboriginal origin:
	• presence of charcoal, burnt wood, blackened shells, hearths;
	• presence of bones of other edible species;
	• presence of artefactual material;
	• presence of layers indicating cultural rather than natural deposition;
	• evidence that the shell fish have been exploited by human beings, e.g., broken open backs, edible size;
	• demonstrable selection of edible, mature, shell fish species;
	• ethnographic and/or historical evidence related to the accumulated shell refuse.
Modified tree	One or more tree(s), living or dead, which has been modified by Aboriginal people by removing the bark or wood resulting in the formation of a scar. This sort of modification was and is frequently done for the making of implements, tools or other materials that were used in traditional cultural practices. DIA require at least two of the following pieces of evidence to establish that a scar is of Aboriginal origin:
	• the scarred tree is an indigenous species and a mature individual;
	• the scar base normally begins above ground level;
	• the scar is roughly parallel-sided and fairly symmetrical in its overall shape;
	• the bark regrowth is generally regular;
	• the scar terminations are either squared off or pointed as a result of bark regrowth;

ABN 47 065 099 228 Aboriginal Heritage

	• axe marks are present;
	• suspected toe holes are arranged in a usable pattern.
PAD (Potential archaeological deposit)	An accumulation of cultural material and sediment deposited over time.
Painting	Places where Aboriginal people have painted on surfaces. Paintings (including daubings, drawings, stencils, prints) can be figurative or non-figurative markings or motifs on surfaces such as rocks, rock walls and trees at fixed locations that are produced by adding pigments and or mediums, such as ochre, blood, beeswax, animal fats, vegetable dyes, tree saps.
Quarry	Places where there is evidence for the extraction of stone or ochre. DIA require at least two of the following pieces of evidence to establish that a natural occurrence of raw material has been used as a quarry:
	• evidence for the removal of material/modified surfaces in the form of negative scarring, crushing, areas of excavation etc;
	 presence of implements used during extraction (e.g. hammerstones, fire-hardened sticks) at the source;
	• evidence of flaking and reduction of the stone material at the source.
	• presence of partially-worked material at the source;
	• ethnographic evidence relating to the extraction of raw material at the source.
Reduction area	Reduction area refers to a cluster of stone artefacts which represent the remains of the flaking of a core. Artefacts within a reduction area can usually be conjoined back together.
Repository/cache	A place where cultural or utilitarian objects are/were taken or stored by Aboriginal people, either past or present.
Rock shelter	A place recognisable as a cave or overhang that may have been utilised by Aboriginal people.
Structure	The placement or arrangement by Aboriginal people of stone, wood or other material made into a structure for ceremonial or utilitarian purposes.
Water source	A source of water, (e.g., gnamma holes, soaks, springs, rock holes), with ethnographic evidence of its use or modification for use by Aboriginal people in connection with traditional cultural life past or present.

ABN 47 065 099 228 Aboriginal Heritage

Appendix 3 – Artefact Identification and Recording

Flaked artefact identification

Flaked stone is identified on the basis of the presence of one or more of the following features (see Plate 20 and Plate 21):

- a positive or negative ring crack;
- a distinct negative or positive bulb of percussion or force;
- a definite eraillure scar beneath a striking platform;
- definite remnants of flake scars (e.g. dorsal scars and ridges);
- fracture termination.

Stone not exhibiting these features is regarded as <u>not</u> artefactual.

Plate 20. Features of the ventral surface of a flake produced through conchoidal fracture (Holdaway and Stern 2004:1.3.1)



Plate 21. Features of the dorsal surface of a flake produced through conchoidal fracture



(Holdaway and Stern 2004:1.3.1)

Flaked stone artefacts are classified into four types:

- flakes exhibiting one positive ventral surface or part thereof;
- retouched flakes containing negative flake scars created after the formation of the ventral surface;
- cores contains one or more negative flake scars and no positive flake surfaces; and
- flaked pieces items that cannot be placed unambiguously into one of the three above categories.

ABN 47 065 099 228 Aboriginal Heritage

Flakes are characterised into four subcategories including complete flakes, longitudinally broken, transversely broken and flake fragments.

Artefact recording

The artefact analysis consisted of a full metrical recording of artefacts located. All artefacts located comprised material that appeared to be flaked, whilst no examples of ground stone were recorded. The following attributes were recorded for each artefact located.

Flakes

- Raw material thickness
- colour
 termination type
- completeness platform type
 - platform width
- width

•

length

- platform thickness
- technological type (core, retouched flake, flake and parts thereof)

•

- number of scars present on the dorsal surface
- presence of retouch
- number of retouch scars
- length and invasiveness of retouch
- use wear presence/absence and location
- presence/absence of platform preparation (faceting, overhang removal)

Cores

- Raw material
- colour
- type (based on number of platforms),
- quantification of flake scars and platform characteristics

Artefact Metric Measurements

Flakes	
Length	Distance along the percussion axis from the ring crack to the distal margin.
Width	Distance between the lateral margins measured at right angles to the percussion axis half way between the ring crack and distal margin.
Thickness	Maximum distance between the ventral and dorsal surface of the flake half way between the ring crack and the distal margin.
Platform Width	Distance along the striking platform from one lateral margin to the other.
Platform Thickness	Distance across the striking platform from the centre of the ring crack to the dorsal surface.
Platform Type	Type of platform may be one of the following:

ABN 47 065 099 228 Aboriginal Heritage

	• Flat – platform where it is not possible to determine whether it has a partial single flake scar, or if it has been heat fractured	
	• Flaked – striking platform formed by one flake scar	
	• Faceted – striking platform has a number of flake scars resulting from rotation of the core	
	• Cortical – unmodified platform consisting entirely of the outer surface of the parent rock	
	• Crushed – the proximal end of the flake is constituted by a sharp edge lacking a distinct platform	
# Dorsal Flake Scars	Number of flakes taken off the dorsal side during production.	
Cortex%	The amount of cortex (chemical or mechanical weathered surface on rocks)	
	on the dorsal side of a flake.	
Overhang Removal	Presence/absence of overhand removal, small flakes are removed from the edge of the platform.	
Retouch/Utilisation	Presence/absence of edge modification by the removal of small flakes. Both the length of retouch and location on the artefact is recorded.	
Termination types	The type of termination may be one of the following:	
	• Feather – straight to the bottom of the flake with no deviation	
	Hinge – closing bend towards nearest free surface	
	• Step – angled change of direction towards nearest free surface	
	• Outré passé – plunging backwards towards the other side of the core	
Cores		
Length	Size recorded along maximum dimensions.	
Width	Size perpendicular to length.	
Thickness	Size measured at 90° to both the width and the length.	
# Platforms	Count number of platforms on the core.	
Flake Scars	Total number, length and width of flake scars present on the core.	
% Cortex	The amount of cortex (chemical or mechanical weathered surface on rocks)	
	on the core.	
Retouch/utilisation	Presence/absence of edge modification by the removal of small flakes.	

ABN 47 065 099 228 Aboriginal Heritage

Artefact recording acronyms

The following acronyms are used for recording artefact type and lithology.

CF or F	Complete flake
FF	Flake fragment
LBF	Longitudinally broken flake
TBF	Transversely broken flake
RUF	Retouched/utilised flake
RUP	Retouch/utilised piece
BL	Blade
DB	Debris
GS	Grindstone
SPC	Single platform core
MPC	Multiplatform core
CF	Core fragment
MANU	Manuport
CH	Chert
BIF	Banded Ironstone Formation
DOL	Dolorite
BAS	Basalt
CL	Chalcedony
IS	Ironstone
SIL	Silcrete
QU	Quartz
QZ or QZT	Quartzite
MS	Mudstone
GR	Granite
SS	Sandstone
CQ	Crystal Quartz

Ground stone artefacts

Ground stone artefacts can be classified into four categories including mullers, millstones, pestles and mortars.

The following attributes are generally recorded for ground material.

ABN 47 065 099 228 Aboriginal Heritage

Length	Size recorded along maximum dimensions.
Width	Size perpendicular to length.
Thickness	Size measured at 90° to both the width and the length
# Ground surfaces	Number of surfaces with ground patches.
Dimensions of ground surfaces	Length and width of all ground surfaces/patches.
Presence and type of any modification	E.g. pitting or hammer dressing to shape the artefact.

Other stone artefacts

Other stone artefacts include manuports, anvils and hammer stones. Manuports are natural objects that have been transported but not necessarily flaked or modified. Anvils comprise blocks or slabs of rock that have been used to support hammering of other objects and will exhibit pitting or indentations from these objects being struck. Hammer stones are usually round or ovoid rocks used to strike flakes off a core. Hammer stones usually have pitting on one or more surfaces from the percussion of other rock.

The following attributes are generally recorded for manuports, anvils, shell or hammer stones.

Length	Size recorded along maximum dimensions.
Width	Size perpendicular to length.
Thickness	Size measured at 90° to both the width and the length.
Modifications	Description of any modifications, e.g. pitting, indentations, or hammer dressing to shape artefact, plus the location and extent of each modification.

Modified trees

Modified trees are trees that have been scarred by people through the removal of bark. Scars made by people tend to be regular in shape, located above ground level and will often show evidence of axe marks (Burke and Smith 2004:226–27).

The following attributes are generally recorded for modified trees.

Type of tree	Tree species
Height of tree	Used to calculate the extent of the root system and therefore the boundary of the site.
Girth of tree	How wide the tree is around the middle.
# scars/modifications	Number of scars in the tree.
Type of scar	E.g. containers, canoes, access to honey.
General location of scar	General location of scar or modification on the tree

ABN 47 065 099 228 Aboriginal Heritage

Height of scar	Height from base of tree.
Scar orientation and aspect	Direction of longest axis of each scar and compass bearing/direction scar is facing.
Scar shape	E.g. round, elongated, oval, irregular.
Degree of scar	How much bark has been removed
Scar dimensions	length – maximum vertical dimension of scar
	• width – maximum horizontal dimension of scar
	• depth – distance between inner exposed wood and outer bark
Regrowth	Extent and depth of regrowth.
Implement	Type of implement used to create the scar or modification, e.g. evidence of stone axe or metal axe, where determinable.
Carvings	Presence and description of any carvings.