SHARK BAY
WORLD HERITAGE PROPERTY LANDSCAPE STUDY

Managing Community Enjoyment
Recreation, Tourism and Development

SUMMARY DOCUMENT

Midwest Region and Recreation and Landscape, Planning and Design Section
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DEPARTMENT OF
Conservation
AND LAND MANAGEMENT
Conserving the nature of WA

World Heritage

FOREWORD

The Shark Bay region is well known for its rich marine life, spectacular coastline, sheltered waters, extensive acacia shrublands, sand plains and dunes, early pastoral and settlement history, and the opportunity for interaction with the dolphins. It has a vast array of places with unique character and identity, it contains a high concentration of significant natural and cultural features, many of state, national and international significance, and offers a range of opportunities for people wishing to experience the special nature of the area. The area is becoming one of the best known tourist destinations in the state.

People are attracted to the region for a variety of reasons and similarly they respond to the natural and cultural features in a variety of ways, which is reflected in the activities that they undertake and the different types and patterns of existing development. This interplay between existing natural and cultural characteristics, and the perceptions, experience and enjoyment people derive from them creates the 'landscapes' of the Shark Bay region.

These landscapes are a vital component of people's enjoyment of the environment. They represent the setting for all people's activities and are a strong influence on their sense of well-being and quality of life. Aesthetic landscapes add to property values and form the settings, and often the attractions, for tourism. This economic value of landscapes is increasingly being determined by environmental economists as part of the planning process. Landscapes are now regarded as a resource, partly because of this economic value and partly because they are an accepted component of resource assessment programs (regardless of economic value). The aesthetic values of Shark Bay landscapes have been formally recognised through inscription on the World Heritage List.

For Shark Bay, for the future, there is a clear need for a consistent, comprehensive and systematic approach to landscape assessment and management across the entire Shark Bay region. It is vital that landscape values are identified, understood, assessed and mapped, that impacts on them are identified, and that methods are defined for determining and sensitively managing both the values and impacts, keeping in mind other resource values of the region. These are the objectives of landscape management and the basis for this study. It is envisaged that this study will be an important tool in the future management of community enjoyment, recreation and tourism, and the development and prosperity of the Shark Bay region.

EXECUTIVE SUMMARY

This study identifies aesthetic values in the Shark Bay World Heritage Property and establishes objectives and guidelines for management of these values. A number of recommendations have been made in relation to the study results, their implementation and further work.

The results of this study are presented as two documents. The summary document provides a concise overview of the study process and management recommendations. The resource document provides detailed information about the study process and management guidelines.

Underlying this study is the recognition that aesthetic values are a vital component of people's enjoyment of the environment and are a strong influence on their sense of well-being and quality of life. It is also recognised that these values are a major component of recreation and tourism, and as such are a major contributor to the prosperity of the region. These aesthetic values of Shark Bay landscapes have been formally recognised through inscription on the World Heritage List.

This is the first systematic study of World Heritage aesthetic values in Western Australia. It also the largest landscape study undertaken outside forest areas and the most comprehensive study of its kind yet undertaken in this State. The methodology is a culmination of development over a number of previous studies, most notably the Leeuwin Naturaliste Landscape Study (CALM 1997). Following the example of that work, it is envisaged that this study will play an important role in the future planning and management of the Shark Bay Property.

PROCESS

The study process consists of two parts, one dealing with assessment of values, the other dealing with management of those values. The assessment consisted of seven main components:

- **Inventory** of data relevant for the assessment was undertaken and mainly involved identifying and mapping of environmental characteristics.
- **Landscape Character** was identified and described broad patterns of environmental characteristics, classifying them into units and sub-units according to their relevance to human interaction.
- **Community Perception and Values** were researched to identify or validate appropriate criteria for determining the environmental characteristics that are most important to people's experience and enjoyment. Public perceptions and attitudes of the wider community from other research were compared with the local survey.
- **Significant Features** were identified and mapped, representing the characteristics or features in the study area that are most important to the experience and enjoyment of people. It involved the assessment of places using established criteria, and the identification of significant places or features through other assessments and lists.
- **Community Use** was identified and mapped based on the location, type and degree of community use of the area. It included spot (localised) use areas

and travel routes (air, ground, water), types of recreational and non-recreational (including industrial or residential) use, ground travel route physical characteristics (such as class, surface, markings and intended traffic type), and existing and expected volume of users. Sensitivity zones were delineated based on the level and type of use and the distance of areas from that use.

- **Sensory Characteristics** were identified for substantial parts of the study area, providing an indication of people's sensory interaction with the environment. It largely focussed on visual characteristics such as views but included other sensory types where relevant (eg. sound, wind, smell).
- **Landscape Classes** were mapped to provide a synthesis of the assessment results most relevant to management of aesthetic values.

The management of these values has been dealt with in five main components:

- **The Management Context** has been discussed, covering some of the broad management issues, regional issues, specific local landscape issues, and management responsibilities and commitments.
- **Landscape planning** covers a general guide for using the assessment results, analysis of the results, a strategy for management, objectives for management by area and value, and a series of guidelines that demonstrate management techniques.
- **Planning community use and recreation** is discussed and objectives are provided for planning in this area, as this is vital to the management of landscape values (and vice versa).
- **Management recommendations** are made.
- Finally, a brief guide for **evaluating proposals** is provided.

OUTCOMES

Visitor Survey

A visitor survey was undertaken as part of this study to investigate community perceptions of Shark Bay landscapes.

People indicated that the features that they enjoyed the most were the most significant features of Shark Bay, which would indicate a low recognition of important natural values. This correlated with three other findings: that very few conservation features were mentioned as being important, that the beauty of the area was listed as being extremely important and that the 'other features' people wanted to see can be more closely linked with experience and aesthetics than natural values. People seemed resistant to listing places as important, enjoyable or beautiful unless they had first hand experience of those places. This is highlighted by the number of additional places listed in the 'other features people wanted to see' responses.

The finding that the most beautiful places were natural and the least beautiful were human-modified is consistent with other research, as is the finding that water and the coast are relatively consistent attributes of beautiful places. The naturalness variable may correlate with the most common comment for future management in the 1993 survey when people said 'leave it as it is'. That

comment was reinforced in this survey when people expressed a desire for a low level of development. The desirable length of stay (of 1 week) was consistent with the 1993 survey. Overall, the results of this simple survey are consistent with similar research conducted in other places (see the bibliography).

Character Units

Four landscape character units with twenty sub-units were identified for the study area (see Character units map). A description of each of these is provided in the main body of the report.

Most landscape character sub-units are well represented in protected areas. Less represented are the coastal sub-units and of these, the bay cliffs sub-unit is the least represented. This appears to be the most used area to access the better 'bay' views. All the coastal sub-units are narrow (by definition), attract a high proportion of the use in the region, and are highly visible.

The terrestrial sub-units are generally represented in both pastoral lease and protected areas. The reticulate dunes sub-unit has only a minor portion of its area protected. A long length of the sea cliffs sub-unit is also outside existing or proposed protected area.

All marine sub units are well represented, including within the Marine Nature Reserve or Marine Park.

Community use extends across many of the sub-units. Apart from pastoral use, much of this use is access route use only. The highest use areas are the gentle transition sub-unit and the cliff sub-units, both bay and sea. Sub-units that receive little or no use are the tree heath, reticulate dune and Tamala sub-units.

Suitability for development is also indicated, with the most suitable being the coastal, gentle transition sub-unit.

Significance

There is a high occurrence of significant features (see Landscape Significance maps) in the study area, with most of the visual aesthetic features lying within the coastal unit. There are some areas of visual aesthetic significance in the hinterland, associated with vegetation diversity, steep slopes and high points. A number of historic features, such as the homesteads, also lie in the hinterland.

Most areas of World Heritage aesthetic value lie within protected areas. The notable exceptions are the Heirisson/Useless Loop Prong and the long length of Zuytdorp Cliffs, south of Zuytdorp Point. There is a variety of other aesthetic features both within and outside protected areas. The mangrove banks of the Wooramel coast and Faure Island are not well represented within protected areas.

Access to significant features varies across the study area, with use tending to be polarised between no access at all and good access with use spreading into adjoining significant features.

Sensitivity Zones

Three sensitivity zones have been delineated for the Property based on the level and type of use and the distance of areas from that use.

Objectives

Objectives have been provided for the different types of significance and sensitivity zones and character sub-units. In summary, significant features are to be protected, with minor or temporary changes permitted where visual aesthetics are well represented and specialist advice has been followed. Landscape character is to be protected according to the sensitivity zones. 'A' zone is to retain existing character, 'B' zone minor change, and 'C' zone can include more substantial change, providing these changes are not seen from important travel routes.

Guidelines

Guidelines are provided (see Resource Document appendices) to assist in the management of development. The guidelines include suggestions for the siting and design of roads and access, activity areas, towers, aquaculture and buildings.

RECOMMENDATIONS

The following recommendations are made in relation to management of aesthetic landscape values in the Shark Bay World Heritage area.

1. The landscape management objectives and recommendations detailed in this study be adopted by the World Heritage Committees, and key State and Local Government agencies.
2. A coordinating mechanism should be established to ensure consistency in the evaluation and approval of development proposals, and landscape management principles and objectives should be included in the EPA Guidance Statement No.49 (Guidance for the Assessment of Environmental Factors - Assessment of Development Proposals in Shark Bay World Heritage Property).
3. Specialist advice relevant to the value be included as part of any development proposal relating to significant values or 'A' sensitivity zone.
4. An integrated community use and recreation plan should be developed, incorporating the results of this study for the whole Shark Bay region.
5. Strategic development plans should be prepared for Denham and Monkey Mia, incorporating the results of this study.
6. The number of aesthetic features affected by physical development should be restricted, decided through the preparation of a community use/recreation study.
7. Natural areas, free of any physical development, should be designated in a plan and should incorporate the principles and results of this study and a community use/recreation study.
8. Maintaining the general undeveloped nature of the Property should be given high priority in planning and design decisions.

9. A variety of access types should be promoted to provide different experiences and to minimise environmental impact. The benefit of aerial views to the appreciation of the visual aesthetic characteristics of the Property should be highlighted.
10. Further work should be undertaken in relation to this study, including to improve the definition for the subcoastal units.

PART ONE - INTRODUCTION

Part One of the report describes how the study was initiated, provides an initial introduction to the meaning of aesthetic values and the criteria for assessment, outlines the study's objectives and scope, and provides a description of the study area. The structure of the report is also briefly outlined.

1.1 STUDY BACKGROUND

Shark Bay was added to the World Heritage List in 1991 on the basis of its natural heritage values. The Shark Bay World Heritage Property meets all four criteria for listing based on natural heritage. One of these criteria (criterion (iii)) aims to establish whether there are outstanding universal values relating to aesthetics and natural beauty. A brief, qualitative description of the 'features' meeting this criterion was provided in the nomination document for the World Heritage List. Other than this description there is little management-related information to assist in the protection and conservation of these aesthetic values. With this problem in mind, CALM applied for, and was granted, World Heritage funding to undertake a formal, systematic assessment of the aesthetic values in the Shark Bay region to provide information for management purposes. A short description of the project was provided in the grant application and this report provides further detail of the project method and outcomes, including a landscape management plan.

1.2 DEFINING LANDSCAPE AND AESTHETIC VALUES

The unique and complex sets of values people create when they respond to natural and cultural environments are commonly termed 'landscapes' (see Glossary). These landscapes have aesthetic values, which are the primary interest of this study.

A simple explanation is as follows. People receive environmental information by a variety of sensory paths. This information is combined with a person's existing knowledge, emotional response and values in a process of perception. This perception process produces that person's 'landscape', their 'image' of that environment. In doing so, they attach values to parts of that environment. Existing values are used in the perception process to produce new values. Thus, each experience adds to a person's values. While it can be difficult to measure elements of perception, it is relatively easy to measure people's values (Itami 1993).

One component of these values is aesthetic value. While the term aesthetic is used often in relation to the study of beauty, it is apparent that its definition in human-environment interaction is very complex and that it has much in common with other values that have often been considered separately, usually because of legislative requirements (see Blair and Truscott 1989). Beauty may result from many things: the sight of a unique creature; the age of an object; the sound of water; an understanding of the science of an ecosystem; the smell of a cooked meal; a spiritual connection with a place; the taste of a fine wine; or the reaping of produce. The study of aesthetics in this context is complex, and in this study

has been reduced in scope to a number of well recognised components: scientific, historic, social and visual.

Aesthetic value in this study, put simply, reflects the personal appreciation and enjoyment stemming from these components.

1.3 CRITERIA FOR ASSESSMENT

Sites of World Heritage aesthetic value have to be of *outstanding universal value* and meet a *condition of integrity*. There are a number of documented versions of the criterion that determines *outstanding universal value* (Criterion (iii)) (see references below). These versions state that the site is to:

- 'contain unique, rare or superlative natural phenomena, formations of outstanding natural beauty.' (Nomination document(DASETT (1990)));
- 'contain superlative natural phenomena, formations or features, for instance, outstanding examples of the most important ecosystems, areas of exceptional natural beauty or exceptional combinations of natural and cultural elements' (SB Regional Strategy);
- 'contain superlative natural phenomena or features of exceptional natural beauty and aesthetic importance' (current World Heritage Operational Guidelines).

Some interpretations of this criterion list separately superlative natural features and features of exceptional natural beauty (see DASETT (1990). The condition of integrity (see WH Operational Guidelines) makes it clear that the object of criterion (iii) is aesthetic value.

The condition of integrity requires (in the case of Criterion (iii)) that the elements necessary to maintain the aesthetic qualities of the site, and that may exist beyond the immediate setting of the site, should be included as part of the site. (It also requires that the area should have a management plan and long-term legislative, regulatory or institutional protection.)

Regardless of the variations in wording, there is little in the criterion for determining 'outstanding universal value'. Despite this, there is an established list of features which satisfy this criterion (iii) (see later in this text) and these are generally accepted as the WH aesthetic values.

The focus of this study then turns to identifying aesthetic values in the WHP, and providing additional detail of the WH aesthetic values. In this case, there is well established, detailed criteria for assessing aesthetic or natural beauty values based on extensive human perception research (see Section 2.4 later in this text).

1.4 STUDY PURPOSE

The purpose of the *Shark Bay Landscape Study* was to provide the information necessary to manage landscape values, particularly aesthetic values, in the Shark Bay World Heritage Property (WHP).

Objectives for the study were:

- identify and assess aesthetic values;

- analyse the assessment results to determine relevant management implications;
- determine the management context, an overall strategy for managing values, and establish zones and objectives for the management of values;
- explore development opportunities and constraints relating to identified values;
- provide a framework for assessing and evaluating impacts;
- provide recommendations, action statements, and guidelines to assist in future management.

1.5 STUDY AREA DESCRIPTION

(Taken from DASETT (1990) and WCMC Description (1998). Further detail is provided in these documents).

Situated over 800km north of Perth, on the westernmost point of the coast of Australia, Shark Bay is bounded by the town of Carnarvon to the north, and extends westwards to include the outer chain of Bernier, Dorre and Dirk Hartog islands, then over 200km southwards joining up with Edel Land and extending southwards to Zuytdorp Nature Reserve. The western boundary is three nautical miles off the coast. The eastern boundary is adjacent to the coast south from Carnarvon to Hamelin Pool, then continuing southwards approximately 70-30km inland from the west coast. The township of Denham and the areas around Useless Loop and Useless Inlet, although within the main boundary are specifically excluded from the World Heritage property.

Of the 2,197,300ha area, protected areas, such as marine parks, marine nature reserves, terrestrial nature reserves and national parks, cover about 1,240,500ha. In addition, land in public ownership is divided into: pastoral land 213,500ha; marine environment 687,750ha; land in private ownership 750ha; other reserves 2,500ha; and vacant Crown Land 55,000ha. These areas are current as at January 2001.

Shark Bay comprises a series of north-south facing peninsulas and islands which separate inlets and bays from each other and the Indian ocean. The coastline is 1,500km long and includes the 200m high Zuytdorp cliffs, which are amongst the highest of the Australian coastline. There are three distinct landscape types: Gascoyne-Wooramel province which comprises the coastal strip along the eastern coast of the bay and consists of a low-lying plain backed by a limestone escarpment; Peron province which comprises the Nanga/Peron peninsulas; Faure Island/sill comprising undulating sandy plains with gypsum pans or birridas, and ancient interdune depressions filled with gypsum. The seaward margin of this province terminates in a scarp 3-30m high and narrow sand beaches; Edel province which comprises Edel Land peninsula and Dirk Hartog, Bernier and Dorre Islands, is a landscape of elongated north-trending dunes cemented to loose limestone. The province terminates to the west as a series of spectacular cliffs.

The basement rock in the area is Late Cretaceous Toolonga limestone and chalk. The most extensive younger rocks are Peron sandstones and Tamala limestones (the offshore islands are composed of the latter). These rocks are often overlaid

by a series of longitudinal fossil dunes accumulated during the Middle to Late Pleistocene. The extensive supratidal flats of Gladstone Embayment, Hutchison Embayment and Nilemah Embayment are comparable to the coastal 'Sabkhas' of the coast of the Arabian Gulf. Gypsum has been formed as a result of evaporation of saline groundwaters within the sediments of broad tidal flats adjacent to areas such as Hamelin Pool. Shell beaches occur at the southern end of Lharidon. The inland terrestrial landscape of Shark Bay is predominantly one of low rolling hills interspersed with birridas (inland saltpans that are at sea-level). Shark Bay itself is a large shallow embayment, approximately 13,000 sq. km in area, with an average depth of 9m (maximum of 29m). The bay is enclosed by a series of islands. Influx of oceanic water is through the wide northern channel, the Naturaliste channel, between Dorre and Dirk Hartog islands and South Passage between Dirk Hartog Island and Steep Point.

The outstanding feature of the bay is the steep gradient in salinities. The salinity gradient ranges from oceanic (salinity 35-40 ppt) in the northern and western parts of the bay through metahaline (salinity 40-56 ppt) to hypersaline in Hamelin pool and Lharidon bight (salinity 456-470 ppt). The salinity gradient has created three biotic zones that have a marked influence on the distribution of marine organisms within the Bay. Tides vary with a spring range of 1.7m and a neap range of 0.6m. The Leeuwin current sweeps past Shark Bay, an intrusion of warm low-salinity tropical water of great zoological significance. The interaction of wind drift with tidal currents leads to a Bay circulation in which overall movement is anticlockwise from west to south-east, then east and finally north-west. Two rivers drain into Shark Bay, including the intermittent flows of the Gascoyne and Wooramel River into the eastern part of the Bay. There is very little surface run-off because of the low rainfall, high evaporation and permeable soils. There is active regional saline groundwater flow, however, and some freshwater springs, such as in the intertidal zone north of Monkey Mia. There is a large quantity of artesian water approximately 300m below the ground surface.

The flora consists of a transition of the South-west Botanical Province to the Eremaean Botanical Province and more than 620 species have been recorded for the entire Shark Bay region, 145 at the northern limit of their range, 39 at their southern limit and 25 considered rare or threatened at the national level.

The South-west Botanical Province consists of vegetation that is rich in Eucalyptus species, forming woodland with diverse, shrubby understories and heathlands poor in grasses. The Eremaean province is correspondingly rich in Acacia species but has large areas dominated by grasses, especially prickly hummock grasses of the genera *Triodia* and *Plectrachne*. The Province includes shrublands of *Acacia ligulata*, *Pimelea microcephala* and *Stylobasium spathulatum*. Vegetation on the older dunes includes *Melaleuca cardiophylla*, *Thryptomene baeckeacea* and *Plectrachne bromoides*. Mangroves occur in small, relatively isolated areas in southern and western Bay, only becoming abundant towards Carnarvon. The southernmost extensive stand of white mangrove *Avicennia marina* occurs on the Peron Peninsula.

The marine flora is dominated by seagrass beds covering 4,000 sq. km. Twelve species of seagrass occur in the Bay: the most abundant species is *Amphibolis antarctica*, covering 90% of the seagrass bed area, providing a substratum for 66

species of algal epiphyte. Halodule seagrass beds occupy an area of approximately 500 sq. km.

Shark Bay is notable for benthic 'living fossil' microbial communities, forming an expansive and wide variety of microbial mats, which are best developed in Hamelin pool, giving the area the most significant assembly of phototropic microbial ecosystems in the world. These *photosynthetic prokaryotes* and *analogous eukaryotic* microalgae, which commenced growing in the Pool when it first formed about 4000 years BP, trap and bind detrital sediment and thereby create organo-sedimentary microbialites or microbial mats, which have mineralised to form stromatolites in Hamelin Pool.

The Shark Bay region is an area of major zoological importance, primarily due to the isolation of the marine and terrestrial ecosystems over significant periods of time. The Bay is located near the northern limit of a transition between temperate and tropical. For example, of the marine fish species 83% are tropical, 11% warm temperate and 6% cool temperate. Of the 26 species of threatened Australian mammals, 5 are found on Bernier and Dorre islands; burrowing bettong *Bettongia lesueur*, rufous hare-wallaby *Lagorchestes hirsutus*, banded hare-wallaby *L. fasciatus*, Shark Bay mouse *Pseudomys praeconis* and western barred bandicoot *Perameles bougainville*. Greater stick-nest rat *Leporilus conditor* and bettong was introduced on Heirisson Prong, and was followed with the release of Shark Bay mice in June 1994.

Shark Bay is renowned for its marine fauna, with 14,000 dugong *Dugong dugon* (V). Humpback whale *Megaptera novaeangliae* (V) and southern right whales use the bay as a migratory staging post. Bottle-nosed dolphin *Tursiops truncatus* can be seen at Monkey Mia. A minke whale was stranded on shore in 1981 and killer whales *Orchinus orca* were sighted attacking dugongs at Sandy Point in May 1983.

The rich avifauna includes over 230 species, with 11 breeding marine birds including osprey *Pandion haliaetus* and Caspian tern *Sterna caspia*, for which Failure Island is a key breeding area. Over 35 Asian migratory species occur in the region and four of these breed in Shark Bay. A number of birds reach their northern limit in the Bay including regent parrot *Polytelis anthropeplus westralis* and western yellow robin *Eopsaltria australis griseogularis*.

Shark Bay is noted for the diversity of its herpetofauna, and supports nearly 100 species. It is rich in 'old Australian elements' with 12 species of diplodactyline geckos and 12 species of pygopodid lizards. Several characteristic species include leptodactylid *Neobatrachus wilsmorei*, hylid *Cyclorani maini*, gecko *Diplodactylus squarrosus*, skinks *Egernia depressa*, *Lerista muelleri* and *Morethia butleri*, and the monitors *Varanus brevicauda*, *V. caudolineatus*, *V. eremius* and *V. giganteus*. Green turtle *Chelonia mydas* (E) and loggerhead turtle *Caretta caretta* (V) occur in the bay, nesting on the beaches at Dirk Hartog Island and Peron peninsula. The islands, peninsulas and gulfs provide a refuge for nine relict or endemic species: pygopodids *Aclys concinna major*, *Aprasia haroldi* and *Pletholax gracilis edelensis*, skinks *Ctenotus youngsoni*, *C. zastictus*, *Egernia stokessi aethiops*, *Lerista maculosa* and *Menetia amaura*. Shark Bay supports populations of at least six sea snake species including the endemic *Aipysurus pooleorum*. Shark Bay is also an important nursery ground for crustaceans, fishes and coelenterates.

The marine flora is dominated by seagrass beds providing a substratum for 100 species of zoophytes, juvenile fish and sea snakes. There are 323 fish species. Large numbers of sharks including bay whalers, tiger shark and hammerheads are readily observed in Shark Bay. There is also an abundant population of rays, including manta ray. Because of the high organic productivity and development of seagrass beds and carbonate sand flats, the shallows of Shark Bay support a benthic invertebrate fauna of exceptional abundance, diversity and zoological significance.

The invertebrate communities of Shark Bay remain essentially unstudied. Coral reefs are present, although they are not abundant, with over 80 coral species. Hermatypic or reef building corals are found in South Passage and there are large patches along the east coast of Dirk Hartog, Bernier and Dorre Islands. The initiation of the Leeuwin current coincides with the mass spawning of hermatypic corals and is believed to be a major factor in the distribution and maintenance of coral communities in the region. In addition, of the 218 species of bivalve in the region, 75% have a tropical range, 10% a southern Australian range and 15% are west coast endemics.

The record of aboriginal occupation of Shark Bay extends to 22,000 years BP. At that time most of the area was dry land, rising sea levels flooding Shark Bay between 8,000-6,000 years BP. A considerable number of aboriginal midden sites have been found, especially on Peron Peninsula and Dirk Hartog Island which provide evidence of some of the foods gathered from the waters and nearby land areas. The mild climate favoured permanent residence.

Shark Bay was named by the English buccaneer William Dampier in the late 17th century. It is the site of the first recorded European landing in Western Australia, with the visit of Dirk Hartog in 1616, followed by William Dampier in 1699. The landing of Dirk Hartog on 25 October 1616 was commemorated by a pewter plate nailed to a post on the northern tip of Dirk Hartog Island, Cape Inscription. By virtue of its position, the area was a key navigation aid for navigators and explorers at this time. In 1712 the ship Zuytdorp of the Dutch East India Company was wrecked offshore and the French ships Uranie and Physicienne, commanded by Captain Freycinet, visited and studied Shark Bay in 1818.

After 1850, the Shark Bay region was variously occupied by guano miners, pearlers, fishermen and pastoralists. Pearling was the biggest industry from 1850 until its decline in the 1940s to be replaced by fishing. The fishing industry peaked in the 1960s and has declined over the last two decades with the introduction of regulations introduced to prevent over-exploitation of fish stocks. In 1904, until abandoned in 1911, quarantine hospitals were set up for aborigines with leprosy and venereal disease on Bernier and Dorre islands. After World War Two, a whaling station was located at Carnarvon, and between 1950 and 1962 up to 7,852 humpback whales were killed. The station collapsed in 1963 due to a lack of whales. Since the 1960s human interaction with wild dolphin groups has occurred regularly at Monkey Mia on Shark Bay's Peron Peninsula, the only known interaction on a regular basis in the world.

Shark Bay has a population of approximately 750, principally located at Denham (population of 450) and Useless Loop. Some of the local residents are of aboriginal descent (Anderson, n.d.). The economy of the region now includes

tourism, fishing, and pastoralism. The residents of Carnarvon (located just outside of the bay area) are partially reliant on the fishing industry established in Shark Bay. The area is fished by 27 boats of the prawn fleet with a harvest reported to have stabilised at 2,000 tonnes over the last 20 years. Scallop fishery catches average at 3,500 tonnes per year from the 14 boats based at Carnarvon. The Shark Bay fisheries have a capital investment of approximately $80 million, employing 500 people in the region. The fisheries harvest approximately $35 million per year. In the 1960s salt evaporation works were established at Useless Loop, and a gypsum mine (now defunct) on Edel Land.

Tourism is important and more than 160,000 visitors per year are estimated to visit Shark Bay. The figure is increasing as a consequence of easier access with the construction of new roads, motels and hotels. One of the greatest tourist attractions of the region is fishing for which a number of fishing tours and charter vessels exist. Nearly all visitors (100,000 per year) come to see a group of wild bottle-nose dolphins which has been coming regularly to feed and interact with people at Monkey Mia beach for more than 30 years (Edwards, 1988). In 1986 an information centre was constructed at Monkey Mia in conjunction with the Shire of Shark Bay, and in 2001 a new visitors centre was developed. The Department of Conservation and Land Management (CALM) has developed visitor facilities at Hamelin Pool, Shell Beach, Eagle Bluff and Francois Peron National Park and provides a wide range of interpretive literature about the World Heritage Property.

1.6 SCOPE OF STUDY

The study, although originally intended to cover only the Peron Peninsular, was broadened to cover the entire Shark Bay World Heritage Property, including the marine areas. It is hoped that this will allow or encourage better integration of planning across the Property.

The outcomes of the study are aimed at community enjoyment, recreation, tourism and development and, while the study is a valuble model for dealing with these aspects of the Property, it is recognised that there is other work that can provide more detailed information on individual topics. It is hoped one of the strengths of this study is that provides a basis for an integrated approach to management of these aspects of the Property.

This is a broadscale study aimed at providing an overall context for managing landscape and aesthetic values. Detailed plans will need to be prepared for new developments and these should aim to be consistent with the findings of this study.

1.7 LANDSCAPE MANAGEMENT STRATEGY

The Shark Bay region has a vast array of aesthetic values, which have been recognised at the highest level by World Heritage inscription. There are various legislative and policy commitments directed at the management of aesthetic values and there is a clear mandate for their protection of these values. Protection will be largely achieved through the management of development. The measures for protection are outlined in the following sections according to area, value and techniques. Underlying these measures are a number of assumptions and principles, some of which are listed below.

The management provisions can be classed as four different treatments of landscape values: enhancement; protection; impact minimisation and rehabilitation. While these levels are not specifically discussed in the management objectives and standards, they are a useful way of describing treatments in specific cases.

There is a general assumption that management can most influence landscape values through physical changes to the environment, changes in community use and changes in the community's knowledge and understanding of places. Changes in community use are the focus of land use planning and recreation planning (see Section 3.3) and changes in the community's knowledge and understanding of places are the focus of promotion and interpretation planning. Landscape management focuses on physical changes to the environment. All three areas of work need to be integrated to achieve community and management aims.

Landscape management can influence physical changes to the environment in three main ways:

1. by providing a high level of protection for significant features (regardless of their location);
2. by controlling environmental change adjacent to use areas according to the nature of the use and the distance of the change from use areas;
3. by encouraging the use in all areas of planning and design principles that enhance, protect or minimise impact on landscape values.

Existing use (or known future use) plays an important role in the management of landscape values. It is a useful basis for managing change (see point 2 above), and it is also the main method for taking up opportunities to enhance landscape values highlighted in landscape assessment. In addition, it provides for development that may impact on landscape values, highlighting suitable areas that will minimise the impact. These latter two situations are relatively dynamic in terms of planning and setting standards. Taking up opportunities to enhance landscape values by, for example, providing new access or other development may not satisfy existing standards. Development of all kinds in areas where standards allow it will, by changing the use, often require adjustments (increasing) to the standards. The latter situation is a relatively simple progression in management and highlights how landscape management responds to changes in use. It also highlights the importance of point three above, given that changes in use may bring many people past development that was previously

unexposed. The former situation is considerably more complex. Decisions regarding new development that may contravene existing standards should:

- involve the appropriate levels of planning, such as broad land use planning, area management planning, and recreation planning;
- integrate the various levels of planning with landscape planning;
- have a 'theoretical' or 'planning model' basis;
- be spatially defined;
- ensure that protection of the mosaic of landscape values is comprehensive, adequate and representative;
- balance current needs with those of future generations;
- consider the issues of precedence and incremental change.

Precedence and incremental change, where one small change defines and leads to future change, are important issues in landscape management (and any land management). A long term plan setting out the vision for an area with some absolute standards is one effective tool for dealing with these issues.

The Strategy for managing landscape values in the Shark Bay area involves five main components:

1. Identification of values;
2. Establishment of management principles;
3. Setting of objectives for areas and types of values;
4. Use of a range of planning and design techniques to ensure that objectives are met; and
5. Consideration of other resource needs.

The assessment process for identifying values has been discussed in Part 2 of this report. The following sections cover points 2 to 4.

Landscape Management Principles or Assumptions

- The natural environment is an appropriate base on which we can evaluate human-induced change.
- The existing conditions are the most appropriate secondary base on which we can evaluate human-induced change.
- There is a general trend of development replacing natural environments (ie. natural environments are a diminishing resource).
- Landscape assessment, by necessity, represents a 'snap shot' in time and it is recognised that values will change, particularly with changes in use.
- There are varying degrees of value applying to different places and management provisions should reflect these by levels of protection.
- Planning and design principles that protect natural and landscape values should be applied to all development.

- Representative samples of landscape character sub units, and the most important of the area's landscape and natural values should be adequately protected in a conservation estate of sufficient size and distribution.
- Development should be guided by the provision of objectives, standards and guidelines.
- As a precautionary measure, the conservation of the natural environment should be given more weight than development.
- Landscape management objectives, standards and guidelines are influenced by land use decisions or 'trade-offs' with other resources but these decisions should be based on full consideration of landscape values.
- There are a number of design precedents, traditions and approaches that have clearly demonstrated that change can: meet landscape, environmental, and the functional, cost and personal preference requirements of development; reinforce the unique regional character; and respect the sense of place of individual sites.

1.8 LANDSCAPE CLASSES

Landscape classes are a way of simplifying a complex array of landscape values into areas for which management standards and guidelines can be provided. They allow us to see (on a map) at a glance, the most important values, or values that are most easily spatially defined.

To assist the interpretation and use of the assessment results, significance, public sensitivity, and key landscape character units/sub-units have been added to one map to form landscape classes.

The classes are:

- Significance
  - World Heritage
  - Not Well Represented
  - Well Represented
- Sensitivity Zones
  - 'A'
  - 'B'
  - 'C'
- Landscape Character Units/Sub-Units
  - Sea Cliffs
  - Bay Cliffs
  - Gentle Transition
  - Flats
  - Parabolic Dunes
  - Reticulate Dunes
  - Desert
  - Tamala
  - Grasslands
  - Birrida

1.9 MANAGEMENT OBJECTIVES BY AREAS AND VALUES

A more detailed outline of the management opportunities, constraints and objectives for the different Landscape Classes is provided below.

Significance - World Heritage

Opportunities	These are the 'World Heritage' features, formally recognised at the highest level, and may become the most promoted. They are a key ingredient in the 'World Heritage' experience and can be the focus for information and interpretation services.
Constraints	There is a high level commitment to conservation of these features, which may restrict the level of community use. Some of these features are particularly sensitive to human intrusion/modification.
Objectives	• World Heritage features should be protected. • The visual and physical integrity of these features and their settings should be maintained or restored. • Development should generally be excluded.

Significance - Not Well Represented

Opportunities	These are the most distinctive features of the area and in many cases are 'one-offs'. They may include some 'World Heritage' features. Their uniqueness is usually apparent and may attract people.
Constraints	These features are not well represented and will need high level of control of community use to protect their values.
Objectives	• The visual and physical integrity of these features and their settings should be maintained or restored. • Development should generally be excluded.

Significance - Well Represented

Opportunities	These features are distinctive within the setting of each character unit and are identified by people as having the most value. They are relatively well represented and generally should accommodate community use without affecting the broad value.

Constraints	These (together with other significance listed above) are the 'attractions' of the area and community use will need to be carefully planned to ensure that they remain the attractions.
Objectives	• The visual and physical integrity of these features and their settings should be maintained or restored. • Development should be of a temporary or minor nature and should be inevident from defining travel routes and use areas (Level 1 and 2).

Sensitivity Zone 'A'

Opportunities	These areas are the most critical areas to existing community use. There is potential for offering variety and quality in experiences knowing that these will benefit a large number of people or appeal to a particular type of user.
Constraints	Development or change will need to be carefully controlled to protect the existing experience. The potential for new access may pose threats to adjacent significant features.

Objectives	In natural areas:
	• The natural landscape character should be protected in the long term.
	• Development should be inevident from defining travel routes and use areas. Exceptions are:
	  • Recreation and safety facilities, which may be seen in the foreground;
	  • Changes that are evident for a short period and are of minor impact
	In rural areas:
	• The rural landscape character should be protected.
	• Development which is of non-rural character should be inevident from travel routes.
	Access and Views:
	• Existing positive experiences should be maintained through the access network.
	• Access routes should be maintained to a high aesthetic standard.
	• Road side-view patterns should be broadly maintained.
	• Key views should be actively managed.

Sensitivity Zone 'B'

Opportunities	These areas are moderately important to existing community use. There is potential for development without compromising the variety and quality of experiences.
Constraints	Development or change will need to be carefully controlled to protect the existing experience. The potential for new access may pose threats to adjacent significant features.
Objectives	In natural areas: • Permanent changes should be of minor, localised impact with adequate setback (min. 100m) from travel routes and use areas, except recreation and safety facilities, which may have reduced setback. • Temporary changes may be evident from defining travel routes and use areas but every effort should be made to ensure they are not dominant. Siting and design techniques should be used to minimise impacts and landscape design principles should be employed where possible to create 'sensitive' changes. In rural areas: • The rural landscape character should be protected. • Development which is of non-rural character should be inevident from travel routes. Access and Views: • Existing positive experiences should be maintained through the access network.

Sensitivity Zone 'C'

Opportunities	These areas are the least important to existing community use. There is a high potential for development without compromising the variety and quality of existing experiences.
Constraints	Development or change may lead to higher use, which will in turn require more care in planning and design.
Objectives	Natural areas • Permanent changes should be of localised impact and every effort should be made to reduce their dominance. • Temporary changes can be dominant but should employ landscape design principles to reduce their impact.

	In rural areas: • Changes can be dominant but should be of localised impact and employ landscape design principles where possible. Access and Views: • Temporary changes can be dominant but should employ landscape design principles where possible.

Sea Cliffs and Bay Cliffs Landscape Character Sub-Units

Opportunities	Offer some of the most spectacular views of the region. Ocean, hinterland and marine wildlife views. Mix of sensory characteristics (eg. wind, wave sound).
Constraints	Often poor soils, susceptible to erosion, and fragile vegetation. Highly exposed to the weather. Access to cliff edge only. High visitor risk - access will need to be carefully controlled. Development and tracks will be highly visible. Low suitability for development.
Objectives	As for the Sensitivity Zone or Significance

Gentle Transition Landscape Character Sub-Unit

Opportunities	Contains the most desirable and suitable areas for development (ie. scenic and gentle slopes). Good access to the water.
Constraints	Easy for users to stray from tracks. High suitability for development.
Objectives	As for the Sensitivity Zone or Significance

Flats Landscape Character Sub-Unit

Opportunities	Expansive views.
Constraints	Waterlogging will restrict use. No topographic and little vegetation screening. Low suitability for development.
Objectives	As for the Sensitivity Zone or Significance

Parabolic Dunes Landscape Character Sub-Unit

Opportunities	Impressive valleys and ridges with long views along the valleys and panoramic views from the ridge tops.
Constraints	Erodible soils, some steep slopes, low vegetation, prone to high wind forces. High visibility. Low suitability for development.
Objectives	As for the Sensitivity Zone or Significance

Reticulate Dunes Landscape Character Sub-Unit

Opportunities	An array of ridge forms with good views, particularly from the high points.
Constraints	Erodible soils, some steep slopes, low vegetation. Low suitability for development.
Objectives	As for the Sensitivity Zone or Significance

Desert Landscape Character Sub-Unit

Opportunities	Spectacular sand forms.
Constraints	Unsuitable for development. Need to discourage vehicle use beyond defined access.
Objectives	As for the Sensitivity Zone or Significance

Tamala Landscape Character Sub-Unit

Opportunities	Elevated with panoramic views and limestone outcrops.
Constraints	High visibility. Shallow soils and low vegetation adjacent to the coast. Low suitability for development near coast.
Objectives	As for the Sensitivity Zone or Significance

Grasslands Landscape Character Sub-Unit

Opportunities	Expansive views across rolling terrain.
Constraints	Low vegetation and limited topographic screening. Tendency for any development to be highly visible. Low suitability for development.
Objectives	As for the Sensitivity Zone or Significance

Birrida Landscape Character Sub-Unit

Opportunities	Impressive, often enclosed views with high colour contrasts.
Constraints	Subject to waterlogging or flooding. No topographic or vegetation screening. Low suitability for development.
Objectives	As for the Sensitivity Zone or Significance

2.0 MAPS

1. Landscape Character Units
2. Landscape Significance - Overview
3. Landscape Significance - Peron Peninsula
4. Landscape Significance - Islands
5. Landscape Significance - Edel Land
6. Landscape Significance - Hamelin Pool
7. Landscape Classes

GLOSSARY

Analysis is the process by which the landscape is broken down into components.

Assessment is a process of synthesis. It is the expression of a composite value based on the value of individual components.

Character see Landscape Character.

Characteristics define distinctive or individual elements. The alternatives of variables used to measure objects.

Classification is the organisation of descriptive information so as to identify a range of homogeneous types or units.

Comparative analysis involves making judgements between places based on the components of those places.

Cultural is used to describe features or settings and is ambiguous, commonly referring to significantly human-modified features or places as well as any feature or place (including natural) which has social significance (eg. places sacred to Aboriginal people). *Human-modified features* and *social significance* can be used to describe these two usages.

Cultural landscape is most often used to describe environments with social and/or historic values. The Burra Charter (Australia ICOMOS) has a very broad definition of cultural significance: aesthetic, historic, scientific or social value for past, present and future generations. *Landscape* (see below) is essentially a cultural construct and the term *cultural landscape* could be interchanged with *landscape*.

Evaluation is the process where assessment results are examined and used to make decisions about alternative futures.

Feature is often used to describe a dominant, easily defined or significant characteristic or combination of characteristics.

Holistic Approach is based on the popular maxim that the whole is greater than the sum of the parts. Similar to intrinsic value in recognising that the environment cannot be judged by an assessment of its components.

Intrinsic value does not acknowledge that comparisons can be made or the environment fragmented in order to make judgements of its value. For example, wilderness exists on the basis of its intrinsic value.

Inventory refers to the identification and collection of data such as land use, slope or topography. Inventory is without value judgements.

Landscape is used by many different people for a variety of purposes, making it a rather ambiguous term. There are three main usages of the term: the first refers to a scene (as in a landscape painting); the second refers to an area which has a common pattern of bio-physical features (as in a landscape ecology); and the third usage refers to the perception of places by people based on their interaction and experience of the physical and biological features of the environment (the environment that becomes our 'landscape'). Landscape management, to a certain extent uses all definitions but specialises on an understanding of the latter.

Landscape Approach delineates homogeneous land units based on similarities of landform, soil, and vegetation characteristics (Brown et al 1979).

Landscape Class is a synthesis of assessment results which provides broad categories of landscapes usually based on differences in importance and management approach.

Landscape Character is the combination of natural and cultural characteristics which allow people to differentiate one place from another.

Natural Landscape Significance is significance based on natural landscape characteristics.

Parametric assessment involves measuring or rating the parameters of a landscape component (ie. measuring slope for landform)

Public value can involve direct input from the public into decision making or can be indirect by including research findings on public preferences into assessment procedures.

Qualitative judgements normally express results using criteria which are not themselves readily reduced to simple or precise numerical values. Most landscape assessment requiring judgement is qualitative even if results are expressed numerically (Litton 1979).

Quality, used with words such as landscape, visual or scenic, can refer to either the characteristics (qualities) of a place or the degree of excellence.

Quantitative procedures measure such things as relative relief, areas of vegetation types, or numbers and coverage of water bodies. The results of such measurement are most useful in drawing systematic comparisons between different landscape components, but their rating to visual value still calls for qualitative judgement (Litton 1979).

Relative value results from making judgements between places on the basis of some shared criteria.

Rural Landscape Significance is significance based on rural landscape characteristics.

Sensitivity Level of use areas is a measure of how important that area is to people's experience.

Valuation is providing a value based on professional judgement, public preference, economics etc.

Values are derived from the process of valuation.

Visual Absorption Capability is a term and concept which describes and index of an area's ability to visually absorb or sustain change based on variables such as landform, vegetation pattern and height, and existing land use.

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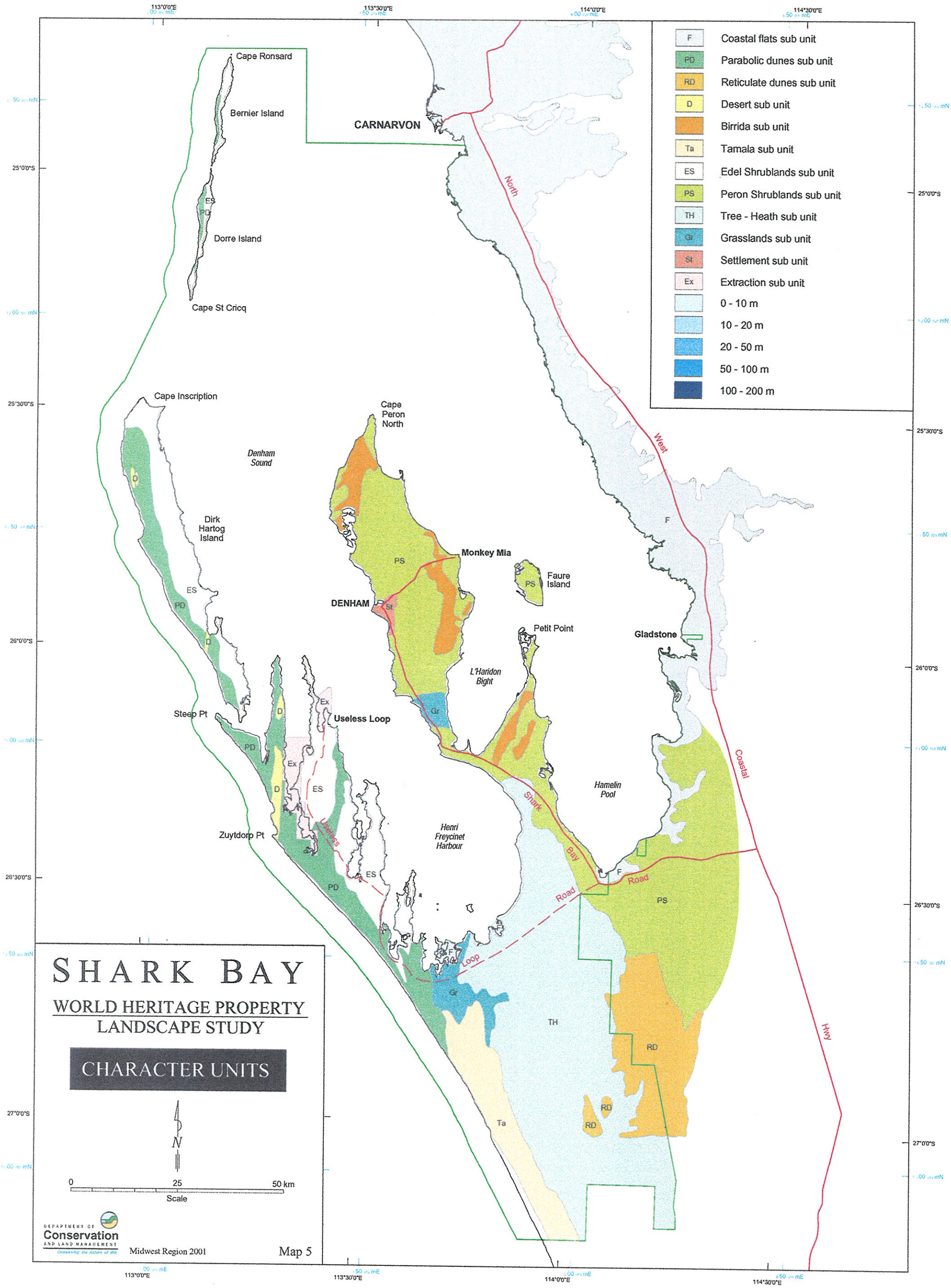
SHARK BAY

WORLD HERITAGE PROPERTY LANDSCAPE STUDY

CHARACTER UNITS



DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

Midwest Region 2001

Map 5

SHARK BAY

WORLD HERITAGE PROPERTY
LANDSCAPE STUDY

LANDSCAPE SIGNIFICANCE

Social
Historic
Scientific

Aesthetic

Cliff
Ledged Cliff
Sloped Cliff
Bay
Beach
Beach
Lagoon
Spit
Headland
Desert
Prominent Dune System
Mangrove
Island
Steep Slope

World Heritage

Cape Ronsard
Bernier Island
Dorre Island
Cape St Cricq
CARNARVON
Cape Inscription
Cape Peron North
Denham Sound
Dirk Hartog Island
Monkey Mia
Faure Island
DENHAM
Petit Point
Gladstone
L'Haridon Bight
Steep Pt
Useless Loop
Zuytdorp Pt
Henri Freycinet Harbour
Hamelin Pool
North West Coastal Hwy
Useless Loop Road
Shark Bay Road

113°0'0"E
113°30'0"E
114°0'0"E
114°30'0"E
25°0'0"S
25°30'0"S
26°0'0"S
26°30'0"S
27°0'0"S

N

0 25 50 km
Scale

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

Midwest Region 2001

Map 6

113°30'0"E
250 000 mE

114°0'0"E
300 000 mE

25°30'0"S

7150 000 mN

26°0'0"S

7100 000 mN

Cape Peron North

Guichenault Point

Cape Lesueur

Denham Sound

Monkey Mia

Peron Homestead

Dubaut Point

DENHAM

Shark Bay

Eagle Bluff

L'Haridon Bight

Petit Point

Faure Island

Shell Beach

Nanga

Henri Freycinet Harbour

Hamelin Pool

Road

LOCALITY

Map Area

LEGEND

- Social
- Historic
- Scientific

Aesthetic

- Cliff
- Ledged Cliff
- Sloped Cliff
- Bay
- Beach
- Beach
- Lagoon
- Spit
- Headland
- Desert
- Prominent Dune System
- Mangrove
- Island
- Steep Slope

SHARK BAY

WORLD HERITAGE PROPERTY LANDSCAPE STUDY

LANDSCAPE SIGNIFICANCE

N

0 10 20 km

Scale

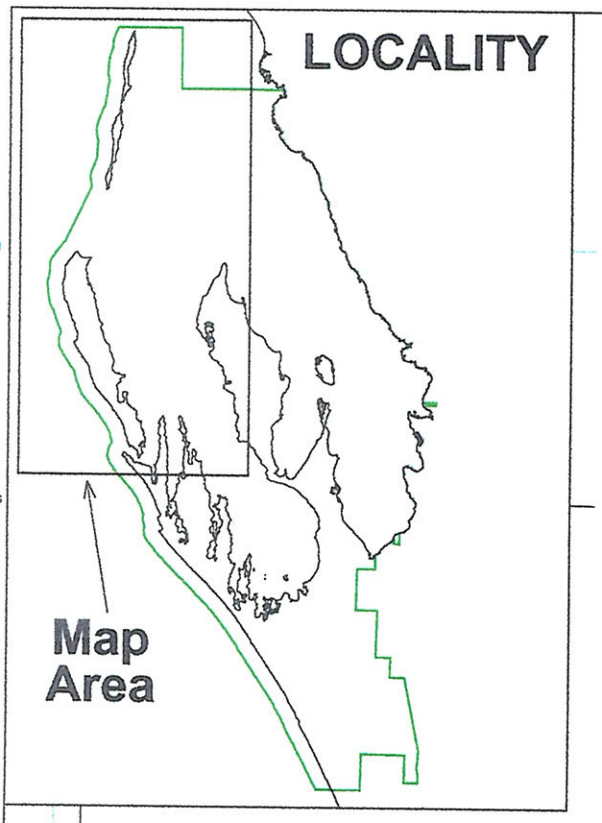
DEPARTMENT OF Conservation AND LAND MANAGEMENT

Conserving the nature of WA

Midwest Region 2001

Map

112°30'0"E
113°0'0"E
113°30'0"E
25°0'0"S
25°30'0"S
26°0'0"S



Cape Ronsard
Bernier Island
Dorre Island
Cape St Cricq
Cape Inscription
Cape Peron North
Denham Sound
Dirk Hartog Island
DENHAM
Steep Pt
Useless Loop

LEGEND

- Social
- Historic
- Scientific

Aesthetic

- Cliff
- Ledged Cliff
- Sloped Cliff
- Bay
- Beach
- Beach
- Lagoon
- Spit
- Headland
- Desert
- Prominent Dune System
- Mangrove
- Island
- Steep Slope

SHARK BAY

WORLD HERITAGE PROPERTY LANDSCAPE STUDY

LANDSCAPE SIGNIFICANCE

N

0 15 30 km

Scale

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

Midwest Region 2001

Map 8

113°30'0"E
750 000 mE

26°0'0"S

7100 000 mN

Dirk Hartog Island

Cape Bellefin

Cape Heirisson

Steep Pt

Useless Inlet

Useless Loop

Zuytdorp Pt

Useless

Loop

Brown Inlet

Henri Freycinet Harbour

Salutation Island

Depuch Loop

Road

26°30'0"S

7050 000 mN

LOCALITY

Map Area

LEGEND

- Social
- Historic
- Scientific

Aesthetic

- Cliff
- Ledged Cliff
- Sloped Cliff
- Bay
- Beach
- Beach
- Lagoon
- Spit
- Headland
- Desert
- Prominent Dune System
- Mangrove
- Island
- Steep Slope

SHARK BAY

WORLD HERITAGE PROPERTY
LANDSCAPE STUDY

LANDSCAPE SIGNIFICANCE

N

0 10 20 km

Scale

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

Midwest Region 2001

Map 9

750 000 mE
113°30'0"E

114°0'0"E
800 000 mE

Shark Bay

Henri Freycinet Harbour

Hamelin Pool

Hamelin

Road

Road

Loop

Useless

26°30'0"S

7 650 000 mN

27°0'0"S

7 600 000 mN

LEGEND

- Social
- Historic
- Scientific

Aesthetic

- Cliff
- Ledged Cliff
- Sloped Cliff
- Bay
- Beach
- Beach
- Lagoon
- Spit
- Headland
- Desert
- Prominent Dune System
- Mangrove
- Island
- Steep Slope

LOCALITY

Map Area

SHARK BAY

WORLD HERITAGE PROPERTY LANDSCAPE STUDY

LANDSCAPE SIGNIFICANCE

N

0 10 20 km

Scale

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

Midwest Region 2001

Map 10

114°0'0"E 800 000 mE

SHARK BAY

WORLD HERITAGE PROPERTY LANDSCAPE STUDY

LANDSCAPE CLASSES

Landscape Significance

- Social
- Historic
- Scientific

Aesthetic

- Cliff
- Ledged Cliff
- Sloped Cliff
- Bay
- Beach (B1)
- Beach (B2)
- Lagoon
- Spit
- Headland
- Desert
- Prominent Dune System
- Mangrove
- Island
- Steep Slope

Public Sensitivity Zones

- A Zone
- B Zone
- C Zone

Cape Ronsard
Bernier Island
CARNARVON
Dorre Island
Cape St Cricq
Cape Inscription
Cape Peron North
Denham Sound
Dirk Hartog Island
Monkey Mia
Faure Island
DENHAM
Petit Point
Gladstone
L'Haridon Bight
Steep Pt
Useless Loop
Hamelin Pool
Zuytdorp Pt
Henri Freycinet Harbour
North West Coastal Hwy
Shark Bay Road
Useless Loop

0 25 50 km
Scale

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

Midwest Region 2001

Map 13