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8 April 2004

BLAKE DAWSON WALDRON

L A W Y E R S

Canal Rocks Pty Ltd
C/- Olifents Real Estate
345 Stirling Highway
CLAREMONT WA 6010

Attn: Mr David McKenzie

Dear Sir

Location 413 Smiths Beach, Yallingup

We refer to Dr Van Der Moezel's letter dated 12 March 2004 requesting our advice in relation to Aboriginal heritage issues affecting the proposed development of Location 413 Smiths Beach, Yallingup (**Land**).

Summary of Advice

1. The existing section 18 authorisation remains valid and can be relied on. However, the section 18 authorisation has a limited scope and effect, which gives rise to the risks discussed below. The risks should be managed in order to ensure they do not threaten the proposed development.
2. Strictly, there is no obligation to undertake further consultations with Aboriginal people about heritage matters. However, further consultations on broader social and environmental matters have been recommended by Canal Rocks Pty Ltd's consultants and the Minister for Indigenous Affairs. Those consultations are likely to be required in any event as part of the environmental approval process. The consultations could be undertaken early and pro-actively as part of a risk mitigation strategy.

Instructions

We are instructed that:

1. Canal Rocks Pty Ltd proposes to undertake a tourist/residential development on the Land. The development proposal has been under consideration for more than a decade. Due to a range of factors not related to Aboriginal heritage matters, the size and scale of the development now proposed is somewhat more modest than that originally proposed a decade ago. However, the nature of the land use proposed has not changed significantly.
2. In 1993 Alan Tingay and Associates, as agents for Canal Rocks Pty Ltd commissioned Aboriginal heritage surveys of the Land. The surveys comprised

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archaeological and ethnographic assessments of the Land and are recorded in the report of McDonald Hales & Associates dated December 1993 (**Heritage Report**). We have not critically examined the Heritage Report and assume that the methodology employed is sound and Aboriginal persons with appropriate knowledge and authority were consulted as part of the ethnographic component.

3. The Heritage Report contains the following material conclusions and recommendations:
 - (a) No ethnographic sites were identified on the Land and there are no ethnographic impediments to the (then) proposed development.
 - (b) Isolated archaeological artefacts were located on the Land. However, these isolated artefacts were assessed by the consultant as not being of any particular significance and therefore not places to which the *Aboriginal Heritage Act 1972* (WA) (AHA) applies.
 - (c) Two archaeological field sites were located on the Land. However, heavy vegetation across most of the Land imposed serious constraints in terms of the efficacy of the archaeological survey process, and the degree of survey coverage achieved is insufficient to allow full evaluation of the demonstrated archaeological resource of the study area to be made.
 - (d) A further field survey will be necessary before a full assessment of the archaeological resource of the study can be made. This should follow vegetation clearance across the remaining portions of the Land.
 - (e) During vegetation clearance, Canal Rocks Pty Ltd should not disturb the area containing field site numbered 1 to the extent delineated in the report. Detailed and specific recommendations relating to field site number 1 will be made once vegetation cover in surrounding areas has been cleared and the full extent and archaeological significance of any archaeological sites in the project area has been assessed.
 - (f) The proponent consult with members of local Aboriginal organisations regarding the development and its potential impact on the local, physical and social environment. This recommendation appears to be directed at consultations that would more usually be conducted within the context of wider environmental assessment rather than Aboriginal heritage issue per se.
4. On 17 January 1994, Canal Rocks Pty Ltd gave notice under section 18(2) of the AHA in relation to the Land, for purposes associated with the proposed development. We have assumed that the area to be impacted by the development now proposed is no greater than that proposed in 1994.
5. The "purpose" identified in the form submitted to the Minister provides:

"It is proposed the land be rezoned for the purposes of residential sub-division and associated works relating to such sub-division for areas designated as per the attached plan."

6. The plan attached to the schedule relating to the purpose is entitled "Proposed Tourist/Residential Zone – Concept Plan" and discloses a range of proposed development and infrastructure including a seaside resort, mixed use village, single residential, public open space, chalets and caravan park.
7. Schedule 1 to the Notice given under section 18(2) identifies the whole of location 413 as the land the subject of the Notice.
8. The then Minister for Aboriginal Affairs gave consent under section 18(3) of the AHA in the following terms:

"I hereby give consent to Canal Rocks Pty Ltd to utilise the land comprising the Smiths Beach development, Busselton for the purpose of a residential sub-division and associated works on condition that archaeological field site 1 (FS1) and the survey area in general be monitored by a qualified archaeologist during the clearance process of section 18 Notice(s) be lodged for any additional site(s) located."

9. The Minister also urged Canal Rocks Pty Ltd to "conduct further consultations with members of local Aboriginal organisations regarding the potential impact of the development on the local physical and social environment, in accordance with your consultant's recommendation." However, the latter is not expressed to be a condition of the Minister's consent under section 18(3).

Validity of section 18 consent and applicability to proposed revised development

Ministerial consent given in accordance with section 18 of the AHA does not "expire" as such. Consequently, the consent given in 1994 is still valid and may be acted upon in relation to the proposed development.

However, the following limitations and risks need to be taken into account.

1. Section 17 of the AHA makes it an offence to disturb and place protected by the AHA, whether or not the place has been previously identified. There are 2 main defences to a prosecution for breach of section 17:
 - (a) Where the activity that caused the disturbance is authorised in accordance with section 18 of the AHA; or
 - (b) Under section 62 of the AHA, where the person charged can prove that it did not know and could not reasonably be expected to have known, that the place or object to which the charge relates was a place or object to which the AHA applies
2. The section 18 authorisation is personal to Canal Rocks Pty Ltd. Consequently, if Canal Rocks Pty Ltd sells the proposed development before the relevant

ground disturbing works are undertaken the purchaser would not get the benefit of the section 18 authorisation.

3. The section 18 authorisation is limited to the purposes described in the Minister's letter dated 11 March 1994. That is, "residential sub-division and associated works". Arguably, the development proposal extends to matters other than a residential sub-division, namely tourist and other associated facilities. If the authorisation is read narrowly it might be regarded as only authorising the residential aspect of the proposed development. However, when the letter is read together with the notice given under section 18 and the plans attached to it, we believe there is a reasonable argument that the words "residential sub-division and associated works" are broad enough to cover the proposed development. However, the section 18 authorisation would not, for example, cover a light industrial development.
4. The section 18 authorisation applies only to the land specified in the Minister's letter. The obvious point is that the section 18 authorisation will not protect any activity that disturbs an Aboriginal site outside the boundaries of location 413. However, the peculiar wording used by the Minister in his letter gives rise to a further difficulty. That is, the approval is expressed to be subject to a condition that, among other things, "section 18 notice(s) be lodged for any additional site(s) located." These words may be interpreted in a number of ways. One alternative construction is that the land the subject of the Minister's consent does not include any area on which an Aboriginal site protected by the AHA is located except for FS1. If this construction is correct, any additional Aboriginal sites located on the land (other than FS1) could not be disturbed unless a further consent under section 18 is obtained. We note that no other Aboriginal sites have been identified to date.
5. The Minister's consent is conditional upon the proponent engaging a qualified archaeologist to monitor the clearing of vegetation on the land. Canal Rocks Pty Ltd will be obliged to comply with this condition. It is an offence not to do so. Of course, there is always a risk that further archaeological material might be uncovered during the process of clearing the land in which case the risks referred to above may arise.
6. We have discussed the operation of the *Aboriginal and Torres Strait Islander (Heritage Protection) Act 1984* (Cth) (**Commonwealth Heritage Act**). The Commonwealth Heritage Act operates in addition to the AHA and enables any Aboriginal person to apply to the Commonwealth Minister for Indigenous Affairs to make an order to protect a place of Aboriginal significance that is under threat of desecration. The Commonwealth Heritage Act could be relied on by any disgruntled Aboriginal people. Obviously, Canal Rocks Pty Ltd could rely on the Heritage Report in opposition to any such claim. However, there is no guarantee against such an application being made.
7. Canal Rocks Pty Ltd could undertake further heritage consultations and surveys in order to confirm the findings in the Heritage Report and give a further notice under section 18 of the AHA in respect of any additional heritage sites located as a result of that exercise (if there are any). However, those consultations and surveys could themselves result in further delay and expense. An alternative

would be to undertake the wider consultations referred to by the Minister in his letter and discussed below.

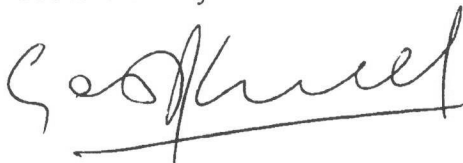
Obligation to undertake further consultations with Aboriginal people

The consent given by the Minister under section 18 of the AHA does not strictly oblige Canal Rocks Pty Ltd to undertake further consultations with Aboriginal people about the proposed development. However, the Minister does "urge" Canal Rocks Pty Ltd to do so and the Aboriginal Heritage Report makes a similar recommendation. The Minister's "suggestion" and the recommendation in the Aboriginal Heritage Report appear to concern broader consultation relating to environmental and social issues generally rather than Aboriginal heritage questions per se.

In our view, Canal Rocks Pty Ltd will probably be obliged to undertake those wider community consultations as part of the environmental assessment and approval process under Part IV of the *Environmental Protection Act 1996 (WA) (EPA)*. It may be appropriate, in order to manage expectations and concerns, to undertake those consultations relatively early in order to identify any potential issues that may be raised by indigenous groups. However, we recommend that any offers to consult be expressed in terms of general consultations for the purposes of managing environmental issues rather than an offer for a further ethnographic or archaeological heritage survey.

Please contact our Mr Gishubl if you would like to discuss any aspect of this advice.

Yours faithfully



Geoff Gishubl

cc: Mr Neill Stevens
by email

Dr Paul Van Der Moezel
by email

*A Report of an
Aboriginal Heritage Survey
Smith's Beach Development
Busselton, Western Australia.*

Prepared for

ALAN TINGAY AND ASSOCIATES

By

K. Edwards B.A.(Hons), A. Murphy B.Sc.(Hons),
M. Hammond B.Sc.(Hons.) and Dr E. McDonald

MCDONALD, HALES & ASSOCIATES
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December 1993

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SUMMARY AND RECOMMENDATIONS

In November 1993, McDonald, Hales and Associates was commissioned by Alan Tingay and Associates to conduct an Aboriginal Heritage Survey of the proposed Smith's Beach housing development, Busselton, Western Australia.

The archaeological survey was undertaken on November 20, 1993, by A. Murphy and K. Edwards, assisted by Dr E. McDonald and M. Hammond. The ethnographic research, survey and consultation was completed by M. Hammond and Dr E. McDonald.

As a result of the archaeological survey two new artefact scatters and several isolated artefacts were recorded. Field Site #1 lies within the boundaries of the PDA. Owing to the small number of finds (29) over a survey path length of over one kilometre and the disturbed context, this site is considered to have been adequately recorded and to have little further research potential. Field Site #2 lies outside the proposed development area, and will not be disturbed. Consequently, this site is not considered to represent an impediment to the continuation of development.

No new or previously recorded ethnographic sites were identified within the PDA.

It is therefore **recommended** that:

- there are no ethnographic impediments to the proposed development.
- the isolated artefacts recorded during the survey process do not represent an impediment to the proposed development
- heavy vegetation cover across most of the PDA imposed serious constraints in terms of the efficacy of the survey process, and that the degree of survey coverage achieved is insufficient to allow a full evaluation of the demonstrated archaeological resource of the study area to be made.
- further field survey will be necessary before a full assessment of the archaeological resource of the study area can be made. This should follow vegetation clearance across the remaining portions of the PDA.

- during vegetation clearance, the proponents do not disturb the area containing Field Site #1, insofar as it has currently been delineated. Detailed and specific recommendations relating to Field Site #1 will be made once vegetation cover in surrounding areas has been cleared and the full extent and archaeological significance of this and any as yet unrecorded material has been assessed.
- the proponent or their representatives consult with members of the local Aboriginal organisations regarding the development and its potential impact on the local physical and social environment.

The proponents are reminded of their obligation under Section 15 of the *Aboriginal Heritage Act 1972-180*) to report any archaeological material that may come to light during the course of development.

Section One: Introduction

1.1 Introduction and Consultancy Brief.

In November 1993, McDonald, Hales and Associates was commissioned by Alan Tingay and Associates to conduct an Aboriginal Heritage Survey of the proposed Smith's Beach housing development, Busselton, Western Australia (Figure 1).

1.2 Local Environment and Land Integrity.

1.2.1 *Climate.*

The narrow coastal belt upon which the PDA is situated experiences a sub-Mediterranean climate, characterised by mild summers and cool, wet winters (Gentilli 1972). Annual precipitation often exceeds 1100mm, much of which falls during the winter months (June to August). However, seasonality for this region is less marked, and at least one in four days during the summer months receive precipitation. As a result, there is no summer water shortage, unlike areas further north, with an attendant growing season of ten months.

In keeping with the absence of extremes, mean maximum temperatures also occupy a narrow range, from a summer high of 24.5°C in January to a 16°C winter low in July. The less than 10° variation in maximum temperatures is also mirrored in the mean seasonal *minima* of 13.6°C in January and 7.4°C in August (Margaret River Meteorological Office).

1.2.2 *Geology.*

The PDA occupies the seaward margin of the Scott Coastal Plain (Lowry 1967), which is composed of younger, active dunes on the ocean front and more stable older dunes further inland. The former are of mixed marine and aeolian origin, consisting of calcareous sands which, whilst still active, are in most places partially stabilised by vegetation cover. The older inland dune systems are similar in origin, but have been stabilised and partially lithified, with a thin covering of leached sand derived from the breakdown of the limestone. Occasional swamps occur throughout this formation as a result of dune transgression blocking natural drainage lines (Lowry 1967).

Further inland still, beyond the boundaries of the study area, the terrain flattens into a low-lying plain with remnant dunes. These form scattered hills and ridges throughout this unit, providing better drained patches in this generally swampy formation. Soils, once again, are generally leached sands, with some humus development (Lowry 1967).

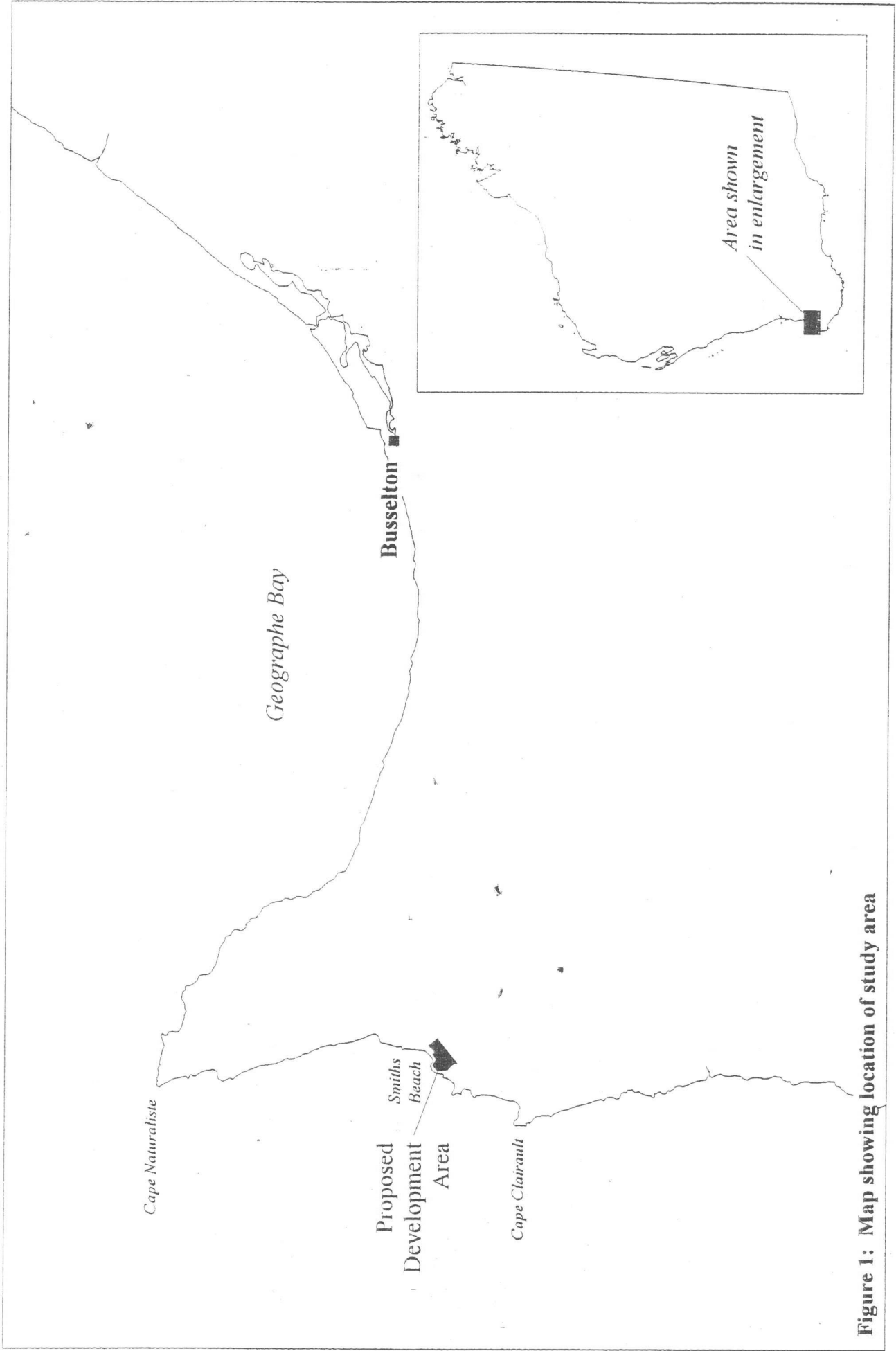


Figure 1: Map showing location of study area

Underlying the plain is the western edge of the Leeuwin-Naturaliste ridge (Beard 1982). This is a north-south trending uplift of Pre Cambrian granites which forms a series of hills rising up to 200 metres in elevation. On the seaward edge most of these outcrops are covered by the calcareous dunal sands, and are not visible. However, they do emerge on the extreme coastal front to produce a rugged, steeply sloping shoreline, with many small bays between granite promontories.

1.2.3 *Vegetation.*

Climate and physiography are the two most influential determinants in vegetation type and form. The PDA falls within the Warren Vegetation Subdistrict, which encompasses all the high rainfall areas along the southern and south-western coast (Beard 1982). Within this subdistrict the vegetation may be further divided into sub-groupings, or alliances, associated with differing micro environments. Basically, these consist of a coastal heath form on the dune system (Boranup System) and a low woodland on the succeeding plain (Scott River System) (Beard 1982).

The PDA is located on the first of these systems, the coastal heath, which itself subsumes a number of sub-communities whose presence and extent is governed by the varying conditions experienced as a result of dune morphology. On the mobile dune faces of the immediate coastal fringe, primary successive species are dominant, including *Acacia littorea*, *Jacksonia furcellata*, *Allocasuarina humilis*, and grasses of the genus *Triodia*.

In hollows, protected from wind and salt scouring, plants more characteristic of the hind dunes may also occur. It is not until the leeward edge of the dune system that the coastal heath reaches its climax form. This consists of dense stands of 1.5 - 2.0 metre high shrubs such as *Agonis flexuosa* (Native peppermint) and *Pimelea ferruginea*, with other representatives of the genus *Acacia*. With increasing distance from the sea, *A. flexuosa* tends to replace the other species or exists as co-dominant with *Banksia* spp, taking the form of low woodland to open woodland depending upon the canopy density. Jarrah (*Eucalyptus marginata*) may also occur as a minor component of the woodland, where it occurs on leached sands, gradually grading into a Jarrah-Marri (*E. calophylla*) association once off the coastal limestone derived sediments. Further inland still, Karri (*E. diversicolour*) may occur as tall forest on the combined breakdown products of the Leeuwin-Naturaliste Ridge granites and coastal limestone.

The study area is currently largely undisturbed by Europeans, access being restricted to a few tracks that are mainly confined to its western and northern edges. Consequently, the native vegetation survives almost intact (consisting of the dense coastal heath previously described), making survey work extremely difficult.

Section Two: Archaeological Survey

2.1 Archaeological background

Although a considerable amount of archaeological research has been undertaken in the Leeuwin-Naturaliste region (Dortch 1979a, 1979b, 1984; Ferguson 1981, 1985; Locke & Murphy 1991; Murphy 1990); most attention has been focussed upon the investigation of single sites or site complexes, with little attempt at synthesis or integration. To date, only one regional archaeological survey has been conducted (Lilley 1993). A review of the archives held by the Department of Aboriginal Sites indicated that three archaeological sites have been recorded within five kilometres of the proposed development area (PDA). These are: S00482 (artefact scatter and midden), S01008 and S02543 (artefact scatters). None of these sites are encompassed within the PDA.

Evidence from several sites indicate that the Leeuwin-Naturaliste area has a considerable time-depth of human occupation. The Devil's Lair site, located the present karri forest on the Leeuwin-Naturaliste ridge, was occupied intermittently between 33,000 and 12,000 BP¹ (Dortch 1979a, 1979b, 1984). Analysis of the faunal and stone artefact sequences from Devil's Lair have also provided insights into subsistence patterns, technological processes and long-term human adaptations in the Southwest (Christensen 1992:40).

Faunal evidence, including the presence of rock wallabies and honey possums in abundant quantities between 25,000 BP and 33,000 BP at Devil's Lair, and other limestone caves in the area, indicates that a faunal suite characteristic of more arid environments was present during the late Pleistocene (Dortch 1984:22). Between 20,000 and 13,000 years ago, there are three trends suggestive of increasing aridity. These trends include an increase in the numbers of "non-forest" species, an increase in the numbers and proportions of lizards, and a decline in the number of "forest" species. The surrounding vegetation was much more open at this time, attracting large numbers of game and facilitating easier movement through the vegetation (Balme *et al* 1978). During the glacial maximum sea levels were 150m lower, exposing a vast coastal plain below the sites, capable of supporting a wide range of fauna (Christensen 1992:40). Around 12 000 years ago, there is a reversal of these trends (Ferguson 1985:70-73). The faunal assemblage also suggests that forest, woodland, heath and possibly other

¹ The abbreviation "BP" is used to denote 'years before present', the present being defined as A.D. 1950.

vegetation regimes were continuously present within a 10 kilometre radius of the cave throughout the late Pleistocene and early Holocene.

Stone and bone artefacts occur in small numbers throughout the deposit. The stone artefact assemblage is dominated by waste flakes, suggesting that tool production was the major stoneworking activity undertaken. A range of raw materials is represented, including quartz, chert and limestone. Chert could be procured from offshore quarries that have since been submerged by post-glacial sea-level changes (Glover 1975), while quartz was obtainable from veins in granitic-gneiss boulders outcropping on the beach a few kilometres to the west, and from cobbles in streams to the east of the site (Dortch 1984:53).

In the lower horizons limestone and quartz predominate while in the upper horizons chert is the primary lithic material. This may reflect changing sea levels which alternatively inundated and exposed sources of chert and/or a change in stone reduction processes. The ratio of tools to waste is consistently higher in chert than either limestone or quartz, which may indicate a preference for chert in terms of tool production given its superior flaking properties (Dortch 1984:50). It should also be noted that the ratio of tools to waste is higher in the upper horizons compared to the lower layers. This may reflect a change from opportunistic to more selective technological/economic behaviour.

Dortch interprets the cave as primarily a family or band occupation site or base camp from which the forest, woodland and wetlands could be exploited (Dortch 1984:48). However visits to the cave were probably intermittent and brief "since even small parties of hunter-gatherers camping there would have depleted local food resources within a matter of days" (Dortch 1984:78). At a regional level, the evidence from Devil's Lair suggests that prehistoric Aboriginal land-use patterns may have involved seasonal or periodic movements, scheduled to the availability of key resources. Bands probably congregated on the coast during summer and autumn and dispersed into the inland during the winter months (Dortch 1984:81). Indeed, there is some evidence that this settlement-subsistence pattern may have continued up until the time of European settlement (Dortch 1974).

Excavations at the Quininup Brook site complex undertaken by Ferguson have revealed a stratified stone artefact sequence dating to between $18,500 \pm 1,700$ BP and 6,000 BP, with a sharp decline in artefact numbers after 10,000 BP (Ferguson 1981, 1985:2). This sequence is broadly similar to that from Devil's Lair, with artefacts being

manufactured from quartz and chert. Ferguson (1985:30) has argued that the abandonment of the site around 6,000 years ago can best be explained in terms of sea level rises which would have destroyed the surrounding resource catchment area (Ferguson 1985:30). The early decline (ie. after 10,000 BP) may be the result of changing environmental regimes not related to sea level changes.

The Arumvale site, also located in karri forest about one kilometre south of Devil's Lair, has returned dates of about 18,000 - 19,000 BP and 9,000 - 10,000 BP from near the base and middle of the deposit respectively (Dortch and McArthur 1985). About 519 artefacts were recovered from the site. According to Ferguson, this site demonstrates an 82% drop in the artefact deposition rate/millennium around 10,000 BP. There is also evidence for a major change in stone reduction processes in the mid-Holocene, which affected only west coast sites, such as that at Dunsborough.

The Dunsborough site is located in woodland about 20 kilometres north of Quininup Brook, on the southern shore of Geographe Bay. Archaeological evidence suggests that the site has been occupied since the terminal Pleistocene, with relatively greater intensity between 7,000 and 8,000 BP, unlike the sequences obtained elsewhere in the Southwest. After this there is a decline in artefact numbers, followed by a dramatic increase in numbers, with the most intensive occupation occurring around 3,000 BP (Ferguson 1980, 1985:472-474). Ferguson explains this anomaly in terms of changes in lithic procurement, in particular the loss of chert quarries owing to the rising sea levels about 6,000 years ago, after which time quartz becomes the primary lithic resource. This is because quartz produces proportionally more waste than chert, therefore similar numbers of artefacts above and below the decline in artefact numbers do not represent a similar intensity of human activity (Ferguson 1980, 1985:474).

Lilley (1993) has undertaken research focused on the Margaret River valley and lowermost reaches of Ellen and Boodjidup Brook, approximately midway between Cape Leeuwin and Cape Naturaliste. This constitutes the only attempt at a regional-scale research programme undertaken to date.

The actual survey methods employed by Lilley varied with conditions of accessibility and visibility but generally entailed 50 m wide transects throughout various vegetation zones. On the plateau, transects paralleled a north-south, east-west grid of forestry tracks. Areas around watercourses and sedgeland were also examined. On the coast where the vegetation was impenetrable, tracks were surveyed in addition to eroded areas in the foredunes and accessible known caves and their immediate surrounds

(Lilley 1993). This included the Ellenbrook area, where several sites, securely dated to between 550 BP and the present, have been previously recorded (Bindon and Dortch 1982). One new site, a small cluster of marine molluscs located in the midst of deflated granite and quartz artefacts near the mouth of Ellenbrook was recorded, returning a date of approximately 4,400 BP (Lilley 1993).

In addition to surface surveys, Lilley undertook archaeological excavations at three cave sites. Cultural material was identified only at Rainbow Cave, a collapsed cave located just inland from the coast near Prevelly Park. Archaeological evidence of prehistoric occupation was found in a small shelter located on the northern side of the cave. Calibrated dates range from 400 BP at the top of the deposit to a basal date of 4,700 BP. Cultural remains include moderate quantities of flaked quartz, animal bone including native rats and mice, *Parameles*, *Bettongia*, *Petrogale* and *Macropus*, and charcoal plus minute amounts of marine and terrestrial mollusc shell (Lilley 1993).

On the basis of his research findings, Lilley (1993) suggested that during the mid-late Holocene human activity in the Leeuwin-Naturaliste region was concentrated on the coastal margin and near coastal transition zone, with the hinterland being utilised in a way that resulted in a poor archaeological signature. The faint overall archaeological signal of the region was interpreted as primarily a reflection of low population densities resulting from a relatively impoverished resource base rather than from technical problems such as low site survival rates or poor surface visibility and access.

2.2 Survey Methods.

The archaeological survey was undertaken on 20th November, 1993, by A. Murphy and K. Edwards, assisted by E. McDonald and M. Hammond. Owing to the nature of the survey, a specialised survey methodology ('continuous recording') was adopted. This is outlined below.

There has been much debate in the archaeological literature concerning the relative effectiveness of different survey techniques and sampling strategies within areas of low visibility and/or accessibility (eg. Anderson 1984; Bowdler 1983; Byrne 1983 a-d; Chartkoff 1978; Cosgrove 1990; Coster 1979; Egloff 1984; Ferguson 1985; Lewarch and O'Brien 1981; Schiffer, Sullivan and Klinger 1978; Sullivan and Bowdler 1984; Vinnicombe 1980, 1984).

Some researchers have suggested that attempts to sample by probabilistic methods in areas of extremely low visibility should be abandoned, and that existing disturbed

and/or cleared areas be primarily targeted for survey (eg. Ferguson 1985; Schiffer, Sullivan and Klinger 1978; Strawbridge 1982). More recently, Packard (1991) has advocated a synthetic approach to field survey, which allows for the incorporation of multiple survey strategies:

Despite some attempt to achieve a 'random sample' (Byrne 1983, 1984; Lovis 1976) it is now widely accepted that the problems of accessibility and visibility are best overcome through the use of stratified or controlled non-random sampling. Within this framework following a relatively planned sampling strategy there is scope for the chance of opportunistic surveys (Packard 1991:28-29).

Owing to the dense vegetation cover over much of the PDA (*cf* Locke & Murphy 1991), and in order to provide a high degree of comparability with other major research projects in the lower Southwest (eg. McDonald, Hales and Associates 1993), a field recording methodology similar to that developed by Packard (1991:30) was adopted. This involves a hierarchically structured format divided into three levels of increasing recording detail: Survey Paths, Components and Site Records.

A Survey Path is an area of unspecified size, shape or type, that has been surveyed. Consequently, the term, Survey Path, can be applied to all sampled areas whether they be fire trails, access tracks or devegetated areas. A Survey Path Cover Sheet, providing summary information, was filled out upon the completion of each Survey Path in order to monitor progress and to assist in the computer entry of data.

All Survey Paths comprise one or more Components. Components differ from Survey Paths in that they provide a detailed record of any environmental or physical changes in key variables. A Component form was filled out for each new component when one or more key variables changed as survey progressed through a Survey Path.

A Site Recording Form was filled out for all sites located. The definition of 'sites' in this sense is taken to include all archaeological features recorded, whether an isolated artefact or a complex stone arrangement. This definition is employed in order to facilitate areal-density analyses of archaeological material, and to address the issue that the number and types of artefacts exposed and recorded in a site is as much a function of the nature of exposure as it is a reflection of the real size or composition of the site.

At the time of the survey, a number of tracks had been partially cleared in order to facilitate access for the project surveyors. These newly created tracks were used in conjunction with existing tracks as survey paths.

2.3 Survey Results.

Overall, it is estimated that a total linear distance of 3,420 metres, or a total area of 12,970 square metres, was intensively surveyed on foot. Visibility along the survey paths was generally excellent, ranging between 65% to 90%. As a result of the archaeological survey, two new artefact scatters and several isolated artefacts were recorded.

- ◆ FIELD SITE #1, Grid reference: SI 50-5,
Edition 1 Metric 315 762E 62 73 336N

A 'continuous' scatter of artefacts, recorded over a linear distance of approximately one kilometre, located in a firebreak exposure running along the western property boundary (Figure 2). All artefacts observed were recorded in detail and were found to consist entirely of quartz pieces, ranging between 20mm to 5mm in maximum dimension (Appendix 1, Table 1). Two main concentrations of artefacts were noted, covering areas measuring 4.0m x 2.5m and 4.0m x 3.0m respectively. The area of highest artefact density was located behind the existing caravan park facilities; a second smaller cluster of artefacts was recorded adjacent to the south eastern corner post of the caravan park fenceline. The density of artefactual material in the clusters ranged from less than one artefact/m² to a maximum of three artefacts/m². Between the clusters, artefact density fell to below one artefact/10m².

- ◆ FIELD SITE #2, Grid reference: SI 50-5,
Edition 1 Metric 313E 272N (APPROXIMATE ONLY)

A small artefact scatter located immediately outside, but adjacent to, the proposed development area on the slope of a limestone ridge running down to the coastline. A total of seven artefacts were recorded over an area measuring approximately 10m x 10m (Appendix 1, Table 2). In addition, a small overhang in the limestone ridge, measuring approximately 3m x 1.5m x 1.0m, was examined for evidence of past occupation. No artefactual material or other occupation debris was noted, however.

In addition to the two artefact scatters, two isolated artefacts were recorded along the north-south access track leading down to the coastline (Appendix 1, Table 3). Despite an examination of the areas off the track adjacent to where the artefacts were recorded, no further artefactual material could be located.

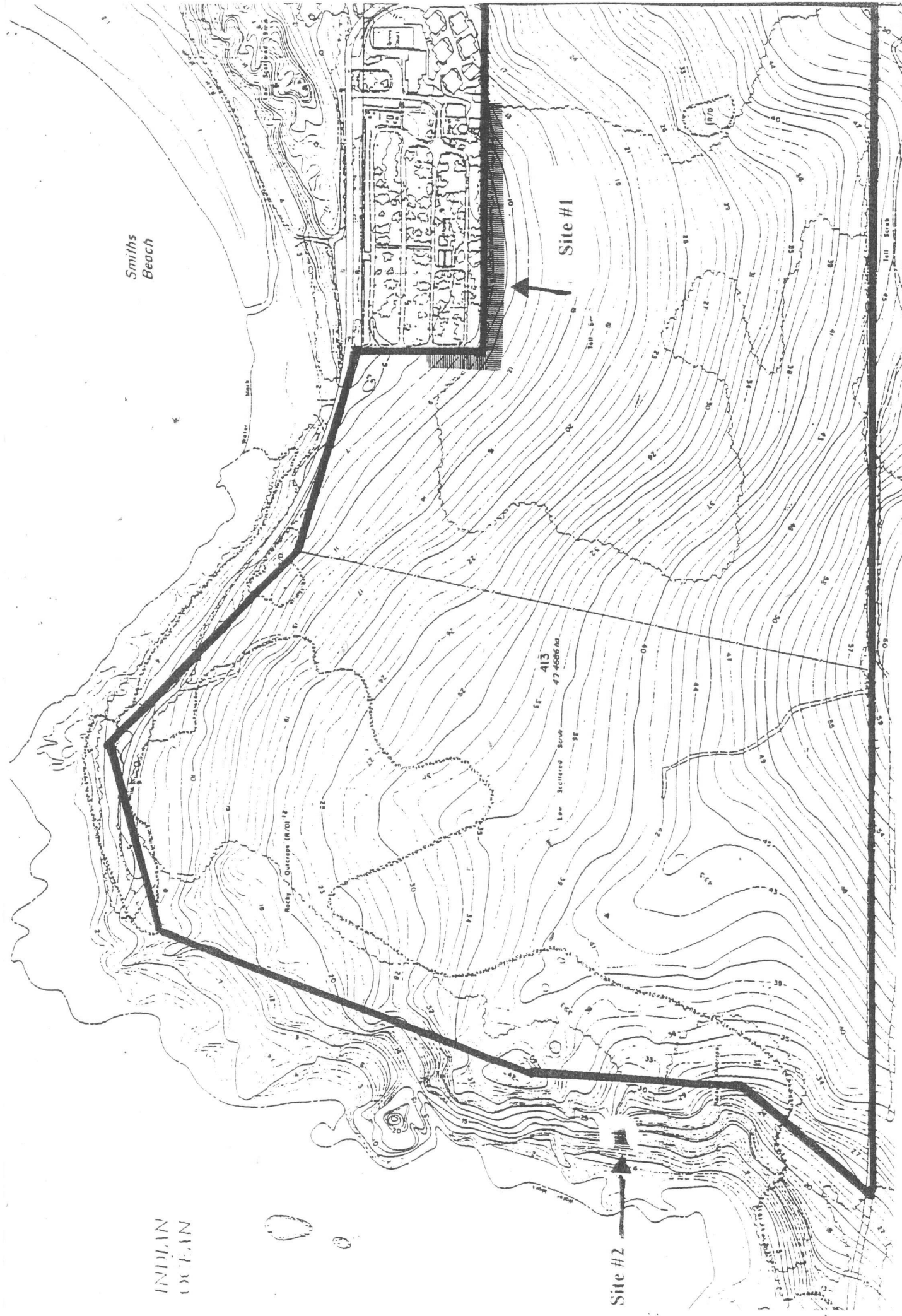


Figure 2: Map showing location of newly recorded artefact scatters.

2.4 Discussion.

On the basis of previous research in the Leeuwin-Naturaliste region of south-western Western Australia it has been suggested that residential mobility patterns were highly variable between the resource-rich coastal margin/near-coastal transition zone and the relatively resource-poor forested interior (Lilley 1993). The nature and distribution of resources, in part, determine the human behavioural responses and resulting archaeological signature (Ambrose and Lorenz 1990).

Humans, in common with other animals, require flexible mobility and socio-territorial organisation patterns in order to keep them supplied with the resources necessary to sustain life. These resources have structural characteristics that vary both spatially and temporally. On the basis of such variations and the limits they impose, a range of viable subsistence and settlement strategies appropriate to certain environmental conditions can be modelled (cf Ambrose and Lorenz 1990).

The fundamental variable of resource structuring has two basic facets: predictability and abundance which, in turn, have additional attributes. Predictability must be considered over both space and time whereas abundance must be considered in terms of resource density, clustering and timing. A combination of these factors characterise four basic resource "states" which represent the extremes which can be expected:

1. *Predictable and dense*
2. *Predictable and scarce*
3. *Unpredictable and dense*
4. *Unpredictable and scarce*

On the basis of these four resource structure states, Ambrose and Lorenz (1990) have generated expected settlement subsistence patterns and their archaeological outcomes (Table 3). The study area, which is situated on the coastal fringe/near-coastal transition zone, has a predictable but patchy distribution of floral and fauna resources, some of which are seasonally abundant. This 'predictable and scarce' resource structuring may be expected to have generated the following behavioural responses: territorial defence, low information exchange, low and scheduled residential mobility, small group size, high population density and moderate diet breadth (Ambrose and Lorenz 1990).

This range of behaviours and their expected archaeological correlates (high regional stylistic variability, exploitation of local stone sources, intensive site useage, structured activity and discard locations and moderate faunal and floral diversity) can be seen to

account for the patterning identified by Lilley (1993) for the coastal areas of the Leeuwin-Naturaliste region.

Behavioural Correlates	A. Predictable & scarce	B. Predictable & dense	C. Unpredictable & dense	D. Unpredictable & scarce
Territorial strategy	territorial defence	home range, semi-permeable	undefended, very permeable	undefended, very permeable
Information exchange	low	medium	very high	high
Residential mobility	low, scheduled	medium, scheduled	high, opportunistic	very high, opportunistic
Group size	small	small	large	very small
Population density	high	medium	medium	very low
Diet breadth	moderate	high	very low	very high
Archaeological correlates				
Macro-regional assemblage variability	high stylistic variability	low stylistic variability	high stylistic uniformity	high stylistic uniformity
Raw material sources	all local, embedded	mostly local	diverse, many distant exotics	local and distant exotics
occupation site intensity	high at home base	moderate at home base	very low at home base	very low at home base
Intra-site spatial organisation	very structured activity & discard locations	moderately structured	poorly structured	poorly structured
faunal and floral diversity	moderately high	high	very low, large game	very high, mostly plant

Table 3. Resource structure, behaviour and archaeological correlates (after Ambrose and Lorenz 1990:10).

With the exception of the utilisation of local resources, few of the expected archaeological correlate can be discerned at either of the two newly recorded artefact clusters. However, this is not surprising given the probably high residential mobility of prehistoric groups in the area as a whole and the level of disturbance across parts of the PDA, which may have acted to destroy any intrasite structuring that may once have existed.

The suggestion that Aboriginal land-use patterns in isolation to other factors generated the observed pattern is probably insufficient, owing to the fact that site discovery and recording is largely dependent upon factors determining where and when research and mitigative surveys are conducted. This can result in the introduction of bias in terms of area and sample coverage. Associated with this is the relative probability of site discovery; the likelihood of locating a site in any given environmental situation is not necessarily proportional to the actual extent of the archaeological resource. Dense vegetation cover across most of the PDA meant that only a low proportion of the total designated area could be effectively surveyed.

2.5 Recommendations.

As a result of the archaeological survey two new artefact scatters and several isolated artefacts were recorded. Field Site #1 lies within the boundaries of the PDA. Owing to the small number of finds (29) over a survey path length of over one kilometre and the disturbed context, this site is considered to have been adequately recorded and to have little further research potential. Field Site #2 lies outside the proposed development area, and will not be disturbed. Consequently, this site is not considered to represent an impediment to the continuation of development.

It is **recommended** that:

- the isolated artefacts recorded during the survey process do not represent an impediment to the proposed development
- heavy vegetation cover across most of the PDA imposed serious constraints in terms of the efficacy of the survey process, and that the degree of survey coverage achieved is insufficient to allow a full evaluation of the demonstrated archaeological resource of the study area to be made.
- further field survey will be necessary before a full assessment of the archaeological resource of the study area can be made. This should follow vegetation clearance across the remaining portions of the PDA.
- during vegetation clearance, the proponents do not disturb the area containing Field Site #1, insofar as it has currently been delineated. Detailed and specific recommendations relating to Field Site #1 will be made once vegetation cover in surrounding areas has been cleared and the full extent and archaeological significance of this and any as yet unrecorded material has been assessed.

The proponents are reminded of their obligation under Section 15 of the *Aboriginal Heritage Act 1972-180*) to report any archaeological material that may come to light during the course of development.

SECTION 3: Ethnographic Survey.

3.1. Ethnographic And Historical Background.

Prior to European settlements at Albany in 1827 and then Fremantle in 1829, it is generally considered that the Southwest of Western Australia was occupied by Aboriginal people forming thirteen socio-dialectal groups or 'tribes'. These groups formed a distinctive socio-cultural bloc and formed part of what Berndt (1979) has called 'The Old Australian Tradition'. They have been distinguished from their neighbours to the north and east by the fact that they did not practice circumcision or subincision.

The survey area is believed to have been occupied by the *Wandandi* people or 'tribe'. Tindale (1974; Figure 3) describes *Wandandi* and their territory as,

From Bunbury to Cape Leeuwin, chiefly along the coast; at Geographe Bay, the vicinity of Nannup and Busselton. According to one informant the tribal name is linked to the [*'wardan*] or crow, but the name given in vocabularies for crow is [*'kwa:kum*]. They were also called the "seacoast people" and the detailed Nina Layman MS gives "*werdandie*" also "*wartine*" as meaning "the sea". In yet another version it is the derivative of the negative term.

The term 'tribe' has, after prolonged debate, fallen almost completely from use among anthropologists when referring to Australian Aborigines. Tindale differentiated between groups on the basis of their language primarily. It is now believed that this was only one of many cultural features which could determine social boundaries, the term socio-linguistic group may be a more accurate reflection of this situation. The maps created by Tindale describing the boundaries of 'Aboriginal Tribes of Australia' are, however, often taken as a starting point in surveys of this type. Tindale believed that boundaries tended to be formed along 'physiographic realities' such as hills, changes in vegetation or rivers. Two problems with this notion, as used by Tindale, diminish the veracity of his project. The first is the use of these 'physiographic realities' by informants as a convenient, quick and approximate translation of the 'cultural realities'. For example it is not uncommon for Tindale boundaries to coincide with roads, although it is possible that this is coincidental and related to topography, as Tindale believed. The second problem concerns the notion of a 'boundary' and how his notion corresponds to the diverse set of cultural practices found across the continent. If the social organisation of the Southwestern cultural block closely followed that of

much of the rest of the continent, then it is likely that the boundaries were highly permeable.

A basic unit of these groups was the band or horde which characteristically numbered up to forty persons and was comprised of a number of families which were the fundamental social unit. Hallam (1975) described the situation between bands as:

a mosaic of usage rights, or rather a series of overlapping mosaics. A group's range for one resource need not coincide with its range for another, although there will be a core area over which there is the greatest degree of overlap, and which is most frequented by a particular community.

Ethnohistorical data suggests there was a great deal of movement in these groups. Individuals, families and bands moved between areas generating a fluid local population size and composition. Each member of such a group brought to the family economy various rights of access and use through inherited and totemic connections to particular areas.

The broadening of such associations was institutionalised through exogamous marriage sets, or 'moieties' and the economic gains which accrued through advancement in age and spiritual knowledge. Advancement in spiritual knowledge required the collection of cultural information, such as stories and songs, particular to places and their custodians. The inheritance of country was probably bilateral with, however, an emphasis on one or other parent. Bates (1985) recorded that along the south coast 'below Augusta and the Donnelly River' a patrilineal system applied whereas along the west coast people were matrilineal. The social organisation of these groups seems to have included matrilineal moieties, *manitjmat* (white cockatoo) and *wardangmat* (crow). Each moiety was divided into four exogamous clans. The names of these clans had totemic associations which placed Aborigines into special spiritual relationships with the flora, fauna and landforms.

Numerous attempts have been made to estimate the population density of various parts of the Southwest, although none for the specific region around the survey area. Hallam (1975) surveyed some of the early settlers estimates for the Southwest and settled herself on a figure;

somewhere between 5 and 20 square miles per person (between twenty and five persons per 100 square miles) and most probably between seven and ten.

Most other estimates of population densities in the Southwest also fall within this range (e.g. Ferguson 1985; Le Souef 1993).

The diversity of plant life and the relative scarcity of large animals in the heavily forested areas of the Southwest suggest that vegetable foods may have formed a major component of the food resource available to people such as the *Warndandi*. Historical records differ as to the abundance of plant food resources available. For example Grey (1841) speaks favourably of the regions' vegetable resources. Meagher and Ride (1979) also depict a mostly favourable picture of food availability. John Bussell in a letter of 1831 (reported in Shann 1978) suggested a more frugal fare, again however, based on vegetable sources.

The reconstruction of Aboriginal life in the Southwest is extremely difficult for a number of reasons, amongst which is the major changes which seem to have taken place in the ecology of the forests. It appears that as a result of frequent burning by Aborigines the forests were once far more open, carrying an even greater diversity of plant species and, probably a greater number of large animals. The precise nature and extent of this environmental change has not been estimated with certainty nor is the archaeological research conclusive. Although some early settlers kept up exhaustive correspondences and diaries their observations are idiosyncratic and all occur within the context of colonialist contact. The journals of some members of the Albany garrison are exemplary in this regard but it has not been determined how generally their observations can be applied.

Another difficulty in attempts at reconstruction is the unknown degree to which disease and frontier brutalities affected the Aboriginal population prior to written records. It can be assumed with some certainty that diseases travelled in advance of the settlers and as a result observations made by settlers may well have been of populations already depleted. If the recorded effects of disease which occurred elsewhere are taken as an indication the loss of life may have been devastating. Green (1984) constructed a table of these from which it can be seen that the effects of recorded epidemics were frequent and severe.

The first experience of non-Aboriginal people for Aboriginal groups in the Southwest came in the form of sealers and whalers. These enterprising mariners and butchers seem to have deserved their reputation as lawless cut-throats if the scene which greeted Lockyer and his party upon arriving at Albany to establish a garrison is taken as a fair indication. Lockyer found Aboriginal men murdered and Aboriginal women

bound and stranded on a small island off the coast. His party was attacked upon arrival but soon developed exceptionally good relations with the indigenes. Solid and prolonged friendships developed between some Aborigines, particularly *Mokare*, and garrison men such as surgeons Nind and Wilson, the commandant Barker and the resident magistrate Collie, all of whom made substantial and perceptive observations over a number of years.

Similarly the first settlers throughout the lower Southwest seem to have found that cordial relations could be established and maintained at little cost and to their benefit. Aborigines could be induced to perform a multitude of tasks for a small portion of, to them, exotic food, such as tea or sugar. The demands on both sides of this trade relationship gradually increased. Aborigines came to settle in satellite camps around farms and settlements where goods and employment could be found whilst still exploiting bush resources. As the encroachment of settlers grew to threaten the traditional subsistence strategies of Aborigines, however, altercations began to occur.

The settlement at Augusta was the first in the region, these were abandoned by most within a short time however. Only a few families settled here permanently as land more easily cleared was surveyed in the Vasse region, where most of the settlers moved to (Shann 1978). Aboriginal people adapted to these conditions by finding employment as shepherds, milkers, land clearers, vermin control, domestic servants and in sundry other farm jobs. With the increased availability of European labour, and wide spread fencing, Aborigines found that they could find only irregular employ on farms and so developed an adaptation of the traditional Aboriginal seasonal round with the seasonal demand for farm labour. The paths taken linking regular places of employment came to be referred to as 'runs'. Fringe camps on the outskirts of towns and on certain farming properties served this highly transient population. For a period this lifestyle was further supplemented by trade in furs, especially possum (Haebich 1988).

The influx of new settlers was largely due to the *Homestead Act* of 1890 which offered finance for a tract of land and certain improvements, ownership of the land being granted provided improvements to a certain value were achieved within a specified period. The *Act* was designed both to encourage settlement, and take advantage of rising wheat prices. The focus of farming in the Southwest changed thereby from sheep to the less labour intensive wheat. Haebich (1984) notes some remarkable statistics in this regard;

Between 1903 and 1912 the area of alienated land in the State grew to twenty million acres and the wheat acreage grew from 138,000 in 1903 to 1.4 million in 1914. By 1914 wheat was [a] major export item with an export value of \$2.7 million compared to \$362 in 1900.

Fencing and widespread cultivation meant that less land was available for native flora and fauna and that pursuit of these involved trespassing on private property. In a relatively short period the bush lands which had allowed Southwest Aboriginal people a measure of economic independence and a space to independently perpetuate their culture all but ceased to exist.

In 1905 the State Government introduced draconian legislation which restricted the movement of Aborigines in the towns and demanded that potential employers obtain a permit. It was intended to benefit those Aborigines of the Northwest who were being employed on cattle stations without wages or healthy conditions and who, it was felt, would benefit from partial isolation from the corrupting influences of the towns. These curfews made many urban dwelling Aborigines criminals in the course of pursuing what to non-Aborigines were normal and necessary aspects of their lives. The work permits made Aborigines more costly employees than Europeans.

A more damaging piece of legislation still was that intended to prevent miscegenation and provide children with vocations. The chosen method was to institutionalise children of mixed racial background separating them from their families. This operation was organised by the Native Welfare Department which was hampered in its attempts at 'humanitarian' initiatives by an impossibly small budget. In this period the Department had only one office in Perth and less than ten staff to administer the whole state. To supplement staff shortages the services of local police were engaged as 'protectors'. This had long been the practice in WA and other states. These same police were required by law also to enforce curfews and health requirements (particularly those concerning 'syphilis') as well as provide rations and hear complaints. This arrangement, unfortunately, established a conflicting set of demands for both parties which only served to increase the conflict of interests which may have already existed between police and Aborigines in regard to property (Haebich 1988). Conditions in these institutions varied over the years but rarely were any forms of vocational training provided, except for domestic service. The camps were often policed by Aborigines from the Northwest who inspired great fear, they were skilled in tracking and believed by many of the inmates to possess supernatural skills. The food and clothing provided were often of a standard which would today be considered unfit. The callousness of the administration has become the stuff of Nyungar legend. This

institutionalisation policy has produced many enduring problems for the Aboriginal community of the Southwest.

The widespread dislocation is, however, also, in a large part responsible for the development of a strong collective identity overlaying regional identities such as existed prior to contact. Haebich (1988) points out that this Nyungar identity is a positive result of a history of oppression. On the other side of the equation the negative effect on many individuals and their families is inestimable. For many years it was believed that Nyungar people were largely 'assimilated' or 'acculturated', however recent research by people such as Birdsall (1988) and Baines (1988) has presented quite a different situation. The people known as Nyungar now live in a variety of locations and maintain much cultural property which is distinctively Aboriginal and specifically Nyungar. In recent years, furthermore, there has been a determined effort to revitalise Nyungar culture which can count many successes. Although there has been a loss of traditional mythological and ritual knowledge which underpins connections with the land, there is still a substantial degree of knowledge available in *Nyungar* society concerning traditional mythological and ceremonial sites.

This knowledge is characteristically carried and transmitted within family networks (Baines 1988). These networks have dynamic properties, changing boundaries to include and exclude parties, and revolving about movement along runs which may have a very long history. Myths and stories are deposited along these networks so that sections of family networks associated with the same stretch of country may have equally well-developed, but quite different stories about the country. Partly as a result of the events described above it seems that there has been an attrition of knowledge, in some instances sites are known but the associated mythology is lost: in other cases, the mythology is remembered but the site location has been forgotten.

In summary there are two principal kinds of connections between individuals and families and the land and the sites in Aboriginal society. These are:

1. Religious, spiritual/mythological. In the Southwest, the major axis of myth is concerned with the Waugal and its influence on freshwater resources (Bates 1985:221; see also O'Connor, Quartermaine and Bodney, 1989).
2. Historical/social associations.

And it must be added here that, realistically, there is now a political/religious association in force. It has its roots in the land rights movement and in responses to the *Aboriginal Heritage Act (1972-1980)* which has served to politicise Aboriginal culture, in general, and Aboriginal spirituality in particular.

The second type of associations are not merely a matter of sentiment. Aboriginal connections with the land and specific sites are spiritual. This means that Aboriginal people perceive links which involve the total life-cycle (birth, death, transitions of status/initiations) which infuse sites with dense and culturally palpable meaning. This may extend to beliefs that the earth, trees and other natural features are the domain of spirits of the deceased. This locates Aboriginal attachments to the land and sites in a spiritual history, grounding their present actions, which may provide a framework for a meaningful and culturally continuous future. There is little doubt that the strength of attachments varies between individuals and families according to experiences, values and a range of other factors. However, there is overall, a recognition that these associations are crucial elements of *Nyungar* society.

3.2 Survey Methodology.

The ethnographic survey was conducted by M. Hammond and Dr E. McDonald, and involved the following process;

1. A review of archival material
2. Consultation with local Aboriginal organisations.
3. Interviews with informants
4. An inspection of the area with nominated informants

The archival research involved a review of published and unpublished material concerning the area as well as an examination of site files held by the Department of Aboriginal Sites, Western Australian Museum.

A list of Aboriginal people with knowledge of, and associations with, the PDA has been built up from previous research conducted in the area (e.g. McDonald, Hales and Associates 1993; Prince, Campbell-Smith and McDonald 1993; Locke and Murphy 1991; Veth and Moore 1989).

Three locally based Aboriginal organisations were consulted; Bibbulmen Mía, Gnuraren Aboriginal Corporation and the Lake Jasper Project. Conflict exists between members of Bibbulmen Mía and the other two organisations. As a result, the small

Aboriginal population of Busselton is divided according to membership of, or allegiance to, one of the afore-mentioned organisations.

The survey strategy and proposed development was discussed with all parties concerned at the consultative meetings. Advice was also sought as to who should be involved in the survey process. Maps of the PDA were used during the meetings to orientate the Nyungar people and to outline the potential impacts of the development. An inspection of the PDA was conducted in the company of two nominated informants.

Informant* #1 is an elderly Nyungar man, reputed to be the oldest member of the Busselton Nyungar community. He was born in Margaret River and has lived most of life in the lower south-west region of Western Australia. Much of his early childhood was spent in the Capel-Busselton area. His family is recognised as one of the original families from the Busselton region. All three Nyungar organisations directed the consultants to him. Informant #1 participated in an inspection of the PDA.

Informant #2 is a man in his thirties, who is currently Chairman of the Gnuraren Aboriginal Corporation. He was born in Busselton and has lived most of his life in the area. Informant #2 is related by marriage and kinship to Aborigines who have prolonged and extensive associations with the PDA. He participated in an inspection of the PDA.

Informant #2 was able to direct the consultants to two of his maternal aunts who have associations with the PDA. Informants #3 and #4 were consulted in the home of informant #4 using maps of the PDA. Informant #2 was present during the consultation process.

Informant #5 is the father of informant #2 and brother-in-law of informants #3 and #4. He is a poet and writer as well as a leading member of the Bibbulmen Mia association. Informant #5 was born in Busselton and is actively involved in researching Aboriginal heritage in the area. He was unable to participate in an on-site inspection of the PDA as he is confined to a wheelchair. Maps of the PDA were used during the consultation process.

3.3 Ethnographic Research Findings

3.3.1 Archival Research.

A review of the site files held by the Department of Aboriginal Sites indicated that there are no previously recorded ethnographic sites within the PDA.

3.3.2 Field Research Findings.

Two inspections of the PDA were made in the company of Informants #1 and #2 respectively. The informants stated that, to the best of their knowledge, no ethnographic sites were located within the PDA.

*3.4 *Conclusions and Recommendations.*

With regard to the provisions of the *Aboriginal Heritage Act (1972-1980)* no ethnographic sites were identified by informants within the bounds of the PDA.

It is **recommended** that there are no ethnographic impediments to the proposed development.

It is further **recommended** that the proponent or their representatives consult with members of the local Aboriginal organisations regarding the development and its potential impact on the local physical and social environment.

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APPENDIX 1:
STONE ARTEFACT ASSEMBLAGE DETAILS

<i>Artefact type</i>	<i>Raw material</i>	<i>Length (mm)</i>	<i>Width (mm)</i>	<i>Thickness (mm)</i>	<i>Comments</i>
BF	Quartz	24	12	6	
CF	Quartz	23	14	5	
CF	Quartz	9	5	2	
FF	Quartz	16	8	3	
DEBRIS	Quartz	20	10	8	
FF	Quartz	4	2	1	
FF	Quartz	11	9	3	
BF	Quartz	6	3	2	
CF	Quartz	15	9	2	
DEBRIS	Quartz	12	8	6	
CF	Quartz	27	10	5	
BF	Quartz	12	8	4	
CF	Quartz	10	7	2	
CF	Quartz	16	8	4	
FF	Quartz	10	5	2	
CF	Quartz	12	10	4	
FF	Quartz	10	10	2	
FF	Quartz	18	6	2	
DEBRIS	Quartz	11	5	5	
BF	Quartz	12	5	2	
CF	Quartz	21	18	4	
DEBRIS	Quartz	12	6	2	
DEBRIS	Quartz	8	5	2	
BF	Quartz	11	10	4	
FF	Quartz	18	12	5	
DEBRIS	Quartz	10	8	6	
DEBRIS	Quartz	9	4	4	
BF	Quartz	6	5	2	
CF	Quartz	10	5	1	

Table 1. Field Site #1, stone artefact assemblage details.

<i>Artefact type</i>	<i>Raw material</i>	<i>Length (mm)</i>	<i>Width (mm)</i>	<i>Thickness (mm)</i>	<i>Comments</i>
CF	Quartz	14	13	2.5	
FF	Quartz	16	9	3	
CF	Quartz	14	11	6	
BPC	Quartz	16	9	8	Crushing on proximal and distal ends; 5 negative flake scars
FF	Quartz	13	9	3.5	Partial cortex
FF	Quartz	10	4	2	
FF	Quartz	9	8	2.5	

Table 2. Field Site #2, stone artefact assemblage details.

<i>Artefact type</i>	<i>Raw material</i>	<i>Length (mm)</i>	<i>Width (mm)</i>	<i>Thickness (mm)</i>	<i>Comments</i>
CF	Quartz	12	18	7	
CF	Calcrete(?)	15	13	4	

Table 3. Isolated artefacts

APPENDIX 2:

STONE ARTEFACT ASSEMBLAGE RECORDING AND ANALYSIS METHODOLOGY

The methodologies employed in the recording and analysis of stone artefact assemblages recorded during the present survey reflects a holistic approach, in which entire stone artefact assemblages, rather than individual implement classes, are the unit of analysis. A number of studies have indicated that a concentration on formal tool typologies alone is not sufficient to ascertain site function and patterns of lithic use (eg Cane 1984, Draper 1985, Hiscock 1983, 1986, O'Connell 1977, Veth 1989).

For recording and subsequent analytical purposes, artefacts were grouped, according to standard practice, into two categories; implements and waste (Figure 1). Waste includes both debitage and core categories. The classification of the stone artefact assemblages will concentrate on technological attributes shared by implement and waste categories rather than upon any presumed morphological or functional characteristics. Artefacts in the core and retouched/utilised categories, together with complete flakes, were isolated for more detailed in-field analysis.

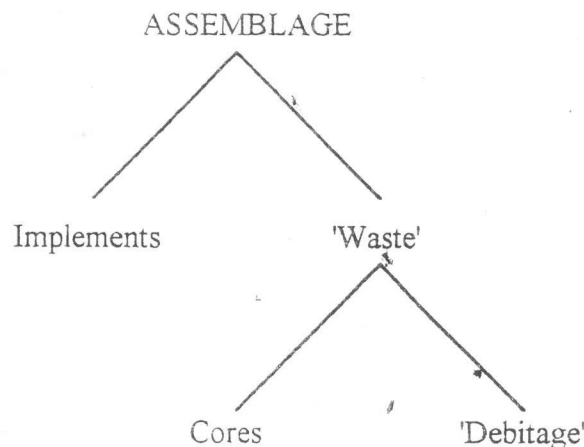


Figure 1: Simplified schema showing division of stone artefact assemblages for analysis.

a). Implement categories.

Implements are defined as any artefact showing evidence of use-wear and/or modification through deliberate reworking of the margins (Kamminga 1982). Three categories are recognised;

i. Retouched/utilised flakes (RUF).

This category covers a wide range of amorphous flakes which display secondary retouch and/or use-wear along one or more margins.

ii. Retouched/utilised cores (RUC).

These are cores that exhibit edge retouch in the form of a row of contiguous flake scars. Artefacts were classified as cores if they exhibited at least one negative flake scar and lacked a single interior surface. The presence of edge retouch on cores is a much debated issue. Replicative studies have demonstrated that damage believed to result from utilisation is identical to patterns observed in platform preparation. Additionally, stepped or undercut edges are seen to be the result of attempts to remove flakes from a core when the angle between the platform and the dorsal surface approaches ninety degrees (Flenniken and White 1985:140; Kamminga 1982). For this reason, cores with step-terminated flake scars will be excluded from this category.

iii. Retouched/utilised pieces (RUP).

This category includes artefacts displaying retouch/use-wear which have been broken during manufacture or through subsequent trampling.

b). Waste categories.

i. Debitage.

Debitage is defined as stone flakes which do not conform to the criteria defined for implement and core categories. In recent years it has become recognised that the analysis ofdebitage is of great utility in dealing with assemblages that contain few 'formal' tools, owing to the fact thatdebitage is usually present in sufficient quantities to permit statistical analyses to be undertaken. Additionally, the study ofdebitage can produce

...unique insights into aspects of cultural activity not apparent through a consideration of tools alone, such as the detection of manufacturing debris of tools removed from the assemblage and the locus of tool production, use and repair (Fish 1981:385).

The proposed system ofdebitage classification follows Sullivan and Rozen (1985), with modifications (*cf* O'Connor 1990). Four mutually exclusive classes ofdebitage are recognised, including complete flakes (CF), broken flakes (BF), flake fragments (FF), and debris. The classes are arrived at by the use of a hierarchical key based upon the presence or absence of the following technological attributes: single interior surface, point of applied force, and margins (Figure 2).

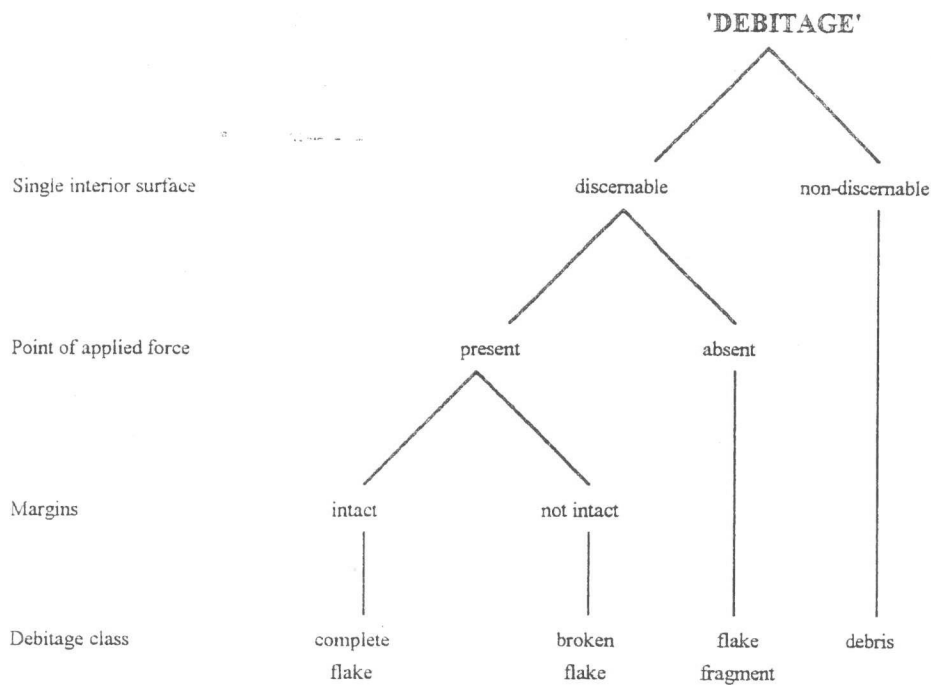


Figure 2: Technological attribute key used to define debitage classes (after Sullivan and Rozen 1985:759)

A single interior surface is indicated by features such as ripple marks, force lines and bulb of percussion. The point of applied force occurs on debitage which has intact striking platforms where these intersect the bulb of percussion.

If the striking platform is partially lost, the point of applied force is indicated by the origin of the force line radiation. Margins are considered intact if the distal end has a hinge or feather termination and if other breaks do not interfere with width measurements.

ii. Cores.

The following five classes are recognised:

Single platform (SPC).

These are cores from which flakes have been detached from a single striking platform.

Multi-platform (MPC).

These are cores from which flakes have been detached from several different platforms. These platforms may be natural surfaces or formed by flake scars, the latter indicating core rotation (Hiscock 1986:49).

Core fragments (Core frag.).

These are cores or broken cores displaying only partial negative flake scars which lack a discernible point of impact.

Bipolar Cores (BPC).

These are cores exhibiting crushing on opposing ends.

Broken Bipolar (BBPC).

These are shattered cores where only part of the crushing remains (O'Connor 1990).

Attributes Analysed.

Complete flakes.

A range of technological attributes were recorded for each complete flake in the debitage category. This suite of attributes was chosen as a prerequisite to the elucidation of artefact morphology and the nature of reduction systems employed. These attributes are to be used in conjunction with data derived from the analysis of debitage, as described above, in order to "test inferences advanced on the basis of differences in debitage [class] proportions" (Sullivan and Rozen 1985:759). The following attributes were recorded:

1. length
2. width
3. platform length
4. platform width
5. platform surface (cortical, flat, faceted, crushed)
6. number of dorsal flake scars (DFS)
7. Cortical index (cortical, part-cortical, non-cortical)

Cores.

Artefacts in the core category were recorded by maximum dimensions, together with core type, platform type and location.

Implements.

Artefacts in the implement category were recorded by their maximum dimensions. In addition, the presence and percentage (of total margin length) of use-wear and/or retouch was recorded together with its disposition. Measurements of the angle of the angle of the altered flake margin(s) and/or flake platform are expressed as an average of several readings made with a goniometer.