Southern Ocean Lodge

PUBLIC ENVIRONMENTAL REPORT



PB PARSONS BRINCKERHOFF
100 YEARS

Baillie Lodges
Unique Australian Experiences

Southern Ocean Lodge

Public Environmental Report

24 March 2006

Baillie Lodges
Unique Australian Experiences

2005
2004, 2003, 2002, 2001
ENGINEERING EXCELLENCE AWARD WINNER
ENGINEERS AUSTRALIA
South Australia Division

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PB PARSONS BRINCKERHOFF
100 YEARS

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Executive summary

The Southern Ocean Lodge proposal is intended as a premium nature-based tourism facility similar to interstate examples such as Longitude 131, Tasmania's Bay of Fires and Lizard Island. The proposal is in a coastal wilderness location and has been designed to provide a high-end accommodation experience while maintaining the key environmental assets of the location. Contemporary architectural design by a local architect, locally sourced food and beverage, interpretive and exploration activities and a day-spa will be on offer to a market not currently well catered for on Kangaroo Island.

The proponent, Baillie Lodges, examined a number of sites on Kangaroo Island before selecting the Hanson Bay location and engaged a local architect to ensure the development is sympathetic to the local environment and island character. A concept design was developed and feasibility studies undertaken which supported the establishment of such a facility.

The development site is set back more than 100 metres from the high water mark and comprises approximately one hectare of coastal land overlooking coastal cliffs, beaches and largely undisturbed native vegetation. The site for the proposed buildings is accessible by way of an existing cleared access track and is the location where the least amount of native vegetation clearance is required as coastal erosion has already created some bare patches.

In June 2005, the proposed Southern Ocean Lodge development was gazetted as a Major Development under Section 46 of the *Development Act 1993*. Comments were received from the public on the Issues Paper prepared by the Major Developments Panel and the Panel determined that the appropriate level of assessment given the project issues would be a Public Environmental Report (PER). The Major Developments Panel developed a set of Guidelines against which the proposal will be assessed. The Guidelines outline the key issues for the project and they are discussed in detail in this document which forms the PER. The key issues are summarised below.

Need for the development

The SA Tourism Plan 2003-2008, suggests that a lack of regional investment in new tourism products is seriously affecting South Australia's competitiveness in the tourism market and identified the need for at least 3 "signature" nature-based, coastal or food and wine tourism developments by 2009. In addition, the "Responsible Nature-based Tourism Strategy" (SATC 2005) identifies the need for at least three memorable nature based accommodation developments in strategic locations.

Baillie Lodges recognised the potential that Kangaroo Island offers in developing such a facility given the unique coastal and wilderness appeal within easy reach of Adelaide as an entry point to the State.

There is currently a lack of high-end accommodation on the Island and as such, many of these visitors come only for a day-trip. The development will offer these visitors, particularly those from interstate and overseas, the opportunity to turn what might be a day-trip to the Island into a longer stay and be immersed in the local environment.

A key United States Travel Wholesaler has said "We are consistently being requested for a more upper-end property on Kangaroo Island. This destination is one of our fastest growing over the last three years, but the lack of a higher-end, world class property precludes us from being able to structure a visit to the Island for many of our clientele." (K Demeter, Down Under Answers, January 2006).

An economic feasibility study prepared by Syneca Consulting and market research indicates that a development such as Southern Ocean Lodge will be well-received by the market and offer flow-on benefits to the local and regional community. The equivalent of up to 32 full-time jobs will be created at the Lodge and it is expected that guests will spend about $7.65 million/year on Kangaroo Island. In addition to direct benefits, there will be flow on effects to other local business such as employment, local produce and other goods and services.

Sensitivity of coastal location

The proposed development is setback a minimum of 100 metres from the high water mark to the west of Hanson Bay. The Lodge and suites are positioned just below a ridgeline and nestled into the landscape to minimise the potential visual impact. While the coastal location of the proposal is what provides the development with its unique appeal, it is important to ensure this environment is protected against any potential impacts from the development. The development has been designed to meld with the existing landscape while allowing guests to enjoy the spectacular views.

The general area comprises coastal cliffs and sand hills over limestone bedrock and is generally well-vegetated. The project site selected for the buildings has been subject to existing natural wind erosion leaving some exposed areas within which the development will be sited.

Bushfire protection and clearance

Southern Ocean Lodge has been designed with fire protection measures in place to ensure it is not dependant on the need for external assistance or evacuation. This enables efforts to be directed towards minimising vegetation modification and/or clearance to those areas where it is most needed.

A combination of passive and active bushfire management strategies are proposed to comply or exceed statutory requirements and minimise the risk to life and property without the need for large scale vegetation clearance. These include perimeter vegetation saturation, window and roof sprinklers, hose reels, the use of fire-fighting foam, and a dedicated water supply. Vegetation modification (to a height of 300 mm) will be undertaken in a 20 metre band surrounding the perimeter of the main building. Modification of the vegetation to a height of 300 mm is sufficient height to ensure satisfactory fuel reduction however also enable survival of the species.

Impacts of clearance on threatened species

The Guidelines specifically sought information on the potential impact on a number of Threatened species of flora and fauna. Two surveys have been undertaken on site: a vegetation and bird survey in 2005, and; a fauna (including birds) survey in 2006. The surveys provide a list of all species identified on site and the conservation status of these species. The survey reports also include information on any potential species that may exist in the area but were not identified at the time of the surveys. In addition, desk top research and liaison with the relevant authorities and experts in the field were undertaken.

Three Threatened vegetation species were identified by the Guidelines. These were: Twining Hand-flower, Kangaroo Island Spider Orchid and Ironstone Mulla Mulla (*Ptilotus beckeriaus*). These species were not identified on the site and further research indicates that it is unlikely they would occur in this area as the habitat around the site does not support these species. There is potential for the Ironstone Mulla Mulla (*Ptilotus beckeriaus*) to occur in the type of vegetation on the site but it was not identified despite being undertaken at the time during which it is most visible.

No mammals of national or state conservation significance were observed during the surveys. There is a slight possibility that two species of conservation significance may occur within the project area. The Kangaroo Island Dunnart (*Sminthopsis aitkeni*) was not observed at the site. The vegetation on the subject land may support the species, however, there is a significant amount of similar vegetation around the area and it is not considered the project would have an impact on the species. The research indicated that while it is possible the Southern Brown Bandicoot (*Isoodon obesulus obesulus*) may also occur on the site no evidence of the species was found despite extensive searching.

The Osprey (*Pandion haliaetus*) is listed as a migratory species under the *Environment Protection and Biodiversity Conservation Act 1999* and rated as “Rare” under the South Australian *National Parks and Wildlife Act 1972*. A pair

of Osprey has been observed along the coast near the subject land with a nest site just over 1 kilometre to the west of the proposed site. It has been documented that reduced Osprey breeding success can occur where human activity is within close proximity to nesting sites, potentially leading to the abandonment of these sites. Extensive desk-top research has been undertaken to determine the potential impact on the Osprey from the development and in particular, the construction activities and is discussed in this report. The study found that it is unlikely there will be an impact on the Osprey as long as appropriate management strategies are implemented including: implementation of a buffer around the nest during the breeding season for Lodge guests and staff; controlling access to the west of the Lodge; installing signage and undertaking contractor/guest awareness, and; undertaking ongoing monitoring to ensure the birds are not being adversely impacted.

The Hooded Plover (*Thinornis rubricollis*) has been observed on many of Kangaroo Island's beaches (such as Vivonne Bay and Hanson Bay) and is listed as 'Vulnerable' under the *Environment Protection and Biodiversity Conservation Act 1999* and rated as "Rare" under the South Australian *National Parks and Wildlife Act 1972*. It would seem that there has been a small increase in the number of breeding pairs across the Island (TOMM 2005) but the numbers are considered to be generally declining across Australia. As the Hooded Plover nests above the high water mark on beaches it is vulnerable to human impacts such as the use of vehicles on the beach, pet dogs and feral animals. The Hooded Plover pair which had been observed on beach below the proposed Lodge site during the 2005 survey appeared to have relocated to the beach to the east of the proposed site during the 2006 survey. A number of management strategies will be implemented to ensure there is no threat to the Hooded Plover from the development of the Lodge including: managing access to the beach, signage, contractor and guest awareness, education and controlled activities.

There are no expected impacts to the White-bellied Sea-eagle and Peregrine Falcon, as no nest sites have been located within close proximity of the site. If any nests were located near the site in the future, similar management procedures to those used for the Osprey would be sufficient to manage any impacts on these species.

Other species assessed include the Southern Emu-wren, Western Whipbird, Bassian Thrush, Beautiful Firetail, Rock Parrot, Painted Button-quail, Glossy Black Cockatoo and the Heath Goanna. It was found that any removal of vegetation for the proposed development may result in a reduction in available habitat for these species. However, this is considered to be minimal due to the large areas of similar vegetation and habitat conserved within the vicinity of the project area. Any increase in feral cat numbers could also impact many of these species and as such, a feral cat eradication programme will be implemented, as well as other management and mitigation measures outlined in the Environmental Management Plan to manage this risk.

Wilderness value and conservation significance

The project site has significant wilderness values in terms of it's 'naturalness' and the quality of existing coastal vegetation, biodiversity and habitat. Despite this, it is considered that the proposed development will not have a major impact upon the wilderness values of the area due to the large areas of similar vegetation and habitat conserved within the vicinity, the relatively small area of the proposed development (approximately 1 hectare will be cleared for construction), and finally, the relatively low visitation numbers (only 25 guest suites will be developed). The management of potential impacts to fauna and flora of conservation significance are summarised above, however it is considered unlikely that the project will impact upon the general conservation significance of the area or the biodiversity values of the area.

Strict management and mitigation measures will be implemented at all times during construction and operation to ensure that impacts to biodiversity are minimised and a monitoring programme will be introduced as part of the EMP to monitor key values in the area, such as the threatened fauna species. In addition, the Proponent has offered the remainder of the site (approximately 98%) to be placed under a heritage agreement protecting it from future development.

Opportunities to provide benefit to local community and environment

The proposed Southern Ocean Lodge development has limited any future development or native vegetation clearance by securing encumbrances over the adjacent properties and will seek a heritage agreement over the proposed site.

The local community will also benefit by providing additional business opportunities for the islands tourism operators with guests at the Lodge likely to take excursions and day trips with local providers. The restaurant will also showcase Kangaroo Island products so as well as direct sales the Lodge will help promote the fresh, clean image of Kangaroo Island products stimulating further growth of these unique Kangaroo Island industries.

The proposed Southern Ocean Lodge is an eco-tourism development that aims to limit its effect on the environment.

This PER is a detailed assessment of all environmental, social and economic issues associated with the project. Although a number of issues have been raised in relation to the development it is believed that any potential impacts can be minimised through a range of strict environmental management and mitigation measures. It is therefore recommended that the proposed development be approved.

PART A

BACKGROUND

1. Introduction to the PER

1.1 Southern Ocean Lodge

The proposed development is located at Hanson Bay, on the south-west coast of Kangaroo Island, South Australia. The development is proposed by Baillie Lodges (the Proponent) and is for the establishment of Southern Ocean Lodge, comprising 25 contiguous accommodation suites and associated facilities including a main Lodge building / reception, spa retreat and staff village.

The proposal is to develop an environmentally sustainable nature-based tourism facility which would provide a range of educational/interpretive wildlife experiences to a market not well catered for on Kangaroo Island. The aim of the project is to develop and operate Southern Ocean Lodge as Australia's leading example of premium nature-based tourism to offer an iconic accommodation experience to the tourism market for Kangaroo Island.

The buildings and site layout have been designed to provide an excellent standard of environmental diligence while maintaining the existing character and landscape contours of the site. Materials and colours have been selected to address bushfire resistance and be compatible with the nature of the existing environment and visual landscape.

The development site is set back more than 100 metres from the high water mark and comprises approximately one hectare of coastal land overlooking coastal cliffs, beaches and surrounding coastal vegetation. The site for the proposed buildings is accessible by way of an existing cleared access track and is the location where the least amount of native vegetation clearance is required as coastal erosion has already created some bare patches.

The proposed site is located in the Kangaroo Island Council Development Plan's Coastal Landscape Zone, where tourism development of 25 units or less is considered a merit use in the zone.

1.2 Background

Historically tourism development located out of townships on Kangaroo Island has been difficult. Many attempts have failed due to a lack of financial backing, public opposition, poor site selection and difficulties encountered during the development assessment process.

However South Australian Tourism Commission has recognised in its "Responsible Nature-based Tourism Strategy", the need for a development offering iconic accommodation experiences and particularly suggests Kangaroo Island as being a preferred site for such a development.

Baillie Lodges identified the need to provide this kind of high quality, unique experience which really builds on the key natural assets of the Island. After exploring a number of sites on the Island, the 100 hectare site adjacent Hanson Bay was identified as arguably the best with its coastal frontage and proximity to Flinders Chase National Park, Kelly Hill Conservation Park and Remarkable Rocks.

Baillie Lodges negotiated the purchase of the land together with the inclusion of encumbrances on the adjoining land to ensure this development could be protected and any potential impacts were minimised.

The Proponent also engaged local architect, Max Pritchard to assist them in planning and designing a structure that capitalised on the spectacular location while being sensitive to the factors that make it so unique.

According to the South Australian Tourism Commission:

"Southern Ocean Lodge will become the icon tourist Lodge for Kangaroo Island and the State. Catering for the rapidly expanding premium experiential tourism markets from the UK, Europe and USA, at present not adequately catered for in this state. It will compliment and reinforce existing tourist ventures in promoting the Island internationally.

The aim of Southern Ocean Lodge is to bring a tourism development to South Australia and Kangaroo Island that will rival the substantial nature-based developments in other states such as Longitude 131 in the Northern Territory or Bay of Fires in Tasmania." (South Australian Tourism Commission).

1.3 The Proponent

Baillie Lodges is a company created by the partnership of James and Hayley Baillie. As founding director, P&O Australian Resorts, James was instrumental in the development and operation of many of Australia's icon natural destinations, including Lizard Island, Cradle Mountain Lodge, Heron Island and Silky Oaks Lodge. Hayley worked for more than a decade on board the world's best expedition ships creating guest programmes to enhance guests' nature and adventure experiences.

Baillie Lodges aim is to develop as a boutique portfolio of unique contemporary sustainable nature based accommodation experiences. After extensive rebuilding, Capella Lodge on Lord Howe Island has been launched as the first of the Baillie Lodges portfolio. Details on Capella Lodge can be found via the website www.lordhowe.com .

Locations of remarkable natural beauty and/or cultural significance provide the vital ingredients for these exclusive product concepts. Environmental credentials are demonstrated by past projects either within or bordering World Heritage listed National and Marine Parks. It is envisaged that Southern Ocean Lodge will be positioned as the group flagship, as a pre-eminent example of sustainable nature based tourism development.

Baillie Lodges enjoy a unique partnership with Hayley's father, Dick Smith, entrepreneur, environmentalist, publisher, explorer and philanthropist. His passion for Australia and for preserving its natural heritage and showcasing it to the world will help guide the Southern Ocean Lodge vision. Further information on Baillie Lodges is available on the company's website at www.baillielodges.com.au.

Max Pritchard is the project architect and has a national reputation for his distinctive architecture, sensitive to location and climate. His reputation is reflected in the award of the Institute of Architects President's Medal in 2004 for "exemplary service to and promotion of the profession of architecture".

His community work was also recognized in 2004 with the receipt, along with his wife Wendy, of a Commendation by the Civic Trust for "extensive work in raising community awareness of the benefits and opportunities of coastal regeneration based on the propagation of native plants".

To complement his design and environmental credentials, Max also brings a sense of place to the project from having been born and raised on Kangaroo Island.

1.4 Project timing

The anticipated project timing is:

Date	Action	Status
February 2006	PER Lodged	Current
August 2006	Decision on PER	If approved*
October 2006	Decision on EPBC	
October 2006	Commence construction	
November 2007	Construction complete	

* This is an indicative timeframe and is subject to change based the decision-making time, weather conditions and accessibility.

The Proponent recognises that the decision on development approval is yet to be made but for the purposes of this document, it is assumed that development approval could potentially be granted in August 2006.

A preliminary construction schedule based on the above timing is discussed in Section 5.2.

1.5 The PER process

On 23 June 2005, the Minister for Urban Development and Planning ("the Minister") made a declaration in the Government Gazette for the proposed Southern Ocean Lodge to be assessed as a Major Development under the provision of Section 46 of the *Development Act 1993*. The Major Development Assessment Process is summarised in Figure 1.1.

The Minister referred the application to the Major Developments Panel ("the Panel") which is an independent statutory authority that has the task of determining the appropriate level of assessment for a Major Development and setting the Guidelines against which the proposal will be assessed.

The Panel reviewed the existing documentation on the project and prepared an Issues Paper which outlined the key issues associated with the proposal. The Issues Paper was released to the public and comments were received from the public and government agencies. The comments were considered by the Panel in determining both the level of assessment and developing the Guidelines.

The opportunity for public submissions on the Issues Paper has closed, but the Issues Paper can still be accessed free of charge to obtain further information about the proposal at Planning SA, and the Kangaroo Island Council. It can also be viewed at Planning SA's "Major Developments Panel" website: http://www.planning.sa.gov.au/md_panel/index.html .

The Panel then has three levels of assessment which can apply to the application – Environment Impact Statement (EIS), a Public Environmental Report (PER) or a Development Report (DR). The EIS is the highest level of reporting required and involves extensive investigations, followed by the PER and DR which require less investigations, as set out in Section 46C of the *Development Act 1993*.

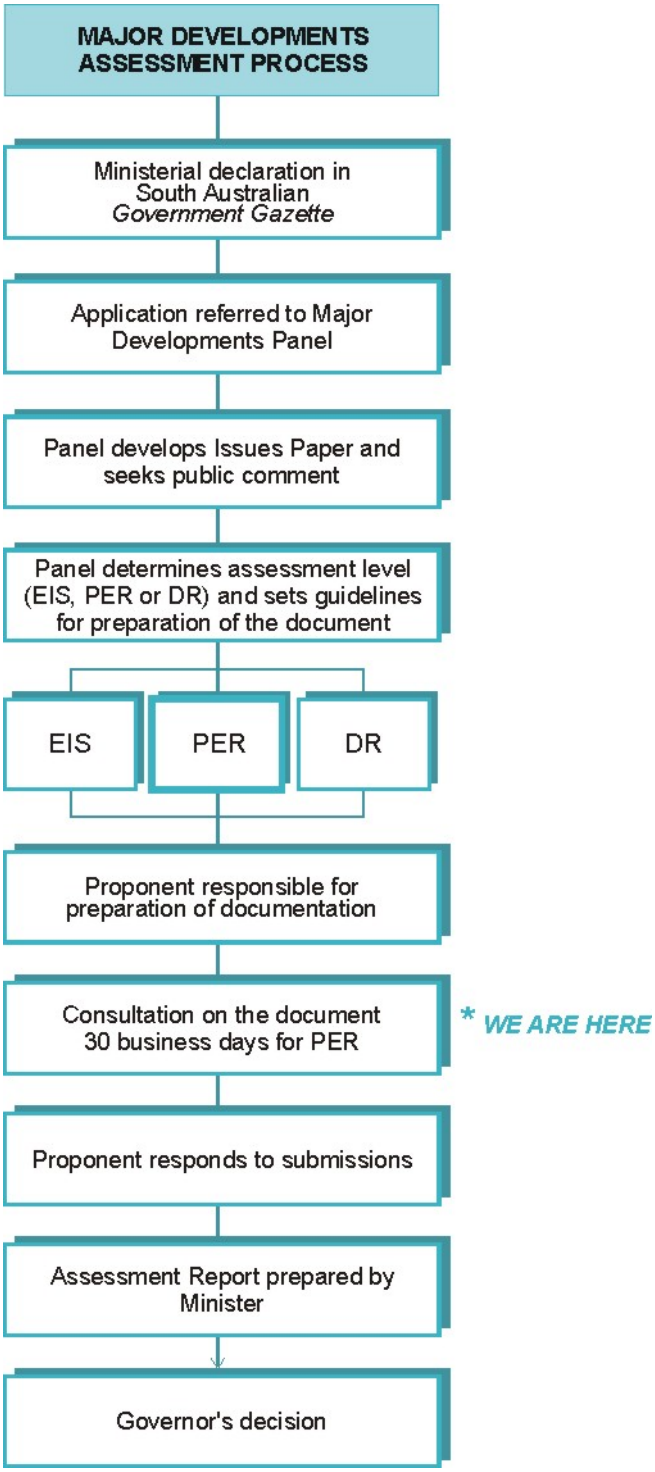


FIGURE 1.1
Major developments assessment process

Following consideration of the public and government comments, the Panel determined that the assessment of this proposal would be undertaken as a Public Environmental Report (PER).

The purpose of the PER is to describe the outcomes of investigations on the issues identified in the Panel's Guidelines and through the public consultation period. A copy of the Guidelines for this proposal is contained in Appendix A with reference to the relevant section of the PER where the issue is addressed.

The PER has been prepared by Parsons Brinckerhoff Australia on behalf of Baillie Lodges in accordance with these Guidelines and describes what the Proponent proposes to do, what the social, economic and environmental effects will be and how the Proponent plans to manage the project.

The Panel's role in the assessment process is now fulfilled, and the Minister will continue with the assessment process under Section 46 of the *Development Act 1993* from this point. The object of Section 46 is to ensure that matters affecting the environment, the community or the economy to a significant extent are fully examined and taken into account in the assessment of the proposal.

The PER has been provided to the Environmental Impact Assessment (EIA) Branch of Planning SA which, on behalf of the Minister, places the document on public exhibition. The public, councils and agencies have 30 business days to comment on the report and Lodge a submission. During this consultation period, a public meeting will be held by Planning SA to assist any persons in preparing a written submission by providing information about the proposal, the process and the relevant document.

The Proponent must then prepare a written response in a "Response Document" to the matters raised by the Minister, Councils or any prescribed or specified authority or body and the public. The Proponent is given two months to provide this to the Minister.

The Minister then prepares an Assessment Report taking into account any submissions and the Proponent's response to them. Comments from the Council or other authority or body may be considered as the Minister thinks fit.

The Assessment Report will set out the Minster's assessment of the proposal, the Minister's comments on the PER, public submissions and responses and comments from other agencies. Any other comments can be included into the Assessment Report.

The documentation and the analyses from the assessment process will then be used by the Governor in the decision-making process, under Section 48 of the *Development Act 1993*, to decide whether the proposal can be approved, and the conditions that will apply, if an approval is granted.

The Governor is the relevant decision-maker under Section 48 of the *Development Act 1993*, when a development application is subject to the PER process.

In arriving at a decision, the Governor must have regard to:

- provisions of the appropriate Development Plan and Regulations
- if relevant, the Building Rules
- the Planning Strategy
- PER and Assessment Report
- if relevant, the *Environment Protection Act 1993*.

The Assessment Report and Response Document are to be kept available for inspection and purchase at a place and period determined by the Minister. Availability of each of these documents will be notified by advertisements in The Advertiser newspaper and local press.

1.6 Requirements of the PER

The purpose of the PER is to describe the outcomes of investigations on the issues outlined in the Guidelines prepared by the Panel which are based on the Panel's Issues Paper and through the public consultation period.

The PER details the expected environmental, social and economic effects of the development. The PER must consider the extent to which the expected effects of the development are consistent with the provisions of any Development Plan, the Planning Strategy and any matter prescribed by the Regulations under the *Development Act 1993*. The PER should also state the Proponent's commitments to meet conditions (if any) placed on any approval that may be given to avoid, mitigate or satisfactorily control and manage any potential adverse impacts of the development on the environment. Further to this, any other information required by the Minister must be considered.

In preparing the PER, the Proponent considers the following aims of the PER and public review process:

- To provide a source of information from which interested individuals and groups may gain an understanding of the proposal, the need for the proposal, the alternatives, the environment which would be affected, the impacts that may occur and the measures to be taken to minimise these impacts.
- To provide a forum for public consultation and informed comment on the proposal.
- To provide a framework in which decision-makers may consider the environmental aspects of the proposal in parallel with social, economic, technical and other factors.

1.7 Structure of the PER

This PER has been prepared to address the Guidelines issued by the Panel as described in Section 1.6. As the Guidelines are not necessarily grouped together by issue, this document has been prepared in accordance with a typical environmental assessment. A copy of the Guidelines is contained in Appendix A and contains a cross-reference to the relevant section of the report. The document structure includes:

- PART A: Background.
- PART B: The Project – a description of the key elements of the project and the rationale behind the design.
- PART C: Environmental, Social and Economic Assessment – examination of the key issues for the project, research undertaken on the issues and their potential impacts and recommendations.
- PART D: Environmental Management Plan – framework for the management of environmental issues for the project.

1.8 Consultation

In the development of the design for Southern Ocean Lodge, extensive consultation has been undertaken with a number of key government agencies and authorities to ensure the development provides a balance between meeting the statutory requirements and offering a premium tourism experience. Those contacted include:

- Department of Premier and Cabinet
- South Australian Tourism Commission
- Planning SA
- Department for Environment and Heritage
- Department of Water, Land & Biodiversity Conservation
- Native Vegetation Council
- Kangaroo Island Council
- Kangaroo Island Development Board
- Country Fire Service.

1.9 Specialist advice

While this report has been compiled by Parsons Brinckerhoff Australia on behalf of Baillie Lodges, it contains the results of technical investigations undertaken by a number of specialist consultants in the relevant fields as outlined below:

- Max Pritchard, Architect – design and layout
- Environmental & Biodiversity Services – fauna survey, advice on vegetation removal and impacts on fauna, weed and pest identification
- Ben Della Torre & Lyn Pedler – botanical and bird survey
- Wayne Phillips – water balance, water management systems
- Syneca – economic assessment
- John Cribb – fire control systems
- Pocius & Assoc – soil testing and engineering advice
- SA Health Commission – wastewater
- Parsons Brinckerhoff – environmental assessment, planning assessment, environmental management plan.

2. Background to the project

2.1 Project objectives

Southern Ocean Lodge is proposed as Australia's leading example of premium nature-based tourism. Baillie Lodges aim is to develop a boutique portfolio of unique contemporary sustainable nature-based accommodation experiences. It is envisaged that Southern Ocean Lodge will be positioned as the group flagship.

Baillie Lodges vision for the project is:

To concept, design, develop and operate Southern Ocean Lodge as Australia's leading example of premium nature based tourism building on the:

- *unique coastal location*
- *stunning views*
- *contemporary architectural design*
- *locally influenced food and beverage*
- *personalised interpretive and exploration activities*
- *leading edge wellness spa.*

Creating a South Australian icon that becomes a discerning destination of choice. The Lodge is designed to be a sanctuary of comfort, style and personal intimacy, redefining the Australian standard.

Products of a comparable nature include Australia's Lizard Island or Silky Oaks Lodge, New Zealand's Blankett Bay or Huka Lodge.

2.2 Need for the proposal

South Australian Tourism Commission have commented that Southern Ocean Lodge is a strategic economic development project of critical importance to the South Australia's tourism industry.

There is considerable evidence that shows that in an increasingly homogenised tourism world, discerning tourism consumers are seeking:

- *experiences that are genuine, relatively uncrowded, down to earth and community based*
- *soft adventure*
- *learning about places, nature or a special interest and unique authentic stories.*

As these qualities become more rare they will become more valued. South Australia can deliver on these preferences and expectations. (South Australian Tourism Export Strategy, 2004).

The South Australian Tourism Export Strategy identifies four key areas where critical intervention is needed to boost South Australia's international tourism profile, being:

- air access (air services to Kangaroo Island are currently being upgraded in size and frequency)

- product development (there is no regional accommodation to rival such properties as Longitude 131, Freycinet Lodge and El Questro)
- South Australian market brand
- working with Tourism Australia.

The Strategy suggests that South Australia has good natural attributes but lacks a "signature" product that can raise the profile of the region and facilitate the experience of these attributes. One of South Australia's key unique natural attractions for international markets is Kangaroo Island.

In 2004, around 50,000 international visitors to South Australia indicated that they made a day trip to Kangaroo Island. This reflects the significant appeal/profile of the region as an attraction for international visitors. Kangaroo Island has a higher proportion of its visitors from overseas than any other region in Australia with 25% of overnight visits to the region being international visitors (Regional Tourism Profile, Kangaroo Island, 2004).

Other areas in Australia well known as tourist destinations for nature and wildlife experiences (e.g. Tasmania, Great Barrier Reef, Central Australia) have very high quality, icon tourist accommodation, designed specifically for their unique sites.

Southern Ocean Lodge will become the icon tourist Lodge for Kangaroo Island and the state. Catering for the rapidly expanding premium experiential tourism markets from the UK, Europe and USA, at present not adequately catered for in this state. It will complement and reinforce existing tourist ventures in promoting the Island internationally and provide:

- longer duration visits
- reduced seasonality
- bigger spending visitors
- even more emphasis on the Island's unique ecology
- marketing of the Island's produce through the restaurant.

The proposal is expected to deliver economic, and some subsequent social benefit, to Kangaroo Island during the construction and operational periods, through provision of employment for a number of local people, use of selected local produce in the restaurant, supply of additional goods and services such as laundry items and additional business opportunity for other tourism operators.

Historically tourism development located out of townships on Kangaroo Island has been difficult. Many attempts have failed due to a lack of financial backing, public opposition, poor site selection and difficulties encountered during the development assessment process. This development is unique in the sense that it has so many critical success factors in alignment including:

- A developer with excellent credentials and track record, who understands the market, has adequate financial backing and a proven reputation for undertaking high quality tourism developments.

- Architect Max Pritchard who has a national reputation for distinctive architecture and design excellence that is sensitive to location, site and environment.

- The close proximity of the site to the main natural attractions on the Island.

- The site's location in a high quality natural environment that includes rugged cliffs, white beaches and natural vegetation.

2.2.1 Testimonials

Baillie Lodges has received a number of testimonials from International Wholesalers and Inbound Operators regarding the need for a proposal such as the proposed Southern Ocean Lodge. A copy of these testimonials is contained in Appendix B.

"… the AOT Group and its overseas clients were very excited about the news of the upcoming opening of Southern Ocean Lodge which we will support 100%, as it is a product missing from Kangaroo Island and in high demand. (Cinzia Burnes, AOT Group, 24 January 2006)

"One of the more noticeable gaps in our product range is the lack of a five star accommodation product on Kangaroo Island. Ironically, Kangaroo Island has one of Australia's most reputable upscale tour operators in Adventure Charters, but we lack a similar five star accommodation experience for our luxury passengers to enjoy once their touring is complete." (K Keady, Qantas Vacations/Jetabout Island Vacations United States, January 2006)

"We are consistently being requested for a more upper-end property on Kangaroo Island. This destination is one of our fastest growing over the last three years, but the lack of a higher-end, world class property precludes us from being able to structure a visit to the Island for many of our clientele." (K Demeter, Down Under Answers, United States, January 2006)

2.3 Benefits and costs of the proposal

A comparison of the economic, social and environmental benefits and the potential impacts or costs of the proposed Southern Ocean Lodge development have been provided as Table 2.1.

As part of this Public Environment Report the potential impacts or risks for the project that are related to the Southern Ocean Lodge development have been investigated in detail.

Table 2.1 A comparison of the benefits and potential impacts of the Southern Ocean Lodge development

Benefits
■ Increased local employment with up to 32 full time equivalent staff employed at the Lodge.
■ Boost to local economy (Additional spending on Kangaroo Island is estimated at $0.45 million and additional spending elsewhere in South Australia for the visitors who stay at the Lodge is estimated at $1.15 million).
■ Change day trippers to over night. (Many up-market visitors currently are on a one-day excursion and it is reasonable to expect that some of these would convert to overnight visitors if suitable accommodation is provided.)
■ Have limited any future development in this area by securing encumbrances on adjacent properties.
■ Provide an avenue for education on the local environment through guided tours and lectures.
■ Raise the profile of Kangaroo Island with interstate & international visitors.
■ Strategic project for the state tourism industry with the Southern Ocean Lodge rivalling substantial nature based developments in other states.
■ The guests' restaurant will showcase Kangaroo Island products so as well as direct sales it will help promote the fresh, clean image of Kangaroo Island products stimulating further growth of these unique Kangaroo Island industries.

Benefits
■ Placing the site under a heritage agreement will prevent further vegetation clearance once the development is operational.
■ Additional business opportunities for the islands tourism operators with guests staying at the Lodge likely to take excursions and day trips with local providers.
■ Revegetation of existing naturally eroded areas following construction as part of rehabilitation program and site landscaping.
■ Beach access and walking tracks will be managed.
■ Heritage agreement ensures flora/fauna corridor between Flinders Chase and Kelly Hill is retained.
Potential impacts
■ Some vegetation clearance will be required to construct the proposed development (refer Section 6.3.2.1).
■ The proposed development may remove some fauna habitat and could potentially cause fauna to move out of the area during construction (refer Section 6.4.2).
■ An increased human presence in the area could cause fauna to move out of the immediate area (refer Section 6.4.2.8).
■ Visual landscape will be altered by the proposed development (refer Section 12).
■ Construction activities and materials brought into site (Section 5.1).
■ Demand on water resources (Section 10.1).
■ Treatment and disposal of waste (Section 11).
■ Treatment and disposal of wastewater (Section 10.3).
■ Increased vehicle movements (Section 4.8).

2.4 The “do nothing” scenario

The SA Tourism Plan suggests that a lack of regional investment in new tourism products is seriously affecting South Australia’s competitiveness in the tourism market. While accommodation is not usually the main motivation for travel, it forms an integral part of the overall visitor experience and is an important factor in destination choice.

The State recorded over 60,000 fewer visitors in 2003 (an estimated loss in economic value of $60 million) and while some is due to external shocks in the tourism industry, South Australia’s market share of total Australian international visitors dropped from 7.9% to 6.9%.

Figures suggest that South Australia is less competitive than interstate competitors and lags behind in recovery trends. (SA Tourism Export Strategy, 2004).

If nothing changes, then at best we can expect to see SA receiving a declining share of tourism growth in the face of strong investment by competing destinations. In short, tourism businesses will become less profitable and overall the tourism industry will become less economically sustainable. (SA Tourism Plan 2005).

Addressing these issues at a State level has two potential outcomes: the projects will change perceptions of what is on offer and will be the catalyst for complementary development.

South Australia will become more appealing as a visitor destination and consequent visitor satisfaction will lead to increased word of mouth recommendations, lengths of stays, visitor expenditure and repeat visits, which will enhance business profitability.

Without a development such as Southern Ocean Lodge, the existing day trip numbers are likely to continue while there is no appropriate level of accommodation to meet the needs of

high-end international and interstate tourists. In turn the flow on effects of such a development will not be felt by the local community.

If the site is not developed for Southern Ocean Lodge it is possible that the land could potentially be developed for a residential dwelling. Alternatively, if no development occurs on the site, the existing flora and fauna remains untouched.

2.5 Strategic tourism context

Southern Ocean Lodge is a strategic economic development project of critical importance to the South Australia's tourism industry.

The South Australian Tourism Plan 2003–2008 sets an ambitious target to grow tourism expenditure from $3.4 billion in 2001 to $5 billion in 2008. This target is also reflected in the South Australia Strategic Plan as the key target for the tourism industry.

To achieve this target (in a climate where South Australia's share of international tourists is declining), four critical success factors were identified in the South Australian Tourism Export Strategy. These are: improving air access, investment in new tourism product, development of a strong SA market brand and working with Tourism Australia.

Importantly the export strategy identified accommodation that acts, as an experience in its own right as critical to tourism success. While Adelaide has a more than adequate supply of good quality accommodation for most periods during the year, there is clear evidence that regional SA is falling further behind its interstate competitors.

Southern Ocean Lodge will bring a tourism development to South Australia and Kangaroo Island that will rival the substantial nature based developments in other states such as Longitude 131 in the Northern Territory or Bay of Fires in Tasmania.

The development is consistent with South Australia's strategic tourism directions for accommodation.

Objective 3.2 in the South Australian Tourism Plan states,

Strategically develop accommodation

"..South Australia's style of regional accommodation development in recent times has been predominantly bed and breakfast. While this has been a positive trend, there is a clear gap and a need to develop viable medium scale accommodation (30–50 units), consistent with the State's core positioning and branding theme."

The Responsible Nature based Tourism Strategy – a joint initiative of the South Australian Tourism Commission and the Department of Environment and Heritage takes this even further and aims to achieve:

"Three to five new or revitalised iconic nature based experiences by 2009."

2.6 Design Guidelines for Sustainable Tourism Development

The South Australian Tourism Commission has recently developed a document which describes the key considerations in developing a tourism facility in a sustainable manner. The Design Guidelines detail a number of actions in site planning that have been applied to the design of the Southern Ocean Lodge as outlined below:

- Give priority to providing experiences for guests and visitors, for example: spaces inside the building, view relating to landscape ('outside'), and views of the building. Ensuring consideration of views both into and out of the site.
- Identify and protect any areas of vegetation significance and endangered species.
- Identify and protect important fauna habitat and threatened species.
- Ensure development does not occur in areas that may endanger or threaten important nesting or breeding areas or migration/movement patterns of fauna.
- Buildings should be located and designed to minimise the removal of mature trees and minimise interference with tree canopies.
- Design landscaping and select indigenous species that are well adapted to local climatic conditions.
- Use materials sourced locally to the site and where possible natural. This also contributes to the authenticity and sense of place.
- Provide a sustainable water supply of sufficient quantity and quality and where possible, harvest water from the site.
- Investigate the potential for treatment and re-use of wastewater.
- Aim to minimise or avoid firebreaks around buildings by using perimeter ground-based and roof-mounted sprinklers systems.
- Locate driveways or access points on cleared land or along property boundaries to avoid unnecessary clearance.
- Screening service areas and utility areas.

This PER outlines the measures introduced in the project to address these Design Guidelines and meet the project objectives.

PART B

THE PROJECT

3. Project description

3.1 Site selection

An iconic Lodge requires an iconic site. Secondary sites don't have the presentation values or natural credentials to drive market demand.

The success of a tourism development can completely rely on the nature of the site selected and how well it is designed to fit with the surrounding natural and cultural landscape. The financially sustainable development and operation of a premium nature based Lodge necessitates a unique location and position that can equate to a room yield premium.

The "Design Guidelines for Sustainable Tourism Development" (SATC 2005) highlight environmental setting as being the single most important factor that contributes to overall attractiveness and consumer satisfaction.

Given these criteria for site selection, the Proponent sought a premium site which could offer guests one of the best examples of Kangaroo Island's natural resources while ensuring there is minimal impact on the existing environment. The site was also well protected from future development and in close proximity to some of the richest natural areas on the Island.

Prospective locations on the North Coast of the Island were discarded due to the highly altered farming environment. A number of alternative locations were considered on the south coast but were not able to address the project's key criteria being: availability of freehold land; proximity to the island's natural attractions, and; a prime coastal location in line with market expectations. It would simply not be economically sustainable to locate a premium market product on a secondary site. The selected site formed part of the vast private land holding (on 5 titles) commonly known as Hanson Bay Sanctuary. The Sanctuary adjoins Flinders Chase National Park to the west and Kelly Hill Conservation Park to the east. The section purchased for this development has more than one kilometre of coastal frontage and surrounded on the other sides by the Hanson Bay Sanctuary, but with direct access the South West River Road (refer Figure 3.1).

The rugged cliffs, wild ocean, white beaches and surrounding coastal vegetation provide scenic beauty and habitat for native birds and animals enabling the Lodge to provide a total wilderness experience consistent with guests' expectations of a natural unspoilt coastal Island experience.

The following general principles for site selection were considered when determining the position of the Lodge within the site as discussed in the SATC's "Design Guidelines for Sustainable Tourism Development (2005)", including:

Build on the least sensitive areas, or areas that have already been subject to human disturbance.

Response: the building site has already been subject to some natural wind erosion and has reduced vegetation coverage. This is discussed in more detail in Section 6.3.2.1.

Optimise the best available views without building on prominent points or ridgelines.

Response: the building is set down from the ridgeline to minimise visual impact and has spectacular views across Hanson Bay.

Develop in an area with natural values that can be used to interpret the environment in a wider context.

Response: as a facility selling the nature-based tourism concept, it is in the interests of the Proponent to ensure the existing environmental assets of the site are preserved. In addition, it is proposed that a key member of staff will be an ecologist/naturalist responsible for environmentally managing the site, organising tours, liaising with researchers to increase knowledge of the area, organising in-house lectures and tours with wildlife experts.

The type of tenure and rights of access and use.

Response: The freehold land was available in this premium location and the Proponent was able to secure encumbrances on adjacent properties which ensure the site and development will be protected.

3.2 Site description

The proposal will occupy approximately 1 hectare of land near the coast, within a 102 hectare section of land (the subject land) which includes a kilometre of coastal frontage, cliffs, beaches and largely undisturbed dense native vegetation. The vegetation is generally of a relatively intact nature (except for existing access tracks and naturally eroded areas) and is a rich habitat for a variety of birds and animals.

The surrounding land uses immediately adjacent the subject land includes Hanson Bay to the south and the “Hanson Bay Sanctuary” to the east, north and west. An existing group of cabins is located to the east at Hanson Bay and includes accommodation cabins, shacks and public beach access. Refer Figure 3.2.

Adjacent the 3,485 hectare Hanson Bay Sanctuary land is Flinders Chase National Park to the west, Kelly Hill Conservation Park and Cape Bouger Wilderness Protection Area to the east, and farming land to the north. It is part of a 10 kilometre stretch of coastline from the South West River mouth to the west (near Remarkable Rocks).

To ensure that the development wasn’t compromised by other developments in the area and to preserve the whole area between Flinders Chase National Park and Kelly Hill Conservation Park as a wilderness corridor, the owners have secured encumbrances on the two adjoining coastal properties limiting their future development as outlined in Section 3.3.

As an additional protection for the area, the Proponent is seeking to place the site under a Heritage Agreement, preventing any vegetation clearance.

The section purchased for this development has more than one kilometre of coastal frontage and surrounded on the other sides by the Hanson Bay Sanctuary, but with direct access via South West River Road. The rugged cliffs, wild ocean, white beaches and surrounding vegetation provide not only scenic beauty but also a habitat for native birds and animals enabling the Lodge to provide a total wilderness experience.

Ben DellaTorre (Ecologist) and Lyn Pedler (Ornithologist) were commissioned to undertake a detailed Botanical and Bird Survey in 2005. They concluded that the site selected for the Lodge and suites was the best in the area from an environmental viewpoint in that it was already experiencing “scalds” and “blowouts” and would require the least clearance of native vegetation.

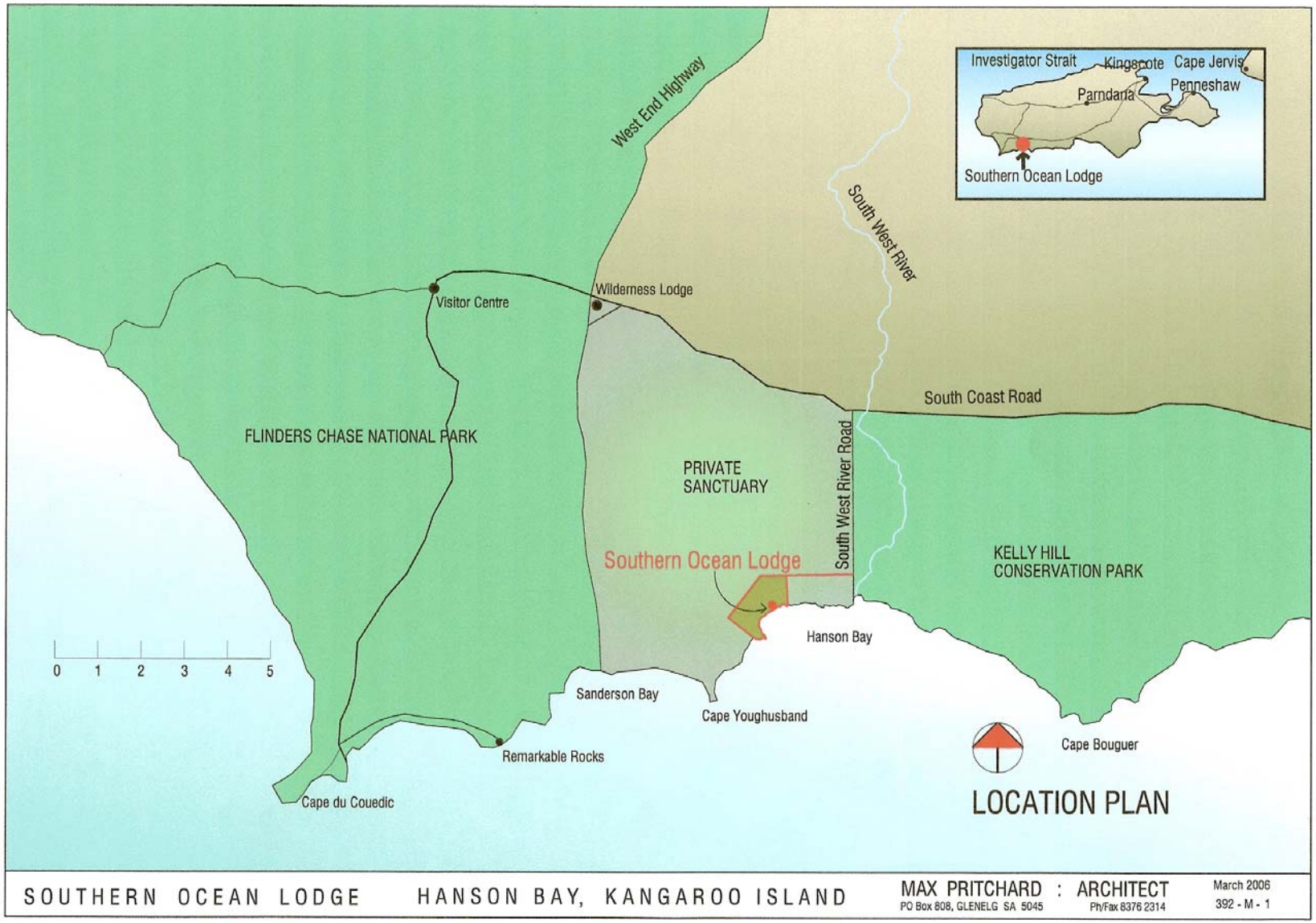


FIGURE 3.1
Location plan

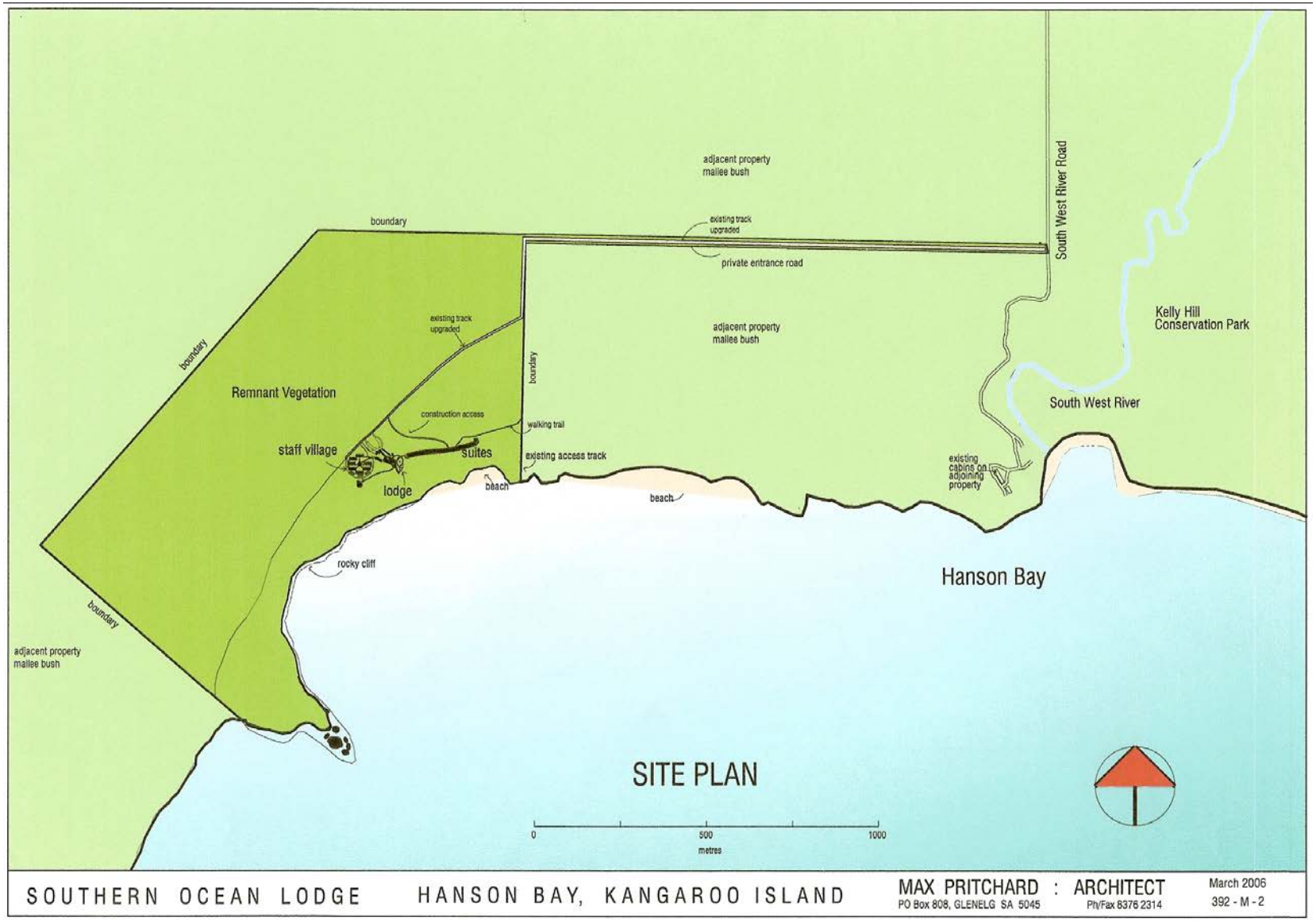


FIGURE 3.2
Site plan

3.3 Property details

The subject land comprises Certificate of Title Volume 5431 Folio 208. A copy of the Certificate of Title is contained in Appendix C.

Control over development in the area has been secured by having encumbrances placed on the two adjoining coastal properties, limiting to one residence for the property to the west and only development on the site of the existing cabins on the property to the east, in essence there can be no additional coastal development between Flinders Chase National Park and Kelly Hill Conservation Park.

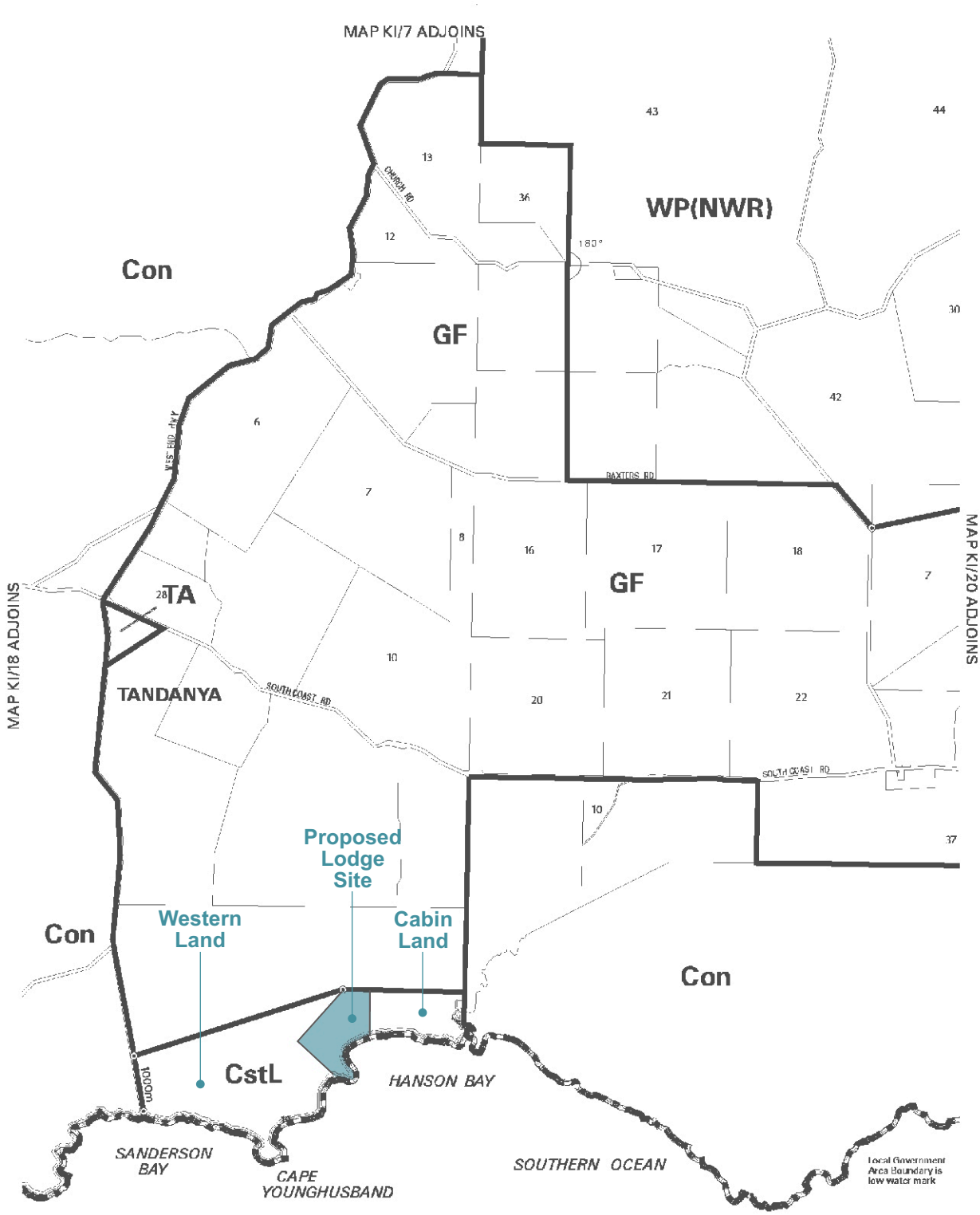
The following provides a summary of the encumbrances which have been negotiated over the adjoining allotments referred to as Cabin Land and Western Land (refer Figure 3.3).

Cabin Land

- Refers to the property known as Hanson Bay Cabins.
- Currently there are six cabins on site and no more than 25 cabins can be constructed on the site.
- A cabin to be constructed shall not:
  - be built other than to provide facilities for patrons intending to cater for themselves
  - be other than of a mid-market “family style” or three star level
  - be situated outside of the Cabin area
  - be visible from any place on the Lodge Land.
- No selling or providing food or beverages of any kind other than self-catering by patrons.
- No building or structure (other than a fence) shall be built on the Cabin Land which shall be situated outside of the Cabin Area, be visible from any place on the Lodge land or provide accommodation for tourists of a deluxe standard.
- Restrictions on the sale of land to other parties, except on the sale of the land to the Government of South Australia or the Government of Australia.

Western Land

- No structure of a Commercial nature or any accommodation for tourists on land within the Coastal Preservation Area may be built or erected.
- Construction of a personal residence for holiday accommodation purposes would be permitted providing that it is not visible from the main building to be constructed on the Lodge land and is set back more than 100 metres from the cliffs within the Coastal Protection Area.
- No building or structure shall be built on the land which provides accommodation for tourists of a deluxe standard.
- Restrictions on the sale of land to other parties, except on the sale of the land to the Government of South Australia or the Government of Australia.



NOTE: For Policy Areas See MAP KI/42

Con	Conservation
CstL	Coastal Landscape
GF	General Farming
TA	Tourist Accommodation
WP(NWR)	Watershed Protection (North-West River)

Scale 1:100000

0 5km

Zone Boundary

Development Plan Boundary

KANGAROO ISLAND COUNCIL ZONES MAP KI/19

Consolidated - 7 August 2003

Property Map

FIGURE 3.3

4. Proposed development

4.1 Items for approval

The Proponent requests approval for the following items which are described in more detail in Sections 4.5 – 4.11 below:

- Main Lodge – 25 accommodation suites and associated infrastructure
- spa retreat
- staff village
- upgrading of access road
- signage.

The proposed Produce Garden which was described in the original documentation has been withdrawn.

4.2 Visitor and staff numbers

As part of the economic analysis for the project, the Proponent has estimated the potential occupancy of the Lodge from Year 1 to full growth. It is forecast that occupancy will grow from 30% in Year 1 to an average occupancy of 65% by Year 6. Up to 32 full time equivalent staff will be employed at the Lodge (refer Section 13.5).

Table 4.1 Operators estimated occupancy

Rooms	25
Average Persons Per Room	2.1
Average Stay (nights)	2.8
Occupancy	65%
Number of guests per year	4,500
Total visitor nights per year	12,500

Source: Syneca Consulting 2005

It is considered important to house core staff on site owing to the broad hours of work required, the risk of late night driving (for drivers and wildlife) local housing shortages, and the necessity to provide quality, convenient accommodation to attract high standard, permanent staff. It is envisaged that many staff may maintain homes on the Island but will have this added convenience. Specific areas such as housekeeping, administration and maintenance will also employ day staff from the Island community.

4.3 Design rationale and site layout

The buildings have been designed as contemporary structures that reflect and respect the Australian and Island bush spirit. The site layout plan is shown in Figure 4.1.

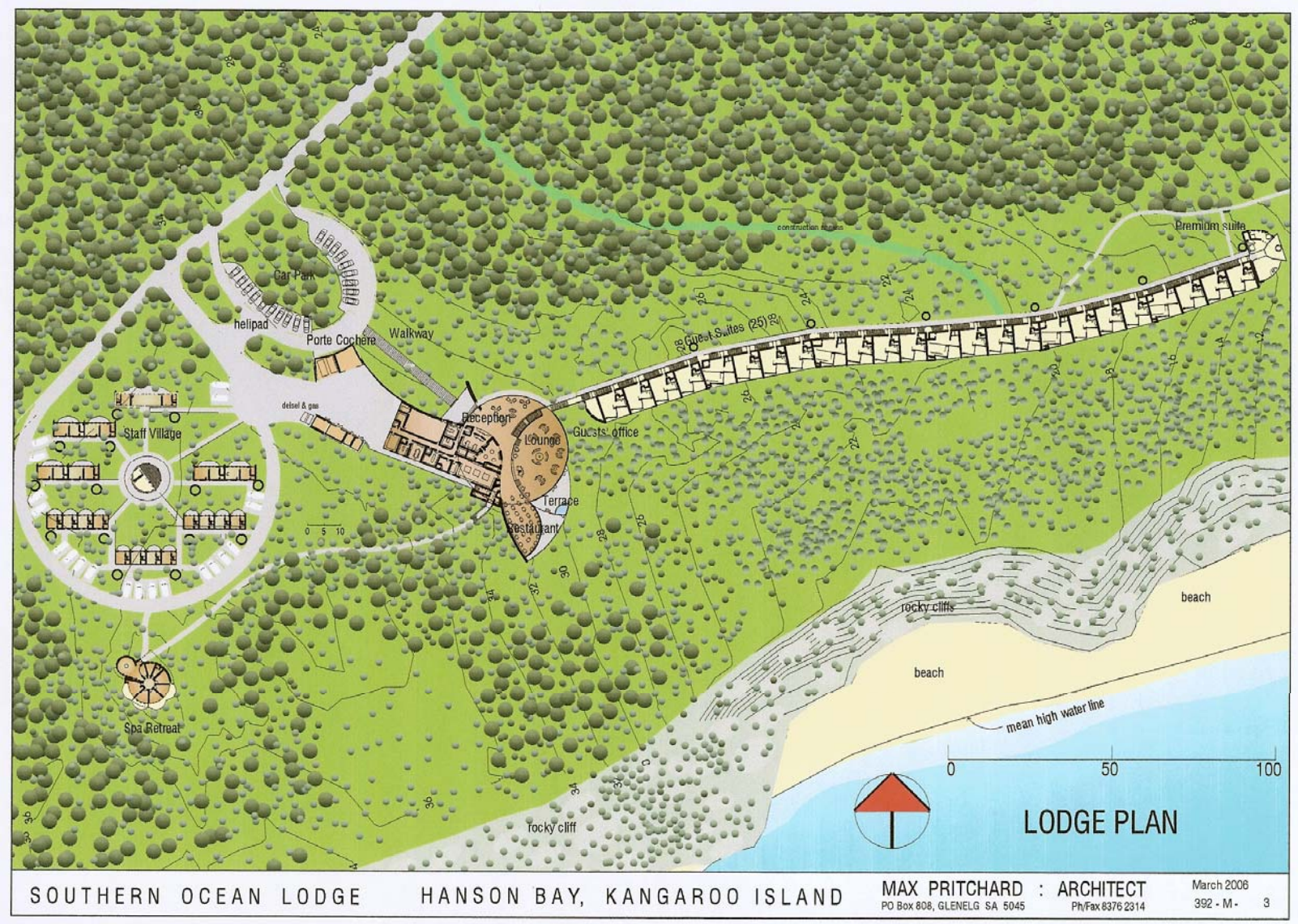


FIGURE 4.1
Site layout

A long curved wall of locally sourced limestone becomes a memorable dominant element linking the carpark to the Lodge. Roofs and walls in grey colorbond revive the bush tradition with texture and colour that complements the limestone and the natural setting. The bush tradition is enhanced by iron rainwater tanks that break up the southern façade of the suites and emphasise the water sustainability and ecological principles of the project.

The suites step down to follow the slope of the land. Overhanging iron roofs emphasise the very low profile of the suites. To further reduce the visual impact the suites are designed in groups of four with a slight change of orientation at the junction of the group being emphasised by rainwater tanks and a curved upturning of the roof, reinforcing the coastal imagery. The deeply recessed terraces on the south side of each suite further punctuate the façade.

The suites have been designed as a continuous long narrow structure. The north/south orientation enables maximum use of winter sun from the north for winter heating, and exposure for the suites to the south-easterly view.

The main Lodge is partially nestled into the side of the ridge to reduce its height and impact and minimise the need for excavation and fill. The building is of a low profile with a flat roof and is located below the densely vegetated ridgeline. A thin curved plane of roof over circular glass walls reinforces the soft low impact nature of the project.

The staff village is located on a relatively flat site, surrounded by dense vegetation that screens it from view from the Lodge and the coast. It appears as small lightweight cabins of iron and glass, relating to the Lodge and its natural bush setting.

The total floor for the buildings is approximately 4,250 m^2 and the site area is approximately 102 hectares. Thus the building occupies 0.39% of the site.

The buildings are all low profile with an average height – suites approximately 4 metres above natural ground, the Lodge approximately 4.5 metres above natural ground, staff village 3 metres above natural ground.

The need for clearance of native vegetation has been minimised. Small areas which may be affected by construction adjacent to the buildings and existing naturally degraded areas will be revegetated entirely with endemic species to preserve the natural bushland setting.

Within the car park separate parking bays are formed within the bush to provide shade, avoid large areas of paving, and maintain the wilderness setting.

4.4 Facilities

A copy of the architect's layout drawings and elevations of the buildings is contained in Appendix D.

Main Lodge

Comprising reception, library, large open lounge, ancillary guest restaurant and meeting room together with staff facilities of kitchen and administration. The site selected is below a densely vegetated ridge, which provides protection from the predominant south west winter wind while providing expansive views of the coast to the south east. The siting also ensures that minimal excavation is required, only at the western end.

A car park is located 50 metres from the Lodge, with access by a covered walkway to the Lodge entrance. The raised walkway assists in the retention of native vegetation and allows for the movement of small terrestrial fauna.

Guest suites

The guests suites have been designed as a continuous long narrow articulated structure containing 25 suites. The north-south orientation enables maximum use of winter sun from the north for winter heating and exposure for the suites to the southerly view. The suites step down to follow the contours of the land (approximately 1 in 14) with minimal cutting and filling.

The suites are linked by an enclosed, ramped corridor to the Lodge. A gently curving plan form and curved roofs minimise visual impact. Each suite has a generous bedroom/lounge and ensuite, all with expansive views to the south east.

Spa retreat

In keeping with market expectations of a premium Lodge, a separate building houses a “wellness spa” for rejuvenation and relaxation treatments.

Staff village

Seven separate accommodation buildings house up to 20 staff, with accommodation ranging from a two bedroom manager’s house to small bedsits. A central circular recreation room/barbeque area becomes the village focus. The image will be of small light weight cabins in a natural bush setting. The staff village is located on relatively flat land surrounded by dense vegetation that screens it from view both within and external to the site.

It is considered important to house staff on site owing to the broad hours of work required, the problem of late night driving (for drivers and wildlife), a shortage of local housing and the necessity to provide quality convenient accommodation to attract high standard, permanent staff. It is envisaged that many staff may maintain homes on the Island but will have this added convenience.

4.5 Materials and colour

Materials are selected for longevity in the coastal environment, bushfire resistance, low visual impact and to reinforce the desire to create an image distinctly appropriate for the Island. Hence, the priority for selection of materials for the Lodge will be based on that which is produced or can be sourced locally e.g. Kangaroo Island and South Australia.

A dominant feature of the Lodge will be the curved limestone wall that commences at the carpark and extends through the entrance and around to the end of the restaurant, separating guest areas from back of house functions. Almost 100 metres long and 3 metres high and constructed of Kangaroo Island limestone, this wall will be a strong memorable element of the design.

It is expected that some limestone for the wall may be sourced on site during the excavation of the piles for the building footings. Additional limestone for this wall and for the proposed works to the access road and car park will be sourced from licensed quarries on the island (Halloran Earthmovers or similar).

Roofs will be high grade colorbond in a grey colour similar to old galvanized iron. This colour and material will also be used for some wall cladding and feature rainwater tanks, which will emphasise the sustainability of the project with all roof water being collected for reuse.

Recycled timbers will be used for internal flooring (to ramps for guests suites and possible for furniture and fittings).

The staff village will be primarily clad in the grey colorbond which will complement the Lodge and the environment while reinforcing the Australian theme.

4.6 Infrastructure

4.6.1 Water

An assessment of the water requirements for the project was undertaken and a water balance produced based on the known rainfall and run-off collection capacity. The report concluded that the water balance within the resort is considered sustainable with some intermittent supplementation using bore water for toilet flushing and providing fire fighting reserves purposes only (refer Section 10 and Appendix E).

All roof run-off water will be collected from the Lodge buildings and reused following filtration and UV treatment. The main storage will be in underground concrete water tanks (3) located under buildings and paved areas to provide approximately 1,000,000 litres of water storage.

This will provide a sustainable system, but there remains an option of piping bore water from the adjoining property to provide additional water if required to supplement supplies for toilet flushing and fire fighting. The proposed location is on adjoining farmland that is already cleared and not within the Coastal Landscape Zone and the owners have agreed to the potential use of their land for this purpose.

In addition, to minimise water use, water saving devices will be utilised wherever possible including shower heads and toilet cisterns.

4.6.2 Sewerage

A number of options were considered for the treatment of wastewater on the site as outlined in Section 10.2.

A Biolytix Filter treatment system has been selected for the development as it offers the best environmental solution while having minimal ongoing operational issues such as noise, smell and cost. The product has won numerous awards at both the national and international level.

The Biolytix system uses a natural, chemical free process to treat sewage and wastewater, converting it into clean irrigation water which will be used to irrigate the planting in the staff village. All sewage and wastewater is fed into the Biolytix Filter using standard plumbing and the Filter also breaks down kitchen waste and sanitary items (refer Appendix E).

The system is compact and also extremely hardy and reliable, requiring only 1 service a year. It is very cost efficient and has the smallest energy consumption of any unit on the market. The system also has powerful odour-absorbing capacity and guarantees no odours.

4.6.3 Power

The estimated peak power required to operate the Lodge is approximately 150 kW. There is an existing low capacity SWER line to the Hanson Bay Cabins which is inadequate to supply the Lodge. While Southern Ocean Lodge have investigated the possibility of connecting to this line there is no plan to connect at this time due to its low capacity, unreliability and high connection costs.

When grid power for the western end of the Island is eventually upgraded, Southern Ocean Lodge will investigate connection to the main supply via South West River Road.

A number of alternative power supply options were considered for the development. A Hybrid PE Cell additional to the system has been explored and could be incorporated as technology advancements allow. Wind turbine generators were considered inappropriate for many reasons including the impact on visual landscape, the need for associated infrastructure and the extremely high cost. Baillie Lodges are investigating the potential to use Biodiesel on the site and will adopt this if suitable.

It is proposed to supply power to the Lodge via multiple diesel generators with a combined capacity of approximately 200 KVA. These will be automated to come on line with demand. The generators will be housed in a sound attenuated building (refer Figure 4.1). Further information on noise is provided in Section 14.

Fuel efficiency is a key driver in equipment selection. Fuel will be stored in 1 x 30,000 litre above ground self bunded tank (double skin with vacuum). The tank will be built to AS 1692 and installed in compliance with AS 1940 and EPA requirements. These tanks are commonly used in bushfire prone areas and flame proof vents will be used.

Based on estimated consumption, it is expected that a fuel delivery will be required every 4–6 weeks. A standard fuel delivery tanker truck already services the western end of Kangaroo Island.

A Smart Energy Management System linked to a Property Management System that controls power supply and usage in occupied/unoccupied guest suites, guest areas and staff facilities will be installed and energy saving lighting and appliances will be used wherever practicable.

4.6.4 Telecommunications

The Southern Ocean Lodge development will require six traditional phone lines and access to broadband speed internet. The proponent currently has Telstra assessing the project and the solution is likely to be satellite or microwave based. Therefore trenching for cables is unlikely to be required.

4.6.5 Hot water

Hot Water will be Solar-powered with diesel boiler boost. In addition, a heat exchanger for the hot water ring main will be added to the generators to make use of any waste heat.

4.6.6 Gas

LPG gas will be supplied to the kitchen area and will be stored in designated area as shown in Figure 4.1. Due to low volume used, deliveries will only be required on a quarterly basis.

4.6.7 Fire fighting

Water storage will be available for fire fighting. The water will be pumped to ground sprinklers in the vegetation around the Lodge, to roof-mounted sprinklers on the buildings and to hose reels. Further detail on the Lodge's Fire Management Plan is contained in Section 17.

4.6.8 Heating and cooling

Suites

Passive heating is employed by allowing the north facing corridor to act as a greenhouse in collecting heat from the winter sun and distributing it to the suites by low speed fans. The windows are shaded by the roof overhang in summer. Cross ventilation will provide most summer cooling. Small reverse cycle units in each room may supplement passive heating and cooling.

Main Lodge

A large area of north facing glass will facilitate winter passive heating. A stone or tiled floor on concrete will act as a heat sink to store and re-radiate this heat. Additional heating will be provided by feature wood fires and underfloor water heating passively supplied by the mechanical diversion of the hot water ring main, supplemented by reverse cycle heating/cooling.

4.7 Traffic

Most guests will arrive at Kingscote airport and then travel by road along the South Coast Road to South West River Road. This development is not dependent on any upgrade of the South West River Road, although State Government has indicated in principle support for this initiative. This section of public road (2 kilometres) may be sealed in the future but is not included in this application. More information on access roads is provided in Section 4.8.

Guests – It is envisaged that about 60% of guests will arrive on Kangaroo Island by air and will require airport transfers. Southern Ocean Lodge would provide a chauffeured transfer using a small deluxe vehicle with a carrying capacity of eight persons. Given the daily flight schedules for the Kingscote Airport, arriving and departing guests could be catered for in one transfer movement up to 4 times each day.

Staff – it is expected that the majority of staff will live on site and have their own vehicle and are likely to make trips off site only on an intermittent basis on non-work days. Some local staff will drive to work each day.

Supplies – The Lodge will utilise a range of local suppliers, many of whom will deliver on a weekly basis. In addition Southern Ocean Lodge will have its own delivery van for laundry and other provisioning from Kingscote.

Diesel/gas – deliveries will take place via tanker every 4–6 weeks. A tanker delivery run already services the western end of Kangaroo Island. Gas will be delivered on a quarterly basis.

Activities – daily tours and activities for small groups would be offered from the Lodge.

Total traffic movements – it is estimated that the Lodge will account for an average of 24 return vehicular movements per day, predominantly in daylight hours.

4.8 Access and car parking

The existing access track into the site from the South West River Road will be upgraded and finished with crushed limestone to preserve the natural quality of the entrance.

Access roads and car parking within the Lodge grounds is minimal and will be formed by providing a compacted rubble base over the existing surface of sand and limestone. Crushed compacted limestone will stabilise the surface.

The main access road in to the site will be 5 metres wide, with passing bays formed where appropriate to minimise vegetation disturbance.

No specific stormwater drainage mechanisms will be required for the road, the roads will be on a slight camber each way and the soil is free draining. The low vehicle usage, low speed of traffic and the stability of the base will mean minimal maintenance (occasional grading) will be necessary.

Separate bays for each car park will be hand formed off a circular ring road, to avoid the clearance of large areas of vegetation (approximate locations are shown in Figure 4.1). The Kangaroo Island Council Development Plan has been examined for its requirements on number of car parks for this type of development and the proposal adequately meets the requirement with 35 car parks provided for staff and guests.

4.9 Access to the beach

Access to the beach from the Lodge will be managed. At present access to the beach from Hanson Bay is not restricted but requires a half an hour walk from a readily accessible public area (Hanson Bay). Southern Ocean Lodge proposes a number of strategies to manage access within the site for guests and staff:

- provision of formed pathways where appropriate (exact locations to be determined to avoid sensitive areas)
- directional signage
- interpretive signage educating guests on environmental aspects
- seasonal management techniques in association with protected area management. For example, restricting access to certain areas during breeding season.

Management techniques to improve visitor awareness of the environment and potential issues include:

- staff induction program that incorporates educative element on value and sensitivity of natural surroundings, regulations and management

- guest awareness – via staff liaison, collateral materials and signage
- interpretive activity staff.

4.10 Landscaping

The “Design Guidelines for Sustainable Tourism Development” suggest that a development with strong connections to the existing flora and fauna on the site will provide a unique and memorable experience.

As much of the existing vegetation on the site will be retained during construction of the Lodge, landscaping for the site will mainly consist of revegetating any disturbed areas. It is proposed to undertake seed collection from the site prior to the majority of work being undertaken. The seeds will be propagated and planted out on the site in areas as shown on Figure 4.1. All revegetation will be carried out using species indigenous to the site and utilising appropriate planting methods. Further information on vegetation clearance, pruning and revegetation is contained in Section 6.3.3.3.

The proposed Produce Garden which had been included in the original documentation to utilise the treated wastewater has been withdrawn.

4.11 Signage

Signage on the site will be limited to:

- Entrance Statement – a simple limestone structure with discreet signage in keeping with local materials and landscape and similar to that used at Flinders Chase National Park. Some examples are shown below.





- Directional Signage – around the Lodge grounds to direct Guests to facilities and away from any sensitive areas. Directional signs will be similar to those used by National Parks and Wildlife SA.

- Interpretive Signage – Will be located where there is an element of the site of interest to visitors and will include descriptive text about relevant issue and where appropriate colour illustration or photographs. For example, informative signage will be used near the beach where Hooded Plovers reside, which describes the birds, their habitat and directs guests away during breeding season. Similar signage has been installed by DEH at Hanson Bay.







5. Construction process

5.1 Construction activities

Site construction activities will be undertaken in a series of stages involving:

- Site Clearing
- Site Establishment
- Site Excavation and Preparation
- Foundation Establishment
- Staff Village Construction
- Suites and Lodge Construction.

5.1.1 Site clearing

Clearing for the project will be undertaken progressively in order to minimise impacts to vegetation as well as sediment and soil erosion.

Clearing of vegetation for the staff village and access tracks will be undertaken in the initial stages of the development while clearing for the Suites and Lodge will be undertaken at a later date following construction of the staff areas. The construction schedule as outlined in Appendix F outlines the separate clearing activities.

Clearing of vegetation will be undertaken by a “hydraxe” machine or similar which mulches the vegetation for spreading over bare areas to help control erosion. Trimming of vegetation in the “edge” areas between construction zone and vegetation will be undertaken as required with hand held pruner or saw.

5.1.2 Site establishment

Site establishment activities will consist of setting up water tanks, generators for power supply and compound area for material and equipment storage during construction.

The site access track will also be graded and sealed with crushed limestone.

5.1.3 Site excavation and preparation

Excavation works will be minimal however cut and fill activities are required to provide level formations for the construction of the suite and Lodge areas. As with clearing activities, the site excavation and preparation for each of the areas will be undertaken progressively to minimise on site disturbance.

5.1.4 Foundation establishment

Foundations for both the staff village and Lodge areas will be established using a screw pile system. This method minimises excavation and concrete requirements in foundation development when compared to conventional footings of reinforced concrete reinforced trenches which have the potential to cause more environmental damage from soil disturbance and concrete spillage.

An attachment to a conventional excavator will be used as a drill which screws steel piles into the earth to the required depth (i.e. through the sand crust to the limestone base). The pile screwing will commence at the lower level of the buildings and move up within the footprint of the structure.

As with clearing and excavation, foundation establishment for the staff village and Lodge areas will be undertaken progressively.

5.1.5 Staff village construction

Following establishment of the foundations, building construction activities will commence.

The staff village construction will involve conventional building techniques similar to that of residential premises and include frame establishment, roof and cladding installation, installation of windows and doors, electrical (including lighting) and plumbing, hook up to water supply and waste (Biolytix), internal lining and flooring and cabinets etc.

5.1.6 Suite and Lodge construction

Construction of the suites and main Lodge will be undertaken following completion of the staff village and use similar building techniques to those outlined in Section 5.1.5.

5.1.7 Construction materials

It is anticipated that some limestone for the feature wall may be sourced on site during the excavation of the piles for the building footings. Additional limestone for the wall, access road and car park will be sourced from licensed quarries on the island (Halloran Earthmovers or similar).

Minimal volumes of concrete will be required for footings e.g. as a base for the stone walls, concrete tanks and for some floor areas in the main lounge. Concrete will be sourced from a local supplier and trucked to site using concrete agitators.

Other building materials e.g. timber, roofing materials, aluminium etc will be sourced from suppliers in Adelaide and transported to the island by existing ferry and road freight services. Consolidation will occur wherever possible to minimise vehicular movements.

5.2 Construction schedule and workforce

A proposed construction schedule is contained in Appendix F. The Schedule is based on preparation of documentation and drawings taking place in parallel with the assessment of the PER and for the purposes of this document, assumes approval would be granted in August 2006.

Following approval, upgrading of the existing road access will be undertaken and the site cleared for the staff village. It is envisaged that the required workforce will include both local trades and mainland workers who will require accommodation. Construction of the staff village and wastewater systems are the first priorities as the village will be used as on-site accommodation by most of the construction workforce. During this time, construction workers will be accommodated in the neighbouring Hanson Bay Sanctuary Homestead.

Construction and fit out of the guest suites, main Lodge and spa will follow with an anticipated completion date of November 2007.

5.3 Service connections

No connection to services external to the site is required as described in Section 4.6.

5.4 Excavated material and construction waste

The buildings and site works have been designed to match the contours of the land, minimising site disturbance. Any excavated material (sand and limestone) will be used on site for construction of road-works and paths.

Construction will be generally of lightweight materials (except stone walls). Wastage will be minimal and disposed of off-site at approved waste collection facilities.

5.5 Access

Where possible construction materials will be sourced locally from Kangaroo Island and South Australia. Material to be brought into the site will be generally lightweight to minimise transport costs and will therefore cause minimal site disturbance and be easy to erect.

Wet trades such as concreting and plastering will be avoided where possible.

5.6 Site management and protection

An Environmental Management Plan has been prepared (refer Part D) and details the strategies and actions to be implemented to protect the existing environment during construction and operation of the Lodge.

5.7 Decommissioning

The project has been designed to have minimal impact on the environment and particularly on landscape form. The buildings have been designed to suit the contours, minimising soil disturbance. Concrete will be avoided where possible by utilising screw piles instead of traditional heavy concrete footings.

Construction materials will be mainly lightweight and therefore easily removable if required. The predominant “solid” material is limestone which occurs naturally on the site.

PART C

ENVIRONMENTAL, SOCIAL AND ECONOMIC ASSESSMENT

6. Biological environment

6.1 Biodiversity

Kangaroo Island's native vegetation is highly fragmented, with almost 90% of native vegetation occurring in individual areas of no greater than 20 hectares in size. The Biodiversity Plan for Kangaroo Island (Willoughby 2001) categorises six Regional Ecological Areas based on previous studies of Kangaroo Island. The 102 hectares of remnant vegetation owned by Baillie Lodges contributes to the South Coast Regional Ecological Area, the largest continuous area of remnant vegetation occurring on Kangaroo Island. This 77,213-hectare area comprises 20% of the island's total land cover, and spans from Cape Borda in the east to Cape Willoughby in the southwest. Eighty six percent of its native vegetation remains, with 72% of this formally protected within National Parks, Conservation Parks and privately-owned Heritage Agreements. Directly to the east and west of the project area are two privately owned titles owned by Hanson Bay Co Pty Ltd. It is important to note that these three privately owned land titles are located between Flinders Chase National Park and Kelly Hill Conservation Park.

The landscape of the project area is characterised by sandy soils over limestone, covered by remnant mallee vegetation dominated by *Eucalyptus diversifolia* (Coastal White Mallee) and *Eucalyptus rugosa* (Coastal White Mallee). Calcareous cliffs form a spectacular coastline with the prevalent vegetation along these coastal areas consisting of remnant low coastal shrublands, dominated by *Melaleuca lanceolata* (Dryland Tea-tree)*, Melaleuca gibbosa* (Slender Honey-myrtle)*, Eucalyptus diversifolia* and *Eucalyptus rugosa.* To the east the cliffs give way to coastal sand dunes.

The remnant vegetation communities across the project area support a diverse range of coastal flora and fauna species. *Eucalyptus diversifolia* (Coastal White Mallee) is the dominant vegetation community across the whole property. This vegetation community covers 77,000 hectares across Kangaroo Island, with 51,300 of these hectares formally protected. Due to low soil fertility, these areas were seldom used for farming practices and therefore 75% of the pre-European distribution of *Eucalyptus diversifolia* communities remains (Willoughby, 2001).

6.2 Relevant legislation

6.2.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) applies to all Australian territory and waters. Under the Act, actions that are likely to have a significant impact upon defined matters of national environmental significance are subject to an assessment and approval process. A person or company proposing to take an action that may have a significant impact on a matter of national environmental significance must refer that action to the Federal Minister for the Environment.

The EPBC Act is triggered when an action:

- is taken anywhere in Australia and has, or is likely to have a significant impact on a matter of national environmental significance; or

- is taken on Commonwealth land or in a Commonwealth marine area and has, or is likely to have a significant impact on the environment; or
- is taken outside Commonwealth land or marine areas and has, or is likely to have a significant impact on the environment on Commonwealth land or waters; or
- is taken by the Commonwealth and has, or is likely to have a significant impact on the environment.

The EPBC Act prescribes seven matters of national environmental significance as triggers for Commonwealth assessment. These include:

- World Heritage properties
- Ramsar Wetlands of international importance
- Nationally threatened species and communities
- Migratory species protected under international agreements
- Nuclear actions, including uranium mining
- The Commonwealth marine environment
- National Heritage Places.

Under the EPBC Act, a company proposing an action that may have a significant impact on a matter of national environmental significance must provide a *Referral* that will help the Commonwealth decide whether the proposal requires assessment and approval. The Commonwealth Environment Minister will consider the *Referral* and is required to decide within 20 business days whether the action requires approval.

A *Referral* for this project was prepared and submitted to the Commonwealth in 2005 (EPBC Reference 1005/2264). The Commonwealth Environment Minister determined the proposed development to be a controlled action (i.e. an action requiring approval) because of potential impacts on listed Threatened species and communities and Migratory species. Under a project-based bilateral agreement, the Commonwealth has agreed to assess this project in line with the South Australian Major Developments process (i.e. through the Public Environment Report document).

6.2.2 National Parks and Wildlife Act 1972

The State *National Parks and Wildlife Act 1972* was designed to allow for the establishment and maintenance of a system of reserves, as well the protection of rare and endangered species of flora and fauna. The Act identifies and protects certain species, as well as creates offences for the damage of flora and fauna. Under the Act it is an offence to take (including removal and damage to) native species from National Parks, Reserves, Crown Land (such as road reserves), land used for a public purpose and forest reserves.

The *National Parks and Wildlife Act 1972*, protects species located within Conservation Parks, Conservation Reserves and any species listed under Schedules 7, 8, and 9 of the Act.

6.2.3 Native Vegetation Act 1991

There have been controls on the clearance and use of native vegetation since 1983, due to the high level of clearance of native vegetation within South Australia. These controls now apply through the *Native Vegetation Act 1991*. This Act regulates the clearance and provides for the management of native vegetation throughout the State, whilst ensuring that areas of high conservation value are protected and that minor clearance is subject to a thorough

assessment process. Under the Act the clearance of native vegetation requires the consent of the Native Vegetation Council, which is advised by the Native Vegetation Branch (of the Department for Land, Water and Biodiversity Conservation), unless it is covered by an exemption contained within the Native Vegetation Regulations 2003. Heritage Agreements with landowners are covered and protected by this Act.

As the proposed development has been deemed a Major Development (under the *Development Act 1993*), the proposal will not require consent for native vegetation clearance from the Native Vegetation Council. However, the proposal will be referred to the Council, as a Referral Authority, and their comments and recommendations will be taken into account when making the final decision and setting any conditions in the case that the project is approved.

6.2.4 Natural Resources Management Act 2004

The management of natural resources underwent a major shift with the State Government's *Natural Resource Management Act 2004* commencing operation in July 2005. The new Act replaces the *Animal and Plant Control Act 1986, Soil Conservation and Land Care Act 1989* and *Water Resources Act 1997*.

The framework for natural resources management seeks to look after the environment such that there is a balance between caring for land, water, plants and animals and the needs of farmers and landowners. The operational requirements of the former Acts have been updated and moved into the new Act in order to maintain a large degree of consistency and minimum change except where it was needed.

Of relevance to this project, the Natural Resource Management legislation incorporates animal and plant control, which will enable and facilitate integrated and sustainable natural resource management, whilst engaging the community in the development and implementation of animal and plant control programs.

6.3 Flora

6.3.1 Existing conditions

6.3.1.1 Survey methodology

A vegetation survey was undertaken within the project area (Hundred of McDonald, Allotment 9 part section 14) from December 2004 to January 2005. A copy of the survey report is contained in Appendix G.

As previously outlined, the two dominant vegetation communities within the surveyed area are coastal white mallee and low coastal shrubland. Eight vegetation survey quadrats (30 metres by 30 metres) were established across these two vegetation communities immediately around the proposed Southern Ocean Lodge development. Each quadrat was positioned in an area that was considered to be homogeneous and representative of the vegetation community in question. The vegetation survey quadrats were formalised using Heard and Channon's (1997, in DellaTorre and Pedler 2005) *Guide to a Native Vegetation Survey (Agriculture Region): Using the Biological Survey of South Australia Methodology*.

Within each quadrat the following activities were carried out:

- Every plant species was recorded and vouchered for later verification by the South Australian State Herbarium.
- Measures were taken on species density; including percentage cover transects across the coastal shrubland vegetation sites.
- The density transects were used to gain a clear understanding of the species dominance in the community.
- A general description of the landscape was recorded for each site.
- A permanent peg was then located at each vegetation survey quadrat and the position of these pegs logged by GPS for later re-location.

Individual species recorded at the site were referenced against the Commonwealth Department of the Environment and Heritage schedules of the Environment *Protection and Biodiversity Conservation Act 1999* and South Australia's *National Parks and Wildlife Act 1972* to assess for conservation status.

6.3.1.2 Native vegetation description

A total of 68 species were collected and vouchered from the eight survey quadrats. Sixty four of these species were native and 4 were classed as weed species. Of the 68 species, the dominant overstorey species were *Eucalyptus diversifolia, Eucalyptus rugosa* and *Melaleuca lanceolata*. These three species were present in seven of the eight quadrats, excepting the coastal dune quadrat. The dominant understorey species were *Melaleuca gibbosa, Dodonea humilis, Pultanaea acerosa* and *Myoporum insulare*. A list of species recorded during the survey is contained in Appendix H and a broad Vegetation Plan is contained in Appendix D. A list of the rare or endangered species found during the survey is outlined in Table 6.1 below:

Table 6.1 Rare or endangered species recorded at the eight vegetation quadrats

Scientific name	Common name	Conservation status		
		Australia	South Australia	Kangaroo Island
Acacia retinoides var. uncifolia	Coast Silver Wattle	-	-	R
Bromus arenarius	Sand Brome	-	-	E
Dichelachne micrantha	Short-hair Plume-grass	-	-	K
Gahnia hystrix	Spiky Saw-sedge	-	R	R
Hardenbergia violacea	Native lilac	-	-	R

Conservation status (Lang & Kraehenbuehl, 1999, in DellaTorre and Pedler 2005):
- Australia – Australian status
- South Australia – South Australian status
- Kangaroo Island – regional status for Kangaroo Island

SA and regional codes
E **Endangered:** Rare and in danger of becoming extinct in the wild.
R **Rare:** Has a low overall frequency of occurrence (may be locally common with a very restricted distribution, or may be scattered sparsely over a wider area). Not currently exposed to significant threats, but warrants monitoring and protective measures to prevent reduction of population sizes.
K **Uncertain:** Likely to be either threatened or rare, but insufficient data for a more precise assessment.
***** **Naturalised alien species**

Species of conservation significance found within the quadrats were referenced to national and state conservation ratings. These species are discussed in more detail in the following sections.

Vegetation species of regional conservation significance to Kangaroo Island have also been included. These include:

(i) Sand Brome (*Bromus arenarius*)

Sand Brome has a Regional (Kangaroo Island) conservation rating of 'Endangered'. This is the only native species of *Bromus* in Australia, distributed on all mainland states except the Northern Territory. It is an erect annual grass, 30–45 cm high flowering between July and October (Jessup and Toelken, 1986, in DellaTorre and Pedler 2005). *Bromus arenarius* was recorded at two of the eight vegetation quadrats. The two vegetation quadrats where *Bromus arenarius* was present are located immediately to the south of the proposed development. The survey indicated this species was frequently found between the proposed development and Cape Bouger, associated with low coastal shrublands over sandy soils.

(ii) Spiky Saw-sedge (*Gahnia hystrix*)

Spiky Saw-sedge has a State conservation rating of 'Rare' and a Regional (Kangaroo Island) conservation rating of 'Rare'. It is a perennial plant measuring 4–15 cm in height, known to flower from November to January and April, located generally along watercourses (Jessup and Toelken, 1986, in DellaTorre and Pedler 2005). This small dwarf-like *Gahnia* species is endemic to Kangaroo Island. It was recorded at one of the eight vegetation quadrats. The species is known to have a very restricted distribution in Australia. It is, however, known to be adequately represented in National Parks or Conservation Reserves on Kangaroo Island with a total of at least 1000 plants present (Robinson & Armstrong 1999, in DellaTorre and Pedler 2005).

(iii) Native Lilac (*Hardenbergia violacea*)

Native Lilac has a Regional (Kangaroo Island) conservation rating of 'Rare'. This is a perennial twining, to somewhat erect plant, often trailing around the base of living trees and shrubs. *Hardenbergia violacea* is distributed across southeastern Australia, from NSW to Tasmania. Within South Australia, other than on Kangaroo Island, this species has been recorded in the Southern Lofty and South East Botanical Region (Jessup and Toelken, 1986, in DellaTorre and Pedler 2005). The species was surveyed at four of the eight vegetation quadrats in association with the mallee vegetation community.

(iv) Coastal Silver Wattle (*Acacia retinoides var. uncifolia*)

Coastal Silver Wattle has a Regional (Kangaroo Island) conservation rating of 'Rare'. This is a tall perennial shrub to small tree up to 8 metres in height. It is closely related to *Acacia retinoides* with *Acacia retinoides var. uncifolia* distinguishable by its smaller phyllodes only between 3–6 cm long and 4–6 mm in width, comparative to *Acacia retinoides* 3–20 cm long and 3–15 mm in width (Jessup and Toelken, 1986, in DellaTorre and Pedler 2005). This species was only recorded at two of the eight vegetation quadrats.

(v) Short-hair Plume-grass (*Dichelachne micrantha)*

Short-hair Plume grass was recorded in the project area and has a Regional (Kangaroo Island) conservation rating of 'Unknown', indicating that it is likely to be threatened but there is insufficient data available for a more precise assessment. It is a tufted, perennial grass-like species that may grow up to 1.2 metres in height.

6.3.2 Potential impacts

6.3.2.1 Native vegetation clearance

The proposed development site is located within part of the site already marked by natural wind erosion as a result of the sandy soil type and prevailing south-westerly winds (refer to Appendix D). There will be a lesser impact on vegetation clearance by using this site and particularly when compared with other potential site locations within the overall subject land (Hundred of McDonald, Allotment 9, Pt Section 14).

The proposal involves the clearance of approximately one hectare of native vegetation for the location of the guest suites, main Lodge and staff village (with further minor pruning for fire control of approximately 1.8 hectares). The existing access track will be utilised and therefore only minor pruning of vegetation along this track will be required. Revegetation of the site is proposed as outlined in Section 6.3.3.2.

As the proposed development has been deemed a Major Development the proposal will not require consent for native vegetation clearance from the Native Vegetation Council. However, the proposal will be referred to the Council, and their comments and recommendations will be taken into account in the decision making process for the proposal.

Significant Environmental Benefit (SEB), as outlined under the *Native Vegetation Act 1991*, is anticipated to be provided for this project, in relation to any cleared vegetation. This is further discussed in Section 6.3.2.6.

Regulations under the *Native Vegetation Act 1991* include a number of exemptions. These set out circumstances in which native vegetation may be cleared provided all criteria under that particular exemption are met. Of relevance to this project, is *Exemption 5(1)(t) – Clearance for a Vehicle Track*. The existing access track to the site is approximately 4 to 5 metres wide and will be cleared to 5 metres (with occasional passing bays depending on vegetation location) as part of the track upgrade under this exemption.

The following exemption is also of relevance to this project; *Exemption 5(1)(v) – Fuel Breaks, Fire Control* (this exemption allows for the establishment of a 5 metre fuel break around the boundary of the property). The proponent is legally permitted to apply this exemption and clear a 5 metre fuel break around the property (total boundary clearance would equate to approximately 1.5 hectares). However, as the proponent wishes to limit native vegetation clearance on the site, extensive discussions with the Country Fire Service have been undertaken to negotiate alternative fire management measures. The CFS has confirmed that boundary clearances will not be required as adequate fire control measures such as ground and roof mounted sprinklers have been incorporated into the footprint of the actual development (within the 1 hectare of vegetation removal).

It is also of interest to note that clearance for an approved ‘dwelling’ and associated firebreaks at the site is currently permitted under Exemption 5(1)(a) of the *Native Vegetation Act 1991* regulations.

In other words, the clearance required for the Lodge could actually be less than what the proponent could potentially do now under an approved exemption.

6.3.2.2 Threatened species

(i) Impacts on species of conservation significance located in the project area

The vegetation survey found four species of conservation significance as described in the previous section. Research indicates that each of these species is adequately represented in

adjacent vegetation or in National Parks and Conservation Reserves on Kangaroo Island. As such it is anticipated that there will be no major impact to these species through development of the site.

(ii) Impacts on species of conservation significance potentially located in the project area

The PER Guidelines require an assessment of the potential impacts of the project upon the following Threatened Species. These three species are rated as having conservation significance under the national *Environmental Biodiversity and Conservation Act 1999* and the State *National Parks and Wildlife Act 1972*.

a) Twining Hand-flower *(Cheiranthera volubilis)*

The Twining Hand-flower, endemic to Kangaroo Island, is listed as 'Vulnerable' in both national and state legislation. This perennial twiner, flowers from September to March. It has been estimated that 20 to 30 populations of this species are known to occur across the Island. The Twining Hand-flower occurs within Kangaroo Island Mallee Ash (*Eucalyptus remota*) and Brown Stringybark (*Eucalyptus baxteri*) habitats with a sparse understorey (Davies 1992). The vegetation survey did not locate any samples of this species on the subject land. Department for Environment and Heritage records indicate no known populations of this species occurring within the surrounding area. It is unlikely the Twining Hand Flower would occur in the area as the development site does not contain suitable habitat to support this species. It is therefore considered that the proposed development is unlikely to have an impact on the Twining Hand Flower.

b) Kangaroo Island Spider Orchid *(Caladenia ovata)*

The Kangaroo Island Spider Orchid is listed as 'Vulnerable' in both national and state legislation. It has only been recorded at the tip of the Fleurieu Peninsula and on the southern and eastern end of Kangaroo Island (Davies 1992). The vegetation survey for this project did not locate any samples of this species. Department for Environment and Heritage records indicate no known population of this species occurring within the surrounding area. It is unlikely the Kangaroo Island Spider Orchid would occur in the area as the habitat around the development is unlikely to support this species and it has never been recorded at the western end of the Island. It is considered that the proposed development is unlikely to have an impact on the Kangaroo Island Spider Orchid.

c) Ironstone Mulla Mulla *(Ptilotus beckerianus)*

The Ironstone Mulla Mulla is endemic to South Australia and listed as 'Vulnerable' in both national and state legislation. This perennial shrub flowers from September to January whilst generally dying back during the winter months. It has being recorded across southern Eyre Peninsula and on Kangaroo Island mainly associated with Coastal White Mallee (*Eucalyptus diversifolia*) open shrubland (Davies 1992). The detailed vegetation survey on the subject land did not locate any samples of this species and were undertaken during the time when it is most visible. Department for Environment and Heritage records indicate no known population of this species occurring within the surrounding area. There is the potential for this species to occur across the proposed development site; however it is unlikely as recent field surveys did not locate the species. It is considered that the proposed development is unlikely to have an impact on the Ironstone Mulla Mulla.

6.3.2.3 South coast regional ecological area

As outlined earlier, the 102 hectares of remnant vegetation owned by Baillie Lodges contributes to the South Coast Regional Ecological Area, the largest continuous area of remnant vegetation occurring on Kangaroo Island.

The South Coast Regional Ecological Area, outlined in the Kangaroo Island Biodiversity Plan, covers 77,213 hectares across the western and southern coast of Kangaroo Island. The majority of the vegetation is classed as native vegetation (86%) and 55,687 hectares (72%) of this vegetation is formally protected (Willoughby 2001).

The total area of the proposed development is relatively minor (1 hectare), and whilst vegetation clearance in this area will somewhat reduce available habitat for species, it is considered to be minimal due to the large areas of similar vegetation and habitat conserved within the vicinity of the project area. It is therefore considered that the project will not have any impact upon the integrity of the South Coast Regional Ecological Area.

6.3.2.4 Native vegetation recovery

Coastal white mallee and low coastal shrubland communities are fragile environments, which can be easily affected by disturbance. It is predominantly because of this that the naturally eroded areas in the project area were selected for the site of the development. Despite this, a direct impact of the project will be the clearance of approximately 1 hectare of land for construction (undertaken in stages as required).

In many circumstances, native vegetation can recover naturally from disturbance as long as the disturbance is not ongoing and any other associated impacts have been managed appropriately. The ability of the sensitive coastal vegetation communities (known to occur at the project site) to recover without intervention is not guaranteed.

It is likely that some regeneration of native species will occur within the disturbed areas adjacent to the development site. However, it is unlikely that the level of regeneration in the short-term will be sufficient to prevent erosion issues arising at the site. The proposed revegetation/landscape programme will therefore complement the natural regeneration of native species.

The revegetation will utilise local native species and focus on replicating the natural environment within the area (with similar plant densities and assemblages). A diversity of species will be utilised with the majority of species being low-growing due to fire management requirements. It is believed that potential impacts from erosion, edge effects and weed invasion will be significantly reduced through the implementation of the revegetation programme.

6.3.2.5 Habitat fragmentation and edge effects

The proposed development will require some native vegetation clearance for the buildings and associated facilities (approximately 1 hectare). Any removal of habitat in these areas may result in a small reduction in available habitat for fauna. However, this is considered to be minimal due to the large areas of similar vegetation and habitat conserved within the vicinity of the project area. It is expected that once the revegetated areas are established, fauna may move back into the area.

Habitat fragmentation is not believed to be a major issue for this project. This is mainly due to the occurrence of large areas of similar vegetation and habitat in the area and the fact that

this development does not comprise a major 'linear' project, i.e. it will not fragment some sections of vegetation / habitat from other sections, as can sometimes occur with projects such as roads, pipelines and transmission lines. Furthermore, no new access roads or tracks are planned for the project.

Edge effects must always be considered when clearing land in sensitive areas. They have the potential to impact on biodiversity by altering important environmental conditions. Edge effects occur when vegetation / habitat exist next to a conflicting land use (such as cleared areas) and they can be categorised into three types (Greening Australia Website 2006):

- Abiotic Effects, which are changes in light, temperature, wind and other factors that occur when a new 'edge' is formed.

- Direct Biological Effects, which include changes in the number and abundance of species brought about by changed environmental conditions. For example, the spread of species that adapt well to the new 'edge' conditions (unfortunately these often comprise introduced species).

- Indirect Biological Effects, which predominantly comprise changes in the way that species interact.

Edge effects are not anticipated to be a major impact of the project, however new 'edges' will need to be managed in order to mitigate against the potential cumulative impacts that can occur in vegetated areas, once 'edges' are created.

Mitigation measures to manage edge effects include; edge repair, edge management and edge protection. All of these relate to how the area is landscaped or revegetated and will predominantly incorporate:

- incorporating plantings to fill 'breaks' in the remnant edge in order to reduce the edge-to-area ratio
- the development of plantings that utilise species suited to sealing edges
- removal of any of the exotic species occurring along edges and replacement with natives
- development of buffer plantings to protect core native vegetation – this can be done with local native species.

All proposed revegetation to manage the impact of edge effects will be sourced from local native species. Further details are provided in Section 6.3.3.2.

6.3.2.6 Wilderness values

The Commonwealth Department of Environment and Heritage's National Wilderness Inventory outlines four wilderness quality 'indicators' that represent the two accepted and essential attributes of wilderness; remoteness and naturalness. These indicators are; remoteness from settlement, remoteness from access, apparent naturalness, and biophysical naturalness. These indicators are used to demonstrate the wilderness values of any particular area. Although the project area would not rate highly in terms of remoteness, it is significant in terms of naturalness.

As the total area of the proposed development is relatively minor (1 hectare), it is considered that there will be no impacts on the wilderness values of the area due to the large areas of similar vegetation and habitat conserved within the vicinity (which also display significant wilderness values). In addition to this, visitation numbers are relatively low (only 25 guest

suites will be developed) and there will be strict management and mitigation measures implemented to ensure that impacts on the natural environment are reduced.

6.3.2.7 Vegetation compensation

Significant Environmental Benefit (SEB) is not defined under the relevant legislation (the *Native Vegetation Act 1991*). The rationale for SEB is, however, based upon the premise that the clearance of native vegetation will result in the further loss of biodiversity and habitat. In order to compensate for that loss, an individual who wishes to clear native vegetation must establish a process to protect and manage the biodiversity in that region over and above that lost. The intent of SEB is, therefore, to not only replace the immediate environmental values lost through clearing, but also to achieve a net gain that contributes to improving the condition of the environment and biodiversity of the region. SEB may be achieved at the site of the operations, or within the same region of the State (DWLBC website 2006).

As discussed earlier, the Southern Ocean Lodge property contributes to the largest remaining continuous area of remnant native vegetation on Kangaroo Island. This privately owned land would form a valuable addition to the formal reserve system across the island. Under the *Native Vegetation Act 1991*, placing a Heritage Agreement on this privately owned land would legislatively protect it against any future vegetation clearance and would also contribute to achieving Significant Environmental Benefit. The Proponent is willing to offer the remainder of their land not being utilised for the development (98%) as a Heritage Agreement to the SA Government.

The Heritage Agreement Scheme is a programme to encourage and assist landholders to conserve native vegetation on their properties. A Heritage Agreement is a contract between a landholder and the State Government for the protection in perpetuity of a particular area of native vegetation. Any activities that would damage the native vegetation or wildlife habitat values of the area are seen as contrary to the terms of the Agreement. Although the Agreement is registered on the title, the land remains the property of the person who holds title to it. The Heritage Agreement scheme is administered by the Department for Environment and Heritage on behalf of the Native Vegetation Council and Department of Water, Land and Biodiversity Conservation (DEH Website 2006).

The Proponent is also planning to implement a Feral Cat Eradication strategy for the site, in consultation with the Kangaroo Island Council/NRM Board (as outlined in the Environmental Management Plan, refer Section D). This will also contribute to achieving SEB. In addition to this, encumbrances have been registered on adjoining titles to limit any further possible development.

Finally, the proponent is investigating the establishment of the SOL Environment Fund, which would contribute on a dollar for dollar basis to local environment projects. This would be funded by visitor tariffs. Based on $10 per room night and 60% occupancy, the initiative could generate about $50,000 pa towards local environmental initiatives.

6.3.2.8 Impacts during construction

The potential impacts on vegetation from construction as discussed above are:

- clearance of vegetation to enable access to the site and construction of the Lodge and associated facilities
- minor pruning for access
- increased edge effects
- risk of Phytophthora spread to the site.

Section 6.3.3 below, outlines how these potential impacts will be managed to ensure any impact is minimal.

6.3.3 Recommendations

A range of management and mitigation measures will be implemented during the construction phase of the project to ensure that any impacts are minimised. The Environmental Management Plan (EMP) for the project outlines these measures in detail (refer Part D) and Sections 6.3.3.3 and 6.3.3.4 below provides examples of the kinds of measures that will be implemented.

6.3.3.1 Access

Vegetation to be retained on the site will be protected by a number of measures as outlined in the EMP. This will include: flagging-off the construction zone and not permitting construction personnel beyond the flagged areas into the native vegetation; educating construction workers about the native vegetation and appropriate on-site behaviour; preventing access to known nesting and habitat areas; implementing weed and pest management measures, and; monitoring of site works for the exacerbation of the occurrence of existing weeds and the potential introduction of new weed species.

Access to the beach will also be restricted and is discussed in more detail in Section 4.10 and the EMP.

6.3.3.2 Revegetation/landscaping

A vegetation plan is proposed for the site (see Appendix D). Prior to any clearance of native vegetation, seed stock will be collected by an appropriately qualified person for future propagation in the areas affected by the development. This will also be undertaken for areas that demonstrate existing scalding, as rehabilitation of the scalded areas will increase the local soil surface stability, as well as for habitat 'edges' that may be prone to the impact of edge effects (refer to Section 6.3.2.5).

The following two lists include proposed revegetation species for the areas within the staff village and the landscaped area around the Lodge. The staff village will be irrigated with treated wastewater as discussed in Section 10. All of these species occur naturally around the site and all were noted during the 2005 vegetation survey. The first three species in the first list are small clumping perennial species that prefer damp areas. The Native Lilac is a creeping shrub that may also be used as a ground cover.

Staff village irrigated area	
Scientific name	**Common name**
Dianella brevicaulis	Flax Lily
Isolepis nudosa	Knobby Club Rush
Orthrosanthus multiflorus	Morning Flag
Hardenbergia violacea	Native Lilac

Revegetation around Lodge	
Scientific name	**Common name**
Correa backhouseana var orbicularis	Common Correa
Dodonea humilis	Dwarf Hop-bush
Goodenia varia	Sticky Goodenia
Hakea rugosa	Dwarf Hakea
Melaleuca gibbosa	Slender Honey-myrtle
Pomaderris ovaria	Coast Pomaderris

All of these plants can be easily propagated from seed. They naturally grow between 30 and 50 cm in height which would meet current Country Fire Service requirements (refer Section 17).

6.3.3.3 Construction

The following management and mitigation measures have been incorporated into the project's Environmental Management Plan (refer Part D) and will be adhered to at all times during the construction phase of the project:

- Construction personnel will be provided with training on appropriate practices for working within this environment. An appropriately qualified person will be involved in the supervision of the construction activities to ensure the minimum impact on the environment is achieved.
- On-ground works will be inspected daily by an appropriate person, to minimise the risk to the environment.
- Excessive movement of soil onto and around the site will be avoided, in order to minimise the spread of weeds and Phytophthora.
- Stockpiles of materials and any associated infrastructure will be located in cleared areas in order to minimise impacts to vegetation.
- Construction machinery and vehicles will not be parked or stored underneath the drip-line of trees or within areas containing native vegetation.
- Removed vegetation will be mulched and utilised on site to comply with general Phytophthora and weed management 'best practice' requirements and a landscaping / revegetation programme, as discussed in Section 6.3.3.2, will be implemented.

6.3.3.4 Operational phase

The following management and mitigation measures have been incorporated into the project's Environmental Management Plan and will be adhered to at all times during the operation phase of the project.

- Education of staff and guests on the local environment through brochures, general training, information packs and workshops. This will be used as a tool in managing people within this environment.
- Continuous implementation of the weed management strategy.

- On-going monitoring of the development to assess any impacts on the environment – this will contribute to general knowledge and will help further development management and mitigation requirements.

- Implementation of a vegetation plan, which utilises local indigenous plant species grown from seed that have been locally collected (i.e. within a 5 kilometre radius of the site).

- Potentially placing part or all of the area surrounding the proposed development under a Heritage Agreement.

6.4 Fauna

6.4.1 Existing conditions

6.4.1.1 Fauna survey methodology

Two fauna surveys were completed for this project. The first survey focussed on avifauna (birds) and was undertaken in December 2004 / January 2005. The second fauna survey covered mammals, reptiles and avifauna again and was undertaken in January 2006. A copy of both survey results is contained in Appendix G and I.

Both surveys were undertaken using standard and well-accepted survey methods as outlined in the reports. More information on the methodologies used is described in each of the reports in Appendix G and I.

(i) Survey 1

For the first avifauna survey, bird species' presence and density was determined using transect counts for three habitats where clearance for building construction and access is proposed. Approximately an hour was taken to traverse each 1 kilometre transect in the three habitats. All birds seen or heard within 25 metre of the transect in each habitat were identified and counted. Species observed or heard outside the 50 metres total transect width or in an adjacent habitat type were noted but not included in calculations. Densities calculated are simply averages of the two counts per area searched.

Locations of species' distribution for mapping were obtained using a hand held GPS. When in dense habitat, an estimate was made of distance and direction from the nearest accessible point. Additional searches were made in the beach and coastal cliff habitats and in the tall mallee/jumbled dune system along the access track.

(ii) Survey 2

The second fauna survey (mammals, birds and reptiles) was undertaken over a six day period between the 16 January 2006 and 21 January 2006. All vertebrate species, which were caught, observed or heard, were recorded. The species, the location (again, using a handheld GPS) and the number of individuals observed were recorded for each sighting.

Two people spent approximately 36 hours actively searching for fauna species and signs of fauna species. This search effort was spread over the different habitat types which were located within the project area. Bird species presence and density was determined using the same methodology employed for the first avifauna survey, as described above.

(iii) Conservation ratings

As outlined earlier, the conservation status of fauna species is specified at the geographic scales of National, State and Regional. Species of national conservation significance are listed under the EPBC Act 1999 as either Endangered (rare and in danger of becoming extinct in the wild) or Vulnerable (rare and at risk from potential threats or long term threats that could cause the species to become endangered in the future). Species which are listed under the EPBC Act 1999, as 'migratory' (either protected directly by this legislation, and / or under international agreements) are also detailed.

State conservation status is based on Schedules of the NPWS Act 1972. Species are listed under the categories of 'Endangered', 'Vulnerable' or 'Rare'.

There are no formal designations of regional conservation significance. Assessment of regional significance relies on information provided in reports such as regional Biodiversity Plans, and discussion with experts familiar with the region. Species are listed under the regional categories of Endangered, Vulnerable, Rare and Uncommon in this report. The 'Uncommon' category indicates that the species of interest is less common in the region, but is not rare enough to warrant special protective measures.

6.4.1.2 Mammals

A total of eight mammal species were positively identified during the fauna survey. Of the eight mammal species, only two were introduced; the Feral Cat and House Mouse, whilst the remaining six are native. The most commonly captured mammal was the Bush Rat which was caught a total of 53 times during the survey period. No mammal species of national or state conservation significance were captured during the survey. Refer Appendix H for a list of mammal species observed during the survey.

6.4.1.3 Birds

A total of 47 birds were either observed or heard along the three transects (in low coastal shrubland, mixed coastal shrubland, and dense low mallee) in the first survey (2004/2005). All bird species and densities identified during this survey are listed in Appendix H.

A total of 41 birds were either observed or heard along the three transects (in low coastal shrubland, mixed coastal shrubland, and dense low mallee) in the second survey (2006) (6 less then the first survey– refer to Appendix H). A number of birds recorded during both the 2005 and 2006 surveys are listed as having conservation significance as under the EPBC Act 1999 or state-rated under the NPWS Act 1972. These are discussed in more detail in the 'Potential Impacts – Threatened Species' section.

In 2005 the most abundant species in the coastal shrubland were mobile groups of Silvereyes (*Zosterops lateralis*), which were feeding on coast beard-heath (*Leucopogon parviflorus*) berries. The occurrence of two Pardalote species, Tree Martins (*Petrochelidon nigricans*) and Welcome Swallows (*Hirundo neoxena*) were, at least partly, due to the proximity of nest sites in the coastal cliff faces, where many individuals were seen entering holes with food for nestlings. Smaller numbers of these and other species seen in 2006 possibly reflect variations in seasonal conditions between years and weather conditions prevailing during surveys. A list of the average densities of birds along each of the three transects is contained in Appendix H.

6.4.1.4 Reptiles

A total of nine reptile species were identified during the fauna survey. All of the species were native species and they comprised of 1 species of goanna, 1 snake species, 4 lizard species, 1 species of legless lizard and 2 gecko species (refer Appendix H). One reptile species of state conservation significance was observed within the survey area. *Varanus rosenbergi* has a state conservation rating of 'Rare' with 7 individuals being observed across the survey area.

6.4.2 Potential impacts

The proposed development is unlikely to have a significant long-term impact on any one fauna species however it is possible that there will be short-term, localised impacts on individuals of a range of fauna species. The following section outlines the potential impacts.

6.4.2.1 Habitat loss

Approximately one hectare of vegetation will need to be removed for the development of the proposed project. As outlined previously, the development will be sited in an area comprising natural scalding resulting from erosion, which is exacerbated by the sandy substrate and prevailing south-westerly winds. Landscaping will also be undertaken in the project area using native species sourced from local stock.

Despite this, there will undoubtedly be a loss of habitat for local species, as a direct result of vegetation removal. However, due to the large area of habitat surrounding the project site, it is unlikely that the impact on any one species will be significant.

Eucalyptus diversifolia (Coastal White Mallee) is the dominant vegetation community across the whole property. This vegetation community covers 77,000 hectares across Kangaroo Island, with 51,300 of these hectares formally protected. In addition to this, the total amount of vegetation removal required for the actual development comprises only approximately 1% of the total vegetated area owned by the proponent.

The project area is also part of a very large tract of native vegetation which is located between Flinders Chase National Park and Kelly Hill Conservation Park. Hence, there is a significant amount of protected native vegetation within the region offering similar vegetation types to those found within the project area.

Therefore, as a result of the relatively minimal amount of vegetation removal required, the balance of remaining vegetation in the project area and surrounding area, the degree to which the habitat types are represented and protected across the region, and due to the range of management and mitigation measures that will be implemented to ensure impacts are minimised, it is believed that there will be no long-term habitat loss.

6.4.2.2 Threatened species

(i) Mammals

No mammal species of national or state conservation significance were observed during the fauna survey. However, there is a slight possibility that two species of conservation significance may occur within the project area. These are the Kangaroo Island Dunnart (*Sminthopsis aitkeni*) and the Southern Brown Bandicoot (*Isoodon obesulus obesulus*) both of which are listed as nationally endangered under the EPBC Act 1999. Under the South

Australian *National Parks and Wildlife Act 1972*, the Kangaroo Island Dunnart is also listed as endangered while the Southern Brown Bandicoot is listed as vulnerable.

a) Kangaroo Island Dunnart *(Sminthopsis aitkeni)*

The Kangaroo Island Dunnart is a small marsupial insectivore weighing around 20–25 g, which is endemic to Kangaroo Island. Little is known of the ecology of this marsupial, as trapping efforts have largely been unsuccessful (Gates 2001; Robinson & Armstrong 1999; Herbert 1996, in EBS 2006). The most comprehensive survey for the Kangaroo Island Dunnart was conducted by Gates (2001, in EBS 2006). Over a two year period 43 survey sites where established with over 13,700 pitfall trap nights and 8,900 Elliot trap nights carried out. From this intensive trapping effort only 22 Kangaroo Island Dunnarts were captured.

Gates (2001, in EBS 2006) suggested the largest area of potential habitat for the Kangaroo Island Dunnart occurs within the Flinders Chase National Park and the land to the north of the park which consists of Kangaroo Island Mallee-ash (*Eucalyptus remota*) and Brown Stringybark (*Eucalyptus baxteri*) associations. These two vegetation associations were not recorded at the proposed site as described in the botanical survey conducted by DellaTorre and Pedler (2005). However there are two historic records from 1979 of the Kangaroo Island Dunnart occurring with in the same vegetation association of Coastal White Mallee (*Eucalyptus diversifolia*) approximately 10 kilometres north of Seal Bay.

Not capturing any Kangaroo Island Dunnarts during the survey does not necessarily mean that they are not present within the site. Gates (2001, in EBS 2006) showed that a significant amount of trapping effort is required to detect a small number of individuals. Whilst Gates (2001, in EBS 2006) did not capture any Kangaroo Island Dunnarts within coastal vegetation, little trapping effort was put into these habitat types (Gates, pers. comm. in EBS 2006).

The project area is part of a very large tract of native vegetation which is located between Flinders Chase National Park and Kelly Hill Caves Conservation Park. Therefore, there is a significant amount of protected native vegetation within the region offering similar vegetation types to those found within the project area.

The removal of the vegetation for the proposed development is not considered likely to have a significant long-term impact on the species given that it is only a slight possibility that the species occurs within the project area. The area of disturbance is considered to be relatively small when the large tracts of native vegetation surrounding the site are considered and therefore, the proposed development is unlikely to have a significant impact on the area of occupancy of the species.

b) Southern Brown Bandicoot *(Isoodon obesulus obesulus)*

The Southern Brown Bandicoot (*Isoodon obesulus obesulus*) is a small robust marsupial, which was once widespread across much of mainland Australia. Within South Australia it is now restricted to the Mount Lofty Ranges, Kangaroo Island and in the southeast of South Australia (Paull, 1995, in EBS 2006). The species has been recorded in a variety of vegetation associations including woodland, coastal and mallee communities, however Paull (1995, in EBS 2006) describes the most common community that the species inhabits on Kangaroo Island to be Brown Stringybark or Sugar Gum (*Eucalyptus cladocalyx*) woodlands. Records however show the species

has been recorded within open coastal white mallee communities across the southern area of Kangaroo Island (Robinson and Armstrong 1999, in EBS 2006).

Southern Brown Bandicoots can be difficult to trap, even in sites where they are abundant. However, this species leaves distinctive conical-shaped holes in the ground as it digs looking for food including earthworms, insects and fungi. Extensive active searching was undertaken across the project area looking for evidence of the Southern Brown Bandicoot. No traces of the species were recorded at or around the site. It is considered unlikely that the Southern Brown Bandicoot inhabits the project area due to no captures of this species and no evidence of their presence being observed. It is therefore further considered that the proposed development is not likely to have a significant long-term impact on the Southern Brown Bandicoot.

(ii) Birds

Avifauna species found in this area which have national or South Australian conservation ratings are discussed below.

a) Osprey *(Pandion haliaetus)*

The Osprey is listed as a migratory species under the *EPBC Act 1999* and rated as 'Rare' under the South Australian *NPW Act 1972*. It is generally common and secure in Australia, particularly in the north, whilst being uncommon and local in southern Australia (Debus 2001, in EBS 2006). The Ospreys on Kangaroo Island occur across all coastal areas, where it nests in spring and summer on rocky faces, rock stacks, Islets, headlands or man made structures (Baxter 1995, in EBS 2006). The South Australian Osprey population is reported to be 43 pairs with an average of 9.5 pairs nesting on Kangaroo Island coasts (6-12 pairs) over the last 21 years (T. Dennis pers comm. February 2006, in EBS 2006).

Little research on the impact of human disturbance on Osprey breeding success has been published within Australia, however Ospreys have been known to nest successfully within close proximity to human activity as demonstrated in Broome, Western Australia where an artificial platform is occupied along the 'Town Beach' (WPMS 1997, in EBS 2006). There are also examples of artificial nesting sites installed in the centre of the towns of Grafton and Ballina in New South Wales, which have being successfully utilised by Ospreys. There have also been reports of them occasionally nesting on buildings (Spencer-Smith T. 2004, in EBS 2006).

A number of overseas studies have been undertaken, which look at various human disturbance activities and associated impacts on Ospreys. These studies had varying results. It appears that the impact of different disturbance activities is dependent on the nature of the disturbance, the timing of the disturbance and the pre-existing level of disturbance within an area, with several studies concluding that human activities have impacted on the breeding success of Ospreys (Swenson 1979; D'Eon and Watt 1994; Richardson and Miller 1997, in EBS 2006). In these instances human activities included extensive logging programs within close proximity to nest sites.

Van Daele and Van Daele (1982, in EBS 2006) indicate that Osprey pairs vary in their ability to tolerate human disturbance. Several studies suggest that tolerance to human activities depends on the timing and frequency of activities and on the degree of habituation that the individual pairs develop to them (Vana-Miller 1987, in EBS 2006). Human activities, which are initiated during incubation and early nesting are probably most disturbing to Ospreys. This is because when birds leave the nest too frequently or

for extended periods of time, the embryos may die. Conversely however, Ospreys, which are initiating nesting in or near areas frequented by humans, may be more tolerant of subsequent human activities than those unaccustomed to humans (Swenson 1979; Van Daele and Van Daele 1982, in EBS 2006).

D'Eon and Watt (1994, in EBS 2006) have recommended a range of zones where different levels of human activity (in their case, logging) can occur and not impact on the breeding success of Ospreys. A 200 metre buffer zone around the nest was recommended where no human activity could occur within the breeding season. An additional 600 metre buffer zone was recommended where only limited human activity could occur within the breeding season (D'Eon and Watt 1994, in EBS 2006). It is important to note, however, that these buffer zones are related to logging, which is considered to be a very noisy and impacting operation with large machinery being used continuously.

Rodgers and Schwikert (2002, in EBS 2006) undertook a study to determine the flush distance of a range of waterbird species, including Ospreys, to personal watercraft (jet ski) and outboard boats. They found that Osprey were flushed at an average distance of 49.5 metres using personal watercraft. That is, the personal watercraft got to within 49.5 metres before the birds moved away. The outboard boat got to within 57.5 metres, on average, before the Osprey moved away. Rodgers and Schwikert (2002, in EBS 2006) recommend a buffer zone of 150 metres for both personal watercraft and outboard boats from foraging and loafing sites. The authors also suggest that this buffer should be adequate for protecting nesting birds from these disturbances.

Trimper *et al* (1998, in EBS 2006) showed that nesting success in Ospreys was unaffected by jet overflights which generated a median noise level of 89 dBA (ranged 66.3–95.5) at nest sites and single noise events of between 90 and 121 dBA. However, the Ospreys did have a level of habituation to the jet noise prior to the study which would affect their reaction at the time of the study. It was shown that the Osprey detected the aircraft visually before the aircraft were audible (Trimper *et al* 1998, in EBS 2006) indicating that the visual aspects of disturbance are also important. Trimper *et al* (1998, in EBS 2006) also indicated that Ospreys reacted strongly (42 of 51 occasions) to humans entering and leaving their viewing blinds. These blinds ranged from 100 to 200 metres from nest sites. The overt behaviour diminished within 15 minutes (Trimper *et al* 1998).

A pair of Ospreys has been observed along the coastline near the project area with a nest site just over 1 kilometre from the proposed development site. The nest site is located on a stack at the base of the cliffs. It is suspected that this pair of Ospreys originated from a nest site between Cape Du Couedic and Remarkable Rocks, which was abandoned after road construction in its vicinity; the pair probably relocating (T. Dennis, pers. comm. in DellaTorre and Pedler 2005) to this site now in use west of Hanson Bay. Three Ospreys were present at this site in January 2005 indicating successful fledging of a nestling seen in November by T. Dennis. The adults of this pair approached calling in an agitated manner whenever observers approached within 400 metres of the nest.

There is a possibility that the Osprey may be disturbed at certain phases during the construction process due to noise and construction activity. However, the duration of the construction phase will be short and the majority of activities will not be noise-generating, particularly at a distance of 1 kilometre from the development site.

The activity generating the most noise is likely to be the initial site clearance, which will last approximately one week. After this activity, the loudest activity is likely to be the excavator, as well as general construction noise (for example, vehicles, tradesman talking, moving building materials around the site, etc). There will be no blasting and a Screw Pile will be used for foundations, the installation of which does not have major noise impacts. Additionally, there will be no visual impact of the construction process at the nest site due the topography of the site and the location of the nest site, providing construction workers keep within the development site.

It is believed that at more than 1 kilometre (i.e. at the nest site) from the construction site the noise levels generated from the development site will be low with the majority of noise being undetectable at the nest site.

Strict management measures will be implemented in the Environmental Management Plan, which will restrict the access of construction personnel outside of the construction zone.

It is considered that the main impact on the Osprey, in the longer-term, is potentially as a result of disturbance by visitors to the proposed development. Visitors walking past or near the nest site (a current track exists along the top of the cliff adjacent to the nest site) have the potential to interrupt the pair. Abandonment of the nest site could occur if the disturbance occurred frequently during the breeding season, particularly during the incubation period.

Management of guests and staff at the proposed development is considered to be critical to minimising the impact on the Osprey, although it is considered unlikely that guests (average age 55+) will want to walk the 3.8 kilometres return distance over rough terrain along the cliff tops. The majority of guests are likely to stay for short periods with most of their time sight-seeing the tourist destinations within the region. Despite this, access to the west of the proposed Lodge by guests and staff will be controlled and minimised.

To ensure the disturbance to the Osprey is kept to an absolute minimum, a buffer of 250 metres will be delineated on the property – guests and staff will be discouraged from this zone within the breeding season (July – February). It should be noted, however that the proponent does not have control over any activities undertaken on the water (such as boating) or from the adjoining properties (i.e. bushwalkers) and therefore cannot implement a buffer zone in every direction.

The buffer distance of 250 metres is based on the previous studies on the Osprey. It is considered that a 250 metre buffer is a conservative distance considering the type of disturbance which may occur adjacent to the buffer area (such as bush walking which has a very low noise and visual impact). Rodgers and Schwikert (2002, in EBS 2006) suggested a 150 metre buffer for personal watercraft and outboard boats which are significantly noisier and more disruptive than walking. An education program (including brochures, educational signs and staff training) will be implemented to ensure all guests and staff are aware of the buffer and other management requirements.

An overview of strategies, which will be implemented to minimise the potential impacts of the proposed development on the Osprey include:

- Implementation of a 250 metre buffer around the Osprey nest site in the breeding season.

- Actively discouraging/preventing walking in a westerly direction from the proposed development (particularly along the cliff top).
- Installing signage to inform and educate guests and staff (and general bushwalkers walking to and from Hanson Bay)
- Undertake ongoing monitoring to ensure the birds are not being adversely impacted.

It is considered that if the above management strategies are implemented appropriately, the proposed development is unlikely to have a long-term significant impact on the Osprey population on Kangaroo Island.

b) White-bellied Sea-eagle *(Haliaeetus leucogaster)* and Peregrine Falcon *(Falco peregrinus)*

The White-bellied Sea Eagle is listed as a migratory species under the *EPBC Act 1999* and rated as 'Vulnerable' under the State *NPWS Act 1972* while the Peregrine Falcon is rated as 'Rare' under the State *NPWS Act 1972*. There are no known nest sites within the immediate vicinity of the proposed development. Both these species are cliff nesters that are known to inhabit the cliffs of the southern coast of Flinders Chase National Park.

Observations of adult individuals of both species perched and flying in the vicinity of cliff tops indicates these species use the area as feeding territories. On several occasions in January 2006 (during the second survey) single adults of both the White bellied Sea Eagle and Peregrine Falcon were seen soaring with the latter apparently hunting as judged by reactions of other birds (up to about 1 kilometre inland over dense mallee). This behaviour was possibly partly influenced by strong onshore winds.

These two species are vulnerable to human activity resulting in failure of breeding attempts and permanent abandonment of nest sites. However, as no nest sites have been located within close proximity to the project area, the likelihood of potential impacts on the species is considered to be low.

If, in the future, nest sites of either of these species are located within close proximity to the proposed development, staff and guests will be instructed to avoid the areas surrounding the nest site with similar strategies to those recommended for the Osprey being implemented.

c) Hooded Plover *(Thinornis rubricollis)*

The Hooded Plover is listed is 'Vulnerable' under the EPBC Act 1999, and also has a state conservation rating of 'Vulnerable'.

The Hooded Plover is listed as a migratory species under the EPBC Act 1999 and rated as 'Rare' under the South Australian NPWS Act 1972. The Hooded Plover occurs across coastal beaches of southern Australia. On Kangaroo Island it is widespread across sandy beaches (Baxter 1995, in EBS 2006) with recent counts held by the SA Department for Environment and Heritage indicating Hooded Plovers are located on such popular beaches as Vivonne Bay, Pennington Bay, Stokes Bay, Hanson Bay and Emu Bay (The Islander, in EBS 2006).

Dennis (2001, in EBS 2006) estimates that the Hooded Plover population on Kangaroo Island has remained relatively stable, between 160–180 birds recorded since 1985. Other records indicate a slight decrease in numbers (see DellaTorre and Pedler 2005).

However since 2002/2003 surveys for the species, it would seem that there has been a small increase in the number of breeding pairs across the Island (TOMM 2005). A pair of Hooded Plovers was present throughout late December and early January 2005 (during the first bird survey – DellaTorre and Pedler 2005) on the beaches immediately to the east of the proposed development with a prepared nest scrape (empty, but much visited as indicated by extensive plover tracks) found just above high water level on the beach nearest to proposed guest suites. A pair was again present in November 2005 and January 2006 on the beach to the east of the proposed development (and has apparently now moved a further 700–800 metres to the east). The nest scrape from the previous year was no longer present at the beach nearest to the proposed development in January 2006 (second bird survey – EBS 2006).

Hooded Plover numbers are declining across many parts of southern Australia, with a range of human activities having an impact on their numbers. These impacts range from the use of motor vehicles on beaches destroying habitat as well as actual nest scrapes and eggs, to increased direct human impact around nest sites; especially the presence of pet dogs and predation from feral and native species. These impacts can lead to birds abandoning their nest sites especially during the breeding season, which can attract potential predators of eggs and young chicks (by Silver Gulls, Pacific Gulls, Australian Ravens, Heath Goannas, Brush-tailed Possums). Protection of breeding areas from human disturbance in fox-free environments such as Kangaroo Island is an imperative for the conservation of this species.

The main issue associated with the Hooded Plover and the proposed development is the possible impact of guests and staff using the beaches, to the east of the proposed development, on which the pair has been sighted. To minimise the impacts that may occur to the Hooded Plovers a number of management strategies will be implemented. Hooded Plovers' breeding season occurs from September through to March, and during this period repeated human disturbance can lead to the abandonment of nesting sites. Therefore, staff and guests will be instructed to avoid using these areas of the beach during this period. Appropriate signage will be displayed along beaches to inform and educate staff and guests on the presence and significance of Hooded Plovers. These signs can inform staff and guests to walk on hard sand below the high water mark and not disturb nest sites where eggs and chicks may be present. Similar signage is currently being used by the SA Department for Environment and Heritage on other beaches around Kangaroo Island, such as Vivonne Bay, Pennington Bay, Stokes Bay and Emu Bay. It should be noted that the beach to the east of the proposed Lodge does not and will not experience the visitor numbers currently encountered by other beaches on Kangaroo Island where Hooded Plovers occur (such as Vivonne Bay and Hanson Bay). Cars, pets and other high-impact activities will definitely not be permitted on this beach.

On-going monitoring of the Hooded Plovers will also be undertaken on a regular basis during construction and once the development has been completed to determine any impacts. This requirement is included in the Environmental Management Plan.

d) Southern Emu-Wren *(Stipiturus malachurus halmaturinus)*

The Southern Emu-wren is a subspecies confined to Kangaroo Island and is more secure than other subspecies found on mainland South Australia. The species has a state rating of 'Rare' under the *NPWS Act 1972*. Across Kangaroo Island they inhabit primarily coastal shrublands and coastal mallee shrublands. Baxter (1995, in EBS 2006) reports this subspecies to be widespread and a moderately common breeding resident to the Kangaroo Island.

Emu-wrens were located at 15 sites in dense low *Melaleuca* or *Eucalyptus* habitat within 1.8 kilometres of low coastal habitat examined during the first bird survey in 2005 and 10 sites in this habitat during the second survey in 2006 despite strong windy conditions unsuitable for thorough searching. Some of the 2006 observations were at or near sites of previous sightings. The densest populations of this subspecies *Stipiturus malachurus halmaturinus* occur in the narrow belt of undisturbed dense cliff top vegetation (up to approximately 1 metre in height) along the south coast of Kangaroo Island. Large areas of this vegetation type are conserved in Flinders Chase National Park and Kelly Hill Conservation Park.

There is potential for the proposed development to have a localised impact on the Southern Emu-wren. It is likely that the construction process will result in birds within the immediate vicinity of the project site moving out of the area (into the adjacent large tract of native vegetation); however, after construction is complete they should move back into the area. A small loss in the area of available habitat for this species will occur as a result of the proposed development, however, this impact is not considered to be significant due to the presence of extensive areas of similar vegetation adjacent to the project area. Ongoing disturbance from the proposed development is likely to be minimal, but several management strategies will be implemented to ensure this occurs.

Walking tracks within the areas surrounding the proposed development will be limited and access to these areas will be strictly managed. The area is a fragile habitat, especially if informal paths are used where there is a tendency to wander. These paths not only remove or damage areas of vegetation but provide easier access to predators such as feral cats, goannas and avian predators which are considered to impact on Emu-wrens.

The proposed development also has the potential to increase or concentrate the feral cat population within the area. This would adversely affect the Southern Emu-wrens as cats would potentially predate heavily on this species. Therefore, appropriate feral cat management procedures are also being implemented to manage this issue. Refer Section 6.5.

e) Western Whipbird *(Psophodes nigrogularis lashmari)*

The Kangaroo Island population of the Western Whipbird is considered to be a separate subspecies to the mainland species. The Western Whipbird has a state rating of 'Rare' under the NPWS Act 1972. They most commonly occur in coastal and sub-coastal mallee from Cape Borda south to Cape du Couedic and east to Cape Willoughby, Baxter (1995, in EBS 2006) also reports them being reasonably common across the inland of the Island.

This extremely secretive bird was mainly detected by its loud territorial calls along the survey transects. This species prefers habitat in very dense vegetation such as low mallee over limestone (as shown by observations in the second bird survey – January

2006), elsewhere Western Whipbirds also occupied the densest patches of low coastal shrubland and one was seen under low *Melaleuca*.

As outlined for the bird species discussed previously, walking tracks within the areas surrounding the proposed development will be limited and access to these areas will be strictly managed, as they not only remove or damage areas of vegetation but can provide easier access to predators such as feral cats, goannas and avian predators which are considered to impact on Western Whipbirds.

Any removal of vegetation of these areas for the proposed development may result in a reduction in available habitat for the species. However, this is considered to be minimal due to the large areas of similar vegetation and habitat conserved within the vicinity of the project area.

As discussed earlier, the proposed development has the potential to increase or concentrate the feral cat population within the area. This would adversely affect the Western Whipbirds as cats would potentially predate heavily on this species. Therefore, an appropriate feral animal management plan will be implemented to manage this issue.

It is considered that the proposed development is unlikely to have a significant long-term impact on the Western Whipbird.

f) Bassian Thrush *(Zoothera lunulata)*

The Bassian Thrush has a state rating of 'Rare' under the NPWS Act 1972. This unobtrusive ground foraging species was found during the January 2005 survey at three sites in dense mallee over limestone along the access track, and is also likely to occur in the taller mallee-dune habitat. While not observed during the 2006 survey this is likely to reflect its infrequent calling and cryptic behaviour rather than absence.

This species is widespread on Kangaroo Island in a variety of dense and usually moist habitats. The possible impacts from the proposed development on this species include a reduction in area of available habitat and an increased predator presence and access associated with dwellings and fragmentation of dense habitat by roads and tracks.

Any removal of habitat of these areas for the proposed development may result in a reduction in available habitat for the species. However, this is considered to be minimal due to the large areas of similar vegetation and habitat conserved within the vicinity of the project area.

An appropriate feral animal management plan will be implemented to manage any impacts on this species associated with feral cats.

It is considered that the proposed development is unlikely to have a significant long-term impact on the Bassian Thrush.

g) Beautiful Firetail *(Stagonopleura bella)*

The Beautiful Firetail has a state rating of 'Rare' under the NPWS Act 1972. The Kangaroo Island population remains moderately common compared with areas of the mainland (Baxter 1995, in EBS 2006).

At least three individuals were seen during the first survey in 2005 and one during the second survey in 2006. This species is widespread in small numbers across Kangaroo Island in a variety of habitats, usually low and densely vegetated.

It is considered that the proposed development is unlikely to have a significant long-term impact on the Beautiful Firetail.

h) Rock Parrot *(Neophema petrophila)*

The Rock Parrot has a state rating of 'Rare' under the NPWS Act 1972. This small parrot is entirely coastal in its distribution, breeding on islands in the York and Eyre Peninsula regions and dispersing to nearby areas. It is not known to breed on Kangaroo Island where the numbers, distribution and requirements of the population are poorly known. Up to about six individuals were seen briefly several times in low coastal shrubland or moving along the coast during the first bird survey and a single bird was seen during the 2006 survey. Intact littoral zone vegetation and low coastal shrubland may be required for continued presence of this species feeding in this area.

It is considered that the proposed development is unlikely to have a significant long-term impact on the Rock Parrot.

i) Painted Button-quail *(Turnix varia)*

The Painted Button-quail has a state rating of 'Rare' under the NPWS Act 1972. Whilst no individuals of this species were seen, clear evidence of their presence was found in the January 2006 survey in dense mallee/limestone habitat, in the form of feeding scrapes, many small (~15 cm) round bare patches of soil exposed in the leaf litter, as this species feeds using a circular motion while scratching with its feet. This cryptic ground dwelling and nesting species is easily overlooked in dense habitats. Populations, movements and requirements of this species are not well known however fragmentation and reduction of *Eucalyptus* habitats with generally dense intact litter and understorey will not be beneficial and will allow easier access to predators of ground dwelling birds such as feral cats.

Any removal of habitat of these areas for the proposed development may result in a reduction in available habitat for the species. However, this is considered to be minimal due to the large areas of similar vegetation and habitat conserved within the vicinity of the project area.

As the proposed development also has the potential to increase or concentrate the feral cat population within the area, a feral animal management plan that will be implemented to manage this issue.

It is considered that the proposed development is unlikely to have a significant long-term impact on the Painted Button-quail.

j) Glossy Black Cockatoo *(Calyptorhynchus lathami)*

The Glossy Black Cockatoo is rated as 'Endangered' under the EPBC Act 1999 and also has a rating of 'Endangered' under the South Australian NPWS Act 1972. The main type of habitat this endangered species requires is drooping sheoak (*Allocasuarina verticillata*) woodlands for foraging and large hollows in eucalypts species such as sugar gum and blue gum. These habitats are not present at the proposed development site or within close proximity to the development site, making it unlikely that this species would

utilise the proposed development area except possibly for the occasional individual passing through the area. The proposed development will not have an adverse effect on the population of Glossy Black Cockatoo occurring on Kangaroo Island.

k) Collared Sparrowhawk *(Accipiter cirrhocephalus)* and Nankeen Kestrel *(Falco peregrinus)*

Both of these species are classed as 'Migratory' under the EPBC Act. Migratory species include species listed in:

- Appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals) for which Australia is a Range State under the Convention.
- The Agreement between the Government of Australia and the Government of the Peoples Republic of China for the Protection of Migratory Birds and their Environment (CAMBA).
- The Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA).

The Collared Sparrowhawk occurs Australia-wide, although it could never really be classed as common. It inhabits most environments, occasionally even urban areas, and feeds predominantly on small birds. Its favoured habitat is low patchy forest and during the site surveys it was sighted in the Low Coastal Shrubland and the Mixed Coastal Shrubland vegetation associations.

The Nankeen Kestrel is also found in most parts of Australia, preferring lightly wooded and open areas (such as agricultural areas), as well as islands along the coastline. It is a successful species due to its tolerance for a wide variety of habitats and its ability to feed on a variety of foods and nest in a range of different sites. Its diet is varied, including small mammals, reptiles, birds and insects.

It is considered that the proposed development is unlikely to have a significant long-term impact on these two species.

l) Other Species Known to Occur in These Habitats

There is the potential that several other species may also be found in the habitats examined during both surveys. The Fantailed Cuckoo (*Cacomantis flabelliformis)*, Scarlet Robin (*Petroica multicolour)* and Dusky Woodswallow (*Artamus cyaneus)* are likely to occur in taller mallee areas such as along the entrance track. The Shy Hylacola (*Sericornis cautus)* may occur in taller mallee or dense low mallee, however in areas that have remained unburnt for extended periods of time populations may not be high and easily missed if not calling. Higher numbers of some honeyeaters such as Tawny crowned Honeyeater and Eastern Spinebill may occur at other times of year in response to nectar sources, and Little Wattlebirds *Anthochaera chrysoptera* are also likely to be present at such times.

Despite the potential occurrence of these species, it is considered that the development will not have a long-term impact upon any of them, due to:

- brief construction times and associated short-term-only impacts

- adequate representation of appropriate habitat across the area and wider region
- management and mitigation measures in the EMP for construction and operation.

(iii) Reptiles

a) Heath Goanna *(Varanus rosenbergi)*

One reptile species, the Heath Goanna (*Varanus rosenbergi*), has a state rating of 'Rare' for South Australia under the NPWS Act 1972 and was frequently observed during the fauna survey. A biological survey of Kangaroo Island by the Department for Environment and Heritage (Robinson and Armstrong. 1999, in EBS 2006) referred to the Heath Goanna as being "*very common and frequently encountered on Kangaroo Island, this is a stark contrast with the remainder of its range on mainland South Australia*". Due to the common nature of this species and the small area proposed to be developed, it is considered that there will not be a significant impact on the Heath Goanna.

6.4.2.3 Bird strike

It is unlikely a substantial number of bird strikes will occur from the glass windows associated with the proposed development. The height of the windows is approximately 2 metres along the southern end of the proposed Lodge.

A number of the birds that inhabit the area (for example, the Southern Emu-Wren) forage from shrub to shrub or across the ground amongst the dense litter understorey. It would be unlikely that these species of birds would strike the windows due to the nature of their movements. Other significant species in the area (such as the Osprey and White-bellied Sea-eagle) are unlikely to fly low enough over the development area to hit any of the windows.

6.4.2.4 Noise and light pollution

During the construction stage of the proposed development machinery and construction work will create some noise pollution. This is discussed in more detail in Section 14 Noise. The short-term effect of this work may lead to the movement of some fauna and bird species away from the area. However it is unlikely to affect fauna and bird species in the long term as it would be expected that these species will return once the construction stage is complete. Construction will only occur during daylight hours in order to minimise impacts to nocturnal animals.

The breeding seasons of significant bird species will be taken into account when considering the timing of noise-generating construction activities.

Light and noise during operation is not envisaged to be an issue. Low wattage path lights will be used at night and spotlights will not be used at all in order to minimise impacts.

The only noise-generating activity at night will be the operation of the generator which will be attenuated in a small building.

6.4.2.5 Road related fauna deaths

The proposed development currently has one access track, which leads to the proposed building site. Access roads and tracks can create the potential for fauna deaths as is commonly seen on many Kangaroo Island roads. To minimise the risk of fauna deaths occurring along the access track a number of management strategies will be adopted.

Controlling the speed limit along the road will give staff, construction workers and guests a greater chance of avoiding fauna. Given the nature of the access track, it is unlikely a vehicle could travel at any significant speed and most traffic movements will be during daylight hours. Appropriate signage along the access track informing people of the presence of native animals and to drive carefully will also be used to reduce the risk to native fauna deaths.

6.4.2.6 Potential fauna barriers

It is unlikely the access track will act as a potential barrier for native animals moving between habitats. The existing access track is approximately 4 metres wide with the proponent planning to widen the track to 5 metres wide, hence increasing the width only marginally. Therefore, it is unlikely that the upgrade of the access track will reduce the range or movements of small foraging birds or other native animals that may occur in the area.

6.4.2.7 Feeding animals

Staff and guests from tourism developments are often inclined to feed native animals that occur in the general area, by hand feeding or by leaving food scraps and litter around for native animals to feed on. The issue associated with this is that some species (in this case, the Common Brush-tail Possum and Heath Goanna) become more dependant on non-native food sources.

Staff and guests for this proposed development will be discouraged from this activity by being educated and informed through signage, brochures, information packs and verbal communication on the impacts associated with the feeding of native animals or littering in a natural environment. Appropriate management and mitigation measures dealing with this issue will be incorporated into the Environmental Management Plan for the project as well as the development's general operating procedures.

6.4.2.8 Impacts during construction

It is possible that the construction phase of the project will disturb native fauna utilising the existing habitat. In particular, the Osprey may be disturbed by the noise and construction activity. However, as the duration of the construction process will be short, the impact is likely to be localised and the Osprey should settle and return to the area (if it is disturbed) once construction is complete.

It is also possible that the construction process will result in Emu-Wren individuals within the immediate vicinity of the project site moving out of the area (into the adjacent large tract of native vegetation); however, after construction it is believed that they too should move back into the area.

A range of management and mitigation measures will be implemented during the construction phase of the project to ensure that impacts during construction are minimised. The Environmental Management Plan for the project outlines these measures in detail; however the following section (Section 6.4.3) also provides examples of measures that will be implemented, such as flagging-off the construction zone and not permitting construction personnel beyond the flagged areas, implementing a Phytophthora Management Plan, and monitoring of site works for the collection and relocation of any trapped or disturbed fauna species.

6.4.3 Recommendations

The following management and mitigation measures have been incorporated into the project's Environmental Management Plan and will be adhered to at all times during the construction and operation phases of the project.

6.4.3.1 Construction

- Construction personnel will be provided with training on appropriate practices for working within this environment. An appropriately qualified person will be involved in the supervision of the construction activities to ensure the minimum impact on the environment is achieved.
- On-ground works will be inspected daily to identify any issues and minimise the risk to the environment.
- During the vegetation clearance required for the project, fauna found at the site will be captured and relocated to adjacent suitable habitat by a suitably qualified person.
- Any trenches and holes left uncovered for more than a few hours will be inspected for trapped fauna first thing in the morning and again late in the afternoon. Any trapped fauna will be caught and released into nearby habitat. This will help reduce the impact of the project on the local fauna species.
- Excessive movement of soil onto and around the site will be avoided, in order to minimise the spread of weeds and Phytophthora.
- A designated wash down bay will be established before entering the site to enable all at risk construction vehicles to be properly quarantined from soil borne diseases, such as Phytophthora and seeds from weed species. Hygiene kits will also be made available to construction personnel in order to minimise the potential spread of weeds and Phytophthora.
- Stockpiles of materials and any associated infrastructure will be located in cleared areas in order to minimise impacts to vegetation and the destruction of fauna habitat.

6.4.3.2 Operational phase

- Education of staff and guests on the local environment through brochures, general training, information packs and workshops will be used as a tool in managing people within this environment.
- Signage will be installed, as discussed previously, for the Osprey and Hooded Plover in particular, to educate staff and guests and to dissuade guests from walking along the informal trail to the west of the property towards the Osprey's nest, as well as along the section of beach adjacent to the Hooded Plovers. This will be particularly important during the birds' breeding seasons.
- Strict policies will be adopted by the Proponent on managing food waste, staff and guests feeding native animals, and littering within the area.
- There will be continuous implementation of a feral cat eradication programme and weed management programme.

- On-going monitoring of the development will be undertaken to assess any impacts on the environment, particularly with regard to the Osprey and Hooded Plovers – this will contribute to general knowledge and will help further development management and mitigation requirements.
- Implementation of a vegetation plan, which utilises local indigenous plant species grown from seed that have been locally collected (i.e. within a 5 kilometre radius of the site).
- Potentially placing part or all of the area surrounding the proposed development under a Heritage Agreement.

6.5 Weeds, feral animals and plant pathogens

6.5.1 Existing conditions

6.5.1.1 Survey methodology

Weeds and feral animals or pests were recorded during the flora and fauna surveys (the first survey was undertaken in December 2004 / January 2005 and focussed primarily on vegetation and avifauna, and the second survey was undertaken in January 2006 and focused on fauna – mammals, birds and reptiles). Refer to Appendices G and I for full descriptions of the methodologies undertaken for these surveys.

6.5.1.2 Weeds

As outlined previously, a vegetation survey was undertaken within the project area (Hundred of McDonald, Allotment 9 part section 14) from December 2004 to January 2005.

The two dominant vegetation communities within the surveyed area are coastal white mallee and low coastal shrubland. Eight vegetation survey quadrats (30 metres by 30 metres) were established across these two vegetation communities immediately around the proposed Southern Ocean Lodge development. Table 6.2 outlines weed species that were located during the flora survey.

Table 6.2 Weed species recorded at the eight vegetation quadrats

Scientific name	Common name
Avellinia michelii	Avellinia
Euphorbia paralias	Sea spurge
Vellereophyton dealbatum	White Cupweed
Vulpia bromoides	Squirrel-tail Fescue

None of these weed species are proclaimed under the *Natural Resource Management Act 2004*.

6.5.1.3 Feral animal species

During the fauna surveys two introduced species were recorded at the proposed development site. A number of house mice were captured in pit fall lines and Elliot traps during the second survey, whilst the skull of a feral cat (*Felis catus*) was collected near the

proposed development. Feral cat tracks were also observed during active searching especially along the cliff tops.

Several informal sightings and tracks of feral cats were also recorded during the first bird survey. These tracks were found to be common throughout the area.

6.5.1.4 Plant pathogens

(i) Phytophthora

Phytophthora are introduced, parasitic fungi that live in the soil and attack the roots and basal stems of plants. There are several species of Phytophthora known to affect native vegetation; however *Phytophthora cinnamomi* is the species most frequently associated with dying vegetation. The only outward sign of its presence is the sickness or death of the plants it attacks (Transport SA 2000).

Phytophthora is now known to be one of the greatest threats to native flora, and hence native fauna. In South Australia, dieback caused by Phytophthora has been found in a number of sites that are within high rainfall areas, including Kangaroo Island (TSA 2000).

New infections of Phytophthora are mainly caused through human activity (i.e. the movement of infected soil, plant matter and water). A wide range of construction activities undertaken within Phytophthora risk areas can spread the disease. These activities include, among many others; clearing, earthmoving, stockpiling, off-road vehicle and machinery use, and uncontrolled access of personnel.

There is no known method of eradicating Phytophthora once it has become established in an area or on a site, therefore the risk of spreading it needs to be minimised through effective management and mitigation and the adoption of appropriate hygiene procedures.

Whilst no signs of Phytophthora-induced dieback were identified at the project site, Kangaroo Island is classed as a high risk area and Phytophthora has been identified at sites along the South Coast Road.

(ii) Mundulla Yellows

Mundulla Yellows is only a relatively recently discovered disease killing-off native plants. The exact cause of Mundulla Yellows has not yet been determined. The symptoms of Mundulla Yellows are characterised by gradual dieback of the effected plant, the foliage become a yellowish colour in appearance, intervainal chlorous on the leaves and epicormic growth over the affected species occurs (Hanold and Randles 1999, in DellaTorre and Pedler 2005).

Although no signs of die-back were identified at the project site, Willoughby (2001, in DellaTorre and Pedler 2005) indicated that Mundulla Yellows occurs at the Rocky River Park Headquarters in Flinders Chase National Park, in and around the township of Kingscote and possibly around Penneshaw.

6.5.2 Potential impacts

6.5.2.1 Weed species

As outlined previously, none of the four weed species located in the project area are *proclaimed* under the *Natural Resource Management Act 2004*, however management and mitigation measures will be implemented to ensure that their distribution is not exacerbated

by construction and operation of the proposed development and that new weed species are not introduced to the site by construction machinery and personnel, and guests.

The proposed Produce Garden described in the original documentation has been withdrawn.

6.5.2.2 Feral animal species

As previously described, the House Mouse and the Feral Cat were both observed across the proposed development area. Both species can become a threat to the biodiversity of an environment; especially the Feral Cat. Feral Cats feed on a range of different native species from reptiles, small mammals and birds. Any increased population of Feral Cats to the area will in turn increase the pressure on existing native species especially threatened bird species such as the Southern Emu-wren, Western Whip-bird, Bassian Thrush and Painted Button-quail.

6.5.2.3 Phytophthora and Mundulla Yellows

As outlined earlier, whilst no signs of Phytophthora or Mundulla Yellows - induced dieback were identified at the project site, Kangaroo Island is classed as a high risk area for Phytophthora, with it having been identified at sites along the South Coast Road. As a result of this, Phytophthora management strategies have been incorporated into the Environmental Management Plan based on the National Parks and Wildlife Service SA, Standard Operating procedure for Phytophthora Threat Management (DEH 2002).

Mundulla Yellows also possibly occurs at the Rocky River Park Headquarters in Flinders Chase National Park, in and around the township of Kingscote and possibly around Penneshaw. Management procedures implemented for the protection of native vegetation from Phytophthora will also mitigate against the possible spread of Mundulla Yellows.

Examples of some of these management and mitigation measures are outlined in Section 6.5.3.

6.5.3 Recommendations

To reduce the likely impacts that feral animals may have on local native species surrounding the proposed development, a feral animal eradication programme will be developed for use during operation of the development. This would include the implementation of a number of management strategies including waste management and feral animal control. Management and mitigation measures, such as those outlined in this section, will also be incorporated into the Environmental Management Plan for the project.

The following management and mitigation measures for the management of weeds, plant pathogens and feral animals have been incorporated into the project's Environmental Management Plan and will be adhered to at all times during the construction and operation phases of the project.

6.5.3.1 Construction

- Construction personnel will be provided with training on appropriate practices for working within this environment. An appropriately qualified person will be involved in the supervision of the construction activities to ensure the minimum impact on the environment is achieved.

- All vehicles and workers accessing the site must follow the guidelines established by the former National Parks and Wildlife SA. Information is also available in Furner (1998, in DellaTorre and Pedler 2005), *Managing Phytophthora on Kangaroo Island*.

- Excessive movement of soil onto and around the site will be avoided, in order to minimise the spread of weeds and Phytophthora.

- A designated wash down bay will be established before entering the site to enable all at risk vehicles to be properly quarantined from soil borne diseases, such as Phytophthora and seeds from weed species. Hygiene kits will also be made available to construction personnel in order to minimise the potential spread of weeds and Phytophthora.

6.5.3.2 Operational phase

- Staff at the Lodge will be provided with training about the symptoms of Phytophthora and Mundulla Yellows, and asked to immediately report any species that may appear affected by the disease to the National Parks and Wildlife Service, SA (now DEH).

- Education of staff and guests on the local environment through brochures, general training, information packs and workshops will be used as a tool in managing people within this environment.

- Strict policies will be adopted by the proponent on managing food waste, staff and guests feeding native animals, and littering within the area.

- There will be continuous implementation of a feral animal eradication programme and weed management programme.

7. Legislation

7.1 Planning analysis

The appropriate South Australian policy and strategic documentation along with the relevant local planning regulations have been considered with respect to the proposal. The findings of this review are outlined below.

7.2 Strategic planning issues

The Planning Strategy for Regional South Australia (the Strategy) highlights the South Australian Government's support of development in regional areas. The Strategy encourages development based upon land use that balances development and conservation through sound and responsive planning.

The purpose of the Planning Strategy is to provide some certainty about future development and to stimulate private investment in regional areas. This occurs through the reflection of the Strategy as policies within the Council's Development Plans.

The Strategy suggests that future growth in regional areas will occur through facilitating sustainable tourism development to achieve economic, social and environmental benefits for the state. The Strategy also highlights a need to strengthen South Australia's reputation for food and wine, nature-based, coastal and marine tourism.

> *The aim is to facilitate sustainable tourism development in appropriate locations, assessed against land and environmental capabilities in order to achieve economic as well as social and environmental benefits for the State.*

The Economic Activity section of the Strategy encourages sustainable tourism development by aligning land use planning with specialty tourism development priorities. The Strategy also highlights a need for small to medium tourist accommodation that is part of the natural and cultural experience of an area including 'innovative and environmentally sensitive nature retreats in appropriate natural areas' (pp 9 of the Strategy). The proposed Southern Ocean Lodge development is considered a nature retreat that is in line with the goals and strategies outlined in the Strategy.

With regard to the environment the Strategy highlights that the development should be designed to protect the coast from erosion, damage, deterioration and pollution and to avoid the natural hazards of coastal erosion and seawater flooding. Also the use of local native species in all revegetation and landscaping programs is recommended. These issues have been considered as part of the proposed development with coastal processes and landscaping addressed in Sections 9 and 6.3.3.2 of this report.

The Planning Strategy highlights the importance of Kangaroo Island as one of the most significant areas for nature conservation in the high rainfall areas of South Australia. The Wilderness Protection Areas and Conservation Parks together with the coastal features provide, as suggested by the Strategy, economic wellbeing to the island by providing a resource for nature-based tourism.

The Strategy emphasises that the entire coastline has a profound influence on the island's appeal to tourists because of its high natural landscape qualities, scenic beauty and

recreational values. The proposed Southern Ocean Lodge will highlight the areas natural landscape and scenic beauty to local, interstate and international visitors emphasising the areas importance.

For the Kangaroo Island Planning and Development Area, Strategy 10 outlines the need to develop tourism facilities on Kangaroo Island including 'sustainable nature retreats of an international standard' which describes the aim of the Southern Ocean Lodge. The development will be in keeping with the Island's unique natural character with the average length of stay expected to increase leading to an economic benefit for the state.

The Strategy highlights that management of visitor thresholds at a sustainable level in high conservation areas is important and this has been considered when designing the proposed development. The number of rooms within the development will be sustainable with water resources, electricity use, and waste management all considered as part of the project.

Another Strategy outlined in the plan for the Kangaroo Island area is the maintenance of a low-scale development in keeping with the natural environment. The Southern Ocean Lodge is a single storey development with a design that will blend with the natural environment.

In general, the Planning Strategy is supportive of a tourism development such as Southern Ocean Lodge, provided that environmental and social factors are taken into consideration.

7.3 Development plan summary

The proposed development is located within the Coastal Landscape Zone as depicted in the Kangaroo Island Development Plan, consolidated 7 August 2003.

In determining the merits or otherwise of the proposal, the provisions of the Development Plan as they apply generally throughout the Kangaroo Island Council area and more specifically the Coastal Landscape Zone have been considered. A full analysis of the relevant policies of the Development Plan is contained in Appendix J.

The development is not listed as a complying or a non-complying development in the Coastal Landscape Zone; therefore the development should be assessed on merit. This merit based analysis suggests that the proposed development is in line with Objectives and Principles outlined by the Kangaroo Island Development Plan.

Economically, the Development Plan encourages investment and the development of new ventures such as Southern Ocean Lodge that complement the environmental and community aims of Kangaroo Island. Another economic objective is to maintain an economically viable and ecologically sustainable tourism industry on Kangaroo Island. With the diversification that comes from the proposed high end eco-tourism development this objective can also be achieved.

A number of specific actions have been taken which address the environmental objectives and principles of the Development Plan. These include:

- siting the development in the area of least impact for vegetation, fauna, landform, etc.
- sympathetic building design to reduce visual impact
- control of access in and around the site
- preparation of Environmental Management Plan
- proposed ecologist/guide during operation to manage environment of site and educate guests.

Native Vegetation clearance also forms a considerable part of the Kangaroo Island Development Plan. The siting and design of the proposed development has reduced vegetation clearance where possible and flora and fauna studies have been conducted to ensure any potential impacts are considered (refer Section 6).

The community related objectives and principles of development control in the Development Plan outline broadening the employment base and creating employment opportunities as important to Kangaroo Island. The proposed development will diversify the tourism industry on Kangaroo Island and provide employment opportunities for 20 people including local wildlife experts and guides. The sale of locally produced products in the Lodge restaurant will also help support the islands boutique industries.

The appearance of land and buildings forms the basis of a number of objectives and provisions of development control in the Kangaroo Island Development Plan. The emphasis is on appropriate siting and a high standard of design as well as landscaping. The proposed development will not be visible from existing roads or recreation reserves and the development will be set back 100 metres from the mean high water mark. The main Lodge will be partly dug into the side of the ridge to reduce its height and impact and dark non-reflective material will mean that the building will be 'lost' in the vegetation from most vantage points. Within the carpark separate parking bays will be formed within the bush to provide shade, avoid large areas of paving and maintain the wilderness setting.

To satisfy the principles of development control landscaping will be used to screen service areas using local endemic species with seed collection already occurring.

The land use provisions of the Development Plan relating to tourism development also highlight the need for the development to be low profile, utilising natural materials, limit native vegetation clearance and consider bushfire risk. These aspects have all been considered as part of the proposed developments design.

The protection of life and property from the effects of bushfire is an important objective for the Development Plan. The design of the proposed development has considered the fire risk of the location and a Bushfire Management Plan has been included as part of this document (refer Section 17). A sufficient independent water supply for fire fighting along with the appropriate sprinklers, hoses and pumps have also been included as part of the development.

In conclusion, the proposed Southern Ocean Lodge development is not at serious variance with the objectives or principles of development control outlined in the Kangaroo Island Development Plan and therefore should be approved on merit.

A full planning analysis including the relevant objectives and principles of development control has been included as Appendix J.

8. Heritage

8.1 Indigenous heritage

Kangaroo Island was not occupied or visited by Aboriginal people at the time of European contact. The oldest human occupation archaeological site dates to 16,000 BP (Before Present), which is when Kangaroo Island was part of the greater Australian land mass. Kangaroo Island separated from the mainland around 9,500 BP, however occupation of the island continued until around 4,300 BP, (with some studies indicating that this may have been as late as 2,250 BP) as indicated by stone tool samples and the absence of the dingo. The population then disappeared, either dying-out or migrating to the mainland (although evidence of watercraft is lacking) (Bowdler, Date Unknown and SA Atlas).

The presence of Aboriginal people on Kangaroo Island between approximately 16,000 BP and 4,300 BP indicate that there is the potential for cultural heritage sites to be located around the island, keeping in mind that likelihood for finding sites increases around coastal and riverine areas, around water sources in arid areas, around land features of a different form to the surrounding landscape and around sensitive landforms, such as sand hills in the vicinity of water sources.

The *Aboriginal Heritage Act 1988* (State) protects Aboriginal cultural heritage in South Australia. The Act provides for the protection and preservation of Aboriginal sites, objects and human remains (burials). The Department for Aboriginal Affairs and Reconciliation (DAARE) keeps a record of the location of known Aboriginal sites and objects. Advice on whether there are any known Aboriginal sites or objects in an area can be obtained by applying in writing in writing to the Minister for Aboriginal Affairs.

DAARE has been contacted for this project to determine the listing of Aboriginal sites on the Register of Aboriginal Sites and Objects. The Aboriginal Heritage Branch has indicated that there are currently no entries on the Register within or around the project area. Despite this, the Register is not a comprehensive record of all Aboriginal sites, objects and remains and as such, there is still the potential to unearth Aboriginal objects during construction. Management procedures will be established and outlined in the Environmental Management Plan in the instance that suspected Aboriginal remains or objects are located during site works.

8.2 Native title claims

Under the *Native Title Act 1993*, The National Native Title Tribunal (NNTT) is responsible for maintaining three public registers; the National Native Title Register, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements. These registers hold records of native title determinations, applications and Indigenous land use agreements made under the *Native Title Act 1993*. To find out whether an area of land or water may be affected by a native title determination, application or Indigenous land use agreement, a search can be requested of the public registers maintained by the tribunal.

The project site comprises private freehold land and as such, Native Title is therefore extinguished over the project area. Despite this, the National Native Title Tribunal was contacted to establish whether there are any Native Title issues associated with the surrounding land. The Tribunal confirmed that there are no Native Title claims over Kangaroo Island.

8.3 Non-Indigenous heritage

Non-Indigenous heritage (often referred to as European heritage) places are protected at a National, State and Local level.

At a national level, the *Australian Heritage Commission Act 1975* was repealed in 2004 and replaced by an amended *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which incorporates heritage as a matter of national environmental significance.

Other features of the new national heritage system include a new National Heritage List of places of national heritage significance, a new Commonwealth Heritage List of heritage places owned or managed by the Commonwealth, the creation the Australian Heritage Council - an independent expert body to advise the Minister on the listing and protection of heritage places, and the continued management of the Register of the National Estate.

State Heritage Places are protected and administered in South Australia by the *Heritage Act 1993* and the *Development Act 1993*. Places of state heritage significance are maintained by Heritage SA on the State Heritage Register (currently administered by the State Heritage Authority) and local heritage places are usually listed in Council Development Plans or maintained on a local heritage register within Council.

All of these heritage lists and registers were reviewed to determine whether there are any places of national or state heritage significance (local heritage places were not listed in Kangaroo Island's Development Plan). No items or places were located in or around the project area.

8.4 Natural heritage places

Natural heritage places can also be listed on the above heritage registers and lists. Flinders Chase National Park and Kelly Hill Conservation Park are both listed on the South Australian Heritage Register and the Register of the National Estate.

9. Landform and coastal processes

9.1 Landform

The Island comprises a range of both rock and land forms contributing to a diverse geological history. The South Coast region of the island is dominated by a landscape of limestone cliffs and plains with scattered sand hills along the coast (Kangaroo Island Soil Conservation Board, 1994). The proposed development is located inland from a steep calcrete cliff between limestone shelfs and dunes.

9.2 Soil and geotechnical

Geotechnical investigations undertaken indicate that the geological characteristics of the site is Dune Sands of varying depths (0.5 to 3 metres) overlaying limestone bedrock (as classified by Pocius & Associates Pty Ltd, refer to report in Appendix K).

Generally sands are characterised by uniform texture and single grain structure. This is consistent with the soil profiling on the proposed site. There is little or no change through the soil profile except for minimal accumulation of limestone fragments towards the deeper levels of the profile.

The interaction of the surface erosion processes and the proposed development is predominantly related to the sands on site which are highly erodable due to their poorly aggregated structure. Fortunately much of the area on site is protected from erosion by vegetative cover with most of the cover being maintained during the course of the construction and operation of the development.

Minimal vegetation clearing will be undertaken during construction to assist with minimising impacts associated with erosion and sedimentation in the project area.

The interaction of the surface erosion process and the development will be managed using the mitigation measures as outlined in the Environmental Management Plan (Part D). These management principally involve:

- Control and divert water around the construction site to minimise flow over non-vegetated construction areas.
- Undertake minimal and progressive clearing of the site – maintaining vegetative cover as long as possible.
- Install and maintain temporary erosion control and sediment collection structures at key points for site drainage in accordance with the EPA Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry (EPA, 1999).
- Revegetate and landscape disturbed areas as soon as practicable to minimise sedimentation and erosion.
- Weekly site inspections during construction of sediment and erosion control devices including inspections after rainfall events.
- Use of (temporary) biodegradable matting over disturbed construction areas.

- Use of compacted limestone access roads with vegetated table drains to minimise erosion associated with non-captured stormwater generated on site.

9.3 Groundwater

On Kangaroo Island potable ground water supplies are in short supply. Borehole data from 700 bores on the Island suggests that fresh ground water occurs as limited and localised supplies sitting atop saline aquifers (Mooney and Grinter, 2000 in INRM Plan, 2003). Low yielding, shallow and ephemeral perched watertables occur across much of the Island where permeable soils overlay clay subsoils at depths of 0.5–1.0 metre and may flow for the mid-winter months when recharge is relatively constant.

At the site of the proposed development dune sand is underlaid by fractured limestone which contains the aquifer. After rain the water is expected to move through the sand layer and flow down slope and enter the aquifer where the rock is fractured recharging the aquifer at regular intervals.

An existing disused bore may be used to supplement the Lodge's water supply when rainfall is limited (usually in summer) the aquifer will then be recharged during the wetter winter months (refer Appendix E).

9.4 Coastal processes

'Coastal processes' refers to the natural forces that shape the coastal zone. These natural forces include wind, waves, currents, tides and floods and they all influence the distribution of sediments in the coastal zone which in-turn shape the coastal area.

Given the distance of the site from the high-water mark (100 metres) and its location on a cliff top the development is not likely to be directly affected by a coastal system where quantities of sand from the beach are moved and shaped by the waves and wind.

The site will not be affected by future sea level change as it will be 15.5 to 40 metres above sea level and 100 metres beyond the high water mark.

Some coastal processes that may influence the proposed development are:

Erosion (wind/wave/water)

Coastal sediments in the Kangaroo Island region consist of dune systems up to 1.5 million years old. Repeated sea flooding on the island has caused the construction, destruction and reworking of these dune complexes. They have also been affected by persistent south-westerly swells combined with dominant south-easterly to north-westerly winds and a low tidal range.

Both wind and water/wave erosion is minimised on the dune systems by the frontal dune which acts as a buffer, if vegetated such is the case at the proposed site. All dunes will suffer very little erosion and can re-build after severe weather events when covered in coastal vegetation. The vegetation stabilises the dune and reduces the effect of erosion. As the dunes are vegetated and will not be subject to degrading activities such as livestock grazing, recreation activities (eg. 4WD driving over dunes), they will not be adversely affected by erosion once the development is constructed. Any erosion caused by vegetation removal

during construction will be controlled and monitored by the projects Environmental Management Plan.

Salt spray

Salt spray can cause corrosion to metal materials. This will be minimised by not leaving construction vehicles out in the open at the site for long periods of time (eg. over night).

The materials selected for the development take the corrosiveness of salt spray into consideration.

Access

Walking or driving on the sand dunes can severely degrade the dune system leading to erosion. This will be prevented by ensuring construction vehicles and workers do not stray from the provided access tracks.

Access will also be a concern after the construction phase when the development is opened. This will be managed however, by the construction of pathways leading to the beach and signs will also be provided to encourage guests from straying onto the dunes and their vegetation.

Run-off

Poor run-off water and sediment quality are the most serious known pollution issues affecting Australia's coastal and marine environments [http://www.deh.gov.au/coasts/pollution/index.html]. The 1995 State of the Marine Environment Report found that pollution from the land contributes up to 80 percent of all marine pollution and is a major threat to the long-term health of near shore marine ecosystems. It affects ecological processes, public health and social and commercial use of marine resources. Due to the sever impacts of poor quality run-off, all stormwater from built up surfaces will be captured for storage. No stormwater runoff above that which occurs from the natural environment will enter the beach or sea.

Wastewater will be treated and stored on site for use. No wastewater will enter the sea, and therefore near shore marine ecosystems will not be affected by the proposed development.

Sea-grass

As the proposed development will not allow any water run-off or waste water to enter the sea, there will be no impact on off-shore sea grass.

Dune vegetation

Coastal environments are dynamic but fragile systems. The removal of vegetation from a coastal environment can have serious impacts on the entire system.

Coastal areas are also susceptible to *Phytophthora* (root-rot fungus), which can be carried into areas by humans via such items as shoes, tent pegs and car tyres. The Phytophthora Management Guidelines produced by the Government of South Australia (2003) identify the project region as a High Risk Zone for the presence of *Phytophthora.* The spread of the *Phytophthora* infection can be managed and appropriate procedures have been included in the Environmental Management Plan.

10. Water management

A sustainable integrated water management system is proposed for the Southern Ocean Lodge site. The system incorporates a water supply arrangement that collects all roof rain water for potable water reuse (supplemented by treated bore water if required) and an on site wastewater treatment scheme that incorporates a number of treatment package units.

Details of the water supply and wastewater management systems proposed as part of the development are provided below while a full copy of the Water Management Report produced for the project is included as Appendix E.

10.1 Water supply

The proposed water supply arrangement for the project has been designed to optimise the collection and re-use of rainfall runoff (refer Appendix E). Specifically the design incorporates the following elements:

- 100% capture of rainfall run-off from the roofs of resort buildings
- treatment (filtering and disinfection) of captured roof rainfall water
- reuse of treated rainfall water used throughout the resort for all potable & personal uses (drinking, showers, hand-basins etc)
- use of bore water to flush toilet systems throughout resort, staff quarters and spa retreat (a small package water treatment plant is incorporated to treat this water supply)
- use of bore water to provide the required fire fighting on-site storage requirement (nominally 60 kilolitres)
- connection to enable (treated) bore water to be fed from the bore water storage tank to the main water storage tanks if required only during periods of limited rainfall.

Design of the staff village includes two 17 kilolitre rainwater tanks per unit as well as an additional two 250 kilolitre storage tanks within the staff village. Six tanks will be used to store the water required for the Lodge building and suites.

Rainwater storage on site will total 840 kilolitres with any over flow directed to the bore water tank which has a design capacity of 250 kilolitres. The water contained in these tanks will be treated (using UV or chemical disinfection) and used as potable water in suites, restaurant, staff Lodge, spa retreat and reception areas as well as make-up water for the plunge pool and sauna.

If rainwater supplies are lacking treated bore water from an existing bore may be used to supplement toilet flushing and fire fighting. Bore water will be pumped to the site via an underground High Density Poly Ethylene (HDPE) pipe (approximate diameter 100 mm) located under the access track and stored in an appropriate 250 kilolitre storage tank. A maintenance capacity of 200 kilolitres will be maintained and reserved in the storage for fire fighting purposes.

10.2 Wastewater

10.2.1 System design

Wastewater from all areas of the development will be treated in a series of localized, compact, state of the art wastewater treatment package units (Biolytix) with all effluent (treated to Class B standards as per SA Reclaimed Water Guidelines, 1999) directed to the single irrigation area in and around the Staff village.

The Biolytix wastewater treatment packages enable all wastewater, including that from sinkerators (macerators) in the kitchens, to be fed directly to the processing unit without any pre-treatment (screening, oil & grease removal etc). The process is based on digestion of organic and other products by a complex eco-group of micro- and macro-organisms, including worms. There is no chemical addition though a small amount of air is delivered to each process vessel to ensure maintenance of aerobic conditions which prevents odour.

The proposed Biolytix system provides a number of benefits including:

- Minimisation of potential risk associated with raw sewage being stored and pumped in the vicinity of the guest suites and ocean shoreline.
- Low cost wastewater collection system as pressure sewer type systems such as Biolytix transfer treated effluent in small polyethylene pipe that may be laid at minimum cost and is not restricted by topography (e.g. compared to gravity sewer).
- Easy isolation of any problem given the separation of the treatment units (e.g. compared to concentrated wastewater flows to a single larger treatment facility).
- Large buffer storage capacity in event of system failure. Individual treatment units have an emergency buffer storage capacity typically around 1-2 days.
- Treatment system units only require annual maintenance.
- Low greenhouse gas emission and embodied energy costs.
- System provides the opportunity for cost effective direct irrigation reuse in the vicinity of each treatment unit.
- Waste treatment to Class B classification (SA Reclaimed Water Guidelines, 1999).

A total of seven Biolytix BF 6 units will be installed on site:

- four units to treat wastewater from the 25 guest suites (i.e. 1 unit for every 6–7 suites depending on final design)
- two units for the staff village
- one unit for the Reception, Restaurant and Lounge complex
- one unit for the Spa Retreat.

An average daily wastewater volume generation of 8,500 litres is anticipated from the development during operations however this will be largely dependent on staff levels and occupancy rates as well as time that guests are in the resort (i.e. using the facilities).

10.2.2 Potential environmental impacts

10.2.2.1 Wastewater irrigation

The effluent receiving area is all natural sand, which will be well mulched to conserve & hold water in the upper layer of the sand. The sand layer is nominally 3 metres thick overlying limestone.

Based on the characteristics of the soil profile (Appendix K) the sandy soils on site generally have a low fertility which decreases even further as the depth from surface organic layer increases.

The low fertility of the soils confines the plant roots to the upper horizons of the profile and increases plants reliance on water stored by organic matter near the surface. The poorly aggregated structure of the sands provides a high percentage of pore space which provides an excellent medium for irrigation. In time as organic matter from effluent disposal increases the water holding capacity of the sand is also likely to increase. Increases in organic matter in the sand can also encourage the establishment of deeper roots in established vegetation.

Based on the requirements of AS 1547 the required area for irrigation of 8,500 litres/day of wastewater is 1,700 m^2. This area has been incorporated into the design of the facility within the Staff village area.

Potential impacts from wastewater irrigation to nearby marine coastal environments and surface water resources are considered negligible given the design and siting of the wastewater treatment system and irrigation area, the topography of the site, the lack of defined permanent surface water flow areas on and adjacent to the site (e.g. major drainage lines etc) and distance of the development from the ocean (at least 100 metres).

Uptake of water from the irrigation area by vegetation as well as losses through evapotranspiration will assist in wastewater irrigation and management. In addition, given the proposed use of mulch in landscaping activities, soil depth (3 metres) and already established vegetation on the irrigation areas the potential for the irrigated wastewater to impact to groundwater in the area are considered minimal.

10.2.2.2 Noise

Noise associated with the wastewater systems will be generated by the small air pump (aeration unit) and effluent disposal pump. The effluent disposal pump has a nominal noise design rating below 40 (dBA) and is not considered likely to provide significant off site noise impacts.

10.2.2.3 Odour

The aerobic biological processes associated with the Biolytix system prevents odour generation associated with the operation of wastewater treatment systems and associated irrigation.

10.2.3 Alternatives considered

Alternative waste water treatment systems were also investigated as part of the design for the project. These alternatives are discussed in further detail in Appendix E and include:

- Aerated waste water treatment plants – involve a two stage treatment of sewage. The first stage is anaerobic and provides some separation of the solids settling to the bottom. The second stage is aerobic using mechanical agitation, stirring and/or air induction using blower pumps, to achieve an aerobic processing of sewage. This process results in noise from the pump blowers and smell from the anaerobic process. This process was therefore discounted as an option for the Southern Ocean Lodge site.

- Sand filters – this relies on the septic tank for primary treatment with separation of the solids from the liquid by sedimentation and flotation. The capacity of this system reduces over time as the nutrient levels rise within the sand bed and therefore will eventually require replacement. This was not deemed a viable solution for the Southern Ocean Lodge development.

10.3 Stormwater

As outlined in Section 10.1 above, the proposed development will capture all rainfall run-off from the buildings roofs and after appropriate filtering and disinfection will be used throughout the Lodge and staff village.

Excessive surface water runoff from other hardstand areas e.g. car parks, access tracks, walkways etc. will be minimised through the construction of these areas in permeable compacted limestone.

These hardstand areas are limited in size on site and will also be constructed with adjacent graded swale/table drains to contain water and facilitate infiltration in excessive rainfall events.

11. Solid waste

11.1 Generation

Waste will be generated during both the construction and operational phases of the Southern Ocean Lodge development.

Where possible, the generation of waste will be avoided however both organic and non-organic waste will be produced as a result of the activities on site.

Organic wastes resulting from activities:

- native vegetation (construction)
- timber, soil and limestone rock (construction)
- food scraps (construction and operation)
- paper products (operation).

Examples of the types of non-organic waste produced include:

- plastic packaging (construction and operation)
- plastic piping and construction materials (construction)
- metal off-cuts (construction)
- glass products (operation)
- cardboard (construction and operation).

11.2 Waste minimisation

The most preferable option is to avoid or reduce waste to reduce the impact the proposed development may have on the environment.

Wastes generated as result of site activities will be reused and recycled or recovered where possible with waste removed for disposal only where reuse or recycling is not feasible.

Waste minimisation strategies to be implemented on the project are outlined as follows:

- Recycled timbers will be used for internal flooring (to ramps for guests suites and possible for furniture and fittings).
- The Proponent proposes to use a screw pile foundation system which ensures minimal excavation is required reducing the amount of excavated material.
- Any excavated material (sand and limestone) will be used on site for construction of road-works and paths.
- Where possible, limestone for the main wall in the Lodge will be sourced on site by using the limestone excavated for the building footings.

11.3 Waste management

Solid wastes generated as a result of the development will be managed through the EMP. The management measures outlined in the plan include:

- appropriate segregation and storage
- re-use and recycling
- disposal requirements.

12. Visual assessment

This section addresses the visual effect of the proposed development in this locality. It describes the rationale for the major design elements of the proposed development and measures to mitigate their visual impact.

12.1 Viewshed analysis

A viewshed analysis has been prepared as a key component of our visual impact assessment study. The 3D Analyst extension was used to derive a Digital Elevation Model (DEM) from 10 metre contours supplied by Department of Environment and Heritage (best data available). Vegetation cover was roughly mapped from a Google Earth image, using the higher resolution site photograph supplied by the client as a guide to the extent of different vegetation types (heath to 1.5 metres, shrubland to 3 metres, high scrubland to 8 metres) and converted to a grid. Spatial Analyst was then used to add the vegetation grid to the DEM to create a new grid that incorporated the effects of vegetation height. This grid was used to calculate the viewshed using observation points 4 metres in height (to represent roof heights) placed at various locations within the proposed development.

The viewshed identifies the areas on a surface that are visible from one or more observation points. Or more simply put, the derived map shows those areas that can be viewed from the proposed Southern Ocean Lodge and likewise, areas which can potentially view the proposed development within the following limitations:

- The digital terrain model which underlies the viewshed map is based on 10 metre contours which limits accuracy. For example, a 5 metre spike (or landform rise) may occur between the proposed development and an observation point which would block a sightline but is not identified in the 10 metre contour DEM.

- Vegetation heights within the extent of the viewshed map vary considerably. The model has incorporated 3 broad heights of vegetation for the types as described previously, these being:

  < 1.5 metres vegetation (heath) within approx 300 metres of high water mark (HWM)
  < 3 metres vegetation (shrubland) from approx 300 metres of HWM to 600 metres
  < 8 metres vegetation (high scrubland) from 600 metres of HWM.

Visual impact assessment

Sightlines were prepared from the key public access points being Hanson Bay cabins, South West River Road (at the junction of the access track to Southern Ocean Lodge), the start of the Kelly Hills Cave walking trail at the third beach at Hanson Bay, and from the beach between the Lodge and Hanson Bay. Southern Ocean Lodge will be visible from viewpoints 2 and 4 as illustrated on the viewshed map, both of which are located on or near the beach (refer Figures 12.1 and 12.2).

Figure 12.3 illustrates the view from viewpoint 4 towards the proposed Lodge. From this location, the Lodge will appear to be nestled in the landscape.

Other than the construction of the Lodge, there is no additional aboveground infrastructure (such as powerlines) required which would add to visual impact. Access to the site is via an existing access track from South West River Road which will be upgraded to provide all

weather access and will not create any additional visual impact. Dense vegetation on both sides of the access track means it will not be visible external to the subject land.

The viewshed suggests that the Lodge will be visible from the remote ocean cliffs to the east within Kelly Hill Conservation Park. However given the distance from these areas to the Lodge are in excess of 5 kilometres together with the low profile of the buildings, the visual impact will be insignificant.

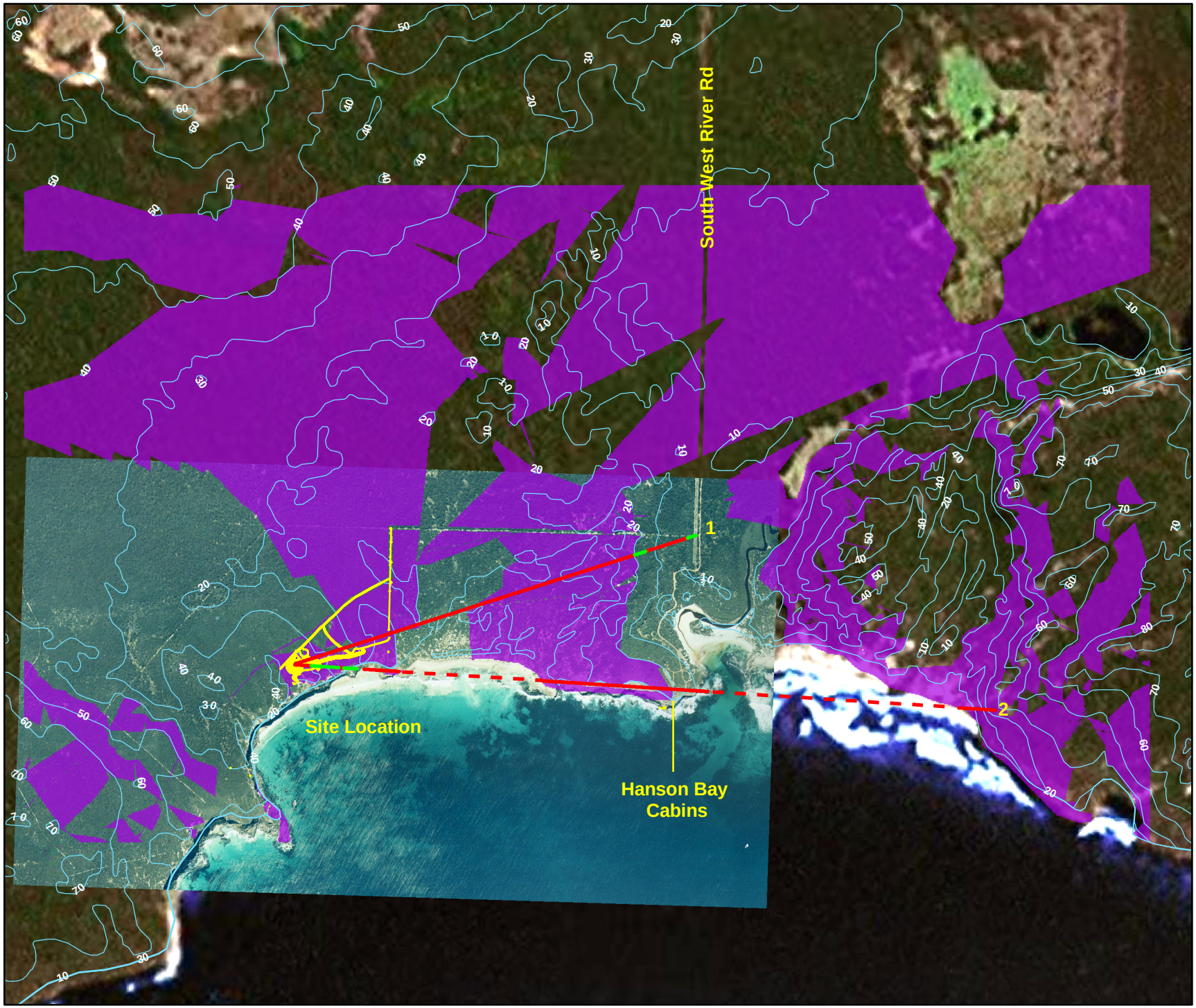
12.2 Visual impact mitigation measures

As described in Section 4.4, the proposal has been designed as low profile, low impact following the contours of the land and set below the ridge line. Colours are muted and dark to blend with the environment. The buildings are designed to minimise visual impact through the following techniques:

- Lodge located below ridge line and partially dug into side of ridge
- Follows contours of the land, with low profile roof
- Dark colours and materials to blend into the environment.

The buildings are set back more than 100 metres from the mean high water mark. The site is approximately level directly back from the cliff tops, so that the buildings are not visible directly out from the shoreline or the sea – (unless some distance out to sea in which case the buildings would be “lost” in the vegetation). The main Lodge is partially dug into the side of the ridge to reduce its height and impact. A thin curved plane of roof over circular glass walls reinforces the soft low impact nature of the project. The low profile and linear nature of the buildings parallel to the coast will minimise glass reflection, particularly from the visible viewpoints.

It is intended to minimise soil and vegetation disturbance during construction which will greatly assist in minimising visual impact as the proposed development will appear to sit within the existing landscape.



Southern Ocean Lodge

Viewshed with Observer Points 1 and 2

Legend

10mcontours

Visible from SOL

Line of Sight

Not-Visible

Visible

Observer Points

1 - South West River Road

2 - Kelly Hill Caves Walking Track

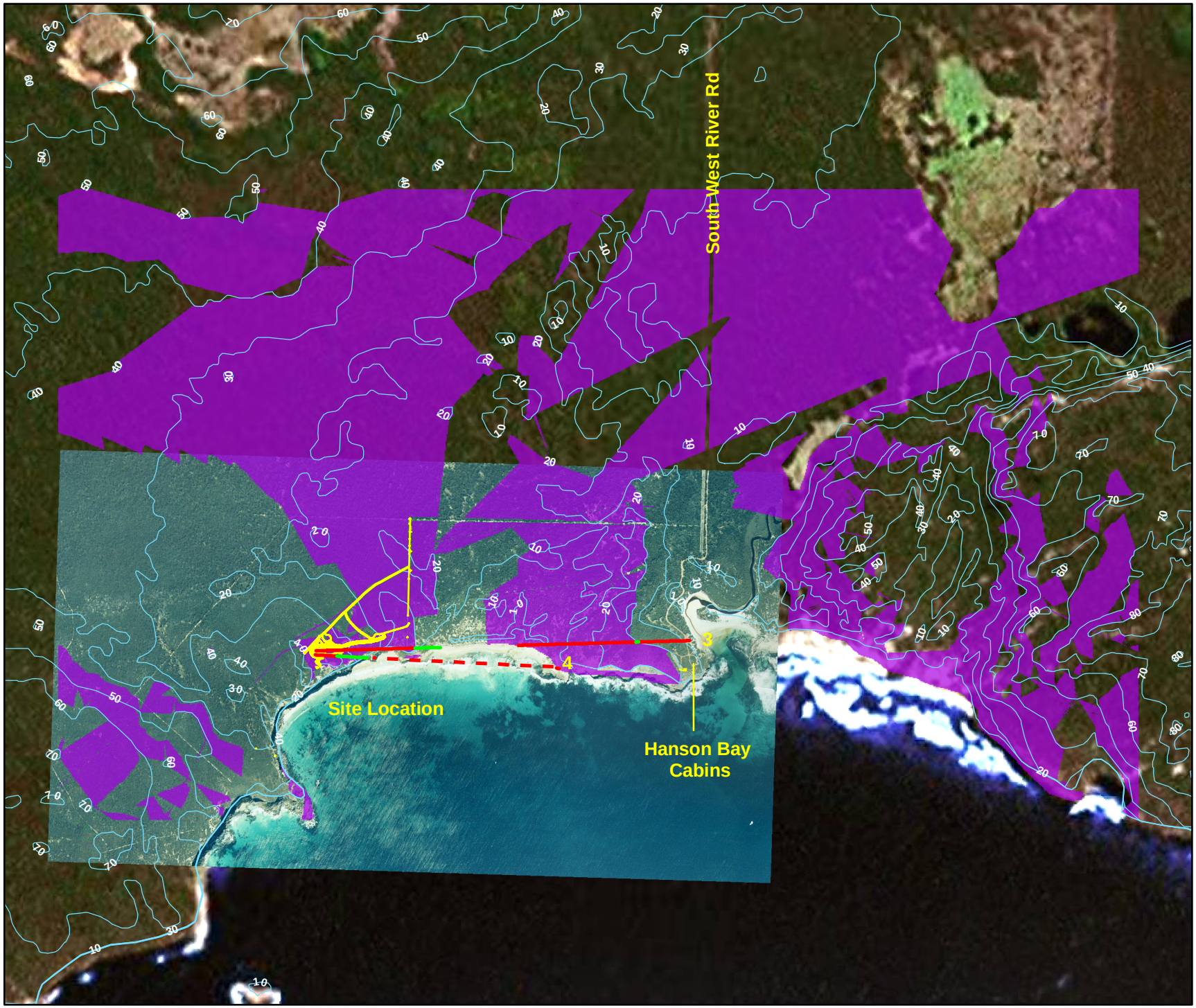
0 0.25 0.5 1

Kilometres

Data Source: Google Earth, DEH
Image Date: 2003
Prepared By: BowskillB
Printing Date: February 2006
Projection Information:
GDA_1994_MGA_Zone_53
Job No.: 2102693A

PARSONS BRINCKERHOFF





Southern Ocean Lodge

Viewshed with Observer Points 3 and 4

Legend

- 10mcontours
- Visible from SOL

Line of Sight

- Not-Visible
- Visible

Observer Points

3 - Hanson Bay Cabins

4 - Beach

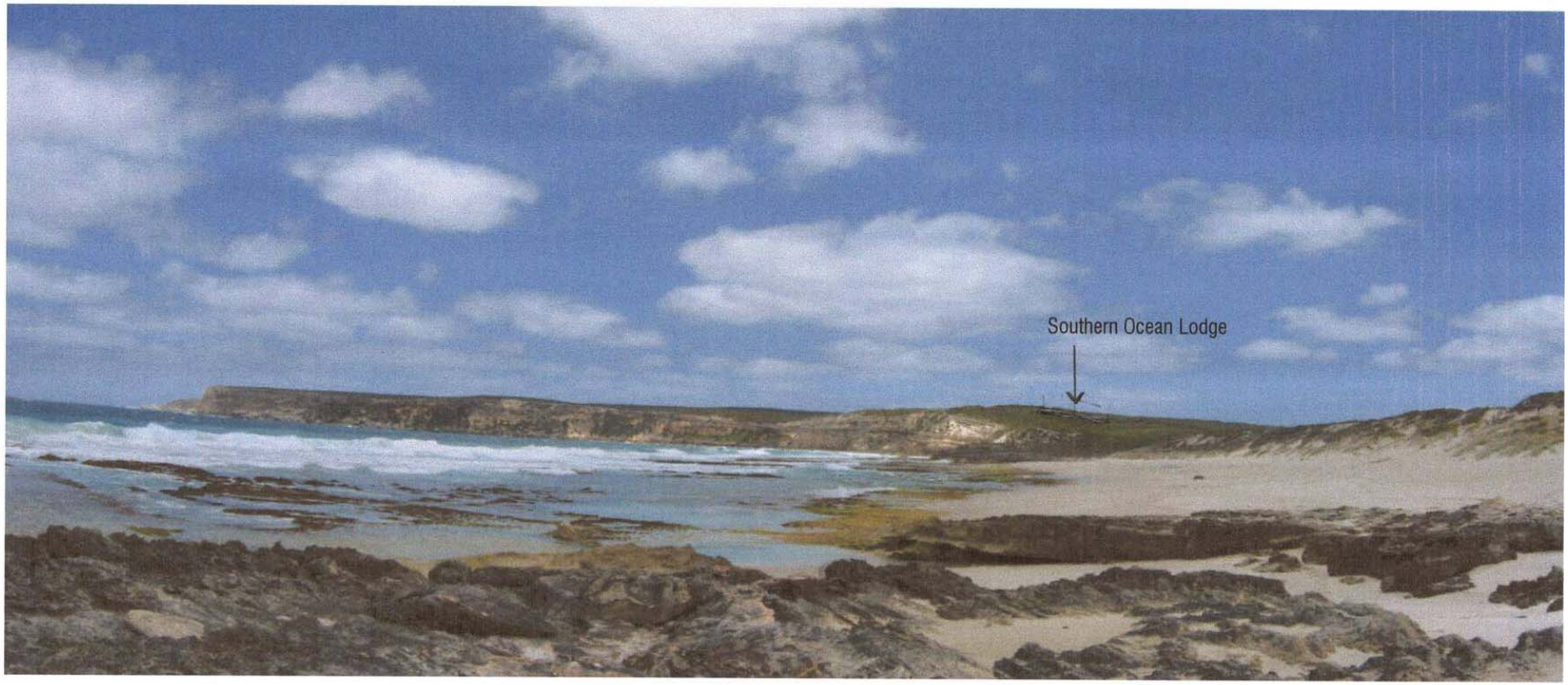
0 0.25 0.5 1

Kilometres

Data Source: Google Earth, DEH
Image Date: 2003
Prepared By: BowskillB
Printing Date: February 2006
Projection Information:
GDA_1994_MGA_Zone_53
Job No.: 2102693A

PARSONS BRINCKERHOFF





Southern Ocean Lodge : Viewed from eastern end of beach on adjoining property

Lodge appears as a low profile dark element in a vast landscape

FIGURE 12.3
Site photo

13. Economic assessment

13.1 Project viability

An economic assessment of the proposal was undertaken by Syneca for the South Australian Tourism Commission in 2005. A copy of the full report is included in Appendix L. The following chapter contains a summary of the potential economic impact of the proposal for Kangaroo Island and South Australia.

13.2 Impacts for the local community

The proposed development is expected to generate significant opportunities for the local community during construction and operation. Aside from jobs directly generated in the Lodge itself, there are expected to be flow-on effects to local industries such as food and beverage and tour operators.

During construction, it is expected that approximately 20 jobs will be created on site.

When the Lodge is fully operational, occupancy is expected to be about 65% per annum and the average stay being 2.8 nights. With an average of 2.1 persons/suite, the number of overnight guests per year is estimated at 4500 staying 12,500 nights. This would be a significant impact for Kangaroo Island representing an increase of 4.5% in the number of overnight guests.

It is expected that visitors to Southern Ocean Lodge would spend about $7.2 million per annum at the Lodge, 60% of which would be for accommodation. Additional spending on Kangaroo Island is estimated at $0.45 million and additional spending elsewhere in South Australia for the visitors is estimated at $1.15 million.

The Syneca report outlines the existing tourism industry on Kangaroo Island, particularly the variety of accommodation on offer. The report suggests that it is unlikely that Southern Ocean Lodge will take much business from existing operators as there is not currently any comparable accommodation provided on the Island. Most existing accommodation is in the low-medium budget range such as camping, caravan parks, motels and holiday houses and while the quantity of accommodation is increasing at about 1-2% per year, there are only a few establishments providing a broad range of services on-site. Given this lack of high-end accommodation, the proposal is not expected to have a detrimental impact on the viability of existing tourism operators on the Island.

There is the potential for some displacement of day-tripper visitors to the Island. Many up-market visitors are on a one-day excursion and it is reasonable to expect that some of these would convert to overnight visitors if suitable accommodation is provided. This kind of displacement would be very welcome on Kangaroo Island as day-trippers are regarded as intensive users of public infrastructure during their short stay and provide little additional business for the on-island economy.

13.3 Local investment

The Kangaroo Island Development Board is not aware of any project which has involved a similar financial investment as Southern Ocean Lodge on the Island in the last 10 years. There are a number of enterprises on Kangaroo Island which have invested significant amounts into expansions and upgrades over time but much of this would be considered repairs and replacement rather than new investment.

13.4 Tourism

Other areas in Australia well known as tourist destinations for nature and wildlife experiences (eg Tasmania, Great Barrier Reef, Central Australia) have very high quality, icon tourist accommodation, designed specifically for their unique sites. Southern Ocean Lodge will become the icon tourist Lodge for Kangaroo Island and the state. Catering for the rapidly expanding premium experiential tourism markets from the UK, Europe and USA, at present not adequately catered for in this state. It will complement and reinforce existing tourist ventures in promoting the Island internationally and provide

- longer duration visits
- reduced seasonality
- bigger spending visitors
- even more emphasis on the Island's unique ecology
- marketing of the Island's produce through the guests' restaurant.

Southern Ocean Lodge has also been identified as a strategic development project of critical importance to the State's tourism industry. The South Australian Tourism Plan 2003–2008 sets an ambitious target to grow tourism expenditure from $3.4 billion in 2003 to $5 billion in 2008. This target is also reflected in the South Australia Strategic Plan as the key target for the tourism industry.

To achieve this target (in a climate where South Australia's share of international tourists is declining), four critical success factors were identified in the South Australian Tourism Export Strategy. These are: improving air access, investment in new tourism product, development of a strong SA market brand and working with Tourism Australia.

Importantly the export strategy identified accommodation that acts as an experience in its own right as critical to tourism success. While Adelaide has a more than adequate supply of good quality accommodation for most periods during the year, there is clear evidence that regional SA is falling further behind its interstate competitors.

Southern Ocean Lodge will bring a tourism development to South Australia and Kangaroo Island that will rival the substantial nature based developments in other states such as Longitude 131 in the Northern Territory or Bay of Firs in Tasmania.

The development is consistent with South Australia's strategic tourism directions for accommodation.

Objective 3.2 in the South Australian Tourism Plan states,

Strategically develop accommodation

"..South Australia's style of regional accommodation development in recent times has been predominantly bed and breakfast. While this has been a positive trend, there is a clear gap and a need to develop viable medium scale accommodation (30–59 units), consistent with the State's core positioning and branding theme." The Responsible Nature based Tourism Strategy – a joint initiative of the South Australian Tourism Commission and the Department of Environment and Heritage takes this even further and aims to achieve:

"Three to five new or revitalized iconic nature based experiences by 2009".

Southern Ocean Lodge is a unique, signature development that will have benefits well beyond the provision of tourism accommodation. The development will have a direct impact on perceptions of the State and Kangaroo Island, help strengthen brand, increase marketing critical mass, improve demand levels and improve visitor yield. It has the capacity to significantly enhance the State's competitive position in nature based tourism.

13.5 Employment

Direct employment

The island provides a stable recruitment base for staff reducing the high staff turnover rates of many tourist developments. Island residents will be employed and trained as appropriate. The staff village will provide quality on site accommodation to allow selected local staff to partially live on site to minimise travelling at inconvenient times. It is expected that up to 32 full-time equivalent staff will be employed once the Lodge is fully operational.

Indirect employment

In addition, it is expected that there will be a flow-on effect to the rest of the Island:

- Services – maintenance, laundry, tourism operation (guided tours) Wildlife experts to lecture and guide, Guides for recreational activities eg fishing.

- Goods – the guests' restaurant will showcase Kangaroo Island products so as well as direct sales it will help promote the image of Kangaroo Island products to the country and world – stimulating further growth of these unique Kangaroo Island industries.

14. Noise

When assessing the noise impact from a development it is important that the background noise is taken into account. Background noise is not constant but varies with wind speed, weather and noise producing activities.

Kangaroo Island is generally considered to be a relatively windy part of South Australia and the south west coast of the Island is particularly windy. Summer winds are most frequently from the south east at 10 to 20 knots. In autumn the prevailing winds shift to the northwest and the wet season begins. The most frequent winter winds are from the northwest to west also ranging from 10 to 35 knots and generating what is frequently stormy surf conditions on the coast near Hanson Bay (Kangaroo Island INRM Plan, 2003). As such, it considered that the site already has an average level of background noise which is reasonably high when compared with many bushland settings.

The development site is approximately 2 kilometres from the main access point of South West River Road. The closest residential building to the proposed development site is the Hanson Bay Cabins which are over 1.5 kilometres from the site. Other private residential buildings are located to the north of the site and are a considerable distance from the site. It is considered unlikely that any noise from the development would carry to these locations. Noise generating activities are discussed in more detail below.

14.1 Construction

While some construction noise is unavoidable, it is relatively easy to control using appropriate work practices. Common sources of construction noise which may be used on this development include excavators, delivery trucks, electric saws and nail guns. In addition, the excavator will also be used in the implementation of the screw pile foundation system as described in Section 5. This process is proven to be very efficient and generates minimal noise unlike traditional concrete footings.

Measures to minimise noise on site are outlined in the Environmental Management Plan including:

- Noisy construction activities will be limited to daylight hours to limit any potential impacts on nocturnal fauna.
- All equipment will be properly maintained, with special attention to mufflers and other noise control devices.
- Between work periods, builders will shut down, or throttle to a minimum, machines such as backhoes, cranes, bobcats, loaders and generators.
- Builders should take care when dropping materials from a height—for example, into or out of a truck, or when loading or unloading scaffolding.
- Place noisy equipment in a location where least “carrying” of noise will occur.

The short-term effect of this work may lead to the movement of some fauna and bird species away from the area. However it is unlikely to affect fauna and bird species in the long term as it would be expected that these species will return once the construction stage is complete.

14.2 Operation

Once the Lodge is completed it is expected there will be minimal noise generated by the development. The only potential noise generating activities during operation will be from the diesel generators used as power supply for the development and traffic movements.

It is proposed to supply power to the Lodge via multiple diesel generators with a combined capacity of approximately 200 KVA. These will come on line with demand and will not be operating full-time. The generators will be housed in a sound attenuated building (refer drawings in Appendix D), with noise emission targets as shown in the table below.

Table 14.1 Noise emissions from diesel generators

Noise emission	Distance from source
65 dB(A)	1 metre
48 dB(A)	7 metres
39 dB(A)	20 metres

Traffic movements to the site are estimated at approximately average of 24 return vehicular movements per day, predominantly in daylight hours. Noise from traffic movements can be minimised by ensuring vehicles are well maintained, access tracks are in good condition and most movements take place during daylight hours.

15. Sustainability

15.1 Sustainability principles

In Australia, there are two fundamental documents outlining policy and discussions relating to 'Ecologically Sustainable Development' (ESD); *Australia's National Strategy for Ecologically Sustainable Development* (NSESD) and the *Intergovernmental Agreement on the Environment* (IGAE).

Although there is no universally agreed definition of sustainability the NSESD makes use of the following definition *"Using, conserving and enhancing the community's resources so that the ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased"* (Commonwealth of Australia, 1992, p6).

The principles of ESD that are outlined in the NSESD and IGAE can be discussed under five main headings.

- inter-generational equity
- intra-generational equity
- precautionary principle
- conservation of biological diversity
- internalisation of environmental costs.

Although it could be argued that no development is truly sustainable, the proposed Southern Ocean Lodge is applying the principles of sustainability in project planning and design, construction and operation.

15.1.1 Inter-generational equity

Inter-generational equity concerns offering future generation's environmental quality that is at least equivalent to that of the present generation. This is a stewardship principle and provides the ability of future generations to meet their own needs.

The Southern Ocean Lodge development is based on the principles of nature based eco-tourism. The siting of the facilities in the most appropriate area of the project site and that is accessible by existing cleared tracks minimises the area of vegetation clearing associated with the project. Minimising clearing, siting the development outside the 100 metre coastal zone, harvesting and reusing rainwater, and creating energy efficient facilities are all elements of the project that are consistent with the principle of inter-generational equity – they are all sustainable aspects of the project that will offer future generations an environment similar to that of the present generation.

The development is not providing the current generation with an enhanced quality of life at the expense of the ability of future generations to achieve the same or better. The encumbrances on neighbouring allotments also assist with the preservation of the area for future generations.

The Southern Ocean Lodge is consistent with the sustainability principle of inter-generational equity.

15.1.2 Intra-generational equity

Intra-generational equity concerns equity within single generations. Whilst the nature of the development dictates that some sections of the community will use the facility more than others, construction and operation of the development will not adversely impact any one sector of the community more than another.

The development is not inconsistent the principles of intra-generational equity.

15.1.3 Precautionary principle

The precautionary principle is defined as: where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Based on the outcomes of the environmental impact assessment undertaken as part of the PER, the development does not present a threat of serious or irreversible environmental damage. Whilst a number of environmental impacts have been identified, these have been addressed where possible in the design and siting of the project as well as the development of various management and mitigation measures as outlined in the EMP.

The precautionary principle can be evidenced in the project through throughout the design process for the development and as well as through the adoption of measures to prevent environmental impacts and degradation i.e. the EMP.

15.1.4 Conservation of biological diversity

Conservation of biological diversity is a key component of sustainability. In addition to conserving the natural ecology, conservation of biological diversity is considered to underpin human well being through the provision of biological services such as those that are essential for the maintenance of soil fertility and clean fresh water and air.

Minimising the clearing associated with the project will reduce potential impacts upon the biological diversity of the site and in turn provide significant cultural, economic, educational, environmental, scientific and social benefit to both the development and the surrounding regional area.

The project design rational and adoption of mitigation measures illustrates the project's consistency with the sustainability principle for conservation of biological diversity.

15.1.5 Internalisation of environmental costs

Internalisation of environmental costs is fundamentally about valuing environmental factors in the valuation of assets and services. It encourages the thought process that users of goods and services should pay prices based on the full life cycle costs.

The development of the Southern Ocean Lodge has adopted the fundamentals of a 'triple bottom line' approach in that the siting, design and development of the project has considered economic, environmental and social factors.

The $10 million dollar project will provide economic benefits to both state and local tourism sectors. Environmentally, the development is based on the principles of eco-friendly tourism that includes energy efficient design, a site self-sufficient water supply based on rainwater harvesting, waste minimisation as well as on site wastewater treatment and reuse. Kangaroo Island, in part, relies on tourism and will therefore experience benefit from the development. The size and nature of the development indicates that there is minimal long term impact from a community services.

15.2 Project sustainability objectives and opportunities

In order to effectively demonstrate the application of sustainability principles within the project, the following table has been developed outlining the key sustainability indicators and objectives and their application through the various phases of the Southern Ocean Lodge development.

Sustainability indicators	Sustainability indicator objective	Project application
Water Use and Conservation	Protection of water quality	Rain water and waste water will be re used on site and therefore minimise potential off site impacts surrounding on coastal environments (terrestrial and aquatic).
	Minimisation of water use	Rain water will be collected and reused following filtration and UV treatment thereby minimising additional demand on alternative water supply options.
	Wastewater reuse	Wastewater generated by the operations will be collected and reused on site for landscaping within the staff quarters.
Energy Conservation	Minimisation of energy consumption over the life of the project	Buildings designed on an east west alignment to maximise heat absorption in winter and avoid excessive heat in summer.
		Corridor acts as a mini-greenhouse, absorbing heat in winter and transferring it to the rooms via low-speed fans.
		The narrow linear floor plan will encourage cross ventilation for summer cooling.
		Large window areas face north for passive winter heat gain.
		Full insulation of external walls and roofs has been incorporated in the design.
		Roof mounted solar collectors will be used for hot water augmented by a diesel boiler when required.

Sustainability indicators	Sustainability indicator objective	Project application
Solid Waste Minimisation	Use of recycled and/or recyclable materials	Organic waste will be composted on site for the productive garden.
	Minimisation of solid waste to landfill	Hard waste generated during both construction and operation will be separated for collection and delivery to appropriate facilities off site.
Biodiversity Conservation	Protection of flora and fauna	A comprehensive review of flora and fauna of the site has been commissioned and its recommendations adopted.
		Guest movements will be confined to designated paths &/or where appropriate only with guided tours.
		Revegetation will be with entirely endemic species.
		There will be no loss of rare vegetation communities or significantly reduced habitat for local birds.
	Sustainable land management practices	The buildings are set back more than 100 metres from the mean high water mark.
		Rehabilitation of scalded areas and areas damaged by construction will take place.
	Weed management	Weeds will be managed through the Environmental Management Plan to prevent infestation or spread.
	Feral cat eradication	A feral cat eradication program will be implemented once the development is operational.
Minimisation of Noise and Air Emissions	Minimisation of harmful air emissions, including greenhouse gases	Use of solar powered energy.
	Reduction of noise generating activities	Managed construction processes and operational activities restricted to benign eco friendly pursuits.
Social Inclusion	Minimisation of social impacts	Direct employment of 20 people with substantial indirect employment.
	Contribution to social inclusion	Development contributes to a stronger more enterprising economy by ensuring increased prosperity from which everyone can benefit.
Enhancement of Visual Amenity	Preservation or improvement of visual environment	The Lodge is located below a ridge line and partially set into the side of the ridge which maximises preservation of existing views and environment.
		Individual car parking bays will be formed within the existing vegetation to avoid large unshaded and visually dominant cleared areas.

15.3 Sustainability monitoring

Monitoring of the project's Sustainability monitoring will be primarily be focused on the maintenance and improvement of the environmental integrity of the site (including constructed site facilities). Once operational, transport use, water and energy consumption, waste generation and revegetation activities will be monitored and recorded on a yearly basis to determine if the development is maintaining its designed level of sustainability.

In the event monitoring indicates that levels of sustainability are not as high as anticipated a review of site operations and activities will be undertaken and where appropriate, the Operational Environmental Strategies within the EMP will be revised to assist in improving sustainability of the operations.

Specific details outlining sustainability monitoring activities are outlined in Part D.

16. Climate

The climate on Kangaroo Island is influenced by the surrounding Southern Ocean and the low elevation of the island. It is generally cool and temperate with a distinctive rainfall peak in winter (with a mean winter rainfall of 110.5 mm). The climate on Kangaroo Island is influenced by the surrounding Southern Ocean and the low elevation of the Island and therefore has a milder climate than Adelaide and the Mount Lofty Ranges.

The hottest months are January and February, often extending into March, (mean monthly maxima 20–25°C) and the coldest is August (mean monthly maxima 13–15°C).

The average rainfall on the Island ranges from more than 900 mm on the highest parts of Kangaroo Island to less than 500 mm on low-lying lands in the North East of the Island. Distribution of rainfall is distinctly seasonal with 42–49% of average annual totals recorded in winter and only about 10% in summer. Spring and autumn each receive an even 23% of the annual totals. Coastal regions commonly experience additional precipitation through heavy dews and coastal fogs. (Kangaroo Island INRM Plan, 2003)

Wind also plays a role in the Kangaroo Island climate. Kangaroo Island is generally considered to be a relatively windy part of South Australia. Summer winds are most frequently from the south east at 10 to 20 knots. In autumn the prevailing winds shift to the northwest and the wet season begins. The most frequent winter winds are from the northwest to west also ranging from 10 to 35 knots. (Kangaroo Island INRM Plan, 2003)

The main climate characteristics can be seen in Table 16.1.

Table 16.1 Climate characteristics of Kangaroo Island (BOM, 2006)

Climate indicator	Values
Mean Daily Maximum Temperature (deg C)	Ranges from 14.4–24.6
Highest Maximum Temperature (deg C)	40.0 (in Jan)
Mean Daily Minimum Temperature (deg C)	Ranges from 9.1–14.7
Lowest Minimum Temperature (deg C)	2.9 (in Sep)
Mean 9 am Wind Speed (km/hr)	Ranges from 18.8–23.7
Mean 3 pm wind speed (km/hr)	Ranges from 18.0–23.8
Mean Rainfall (mm)	Ranges from 16.3–110.5

17. Fire management

17.1 Introduction

This report has been prepared to address specific bushfire risk/hazard management issues and follows consultation and a site inspection with Brian Menadue – Senior Development Assessment Officer, Development Assessment Unit (Bushfire Protection), Country Fire Service and John Cribb of Commercial and Domestic Fire Services. The CFS has indicated in principle support of the fire management plan proposed herein.

17.2 Bushfire risk factors

17.2.1 History

In the past, large bushfires were frequent events on Kangaroo Island as burning was used to manage hazards and clear vegetation for the establishment of agricultural land. This has been reduced over the past two decades as legislation controlling the clearance of native vegetation has been implemented and clearance is subject to approval from the Native Vegetation Council.

Lightening strikes and burning off are the main fire causes on the western end of the Island burning thousands of hectares on undeveloped areas. Recent fires included the Mt Taylor fire in December 2000 in native vegetation and Gosse fire in January 2001 on farming land. Recent wildfire events have resulted in the destruction of many thousands of hectares.

The Hanson Bay area may have been effected by three major fires that occurred at the western end of the island in 1918, 1928/29 and 1931. The fires burnt large areas of Flinders Chase National Park through to the Kelly Hill Conservation Park.

17.3 Climate

Kangaroo Island's climate is best described as temperate and tends to be a few degrees cooler in summer and warmer in winter than much of mainland South Australia. The annual average rainfall can reach 900 mm at the western end of the Island. At Cape Bouger, which lies 8 kilometres to the west of the proposed development, the long term mean rainfall is 629 mm and is characterised by a winter dominant rainfall pattern.

Peak bushfire season occurs during summer and autumn (December to March) where the landscape changes, with conditions turning to dry and warm, with temperatures ranging from 20º C to 32ºC. The central areas of the Island occasionally experience temperatures of up to 35–40ºC.

17.4 Vegetation

The site is located within the South Coast Regional Ecological Area, which comprises the largest continuous area of native vegetation occurring on Kangaroo Island. Within this 77,213 hectare area, 86% of native vegetation remains.

The 110 hectares owned by Baillie Lodges is predominantly covered by dense mallee vegetation (2 to 3 metres in height) apart from low coastal shrubs that prevail within 100 to 150 metres of the coastal cliffs. The dense mallee vegetation that occurs across the majority of the site presents a significant bushfire hazard.

17.5 Development issues

17.5.1 Access and egress

The South Coast Road is the main east-west highway that provides access to Flinders Chase and the western end of the Island.

Access to Hanson Bay from South Coast Road is via South West River Road. This is a 4 kilometre long, unsealed public road with an approximate width of 5 metres. South West River Road is bound by the dense mallee vegetation of Kelly Hill Conservation Park to the east and a private sanctuary to the west. Tree canopy overhangs the public road for a 2 kilometre section.

From the South West River Road, access to the development site is via a 4 to 5 metre wide existing access track that winds its way through the dense mallee vegetation to the development site. In places the surface of the track is sandy with overhanging vegetation. The surface of the track is proposed to be upgraded with crushed limestone to provide all weather access for conventional vehicles. The boundaries of the site have previously been cleared to a width of 4 to 5 m to provide vehicle access however they are now overgrown.

17.5.2 Siting and design

The development site is located 100 to 200 metres from the coast and surrounded on the north, east and west sides by the dense mallee vegetation that occurs consistently throughout this region. On the southern side, the site benefits from its proximity to the southern ocean and the low coastal vegetation (predominantly 300 mm to 500 mm) that affords significantly reduced bushfire threat.

The main guest facilities of reception, lounge, restaurant and accommodation suites have been designed as a continuous structure approximately 100 metres from the coast.

The siting and layout of the main building offer advantages in that:

- The long southern frontage is protected from extreme bushfire exposure by the sea and low coastal vegetation.
- The ridge to the west of the lounge provides some protection reduction in wind and fire intensity.
- The continuous linking of guest facilities provides a structure more easily protected than separate individual structures.

The staff village of 8 individual structures is located on a relatively flat area more than 150 metres from the coast. A circular access road separates the village from the surrounding mallee scrub and acts as a firebreak. Low indigenous vegetation between the units is irrigated by treated waste water. A separate building housing the spa retreat is adjacent to the village.

17.6 Bushfire risk management strategies

A combination of passive and active bushfire management strategies are proposed within this report to comply or exceed statutory requirements and minimize the risk to life and property without the need for large scale vegetation clearance.

17.6.1 Passive measures

17.6.1.1 Vegetation modification

It is proposed to maintain a 20 metre band of modified vegetation (pruned to 300 mm high) surrounding the guest suites and main building and staff village (within the fire break/access road to act as a fuel reduced zone and reduce fire intensity within close proximity to the building (refer Vegetation Plan in Appendix D).

Much of the area between the coast and the building is existing low dense vegetation, 300 to 500 mm high, naturally “pruned” by the high winds. In most instances this vegetation could remain in close proximity to the buildings, however may need to occasionally be pruned to maintain the 300 mm height.

On the north side of the suites, the vegetation type is similar but increasing in height (up to 2 to 3 metres in some cases). Where necessary this mallee vegetation may need to be thinned and lower vegetation pruned to a height of 300 mm, up to 20 metres from the building.

Existing bare areas on the north side would be re-vegetated with similar low indigenous species, propagated from seeds collected on site. This strategy will maintain habitat and ground cover to prevent erosion.

Existing native vegetation within the circular ring road of the staff village will require significant clearance and modification. This is in part due to the clearance required to accommodate the staff cabins and in part due to the additional nutrients that will be irrigated within this area from the waste disposal system. Low indigenous species will be replanted within the circular ring road.

17.6.1.2 Building construction

All buildings will be constructed to follow the principles of Australian Standards AS3959-1999, Level 3 Construction, as recommended for Extreme Fire Risk.

This will include:

- non flammable materials for all external surfaces, eg steel, aluminium, fibre cement, no exposed timber
- all glazing toughened, with openings protected by stainless steel mesh
- any under floor spaces sealed; vents covered with stainless steel mesh
- foil under all roofing and roof spaces sealed
- metal fire shutters will be provided to all windows in external walls to the Designated Safe Refuge area described below.

17.6.1.3 Designated safe refuge

In addition to the above measures, it is proposed that a section of the main building be constructed to a higher standard of fire resistance to provide a designated safe refuge.

This area includes the kitchen, toilets and presentation room and is highlighted on the plan in Appendix D. The safe refuge provides the following additional fire protection measures to the rest of the building:

- supplies and communications equipment can be permanently available
- the design features smaller windows than other sections for the development that can be protected externally by steel fire shutters
- fire resistant doors and fire resistant internal walls (i.e. stone) will separate the refuge from the more exposed lounge.

In the event of a fire, it is proposed staff and guests would remain in the main lounge area as the fire approached and then proceed to the specific refuge area when directed by trained staff.

17.6.2 Active measures

The active protection measures will provide the most comprehensive “state of the art” protection of any facility in the state and represent years of research and development by John Cribb of Commercial and Domestic Fire Services Cribb Engineering Pty Ltd and Brian Menadue, Senior Development Assessment Officer, SA Country Fire Service.

17.6.2.1 Perimeter vegetation saturation

Butterfly sprinklers, raised above the height of the vegetation (i.e. 500 mm) spaced to ensure 100% overlap and located within 10 metres of the buildings, will completely surround all buildings. They will saturate the modified band of vegetation that surrounds all buildings. As well as suppressing a fire, the saturated vegetation will increase humidity and with wind affects assist to raise radiant heat above the buildings.

17.6.2.2 Window protection

Sprinklers will be mounted under the eaves at 3 metre centres above all windows to reduce spark and ember attack and radiant heat on the windows.

17.6.2.3 Roof protection

Roof mounted sprinklers will be located above gutters and near roof ridgelines to limit spark and ember attack and reduce radiant heat impact.

17.6.2.4 Hose reels

Fifteen external hose reels with 30 metre hoses provide the opportunity for additional active fire suppression including the ability to extinguish spot fires prior to and after the fire front passes. A fire suppressant foam would be added to this supply as described in Section 17.6.2.

17.6.2.5 Water supply and pumping system

All sprinklers and hose reels will be served by a continuous loop line, controlled by a diesel powered pump and a multi stage electric jacking pump (to cut in for initial demand). A dedicated water supply of a minimum 150,000 litres will be maintained at all times to supply this system. The quantity of the water is calculated to enable the continuous operation of all sprinklers for a minimum of one hour continuous operation with the backup of hose reels. The water supply will be housed in underground concrete tanks and/or galvanized metal tanks.

The active fire protection measures are depicted on a Fire Protection System Plan (Appendix D).

17.7 Operational matters

17.7.1 Evacuation

Due to the dense mallee vegetation, the South West River Road and the existing access track will present a significant hazard to private and emergency services vehicles during the event of a bushfire. The recent bushfire on the Eyre Peninsula demonstrated that the greatest risk to life occurs during evacuation by people when the threat of bushfire is imminent.

The building will be designed as a safe refuge within which guests and staff can be safely accommodated without the need for additional assistance.

The proximity of beaches protected by high cliffs (immediately below the site) or sand dunes (to the east) would enable an alternative safe area that may be considered as guests could be guided by staff. (The high staff/guest ratio may encourage this strategy). Problems of dehydration, radiant heat and smoke inhalation have been experienced on other open beach safe areas, but the topography and trained staff may alleviate these problems.

17.7.2 Training

With the strategy of development being sustainable in not requiring outside assistance, training of staff in bushfire safety and building protection assumes a high priority. Staff would undertake training courses appropriate to the fire risk and to the SA CFS standards required for the complex and environment. This would be reinforced by a program of equipment testing and fire drills for all staff.

The provision of an on site fire unit, National Parks type, will be considered.

17.7.3 Emergency services

A helipad will be provided adjacent to the car park. This will provide a base for emergency evacuation for the south west of the island and possibly a refilling base for water bombing helicopter servicing the adjacent parks (a refilling hydrant will be provided for this purpose).

17.8 Environmental considerations

17.8.1 Vegetation modification and clearance

Southern Ocean Lodge has been designed with fire protection measures in place to ensure it is not dependant on passive building protection design, external assistance or evacuation. This enables efforts to be directed towards minimising vegetation modification and or clearance to those areas where it is most needed.

The Native Vegetation Act and Regulations contains exemptions that enable vegetation clearance of 5 metres for access tracks and fuel breaks. If a 5 metre fuel break for fire control purposes were established along the 3 kilometres of property boundaries, the vegetation clearance would be in the order of 1.5 hectares.

Vegetation clearance and or modification along the existing access track and property boundaries is not proposed due to the extent of clearance that would be required to allow safe access and egress in the event of a fire. The nature of the dense mallee vegetation in this location means that establishing a fuel break for fire control purposes along the access track or property boundaries would require clearance of 15 metres wide or greater to be effective. If this type of clearance were to occur, similar clearance would also be required along the South West River Road.

Strategies to minimise vegetation clearance and modification for fire control purposes include:

- No clearance along property boundaries or existing access tracks for fuel break purposes for the reasons discussed above.
- Vegetation clearance to the extent necessary to accommodate the building footprints and associated works such as driveways and vehicle manoeuvring areas.
- Vegetation modification (to a height of 300 mm) will be undertaken in a 20 metre band surrounding the perimeter of the main building and complex. Modification of the vegetation to a height of 300 mm is sufficient height to ensure satisfactory fuel reduction however also enable survival of the species.
- Rehabilitation of scalded areas using locally indigenous species is proposed. This predominantly occurs within the modified 20 metre band that surrounds the perimeter of the main building and complex and to a lesser degree, the spa retreat.

The extent of vegetation clearance and modification is shown below and depicted on the Vegetation Plan – contained in Appendix D.

- Vegetation clearance 1 hectare
- Minor vegetation modification 1.8 hectare
- Rehabilitation of scalded areas 0.4 hectare

17.8.2 Fire fighting foam

Fire fighting foams are composed principally of surfactants and act by increasing water efficiency in a fire fighting situation. They have been used effectively in fire protection for over half a century. In this time, the technologies used in formulating and discharging foam have evolved and increased in their effectiveness. As a result of environmental public

awareness, manufacturers have also developed new formulations to assist in minimising environmental issues associated with use of the foams.

Potential impacts associated with fire foam use are predominantly related to two areas – vegetation and aquatic ecosystems. The limited information on effects of fire retardant usage on Australian vegetation was initially raised in 1987 however few advances have been made in investigating the effects of fire fighting chemicals on vegetation since that time (Adams and Simmons, 1999).

Potential impacts on vegetation include leaf death, scalding, and changes associated with the addition of nitrogen and phosphorous into the environment however the level and severity of these impacts are varied depending on vegetation associations, species as well as climate and weather patterns.

Available information suggests that the entry of fire fighting chemicals into aquatic environments could adversely affect aquatic invertebrates and disrupt ecosystem functions; however no studies have been carried out on Australian species (Adams and Simmons, 1999). Based on research in the US, the potential impacts on aquatic species include, direct toxicity to fish and invertebrates, potential increases in algal biomass, decreased ability to obtain oxygen and inhibited respiration. The degree and level of impact varied in species and in ecosystem (e.g. lake, river etc).

Foams are highly effective in suppressing and extinguishing fires and their use in Australia is increasing.

As recommended by the CFS (during consultation regarding the project) fire fighting foams have been included as a component of the fire management strategies and controls to be adopted in the Southern Ocean Lodge development.

Use of fire fighting foam on site will only occur in an emergency situation. In the event of a bushfire emergency it is also likely that the CFS will deploy foam retardant to control and suppress outbreaks of fire in the area.

To address potential environmental issues associated with foam use as part of the development, the following mitigation measures will be implemented on site:

- Foams will only be deployed in emergency situations and will not be used on site for prescribed (controlled) burning operations.
- Only shot term retardants (foam) will be used (as required) on site – short term foams are dependent on the water they contain unlike long term retardants which remain effective until removed by rain or erosion.
- Foam use will be limited in areas directly adjacent (less than 50 metres from the coast line).

Given the limited use on site and the mitigation measures proposed, it is considered that there is minimal environmental risk associated with fire fighting foam use as part of the development.

18. Emergency procedures

Staff at the Southern Ocean Lodge must have the ability to respond promptly and appropriately in the event of a medical emergency.

The following procedure has been developed for implementation during operations:

1. Southern Ocean Lodge calls 000 and is connected with the SA Ambulance Service in Adelaide.

2. First Response Group (Kangaroo Island Ambulance) is notified and dispatched from Gosse (Western Districts Sport Oval). Concurrently, an additional ambulance back up is dispatched from Kingscote or Parndana and the Adelaide based rescue helicopter and treatment team (Rescue Five 1) is placed on standby.

3. The First Response Group focuses on Assessment and Communication and the need for more resources such as medivac (Helicopter airlift from Southern Ocean Lodge or Royal Flying Doctor Service (RFDS) from Kingscote or closer strip i.e. Vivionne Bay).

4. If the patient is dispatched to Kingscote Hospital they may be transferred to the back up Ambulance en-route.

5. An RFDS plane transfer could be called by Kingscote Hospital if the situation worsens.

To ensure readiness and effective emergency response on site the following will also be implemented on site:

- Key Lodge personnel to be first aid trained.
- Lodge to hold RFDS medical kit, oxygen, possibly a small defibrillator, stretcher and supplies for trauma and pain relief.

PART D

ENVIRONMENTAL MANAGEMENT PLAN

19. Project details

19.1 Project vision

Southern Ocean Lodge is proposed as Australia's leading example of premium nature-based tourism. The unique coastal wilderness location, stunning views, contemporary environmental design, locally sourced food and beverage, personalized interpretive and exploration activities combined with a leading edge wellness spa, will ensure status as a South Australian tourist icon.

Baillie Lodges vision for the project is:

To concept, design, develop and operate Southern Ocean Lodge as Australia's leading example of premium nature based tourism:

- *unique coastal location*
- *stunning views*
- *contemporary architectural design*
- *locally influenced food and beverage*
- *personalised interpretive and exploration activities*
- *leading edge wellness spa*
- *creating a South Australian icon that becomes a discerning destination of choice.*

19.2 Project details

The proposed development is located at Hanson Bay, on the south-west coast of Kangaroo Island, South Australia. The development will involve the establishment of the Southern Ocean Lodge, comprising 25 contiguous accommodation suites and associated facilities including: reception/main Lodge, spa retreat and staff village.

The development involves the construction of a:

- Main Lodge – 25 accommodation suites and associated infrastructure
- spa retreat
- staff village.

Ancillary activities associated with the development will involve the establishment of:

- an access track (upgrading of existing)
- signage.

20. Environmental management

20.1 Introduction

Baillie Lodges are committed to creating the Southern Ocean Lodge to be one of Australia's leading examples of premium nature based tourism.

With the ethos of the development being an environmentally sustainable nature-based tourism facility which will provide a range of educational/interpretive wildlife experiences, Baillie Lodges have also adopted various environmental management techniques throughout all stages of the development.

The environmental management processes adopted by Baillie Lodges in the development of the project have been to:

- Consider the risks of the project and determine appropriate measures to address them.
- Adopt design principles for the development which minimises environmental impacts and enhances use of environmentally sustainable practices.
- Facilitate environmental impact assessment activities during the preparation of the Public Environmental Report (PER) for the project planning and approval stages.
- Produce a framework for control of construction and operational impacts including performance requirements and procedures associated with compliance auditing.
- Provide the community with the assurance that the activities undertaken by Baillie Lodges are being managed in an environmentally acceptable manner.

This Environmental Management Plan (EMP) is an internal Baillie Lodges document that details the environmental management strategies to be employed during all phases of the development e.g. siting and design, construction and operation. A final EMP will be developed by Baillie Lodges to incorporate any comments/conditions of approval following determination of the Major Development application process.

The structure of the EMP is as follows:

Section 1: Project details

Outlines project details including location and infrastructure of the project site.

Section 2: Introduction and background

Introduces the EMP and outlines the need as well as aims and objectives of the Plan. Management responsibilities are also outlined for the various stages of the project.

Section 3: Project design environmental strategies

A series of environmental strategies have been developed for the various environmental aspects and impacts associated with the design of the project. Each strategy outlines the underlying design principles and objectives as well as how this has been adopted on the project.

Section 4: Construction environmental strategies

A series of environmental strategies have been developed for the various environmental aspects and impacts related to the construction of the project. Each strategy has a specific objective(s), and contains various actions with associated responsibilities for sign off. Provision has also been included for implementation and sign off.

Section 5: Operational environmental strategies

A series of environmental strategies have been developed for the various environmental aspects and impacts related to the operations of the project. Each strategy has a specific objective(s), and contains various actions with associated responsibilities for implementation and sign off.

20.2 Need for the EMP

Baillie Lodges is committed to developing an environmentally sustainable nature-based accommodation development.

This EMP has been developed to demonstrate Baillie Lodge's commitment to environmental management and corporate citizenship and to address the issues raised in the Planning SA *Guidelines for the Preparation of a Public Environment Report for the Southern Ocean Lodge, Hanson Bay, Kangaroo Island Proposal. November 2005.*

20.3 Aims and objectives of the EMP

The EMP is an internal management tool to facilitate the adoption of environmentally responsible work practices during the completion of activities associated with the project.

The aims and objectives of the EMP are to:

- Identify the environmental issues and requirements that must be addressed in the development of the project.
- Outline the environmental management practices to be implemented by Baillie Lodges to minimise adverse environmental impacts associated with all phases of the project. A number of the strategies for environmental management have been developed from mitigation measures and recommendations from associated environmental studies for the site and these have been included in the EMP.
- Assign responsibility and reporting requirements for environmental management throughout the project.

If approved, Baillie Lodges will review this EMP to include any additional management activities that may result from the assessment process.

20.4 Management structure and responsibilities

20.4.1 Project Manager

The Baillie Lodges Project Manager will be responsible for the following activities:

- Adopts eco-friendly and sustainable environmental design characteristics within the development and siting of the project.
- The development and finalisation of the Public Environmental Report and Environmental Management Plan for the project.
- Finalisation of the EMP following development approval (if approved) (i.e. incorporating relevant conditions of development approval into the EMP to ensure adoption during construction and operational phases of the project).
- Facilitating regular reviews and updates of the EMP as required.
- Ensuring use of the EMP by the Construction Project Manager.

Project Design Environmental Strategies are outlined in detail in Section 21.

20.4.2 Construction Project Manager

The construction of the Southern Ocean Lodge will be overseen by a Construction Project Manager who will be responsible for the following environmental related activities:

- Implementation of the Construction Environmental Management Strategies including Construction Management Plan and scheduling.
- Detailing the environmental constraints of the site and management measures to be implemented during construction to building and construction sub-contractors.
- Organising the completion of environmental inspections during construction.
- Following up Contractor non compliance and corrective action requirements.

The Construction Project Manager will be supported by a Construction Foreman/Supervisor who may at any time be delegated the above responsibilities.

Construction Environmental Strategies are outlined in detail in Section 22.

20.4.3 Operations Manager

The operation of the Southern Ocean Lodge will be undertaken by a team of 20 personnel and overseen by an Operations Manager.

During operations it is anticipated that environmental impacts associated with the project will be minimal however to demonstrate its commitment to the principles of sustainability, Baillie Lodges will implement a number of ongoing environmental management strategies during site operations.

Details of the operational environmental strategies are outlined in Section 23. The Operations Manager (or nominated delegate) will be responsible for the implementation of these strategies.

20.5 Additional requirements

20.5.1 Legislative requirements

In addition to adhering to this EMP, all activities associated with the Southern Ocean Lodge must comply with the relevant legislation and associated regulations. These include but are not limited to the following:

- *Aboriginal Heritage Act 1988*
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
- *Agricultural Chemicals Act 1955*
- *Dangerous Substances Act 1979*
- *Development Act 1993*
- *Environment Protection Act 1993*
- *Environment Protection Biodiversity Conservation Act 1999*
- *Environment Protection (Water Quality) Policy 2003*
- *Environment Protection (Air Quality) Policy 1994*
- *Environment Protection (Burning) Policy 1994*
- *Environment Protection (Industrial Noise) Policy 1994*
- *Environment Protection (Machine) Noise Policy 1994*
- *Environment Protection (Waste Management) Policy 1994*
- *Fire and Emergency Services Act 2005*
- *Heritage Act 1993*
- *Land Acquisition Act 1969*
- *Local Government Act 1999*
- *Natural Resource Management Act 2004*
- *National Trust of South Australia Act 1955*
- *Occupational Health, Safety and Welfare Act 1986 (and associated regulations)*
- *Petroleum Products Regulations Act 1995*
- *Public and Environmental Health Act 1987*
- *Sewerage Act 1929*
- *National Parks & Wildlife Act 1972.*

20.5.2 Policies, guidelines, standards and codes of practice

The project will also comply with:

Guidelines and handbooks

- EPA Guideline. Bunding and Spill Management (January 1994).
- EPA Handbook. Pollution Avoidance on Commercial and Residential Building Sites (2004).
- EPA Information. Construction Noise (July 2002).

Codes of practice

- National Code of Practice [NOHSC: 2017(2001)] Storage and Handling of Workplace Dangerous Goods.
- Stormwater Pollution Prevention: Code of Practice for the Building and Construction Industry. Environment Protection Agency, 1999. Government of South Australia.

Standards

- AS/NZS 1940 Storage and handling of flammable and combustible liquids.
- AS/NZS 3780.8 Storage Tanks and Bund Design.

20.6 Liaison and government consultation

For issues associated with the project as a whole, liaison with Government agencies and representatives will be undertaken by Baillie Lodges Project Manager.

21. Project design environmental strategies

The following environmental strategies have been developed as part of the overall planning for the project. Each strategy addresses a particular environmental issue that has been considered during the project design.

21.1 Project siting, design and visual impact

Objectives:	**Design a premium nature based tourism facility with contemporary architectural design that is in harmony and balance with its surrounding coastal wilderness location.** **Minimise the visual impact arising from the construction and operation of the Southern Ocean Lodge.**

Management strategy and actions	Responsibility	Status
Design facilities to follow contours of the land i.e. step suites down to follow contours.	Baillie Lodges Project Manager / Architect	Implemented in design
Minimise visual impact and increase synergy with surrounding area by adopting curved plan forms and overhanging curved iron roofs to emphasise the low profile of the facilities.	Baillie Lodges Project Manager / Architect	Implemented in design
Maintain the natural bush character of the landscape by designing project to minimise removal of vegetation.	Baillie Lodges Project Manager / Architect	Implemented in design
Adopt materials suitable for longevity in the harsh coastal environment.	Baillie Lodges Project Manager / Architect	Implemented in design
Adopt building colours that assist in minimising visual impacts of development and create synergies with surrounding environment.	Baillie Lodges Project Manager / Architect	Implemented in design

21.2 Water supply and management

Objective:	**Design a water supply system for the Southern Ocean Lodge based on site self sufficiency and minimising the need for water from off site sources e.g. mains, water supply bores etc.**

Management strategy and actions	Responsibility	Status
Develop a site water balance to determine water requirements of site and potential supply options.	Baillie Lodges Project Manager / Architect	Implemented in design
Design site water supply to maximise harvesting of stormwater/rainwater from site buildings. Include water storage and treatment facilities (filtration and UV treatment) to facilitate reuse on site.	Baillie Lodges Project Manager / Architect	Implemented in design

Management strategy and actions	Responsibility	Status
Investigate possible options for additional water supply requirements e.g. bores for use in fire fighting and domestic amenities (toilet flushing) etc.	Baillie Lodges Project Manager / Architect	Implemented in design

21.3 Wastewater management

Objective:	Design a wastewater treatment system for the development that allows treatment and beneficial reuse onsite.

Management strategy and actions	Responsibility	Status
Investigate options for a site wastewater treatment system that allows onsite treatment and beneficial reuse.	Baillie Lodges Project Manager / Architect	Implemented in design
Investigate suitable irrigation techniques e.g. sub surface, surface taking into consideration soils type and vegetation on the site.	Baillie Lodges Project Manager / Architect	Implemented in design
Develop and include elements of wastewater system in project design.	Baillie Lodges Project Manager / Architect	Implemented in design

21.4 Solid waste minimisation and management

Objective:	Design the Southern Ocean Lodge with specific solid waste minimisation and management principles.

Management strategy and actions	Responsibility	Status
Incorporate in building design the use of recyclable materials.	Baillie Lodges Project Manager / Architect	Implemented in design
Include in design provisions for recycling of site solid waste e.g. glass, plastics, paper etc.	Baillie Lodges Project Manager / Architect	Implemented in design

21.5 Chemicals and hazardous materials

Objective:	Design chemical and hazardous materials storage areas associated with the Southern Ocean Lodge in accordance with Australian Standards to avoid potential impact on the environment and human health.

Management strategy and actions	Responsibility	Status
Review Australian Standard and EPA requirements for storage and bunding of fuels.	Baillie Lodges Project Manager / Architect	Undertaken during design

Management strategy and actions	Responsibility	Status
Review chemicals to be stored on site to ensure storage and segregation requirements are adequately identified prior to design of facilities.	Baillie Lodges Project Manager / Architect	Implemented in design
Design facilities in accordance with Australian Standard and EPA requirements and taking account of segregation requirements for different materials.	Baillie Lodges Project Manager / Architect	Implemented in design

21.6 Stormwater management and erosion control

Objective:	**Design the project to minimise the volume of soil displaced during construction and operation and to protect existing drainage systems and nearby waterways from silt and chemical contamination.**

Management strategy and actions	Responsibility	Status
Design site facilities to minimise vegetation clearance and associated potential for wind erosion, surface erosion and sedimentation.	Baillie Lodges Project Manager / Architect	Implemented in design
Design site access using existing cleared access track. Minimise required clearing of existing track.	Baillie Lodges Project Manager / Architect	Implemented in design
Include in the Construction Management Plan the provision for gradual clearing of the site to minimise clearing and associated soil erosion risk.	Baillie Lodges Project Manager / Architect	Implemented in design
Design facilities to minimise excavation requirements and associated movement and stockpile of fill material.	Baillie Lodges Project Manager / Architect	Implemented in design

21.7 Noise and vibration

Objective:	**Design and site the Southern Ocean Lodge to minimise potential noise impacts on surrounding areas during construction and operation of the development.**

Management strategy and actions	Responsibility	Status
Design development to require no blasting during construction for establishment of foundations.	Baillie Lodges Project Manager / Architect	Implemented in design Design will use screw piles for foundations to negate need for drilling etc
Include construction times and noise requirements in Construction Management Plan.	Baillie Lodges Project Manager / Architect	Implemented in design

21.8 Air quality

Objective:	Design and site the Southern Ocean Lodge to minimise potential air emissions associated with construction and operations.

Management strategy and actions	Responsibility	Status
Design site facilities to minimise vegetation clearance and associated potential for dust generation.	Baillie Lodges Project Manager / Architect	Implemented in design
Design site access using existing cleared access track.	Baillie Lodges Project Manager / Architect	Implemented in design
Include in the Construction Management Plan the provision for gradual clearing of the site to minimise clearing and potential for dust generation.	Baillie Lodges Project Manager / Architect	Implemented in design
Design facilities to minimise excavation requirements and associated movement and stockpile of fill material.	Baillie Lodges Project Manager / Architect	Implemented in design

21.9 Bushfire management

Objective:	Design and site the Southern Ocean Lodge to meet Country Fire Service criteria in accordance with relevant legislation, codes of practices and policies.

Management strategy and actions	Responsibility	Status
Liaise with Country Fire Service representatives during design to determine requirements for clearing, provision of fire fighting resources.	Baillie Lodges Project Manager / Architect	Implemented in design
Obtain sign off from CFS regarding the adequacy of bushfire management techniques included in design.	Baillie Lodges Project Manager / Architect	Implemented in design
Incorporate requirements in final design of project.	Baillie Lodges Project Manager / Architect	Implemented in design

21.10 Native vegetation

Objective:	Design and site the Southern Ocean Lodge to minimise the impact on native vegetation.

Management strategy and actions	Responsibility	Status
Undertake a site vegetation assessment to determine site vegetation associations and levels of significance.	Baillie Lodges Project Manager / Architect	Completed
Design site facilities to minimise vegetation clearance i.e. use cleared areas on site where possible e.g. existing access track into site, incorporate facilities around vegetation e.g. carparks.	Baillie Lodges Project Manager / Architect	Implemented in design

21.11 Native fauna

Objective:	Design and site the Southern Ocean Lodge to minimise the impact on native fauna and fauna habitat.

Management strategy and actions	Responsibility	Status
Maintain the character of the landscape by designing project to minimise removal of vegetation.	Baillie Lodges Project Manager / Architect	Implemented in design
Undertake a site fauna assessment to determine site habitat associations and species of significance.	Baillie Lodges Project Manager / Architect	Completed
Design site facilities to minimise vegetation clearance i.e. use cleared areas on site where possible e.g. existing access track into site, incorporate facilities around vegetation e.g. carparks.	Baillie Lodges Project Manager / Architect	Implemented in design

21.12 Weed and pest control

Objective:	Design and site the Southern Ocean Lodge to minimise the potential for increased weeds and pest.

Management strategy and actions	Responsibility	Status
Undertake a site weed and pest assessment to determine potential level of infestations prior to site development.	Baillie Lodges Project Manager	Completed
Develop a Phytophthora Management Strategy (within the EMP) for implementation on the project during construction and operational activities.	Baillie Lodges Project Manager	Developed
Develop a feral animal Management Strategy for implementation on the project during construction and operational activities (in consultation with KI Council / KI NRM Board.	Baillie Lodges Project Manager	Developed

21.13 Cultural and European heritage

Objective:	Minimise potential impacts to cultural and/or European heritage areas / items associated with the project.

Management strategy and actions	Responsibility	Status
Undertake investigations to assess possible impacts of the project on cultural heritage.	Baillie Lodges Project Manager / Architect	Implemented in design
Undertake investigations to assess possible impact of the project on European heritage.	Baillie Lodges Project Manager / Architect	Implemented in design

Management strategy and actions	Responsibility	Status
Incorporate any required design changes based on findings of heritage investigations.	Baillie Lodges Project Manager / Architect	Not required – no issues with heritage identified during investigations that required design review of the development

21.14 Signage, access and disturbance

Objective:	Minimise access and potential disturbance of surrounding coastal environments by guests at the facility.

Management strategy and actions	Responsibility	Status
Incorporate in the project design the provision for information signs in and around the site instructing people of sensitivity or surrounding area and restricting access.	Baillie Lodges Project Manager / Architect	Implemented in design
Utilise existing track into site. Design not to include any additional access roads or tracks.	Baillie Lodges Project Manager / Architect	Implemented in design

21.15 Energy efficiency

Objective:	Maximise energy efficiency of facilities associated with the project.

Management strategy and actions	Responsibility	Status
Design buildings on an east west alignment to maximise heat absorption in winter and avoid excessive heat in summer.	Baillie Lodges Project Manager / Architect	Implemented in design
Maximise use of cleared areas and establish building corridor to act as a mini-greenhouse to absorbing heat in winter and transfer it to the rooms via low-speed fans.	Baillie Lodges Project Manager / Architect	Implemented in design
Adopt a narrow linear floor plan that will encourage cross ventilation for summer cooling.	Baillie Lodges Project Manager / Architect	Implemented in design
Design facilities to include large north facing windows for passive winter heat gain.	Baillie Lodges Project Manager / Architect	Implemented in design
Include full insulation of external walls and roofs in the design.	Baillie Lodges Project Manager / Architect	Implemented in design
Include within the design, roof mounted solar collectors for hot water supply.	Baillie Lodges Project Manager / Architect	Implemented in design

22. Construction environmental strategies

The following environmental strategies will be employed during construction of the development to minimise potential impacts on the environment.

A number of management strategies have been developed from mitigation measures and recommendations from as outlined in the associated environmental studies undertaken for the project while others are based on the principles of construction best practice.

22.1 Construction management

Objective:	**Implement construction management techniques to manage construction process and minimised any potential environmental impacts associated with construction activities.**

Management strategy and actions	Responsibility	Status
Develop and implement Construction Management Plan and Schedule prepared for the project. Include in the plan:	Baillie Lodges Project Manager/Construction Project Manager	Plan and schedule completed Implementation not commenced
▪ Progressive clearing of site	Baillie Lodges Construction Project Manager	Not commenced
▪ Collection of seed for propagation	Baillie Lodges Construction Project Manager	Not commenced
Restrict speed along access road to minimise potential native fauna deaths.	Baillie Lodges Construction Project Manager	Not commenced
Ensure an appropriately qualified person is available at all times on site to provide construction supervision.	Baillie Lodges Construction Project Manager	Not commenced

22.2 Construction inspections

Objective:	**Implement a schedule of inspections to monitor the environmental performance during construction with specific emphasis implementation of the Construction Environmental Strategies in the EMP.**

Management strategy and actions	Responsibility	Status
Undertake daily inspection of the construction works – record results of inspections in daily work schedule/diary.	Baillie Lodges Construction Project Manager	Not commenced
Undertake a weekly inspection of the work using the Construction Management Environment Checklist (Section 24).	Baillie Lodges Construction Project Manager	Not commenced
Maintain copies of completed weekly checklist on site.	Baillie Lodges Construction Project Manager	Not commenced

22.3 Environmental emergency management

Objective:	Develop emergency management requirements and implement as required during construction.

Management strategy and actions	Responsibility	Status
Ensure emergency contacts e.g. (including EPA, CFS, Police and other relevant authorities) and associated procedures are communicated to all construction personnel.	Baillie Lodges Construction Project Manager	Not commenced
Ensure MSDS for any chemicals used on site during construction are kept onsite and maintained.	Baillie Lodges Construction Project Manager	Not commenced

22.4 Water supply and management

Objective:	Provision of water during construction.

Management strategy and actions	Responsibility	Status
Identify and provide water supply for use during construction.	Baillie Lodges Construction Project Manager	Included in Design/Plan. Tanks will be installed as part of Stage 1 – Staff Village, these will be initially filled by tanker and then rainfall once roofs on.
Tanks are to be installed as part of Stage 1 – Staff Village activities. Initially these will be filled by tanker and then rainfall once roofs are established.	Baillie Lodges Project Manager / Architect	Included in Construction Management Plan

22.5 Solid waste minimisation and management

Objective:	Minimise and appropriately manage waste associated with construction activities undertaken for the project

Management strategy and actions	Responsibility	Status
Provide segregated waste storage areas during construction e.g. timber, steel etc.	Baillie Lodges Construction Project Manager	Not commenced
Recycle site wastes where possible (based on recycling services provided locally).	Baillie Lodges Construction Project Manager	Not commenced
Inform all construction contractors of waste disposal requirements and locations of collection areas and bins.	Baillie Lodges Construction Project Manager	Not commenced

Management strategy and actions	Responsibility	Status
Provide sealed bins for domestic waste to minimise litter and potential for pest and vermin on site.	Baillie Lodges Construction Project Manager	Not commenced
Include details of waste management in the Construction Management Plan.	Baillie Lodges Project Manager / Architect	Included in Construction Management Plan

22.6 Chemicals and hazardous materials

Objective:	To ensure minimal environmental impact due to chemical and hazardous material use and storage during construction.

Management strategy and actions	Responsibility	Status
Ensure that chemical and hazardous material storage areas during construction are established in accordance with EPA Guidelines and Australian Standards.	Baillie Lodges Construction Project Manager	Not commenced
Ensure any chemical wastes generated during construction are disposed of by a licensed waste transported in accordance with relevant codes of practice and at EPA licensed facilities.	Baillie Lodges Construction Project Manager	Not commenced
Inspect chemical storage areas daily during construction.	Baillie Lodges Construction Project Manager	Not commenced
Ensure spill containment and clean up materials are provided on site during construction.	Baillie Lodges Construction Project Manager	Not commenced

22.7 Stormwater management and erosion control

Objective:	Minimise stormwater and erosion/sedimentation impacts (on and off site) associated with construction activities.

Management strategy and actions	Responsibility	Status
Control water from the construction areas on site so it is diverted around all disturbed areas.	Baillie Lodges Construction Project Manager	Not commenced
Install and maintain temporary erosion control and sediment collection structures at key points for site drainage – refer to the *EPA Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry* (EPA, 1999) of installation requirements etc.	Baillie Lodges Construction Project Manager	Not commenced
Undertake daily inspections of sediment and erosion control structures during construction.	Baillie Lodges Construction Project Manager	Not commenced

Management strategy and actions	Responsibility	Status
Undertake progressive clearing of site to minimise soil erosion and sediment risk e.g. clearing for staff facilities then undertake clearing for main facilities.	Baillie Lodges Construction Project Manager	Included in Construction Management Plan and Schedule Not commenced on site

22.8 Noise and vibration

Objective:	Minimise noise emissions associated with construction activities.

Management strategy and actions	Responsibility	Status
Ensure construction activities are undertaken within daylight hours.	Baillie Lodges Construction Project Manager	Not commenced
Ensure all construction plant and equipment is maintained in accordance to manufacturer's requirements.	Baillie Lodges Construction Project Manager	Not commenced
Include details of site access arrangements, construction hours and noise requirements to all site contractors and suppliers.	Baillie Lodges Construction Project Manager	Not commenced

22.9 Air quality

Objective:	Minimise air emissions associated with construction activities (including airborne dust emissions).

Management strategy and actions	Responsibility	Status
Undertake progressive clearance of vegetation on site to assist with dust control e.g. clearing for staff facilities then undertake clearing for main facilities.	Baillie Lodges Construction Project Manager	Not commenced
Visually monitor dust generation daily.	Baillie Lodges Construction Project Manager	Not commenced
Seal (with crushed limestone) access roads as soon as practicable during construction to assist with dust minimisation associated with vehicle movements.	Baillie Lodges Construction Project Manager	Not commenced

22.10 Bushfire management

Objective:	Minimise bushfire potential associated with construction activities.

Management strategy and actions	Responsibility	Status
Liaise with CFS and notify of construction schedule and activities.	Baillie Lodges Construction Project Manager	Not commenced
Where possible during high/extreme fire conditions use diesel powered vehicles to access site.	Baillie Lodges Construction Project Manager	Not commenced
During high/extreme fire conditions restrict (petrol) vehicle access to cleared on site area – areas to be clear of grass.	Baillie Lodges Construction Project Manager	Not commenced
Provide and maintain on site fire fighting equipment.	Baillie Lodges Construction Project Manager	Not commenced
Provide and maintain emergency services numbers and contact details to all construction contractors on site.	Baillie Lodges Construction Project Manager	Not commenced

22.11 Native vegetation

Objective:	Minimise construction impacts on adjacent native vegetation.

Management strategy and actions	Responsibility	Status
Arrange for collection and propagation of native seed stock by a suitably qualified person for use in areas cleared by the development.	Baillie Lodges Construction Project Manager	Not commenced
Undertake progressive clearance of vegetation e.g. clearing for staff facilities then undertake clearing for main facilities.	Baillie Lodges Construction Project Manager	Not commenced
Locate and establish material stockpiles and storage in cleared areas well clear of vegetation edge zones.	Baillie Lodges Construction Project Manager	Not commenced
Provide parking areas for construction machinery and vehicles in cleared areas – not under drip line of trees or within areas containing native vegetation.	Baillie Lodges Construction Project Manager	Not commenced
Create contractor ‘no go’ zones and implement during construction. Flag areas off and include details in induction of construction contractors.	Baillie Lodges Construction Project Manager	Not commenced
Inspect vegetation/work zone interfaces daily to identify any breaches of ‘no go’ zones.	Baillie Lodges Construction Project Manager	Not commenced
Restrict site access to dedicated roads to prevent unnecessary disturbance or destruction of vegetation.	Baillie Lodges Construction Project Manager	Not commenced
Mulch all cleared vegetation and reuse on site.	Baillie Lodges Construction Project Manager	Not commenced

22.12 Native fauna

Objective:	**Minimise construction impacts on native fauna.**

Management strategy and actions	**Responsibility**	**Status**
Create contractor 'no go' zones and implement during construction. Flag areas off and include details in induction of construction contractors.	Baillie Lodges Construction Project Manager	Not commenced
Identify local fauna rescue service and include emergency details on site contact list – include details in site induction for contractors.	Baillie Lodges Construction Project Manager	Not commenced
Monitor vegetation clearance activities to minimise impacts to native fauna – in the event of discovery, facilitate removal by an appropriately experienced person.	Baillie Lodges Construction Project Manager	Not commenced
Undertake daily inspections prior to commencement of works (and at cessation of daily construction activities) to identify any potentially trapped native fauna – in the event of discovery, facilitate removal by an appropriately experienced person.	Baillie Lodges Construction Project Manager	Not commenced
Restrict site access to dedicated roads to prevent unnecessary disturbance or destruction of vegetation.	Baillie Lodges Construction Project Manager	Not commenced
Include impacts associated with the feeding of native fauna in construction contractor training and induction.	Baillie Lodges Construction Project Manager	Not commenced
Visually monitor any instances of Hooded Plover during construction.	Baillie Lodges Construction Project Manager	Not commenced

22.13 General weed and pest control

Objective:	**Minimise introduction of weeds and pests associated with construction activities.**

Management strategy and actions	**Responsibility**	**Status**
Create contractor 'no go' zones and implement during construction. Flag areas off and include details in induction of construction contractors.	Baillie Lodges Construction Project Manager	Not commenced
Minimise clearing and access areas on site to assist in minimising weed generation and growth.	Baillie Lodges Construction Project Manager	Not commenced
Provide covered bins for general rubbish to minimise potential for introduction of pest and vermin on site.	Baillie Lodges Construction Project Manager	Not commenced
Mulch all cleared vegetation and reuse on site to comply with general Phytophthora and weed management 'best practice'.	Baillie Lodges Construction Project Manager	Not commenced

22.14 Cultural and European heritage

Objective:	Minimise potential impacts to cultural and/or natural heritage areas/items associated with construction activities.

Management strategy and actions	Responsibility	Status
In the event of a discovery of an item of heritage significance stop work immediately and implement the Procedure for Heritage Item / Site Discovery (Section 26).	Baillie Lodges Construction Project Manager	To be implemented only as required

22.15 Signage, access and disturbance

Objective:	Manage access and potential disturbance of surrounding coastal environments during completion of construction activities.

Management strategy and actions	Responsibility	Status
Public safety during construction will be facilitated through appropriate signage and segregation of the construction zone.	Baillie Lodges Construction Project Manager	Not commenced
Include details of site access requirements in construction contractor inductions.	Baillie Lodges Construction Project Manager	Not commenced
Establish bunting and rope off no go zones on site.	Baillie Lodges Construction Project Manager	Not commenced

22.16 Training and induction

Objective:	Provide training and induction of construction contractors.

Management strategy and actions	Responsibility	Status
Develop and implement contractor induction and training for all construction contractors.	Baillie Lodges Construction Project Manager	Not commenced
Include in the training and induction details on the various environmental strategies as outlined in Section 4 of the EMP.	Baillie Lodges Construction Project Manager	Not commenced

22.17 Phytophthora management strategy

Objective:	**Protect the integrity of the area by minimising the risk of *Phytophthora* infestation and spread to the site due to construction activities.** **Provide construction strategies that facilitate the protection of native plant populations and ecosystems and critical fauna habitats.**
Background:	The transfer of Phytophthora cannot be eradicated from an area once infested. The transfer of infested soil, water and plant material through human activity is the highest risk of spread of *Phytophthora* species.
Responsibility:	Baillie Lodges Construction Project Manager / Baillie Lodges Project Manager

Management strategy and actions	**Status**
Provide warning signs on site (refer to DEH Standard Operating Procedure, 2002 for examples).	Not commenced
Restrict vehicles and construction workers to designated access roads and construction areas.	Not commenced
Prohibit access to areas on site that are experiencing ponding of water.	Not commenced
Provide general information to construction contractors to increase understanding of the risks of spreading Phytophthora and required behaviour to minimise.	Not commenced
Restrict the use of track mounted machinery on site – rubber tyred vehicles are easier to clean.	Not commenced
Ensure all vegetation and soil removed during construction process remains on site.	Not commenced
Ensure that at risk vehicles, equipment and footwear are clean before entering and leaving the site. ■ Visual inspections should confirm that at risk vehicles, equipment and footwear are free of clods of soil, slurry (water and soil mixture) and plant material (particularly roots and lower stem)*. ■ All at risk vehicles accessing the site are to carry a Phytophthora hygiene kit (see list following list of contents) at all times. ■ Establish equipment/vehicle wash down areas*. ■ Ensure all at risk contractors and vehicles leaving the site use equipment/vehicle wash down areas (refer to following procedure for washdown activities)*. NOTE: If at risk vehicles and / or equipment are kept on the site for the duration of the works, then they will not be subject to hygiene procedures until they leave the site. * Requirements only relevant to people/vehicles entering and leaving site that are considered at risk e.g. excavator contractor, etc.	Not commenced

Phytophthora Hygiene Kit – Equipment List	
Contents	**Purpose**
Hard brush(es) - long and short handled.	To remove mud from tools and footwear
Disinfectant: ■ Methylated spirit (70-100%). ■ Sodium hypochlorite (pool chlorine) (dilute with 4-10 times with water).	To sterilise tools and footwear

Phytophthora Hygiene Kit – Equipment List	
Contents	**Purpose**
Hard brush(es) - long and short handled.	To remove mud from tools and footwear
Quaternary ammonium compound: ■ Coolacide®. Add 1 part Coolacide® to 5000 parts or water (0.02%). ■ Phytoclean®. Add 1 part Phytoclean® to 50 parts of water (0.2%).	To sterilise equipment and vehicles
Hand held spray bottle.	To spray tools and footwear
Pressurised spray unit.	To spray down equipment (preferred to the use of pressurised fire fighting equipment to minimise water use)

Phytophthora Clean Down Procedure
Procedure consists of two steps:
1. Dry brushing
i) Clods of soil should be removed firstly with a hard brush or tool.
2. Disinfection with a fungicide
i) Disinfect footwear, small equipment and tools using a hand held spray bottle and disinfectant (refer to the above equipment).
ii) Disinfect heavy equipment and vehicles (wheels, mudflaps and undercarriage) using a pressurised spray unit containing a solution of a quaternary ammonium compound (refer to equipment list above).
iii) Disinfectant shall be applied until all soil and mud is saturated, with particular attention to undercarriages and areas of machinery that are difficult to access.
iv) Allow disinfectant to penetrate for at least 5 minutes (preferably 10 minutes) before equipment departs.

Safety, Health and Welfare
Wear Personal Protective Equipment including gloves and safety goggles when handling or using disinfectants.

Disposal
All disinfectants are toxic to water organisms and extreme care must be taken in the sure and disposal of undiluted, diluted and exhausted solutions: ■ Undiluted disinfectants must be disposed of in an approved disposal site. Where possible, re-use containers. Triple rinse, crush and dispose of containers at licensed disposal site. ■ Diluted and exhausted solutions should be diluted a further 5 times and spread over the ground a minimum of 50 metres away from surface waters. They may also be inactivated in a pit by addition of organic matter such as sawdust, absorbing clay or paper.

22.18 Concrete agitator wash down area

Objective:	**Minimise potential environmental impacts associated with concrete agitator wash down activities on site.**

Management strategy and actions	Responsibility	Status
Provide a specific concrete agitator wash down area on site.	Baillie Lodges Construction Project Manager	Not commenced
Ensure wash down of agitators is undertaken only in designated area.	Baillie Lodges Construction Project Manager	Not commenced
Provide a suitable area for placement and drying of excess concrete, dispose and/or recycle material as appropriate.	Baillie Lodges Construction Project Manager	Not commenced

23. Operational environmental strategies

23.1 Operational environmental monitoring

Objective:	Develop and implement a program of operational environmental monitoring to maintain and improve the environmental integrity of the site

Management strategy and actions	Responsibility	Status
Develop an Operational Environmental Checklist for implementation following commencement of operations. Checklist is to address: ■ Transport use ■ Water consumption ■ Energy consumption ■ Waste generation and disposal ■ Recycling ■ Revegetation Activities ■ Soil Erosion ■ Phytophthora Identification ■ Feral Cat Eradication strategy.	Baillie Lodges Project Manager	Completed
Undertake operational environmental monitoring as outlined in Operational Environmental Checklist (Section 25).	Southern Ocean Lodge Operations Manager	Not commenced
Maintain completed records of Operational Environmental Checklist on site for review.	Southern Ocean Lodge Operations Manager	Not commenced

23.2 Employee training and visitor education

Objective:	Provide employees and guests with details outlining the unique environmental characteristics of the site and its surrounds. Encourage responsible behaviour that respects site uniqueness

Management strategy and actions	Responsibility	Status
Provide employee training and visitor information (packages in guest facilities) outlining unique characteristics of site and detailing appropriate behaviour. Specifically include information outlining: ■ Managing use of tracks and walkways. ■ Signage and details on local native fauna e.g. hooded plover. ■ Impacts associated with feeding native fauna.	Southern Ocean Lodge Operations Manager	Not commenced

23.3 Native vegetation

Objective:	Minimise impacts adjacent native vegetation associated with Lodge operations.

Management strategy and actions	Responsibility	Status
Develop and implement a Revegetation Plan for the site. The Plan should include: ■ Collection and propagation of native seed stock by a suitably qualified ecologist for use in areas cleared by the development. ■ Revegetation of 'edge' zones to ensure ongoing 'edge management and edge protection'. ■ Incorporation of plantings to fill 'breaks' in the remnant edge in order to reduce edge-to-area ratio - utilise species suited to sealing edges. ■ Identification of areas where development of buffer plantings may be required to protect core native vegetation. Undertake buffer plantings with local native species.	Baillie Lodges Project Manager	Plan developed not implemented (Part C, Figure 6.1)
Negotiate with the SA Government the opportunities for establishing a Heritage Agreement over the remaining (non developed) areas on site to prevent future clearing.	Baillie Lodges Project Manager	Not commenced

23.4 Native fauna

Objective:	Minimise impacts native fauna associated with Southern Ocean Lodge operations.

Management strategy and actions	Responsibility	Status
Maintain local fauna rescue service emergency details on site contact list.	Southern Ocean Lodge Operations Manager	Not commenced
Provide signage on site detailing native fauna in the area e.g. Osprey and Hooded Plover.	Southern Ocean Lodge Operations Manager	Not commenced
Restrict site access to dedicated roads to prevent unnecessary disturbance or destruction of vegetation.	Southern Ocean Lodge Operations Manager	Not commenced
Restrict speed along access road to minimise potential native fauna deaths.	Southern Ocean Lodge Operations Manager	Not commenced

23.5 Signage, access and disturbance

Objective:	**Manage access and potential disturbance of surrounding coastal environments during operation of the Southern Ocean Lodge.**

Management strategy and actions	Responsibility	Status
Manage access to certain areas on site. Include details in suite information packages and signage.	Southern Ocean Lodge Operations Manager	Not commenced
Provide signage on site detailing native fauna in the area e.g. Osprey and Hooded Plover.	Southern Ocean Lodge Operations Manager	Not commenced

23.6 Bushfire management

Objective:	**Minimise bushfire potential associated with construction activities.**

Management strategy and actions	Responsibility	Status
Provide and maintain on site fire fighting equipment and water supply.	Southern Ocean Lodge Operations Manager	Not commenced
Maintain emergency services numbers and contact on site.	Southern Ocean Lodge Operations Manager	Not commenced
Include bushfire management information in employee training and guest information guides.	Southern Ocean Lodge Operations Manager	Not commenced

23.7 Solid waste minimisation and management

Objective:	**Minimise and appropriately manage waste associated with the operations of the Southern Ocean Lodge.**

Management strategy and actions	Responsibility	Status
Provide secure segregated waste storage areas during operations e.g. cardboard, plastic etc.	Southern Ocean Lodge Operations Manager	Not commenced
Recycle site wastes where possible (based on recycling services provided locally).	Southern Ocean Lodge Operations Manager	Not commenced
Inform all employees and guests of waste disposal requirements and locations of collection areas and bins.	Southern Ocean Lodge Operations Manager	Not commenced

23.8 Chemicals and hazardous materials

Objective:	**To ensure minimal environmental impact due to chemical and hazardous material use and storage during operations.**

Management strategy and actions	Responsibility	Status
Ensure that chemical and hazardous material storage areas (including fuel) are maintained to design capacity in accordance with EPA Guidelines and Australian Standards.	Southern Ocean Lodge Operations Manager	Not commenced
Ensure any chemicals / fuel stored during operations are stored appropriately.	Southern Ocean Lodge Operations Manager	Not commenced
Ensure chemical and hazardous wastes generated during operations are disposed of by a licensed waste transporter in accordance with relevant codes of practice and at EPA licensed facilities.	Southern Ocean Lodge Operations Manager	Not commenced
Inspect chemical storage areas during operations as outlined in the Operational Environmental Checklist.	Southern Ocean Lodge Operations Manager	Not commenced

23.9 Stormwater management and erosion control

Objective:	**Minimise stormwater and erosion/sedimentation impacts (on and off site) associated with operations of the Southern Ocean Lodge.**

Management strategy and actions	Responsibility	Status
Maintain access road and walking areas in good condition i.e. graded surface, low gradient batters.	Southern Ocean Lodge Operations Manager	Not commenced
Undertake regular inspections of site to identify any areas of erosion – stabilise immediately.	Southern Ocean Lodge Operations Manager	Not commenced

23.10 Environmental emergency management

Objective:	**Develop emergency management requirements and implement as required during operations.**

Management strategy and actions	Responsibility	Status
Ensure emergency contacts e.g. (including EPA, CFS, Police and other relevant authorities) and associated procedures are communicated to all operations personnel.	Southern Ocean Lodge Operations Manager	Not commenced
Ensure MSDS for any chemicals used on site during operations are kept onsite and maintained.	Southern Ocean Lodge Operations Manager	Not commenced

23.11 General weed and pest control

Objective:	**Minimise introduction of weeds and pests associated with operations activities.**

Management strategy and actions	**Responsibility**	**Status**
Develop and implement a general weed management and maintenance program to address Avellinia, Sea spurge, White Cupweed and Squirrel-tail Fescue on site (as well as other weeds as may be identified).	Southern Ocean Lodge Operations Manager	Not commenced
Provide covered bins for general rubbish to minimise potential for introduction of pest and vermin on site.	Southern Ocean Lodge Operations Manager	Not commenced
Mulch any vegetation cleared during maintenance and reuse on site to comply with general Phytophthora and weed management 'best practice'.	Southern Ocean Lodge Operations Manager	Not commenced

23.12 Phytophthora management strategy

Objective:	**Protect the integrity of the area by minimising the risk of *Phytophthora* infestation and spread to the site during operations activities.**
Background:	The transfer of Phytophthora cannot be eradicated from an area once infested. The transfer of infested soil, water and plant material through human activity is the highest risk of spread of *Phytophthora* species.
Responsibility:	Baillie Lodges Project Manager / Southern Ocean Lodge Operations Manager

Management strategy and actions	**Status**
Provide warning signs on site (refer to DEH Standard Operating Procedure, 2002 for examples).	Not commenced
Restrict operational vehicles to sealed (crushed limestone) designated access roads, delivery and parking areas.	Not commenced
Restrict pedestrian / walking access to tracks and designated walkways on site.	Not commenced
Prohibit access to areas on site that are experiencing ponding of water.	Not commenced
Provide general information to employees and guests to increase understanding of the risks of spreading Phytophthora and required behaviour to minimise.	Not commenced
Undertake regular inspections of site to identify any areas of potential phytophthora infestations – notify DEH immediately.	Not commenced

23.13 Feral cat eradication strategy

Objective:	**Establish, implement and maintain a Feral Cat Trapping Program on site**

Management strategy and actions	Responsibility	Status
Purchase cat traps.	Baillie Lodges Project Manager / Southern Ocean Lodge Operations Manager	Not commenced
Develop a trapping plan identifying locations for set up of traps.	Baillie Lodges Project Manager / Southern Ocean Lodge Operations Manager	Not commenced
Set traps and check daily for period of 3 months.	Baillie Lodges Project Manager / Southern Ocean Lodge Operations Manager	Not commenced
Continue to set traps for period of 1 week every 4 weeks during operations of facility (this should be reviewed based on capture rates).	Baillie Lodges Project Manager / Southern Ocean Lodge Operations Manager	Not commenced

24. Construction management environmental checklist

Inspections will be conducted weekly to monitor the implementation of the EMP as well as site activities. All inspection reports and checklists will be kept in a file on site.

1. SITE ACTIVITIES AND CONTRACTORS

List all Contractors present at time of inspection and activities being undertaken.

Contractor	Activities	Inducted

2. CHECKLIST

* Conformance to be indicated as conformance (C) or Non conformance (NC).

STORMWATER MANAGEMENT AND EROSION CONTROL		
Item	**Comment**	**Conformance***
Erosion and sedimentation devices implemented as required		
Maintenance of erosion and sedimentation devices in working order		
Any evidence of off site release of sediment or sediment laden water		

AIR QUALITY		
Item	**Comment**	**Conformance***
Evidence of dust generation associated with site activities or vehicle movements		
Visually monitor dust generation on site		

SOLID WASTE MANAGEMENT AND RECYCLING		
Item	**Comment**	**Conformance***
Segregated waste disposal facilities for recyclable materials provided on site		
Appropriate waste disposal and segregation on site		

CHEMICALS AND HAZARDOUS MATERIALS MANAGEMENT		
Item	**Comment**	**Conformance***
Bunded area provided for storage of fuels, oils maintained.		
Relevant MSDSs for chemicals stored on site.		
Chemical and oil or fuel wastes are disposed of to a licensed facility (require evidence)		
Clean up materials available on site for use in the event of a spill		

ENVIRONMENTAL EMERGENCY RESPONSE		
Item	**Comment**	**Conformance***
Any accidental spillage of fuels or other chemicals in preceding week.		
If yes, were areas cleaned appropriately and waste disposed of appropriately.		

NOISE AND VIBRATION MANAGEMENT		
Item	**Comment**	**Conformance***
Construction Activities limited to daylight hours		

VEGETATION AND FAUNA MANAGEMENT		
Item	**Comment**	**Conformance***
Contractor 'no go' zones on site and clearly "flagged" off – note any breaches of no go zone		
Vehicle parking during construction in appropriate designated areas – not under driplines or in areas of vegetation		
Site access restricted to dedicated road		
Cleared vegetation mulched and reused on site		
Daily inspections undertaken for trapped fauna		
Fauna rescue details on site and used as required		

CONCRETE AGITATOR WASH OUT		
Item	**Comment**	**Conformance***
Concrete agitator wash down area maintained		
Evidence of concrete agitator wash down in non-designated areas		
Waste concrete stored in designated areas on site		

PHTYOPHTHORA MANAGEMENT PROCEDURES		
Item	**Comment**	**Conformance***
Phytophthora decontamination procedures implemented as required on site		

BUSHFIRE MANAGEMENT		
Item	**Comment**	**Conformance***
Fire fighting equipment and water supply supplied and maintained on site		
Access for petrol vehicles restricted during high/extreme fire conditions		

CULTURAL AND EUROPEAN HERITAGE		
Item	**Comment**	**Conformance***
Heritage procedure implemented on site in event of discovery		

3. COMMENTS AND SIGN OFF

Any additional comments:

Sign off:

Name	**Signature**	**Date**

25. Operational environmental monitoring form

The following form will be used monthly to monitor:

- the progression and implementation on environmental programs implement on site and
- the ongoing sustainability of the site operations.

TRANSPORT USE

Transport use associated with the operations will be monitored using kilometres travelled as a basis for comparison.

Each month the kilometres travelled on each company vehicle will be recorded on the attached form. Comments on the figures will also be provided on a monthly basis.

WATER CONSUMPTION

Water use associated with the operations will be monitored using volumes (kilolitres) required from the supplementary groundwater supply bore.

Each month the kilolitres used in the operations (sourced from the groundwater bore or other sources) will be recorded on the attached form. Comments on the figures will also be provided on a monthly basis.

ENERGY CONSUMPTION

Energy use associated with the operations will be monitored using volumes (litres) of diesel consumed.

Each month the litres used in operations (based on generator run time or fuel purchase records) will be recorded on the attached form. Comments on the figures will also be provided on a monthly basis.

SOLID WASTE GENERATION, DISPOSAL AND RECYCLING

Waste generation and disposal activities associated with the operations will be monitored using waste collection records i.e. number and size (and approximate weight) of waste receptacles collected from site. Recyclable materials will be monitored in a similar fashion.

Each month the number and volume of waste containers collected from site will be recorded on the attached form. Comments on the figures will also be provided on a monthly basis.

REVEGETATION ACTIVITIES

Revegetation activities will be undertaken as required as part of the operations.

Because of the sporadic nature of the revegetation activities, monthly monitoring will be used to identify whether activities occurred or not. Comments on revegetation activities that have been undertaken in any given month will be provided as necessary.

SOIL EROSION

Monitoring of soil erosion occurrences will be based on visual observations. Where soil erosion on site is noted and requires addressing, details will be provided in the monthly comments sheet and followed up the following month.

PHYTOPHTHORA IDENTIFICATION

Monitoring of Phytophthora on site will be based on visual observation. Where areas of dieback on site are noticed / suspected details will be provided in the monthly comments sheet and followed up the following month.

In any instance that Phytophthora is suspected on site, contact is to be made with the NPWS and a site inspection arranged.

FERAL CAT ERADICATION

Details of the Feral Eradication are provided in the EMP.

Monitoring of feral cat eradication will be based on the implementation of the strategy as outlined in the EMP.

Details of monthly activities will be provided in the comments section of the forms.

Data Collection

Year: **2006 / 2007 / 2008 / 2009 / 2010 / 2011 / 2012 / 2013 / 2014 / 2015**

MONTH	J	F	M	A	M	J	J	A	S	O	N	D
WATER CONSUMPTION												
Groundwater bore (kl)												
Other sources (kl)												
ENERGY CONSUMPTION												
Diesel (litres)												
WASTE GEN & DISP												
Number of containers collected*												
RECYCLING												
Number of containers collected*												
REVEGACTIVITIES												
Occurring on site												
SOIL EROSION												
Evidenced on site												
PHYTOPHTHORA ID												
Evidenced on site												
FERAL CAT PROGRAM												
Implemented on site												

* Provide details of container size and number in comments sheet

MONTHLY COMMENTS (circle)

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

TRANSPORT USE

WATER CONSUMPTION

ENERGY CONSUMPTION

SOLID WASTE GENERATION, DISPOSAL AND RECYCLING

REVEGETATION ACTIVITIES

SOIL EROSION

PHYTOPHTHORA IDENTIFICATION

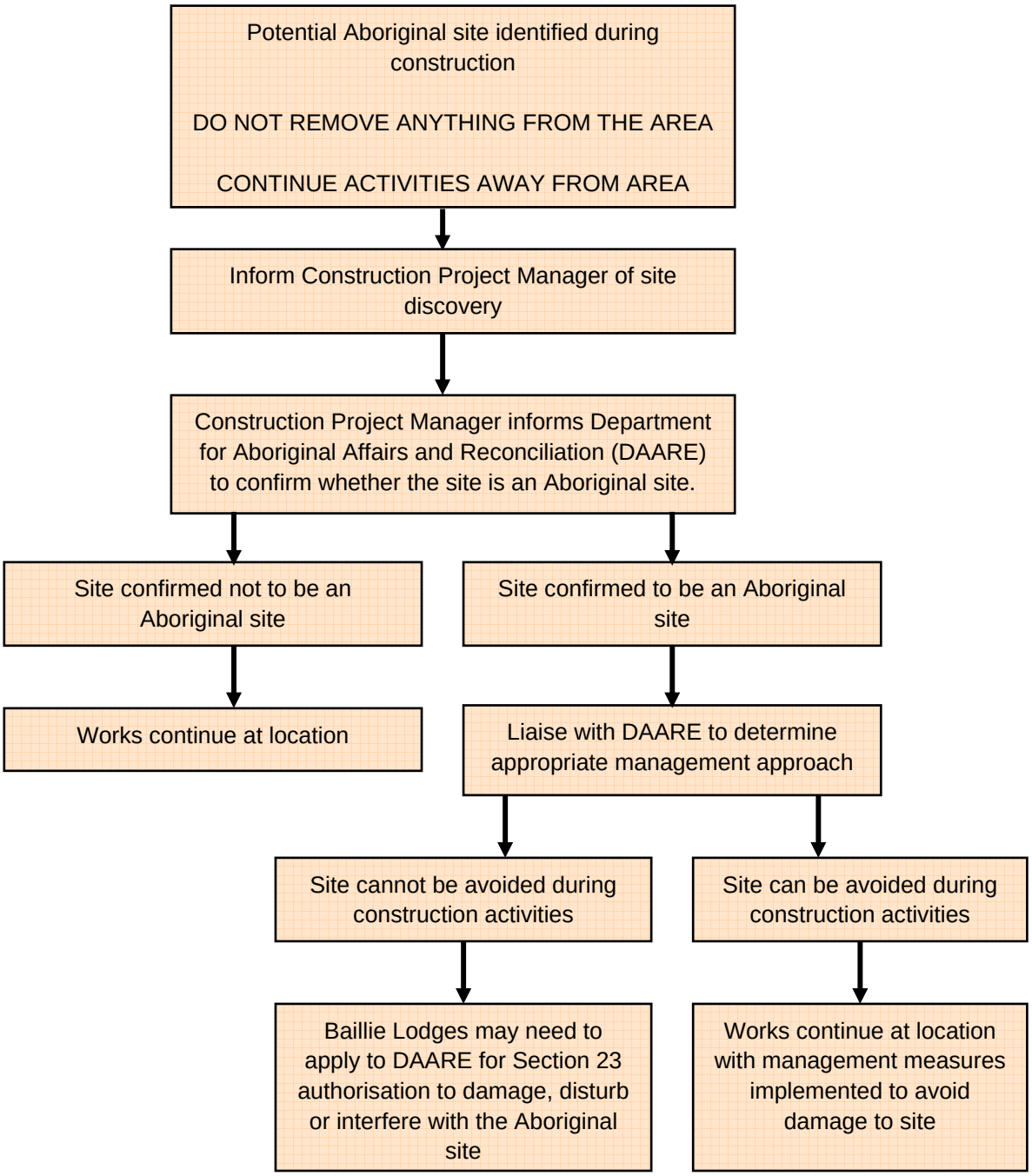
FERAL CAT ERADICATION

ADDITIONAL COMMENTS

Sign off:

Name	**Signature**	**Date**

26. Procedure for Aboriginal site discovery



27. References

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Appendix A

PER guidelines

PER guidelines

	Guideline	Reference in PER
5.1	**Need for the Proposal**	
5.1.1	Describe the need for the proposal, including the reasons for its proposed location and staging.	2.2, 3.1,5.2
5.1.2	Assess the “do nothing” option.	2.4
5.1.3	Justify the selection of the proposed location from an environmental and economic perspective in comparison with alternative sites on the Island, particularly less vegetated sites on the South Coast.	3.1
5.2	**Environmental Issues**	
	Native Vegetation	
5.2.1	Describe the local, district and regional context for native vegetation	6.1
5.2.2	Quantify and detail the extent, condition and significance of native vegetation (individual species and communities) that may need to be cleared or disturbed during construction and the ability of communities or individual species to recover, regenerate or be rehabilitated.	6.3.1.2 6.3.2.1 6.3.2.4 6.3.3.2
5.2.3	Calculate the level of clearance that would be required for the whole site and for individual community types (including ancillary clearance for accommodation and all infrastructure, the produce garden, walking trails and areas required for bushfire safety).	6.3.2.1
5.2.4	Describe the effect on the conservation status, (local, regional, state and national) habitat value of vegetation communities and individual species, especially those that are threatened including the Kangaroo Island spider orchid, the twining finger-flower and *Ptilotus beckerianus.*	6.3.2
5.2.5	Describe the potential for and nature of the habitat fragmentation.	6.3.2.5
5.2.6	Describe changes in biological diversity resulting at the interface between the proposed development and existing vegetation i.e. the “edge effect”.	6.3.2.5
5.2.7	Describe the effect of introduced weed species on native vegetation before and after construction, including species that may originate from the produce garden or landscaped areas.	6.5.1.2 6.5.2.1
5.2.8	Outline the risk of spread of disease, eg plant pathogens such as *Phytophthora*.	6.5.1.4
5.2.9	Outline the need for, size, location and management of the proposed produce garden and the degree of vegetation clearance required to accommodate it.	4.1
5.2.10	Outline any proposed revegetation works (illustrating location, densities and species to be planted) walkways and retaining structures.	6.3.3.2
5.2.11	Identify measures to minimise and mitigate vegetation clearance, including incorporating remnant stands in the layout design, and to compensate for the loss of native vegetation and habitat.	6.3
5.2.12	Identify measures to compensate for vegetation clearance.	6.3.2.7
5.2.13	Describe measures to deliver significant environmental benefit as required by the *Native Vegetation Act.*	6.3.2.7
	Native Fauna	
5.2.14	Describe the local, district and regional context for native fauna.	6.4.1
5.2.15	Describe the extent of fauna and/or habitat loss or disturbance during the construction and operation phases and the ability of communities and individual species to recover (especially the occurrence of threatened or significant species including those listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999)*.	6.4.1 6.4.2

	Guideline	Reference in PER
5.2.16	Outline the effect during the construction and operation phases on the conservation status of faunal communities or individual species , including the Osprey, White-bellied Sea-Eagle, Peregrine Falcon, Southern Emu-Wren, Western Whipbird, Bassian Thrush, Beautiful Firetail, Hooded Plover, Rock Parrot, Southern brown bandicoot, Kangaroo Island dunnart, Glossy black-cockatoo and those that are threatened on a State/regional basis and/or listed under the *Environment Protection and Biodiversity Conservation Act 1999.*	6.4.2.2
5.2.17	Describe the effect on introduced species, especially feral cats.	6.5.1.3, 6.5.2.2
5.2.18	Outline the risk of road related fauna death and injury.	6.4.2.5
5.2.19	Outline the effect of light and noise pollution on nocturnal animals and the risk of bird strike associated with the large glass windows.	6.4.2.4
5.2.20	Identify mitigation measures and their effectiveness, including measures to minimise the upgraded access road and subsidiary tracks acting as fauna barriers or as a corridor for feral animals.	6.4, 6.5.2
	Geology and Soils	
5.2.21	Describe the underlying geology and the nature of the soils with special reference to coastal and karstic landforms.	9.2
5.2.22	Outline the interaction between surface erosional process and the proposed development.	9.4
	Management	
5.2.23	Identify the need for fire management to maintain biodiversity on the site and the implications for bushfire protection.	17
5.2.24	Describe the waste collection storage and disposal systems and opportunities for recycling and resource recovery, including measures to deter scavenging by native or feral species.	11
5.2.25	Outline the principles to be followed to demonstrate that the development would be environmentally sustainable.	4.3,4 4.5, 4.6, 4.7, 4.9, 9.3, 10, 11, 15
5.2.26	Detail the extent of any landscaping, highlighting plant species suited to local conditions.	4.11, 6.3.3.2
5.2.27	Describe the measures proposed for the disposal of excavated material and construction waste.	5.4, 11
	Water	
5.2.28	Describe the impact of developing a wastewater treatment system including the expected volume to be treated and disposed of.	4.6.2,10.2
5.2.29	Describe the connection to water supply for the proposed development and include information on the quantity of potable water required and the implications for existing users	4.6.1,10.1
5.2.30	Describe stormwater and wastewater management and the potential impact on groundwater resources, surface water resources and the marine and coastal environment.	8.3, 8.4,10.2
5.2.31	Describe the impact of the development on existing groundwater resources including the need for a water supply pipeline and information regarding its proposed location	8.3, 10.1
5.2.32	Identify any opportunities for recycling all forms of wastewater.	4.6.1,4.6.2,10.2
5.2.33	Identify ways in which water use can be minimised or supplemented including the collection and use of rainwater.	4.6.1,4.6.2,10.1
5.2.34	Outline the measures proposed to manage stormwater runoff from hard surfaces which are not being used for harvesting water supply, especially access roads	4.8, 10.3, 22.7, 23.9
	Power	
5.2.35	Describe the delivery of diesel fuel to the site and proposed bunding measures for its storage.	4.6.3
5.2.36	Outline the implications of connecting to the power grid for the existing infrastructure and current users.	4.6.3
5.2.37	Identify ways in which power use can be minimised or supplemented, especially using alternative energy sources and energy efficiency measures.	4.6.3

	Guideline	Reference in PER
	Coastal	
5.2.38	Describe the visual effect of the proposed development in this locality.	12
5.2.39	Describe the rationale for the major design elements of the proposed development and measures to mitigate their visual impact.	4.4,12
5.2.40	Outline how guests and staff of the facility will access the beach and the management measures proposed to prevent or limit soil erosion of the immediate coastal access points.	4.8, 4.9, 9.4
	Monitoring	
5.2.41	Describe all the monitoring measures, reporting regimes and audits for water, vegetation, flora, fauna (including listed and scheduled species under the *Environment Protection and Biodiversity Conservation Act 1999* and *National Parks & Wildlife Act*, waste, soil erosion, pathogens and introduced species which will be included in a Management Plan.	PART D 19–26
5.2.42	Describe the means by which the sustainability of the proposal will be audited.	15.3
	General	
5.2.43	Describe the broader impacts on the perceived wilderness value of the region due to increased 'human disturbance' from both guests and staff, especially as the site is within the South Coast Ecological Area (Biodiversity Plan for Kangaroo Island, 2001) and nearby National and Conservation Parks and a Wilderness Protection Area.	6.3.2.6
5.2.44	Provide information on the expected levels of environmental noise associated with the operation of the facility, identifying all potential noise sources, and describe the extent to which these noise emissions can be reduced and contained to minimise effects upon the wider locality including native fauna.	14
5.2.45	Describe the net benefits and opportunities provided by the proposal to the regional and local environment.	2.3, 13
5.2.46	Detail the proposed access and on site car parking arrangements, including information about road width and associated drainage measures and maintenance requirements.	4.4, 4.7, 4.8, 5.5, 10.3
5.2.47	Describe implications of climate change with respect to the proposal and any proposed adaptation and reduction measures in relation to greenhouse gas emissions.	15, 16
5.2.48	Outline proposed signage and other educational resources including those which will provide information on preferred access tracks, environmental features and hazardous areas, within the site.	4.11
5.2.49	Detail what will be included in an environmental management plan, for both construction and operational components.	PART D 19–26
5.3	**Economic Issues**	
5.3.1	Outline the opportunity for tourism and investment in the area to be enhanced as a result of the proposal.	2.2,2.5,13
5.3.2	Identify employment and investment opportunities, including the "multiplier effect".	13.5
5.3.3	Outline the potential for the project to attract and enhance the business operations of other allied industries and commercial ventures.	13.2,13.3
5.3.4	Provide information about the branding and marketing of the development that may influence consumer perceptions of South Australia as a tourist destination.	13.4, 2.5, 2.6
5.3.5	Provide a full economic analysis of the proposal including the long term economic viability of the project.	13
5.3.6	Describe strategies to return the site to its predevelopment state, should the project fail.	5.6
5.4	**Risk/Hazard Management**	
5.4.1	Detail fire management processes and measures to reduce bushfire risk, especially those which minimise vegetation clearance and land disturbance.	17

	Guideline	Reference in PER
5.4.2	Describe strategies for emergency evacuation during medical emergencies and/or bushfire risk.	18
5.4.3	Describe strategies for ensuring public safety during construction.	5, 22.15
5.4.4	Describe procedures to prevent, minimise and manage pollution spills or sewage leaks.	23
5.4.5	Describe how introduced species and pathogens will be managed.	6.5.3, 22.13, 22.17
5.4.6	Outline the proposal for bunding of hazardous materials storage areas	21.5
5.4.7	Describe strategies for wind erosion and control.	PART D 19–26
5.5	**Effects on Communities**	
5.5.1	Identify the effect on any Aboriginal sites of archaeological, anthropological or other significance, including any sites listed in the Register of the National Estate and the SA Register of Aboriginal Sites and Objects, or identified after consultation with Aboriginal councils or groups.	8.1
5.5.2	Identify the effect on any non-Aboriginal cultural sites.	8.3
5.5.3	Describe the impact on any Native Title Claimants and the consequent impact on the potential ongoing enjoyment of native title rights (if any) by native title holders.	8.2
5.5.4	Describe the effect on visual amenity and landscape quality, especially the effects of the built form of structures and including the access road, earthworks, power lines and impact on the coastal environment.	12
5.5.5	Describe the proximity to existing and potential dwellings, if any.	3.2
5.5.6	Identify any other impact on local amenity.	12, 13
5.5.7	Outline the traffic generation and truck movements to and from the site and their hours of operation during the construction period and operational phase.	4.8
5.5.8	Outline the impact on existing tourism and recreation infrastructure (e.g. Kelly Hill Caves Conservation Park and Flinders Chase National Park).	13
5.5.9	Outline the likely size and composition of the construction workforce and other employees, particularly information on employment opportunities for the local community.	5.2,13.5,
5.6	**Effects on Infrastructure Requirement**	
5.6.1	Outline the requirements for and likely location of gas, electricity, water, sewerage, stormwater management, communications systems and local roads.	4.6
5.6.2	Detail the extent to which the facility will generate the need for upgraded infrastructure beyond the site boundaries	4.6
5.6.3	Outline the potential for adopting water sensitive urban design for managing stormwater.	10
5.6.4	Detail emergency services arrangements.	17, 18
5.6.5	Outline opportunities to incorporate best practice infrastructure design.	4.6
5.6.6	Identify alternative systems of effluent treatment including composting toilets.	4.6, 10.2
5.7	**Constructional and Operational Effects**	
5.7.1	Provide information about the accommodation arrangements for the construction workers and employees.	5.2
5.7.2	Outline the timing of construction and the time of year it is likely to occur.	5.2
5.7.3	Describe the level of cut and fill required and the effect on the natural topography of the site.	4.4, 5
5.7.4	Identify the effects of construction on any Karst cave systems in the district, especially from blasting or vibration.	5, 9
5.7.5	Provide a site construction plan and outline strategies to minimise effects on the local environment.	5.2, PART D
5.7.6	Identify the source of any construction materials including limestone for the Lodge and for road making and the opportunity for the use of recycled materials.	5.1, 4.5
5.7.7	Provide information about the transport and storage of any construction materials to minimise effects on the local environment.	5.1, 4.7

	Guideline	Reference in PER
5.7.8	Identify measures to stabilise disturbed areas and areas susceptible to soil erosion.	22.7, 23.9
5.7.9	Identify the measures for the control of dust, vibration, noise, stormwater and other emissions during construction and operation.	PART D
5.7.10	Describe the implementation of environmentally acceptable work practices and monitoring programs.	PART D
5.7.11	Detail the encumbrances or similar mechanisms to control and manage activities on adjoining land.	3.2,3.3
5.7.12	Detail the proposed monitoring of impacts during and after construction including reporting and auditing measures	PART D
5.8	**Planning and Environmental Legislation and Policies**	
5.8.1	Describe the proposal's consistency with the relevant Development Plan and Planning Strategy.	7.2,7.3
5.8.2	Describe the proposal's consistency with State and Commonwealth legislation and initiatives relating to conservation or protection of the biological environment.	6.2

Appendix B

Testimonials

Qantas Vacations handles 2000 luxury passengers per year from the USA and Canada to Australia. One of the more noticeable gaps in our product range is the lack of a five star accommodation product on Kangaroo Island. Ironically, Kangaroo Island has one of Australia's most reputable upscale tour operators in Adventure Charters, but we lack a similar five star accommodation experience for our luxury passengers to enjoy once their touring is complete. We heartily endorse the government of South Australia to approve construction of an environmentally friendly Southern Ocean Lodge on Kangaroo Island. Having such a facility would result in a longer visitor length of stay from North American markets on KI.

Kieron J. Keady
Vice President - Sales & Marketing
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I easily recall my first visit to Kangaroo Island and meeting with Craig Wickham – what a fantastic place – so natural, peaceful and beautiful – we had to start selling it. We then were one of the first tour wholesalers to heavily promote Kangaroo Island here in the states and we did so using Craig Wickham's tour company to arrange day tours only, as there was a lack of good accommodation then. Even now there is a missing component for the North American who wants to stay and be pampered in luxury while visiting this natural setting. There is a huge need for a lodge style accommodation property so we can then sell extended overnight experiences to the island with confidence that our clients will be satisfied. We sell many lodges throughout New Zealand and having one here on KI to ad to those travel experiences will just be perfect.

Ian Swain

President, Swain Tours, Philadelphia, USA

"We are consistently being requested for a more upper-end property on Kangaroo Island. This destination has been one of our fastest growing over the last three years, but the lack of a higher-end, world-class property precludes us from being able to structure a visit to the Island for many of our clientele. Instead, we see many of them instead redirecting parts of their holiday to properties such as Longitude 131 in Ayers Rock and Lizard Island in Tropical North Queensland.
Considering that so much of what attracts people to Australia is located in the compact destination that is Kangaroo Island, we would certainly love to see such a property built there."

Kirk Demeter
President
Down Under Answers, LLC
Best Wholesaler 2003, 2004 & 2005 as voted by Aussie Specialist Agents

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final draft

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24 January 2006

To Whom It May Concern:

The AOT Group is one of Australia's largest travel companies with its Inbound Division, AOT Inbound, being Australia's largest Inbound Tour Operator, catering for over 120,000 overseas passengers per annum.

Kangaroo Island has become an iconic destination for the Western Hemisphere markets we specialise in over the last seven years. This is particularly due to the excellent job of the South Australian Tourist Commission which has strongly promoted this destination in our key markets.

As Kangaroo Island becomes "a must do" for many visitors from the UK, Europe and the United States, it becomes evident that there is a lack of premium product, particularly in accommodation, available to our clients.

There is a variety of touring options available on Kangaroo Island which vary from budget touring products to upmarket 4 wheel drive touring with private guides and gourmet meals.

Over the years the knowledge and understanding of the overseas wholesalers has grown and improved and they are very aware of the massive difference in the experience offered by premium products, hence pushing them ahead of more budget options.

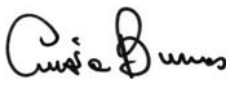
Currently for these passengers, it is particularly difficult to match the premium experience in the touring and catering side of the tour with a suitable level of accommodation. Their Australian would normally include other icons in Australia, such as Sydney, where they have several options of luxury accommodation, Ayers Rock, where they also have at least 2 options of premium accommodation products and majority of them will also spend some time on one of the island resorts where we have a wide choice between 5 and 5 ½ stars.

The AOT Group is currently running several group series to Kangaroo Island which would be very receptive to the ability of opting for premium accommodation, as would most of our upmarket FIT passengers.

For these reasons the AOT Group and its overseas clients were very excited about the news of the upcoming opening of Southern Ocean Lodges which we will support 100%, as it is a product missing from Kangaroo Island and in high demand.

I remain at your disposal for any further information and happy to elaborate on the above statement further, if required.

Yours faithfully,



Cinzia Burnes
Managing Director Inbound

TravelPoint
Sunlover Holidays
needitnow.com.au
Right Price, Right Location, Right Now
JOURNEY EVENTS TRAVEL
aotNZ
New South Wales holidays
TravelMate.com.au
aotonline

Appendix C

Certificate of Title

CERTIFICATE OF TITLE

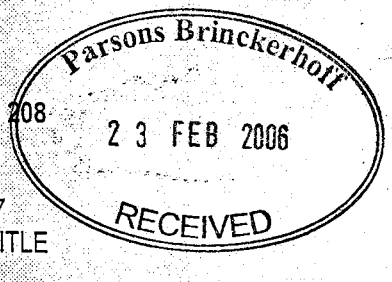
REAL PROPERTY ACT, 1886



South Australia

VOLUME 5431 FOLIO 208

Edition 3
Date Of Issue 01/07/1997
Authority CONVERTED TITLE



I certify that the registered proprietor is the proprietor of an estate in fee simple (or such other estate or interest as is set forth) in the land within described subject to such encumbrances, liens or other interests set forth in the schedule of endorsements.

REGISTRAR-GENERAL



WARNING: BEFORE DEALING WITH THIS LAND, SEARCH THE CURRENT CERTIFICATE

REGISTERED PROPRIETORS IN FEE SIMPLE

JAMES WILLIAM BAILLIE AND HAYLEY JENNIFER BAILLIE BOTH OF PO BOX 596 AVALON BEACH NSW 2107 AS JOINT TENANTS

DESCRIPTION OF LAND

ALLOTMENT 9 DEPOSITED PLAN 25953
IN THE AREA NAMED KARATTA
HUNDRED OF MCDONALD

EASEMENTS

NIL

SCHEDULE OF ENDORSEMENTS

10008052 ENCUMBRANCE TO HANSON BAY CO. PTY. LTD. (SINGLE COPY ONLY)

End of Text.

MK18P

GOVT Rd
NEW RD
25·00
130·86
181° 12'
271° 12'
2100·00
1500·00
10
91° 12'
181° 12'
HANSON BAY
SEC. 19
Mark
Water
9
8
30·18 Coast reserve from high water mark.
High
1232·60
41° 12'
311° 19' 30"
0 200 400 600 800 Metres

Appendix D

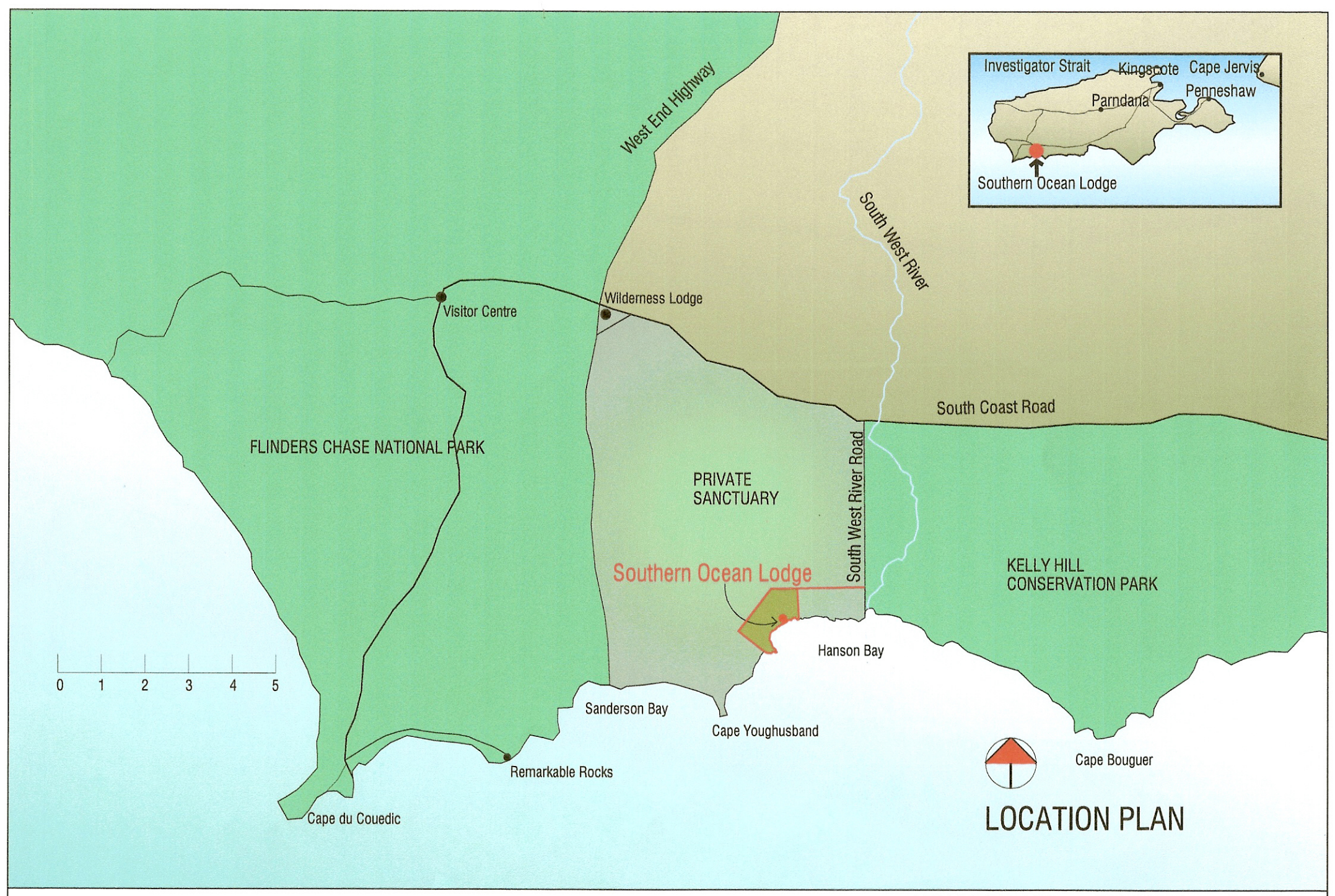
Architects drawings

SOUTHERN OCEAN LODGE

HANSON BAY, KANGAROO ISLAND

MAX PRITCHARD : ARCHITECT
PO Box 808, GLENELG SA 5045 PH/FAX 8376 2314

March 2006



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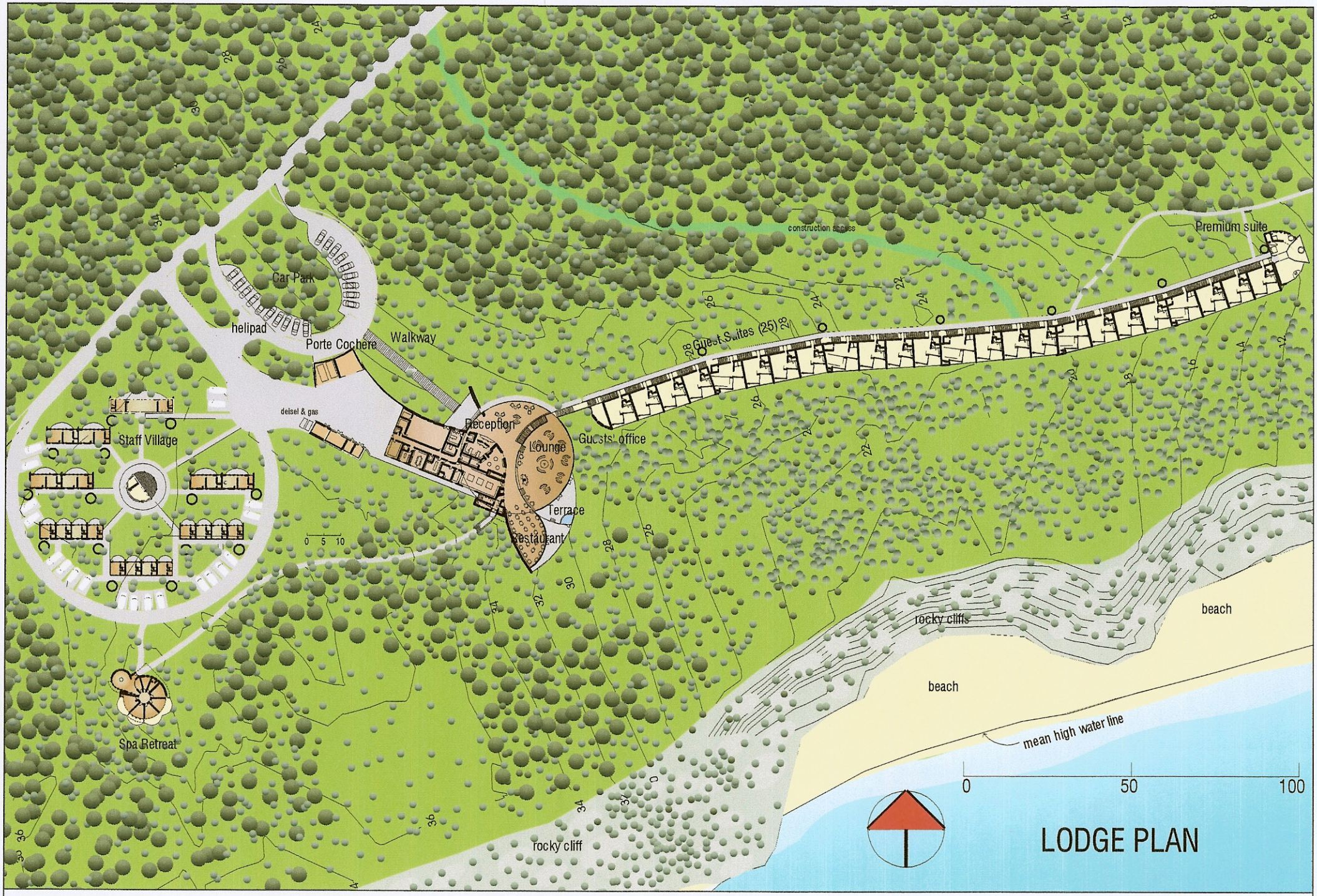
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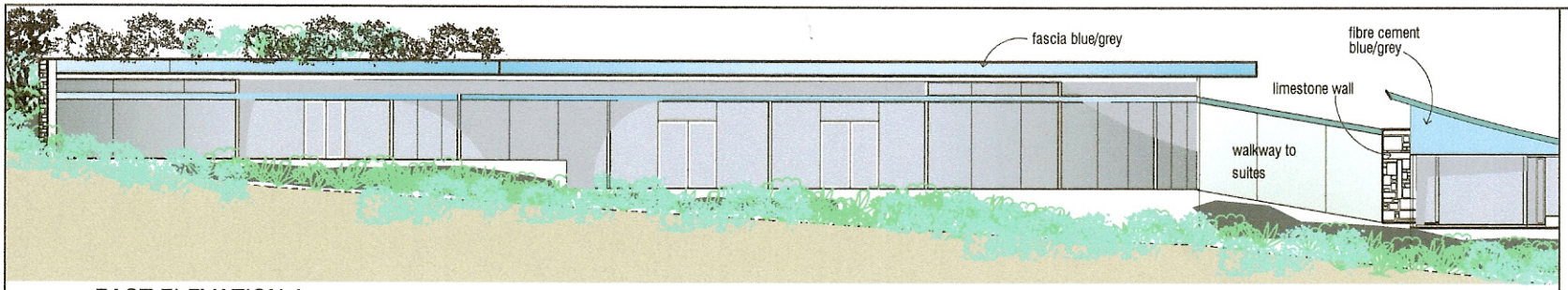
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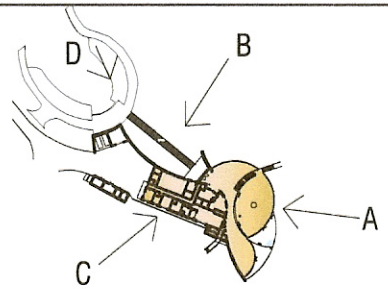
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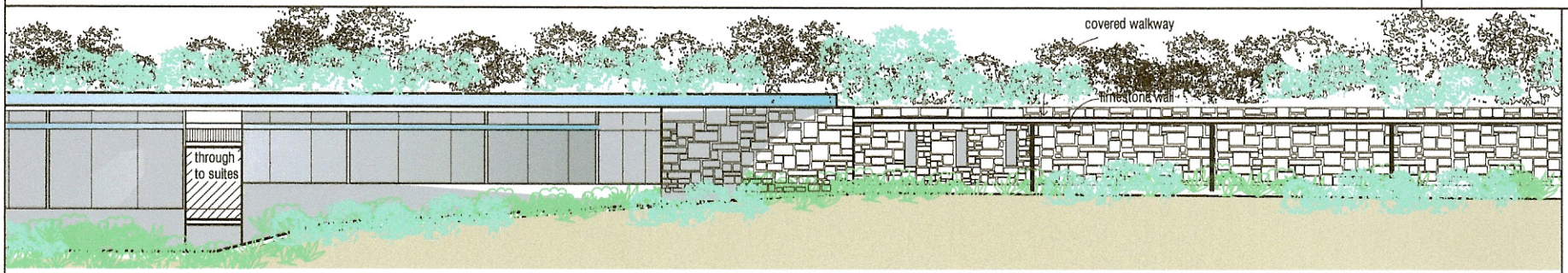
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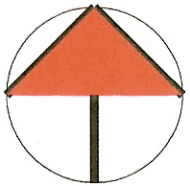
EAST ELEVATION A

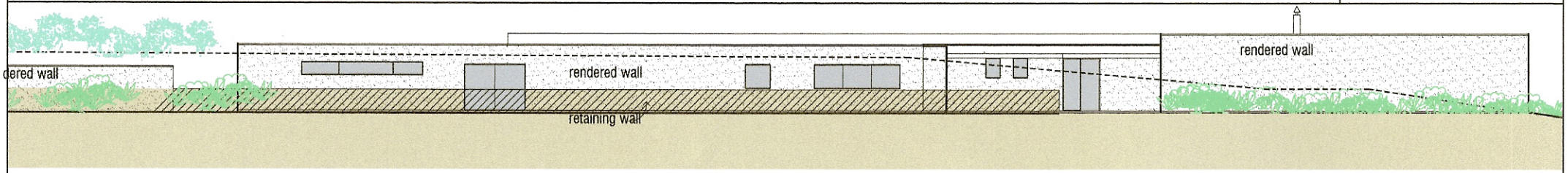


Key Plan

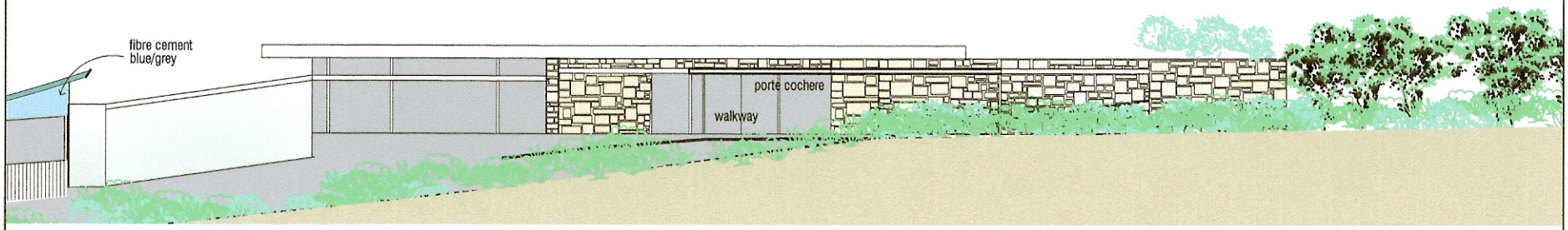


NORTH EAST ELEVATION B





WEST ELEVATION C



NORTH ELEVATION D

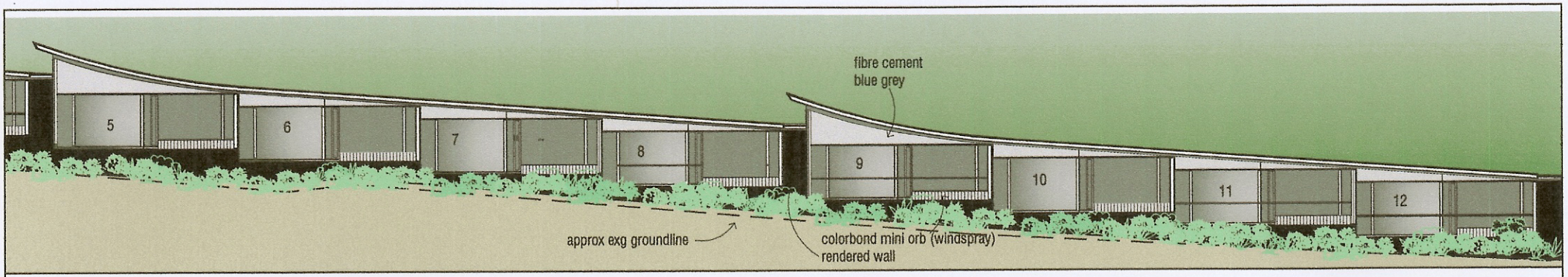
LODGE ELEVATIONS

Scale 1:250

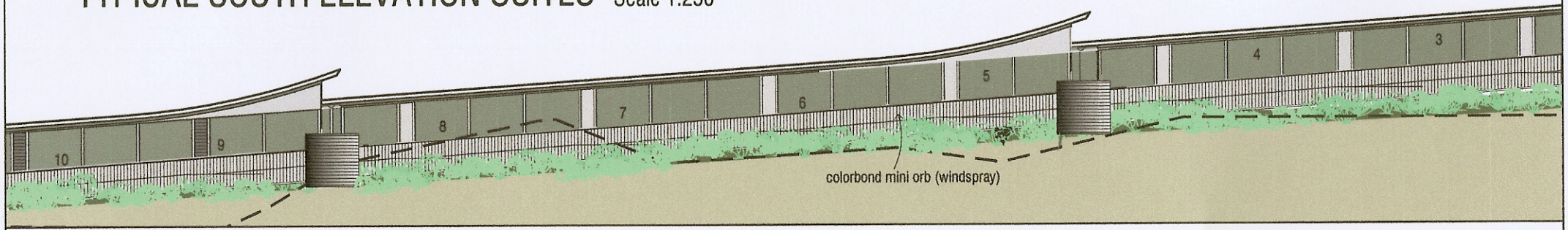
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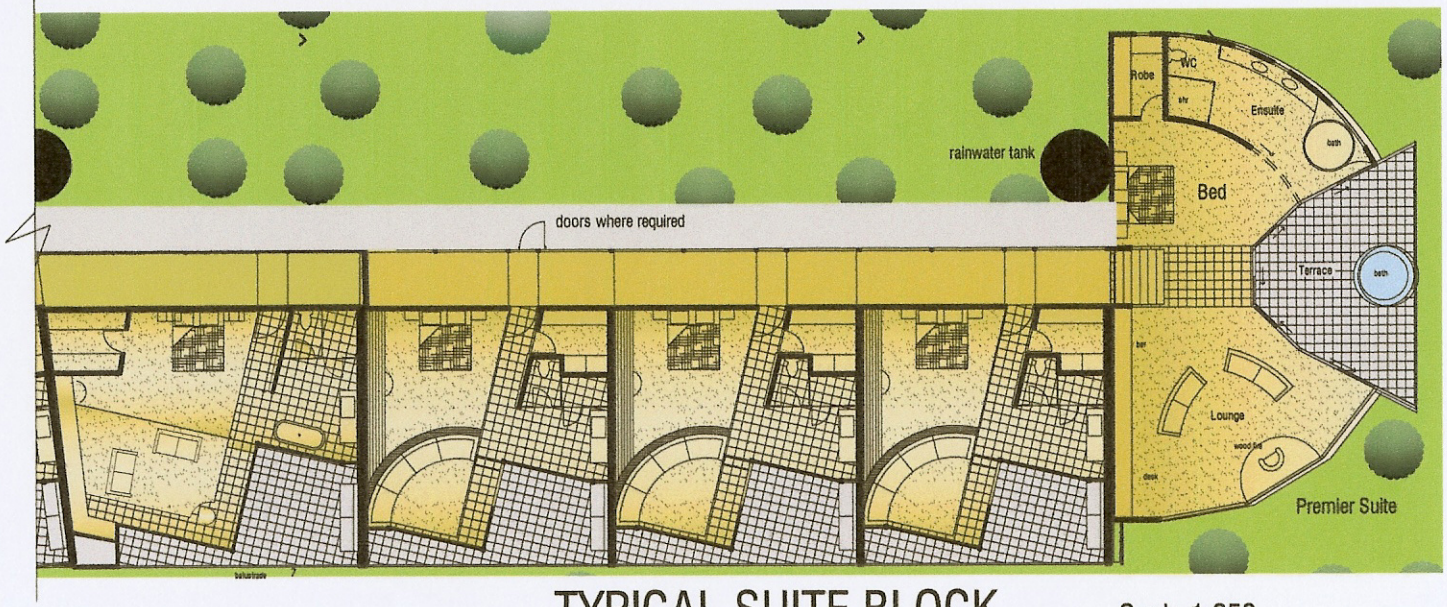
March 2006
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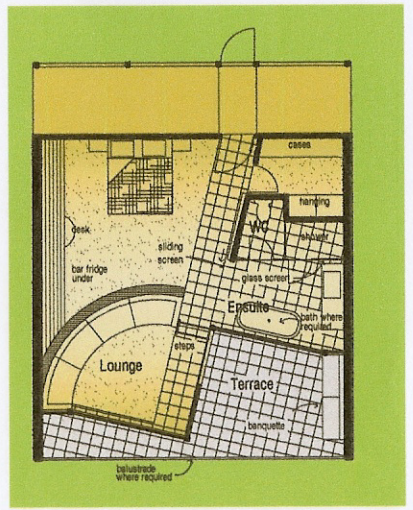
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TYPICAL NORTH ELEVATION SUITES Scale 1:250



TYPICAL SUITE BLOCK Scale 1:250

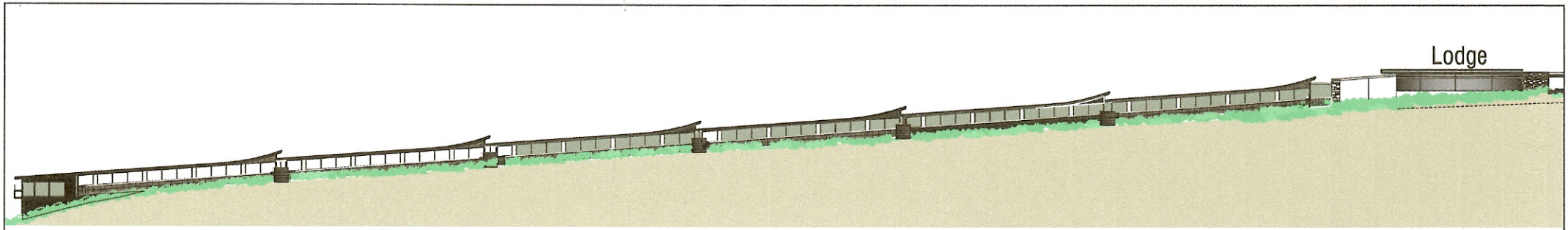


TYPICAL SUITES 1 to 24
Scale 1:200

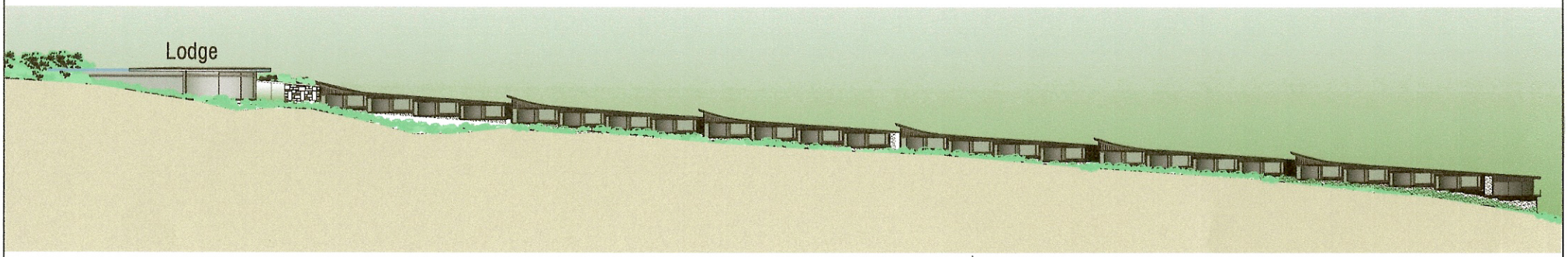
SOUTHERN OCEAN LODGE HANSON BAY, KANGAROO ISLAND

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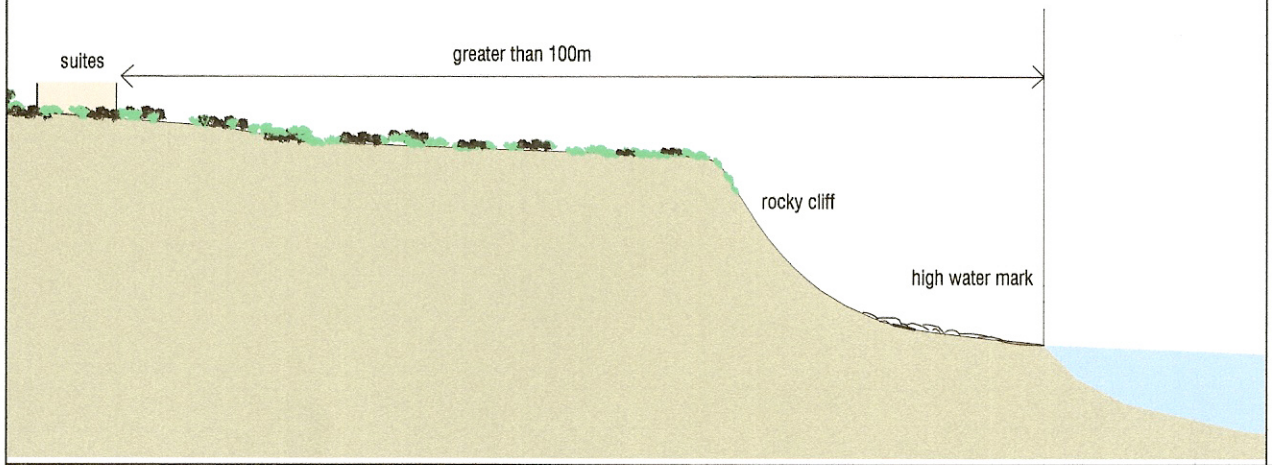
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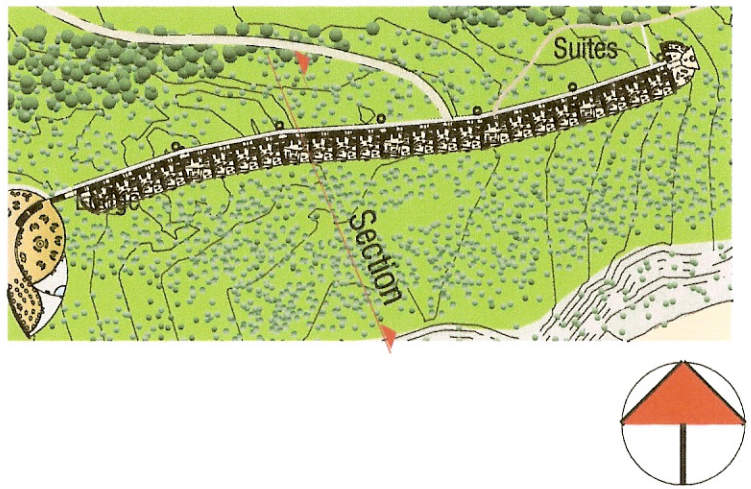
NORTH ELEVATION - GUEST SUITES



SOUTH ELEVATION - GUEST SUITES



Section Through Suites

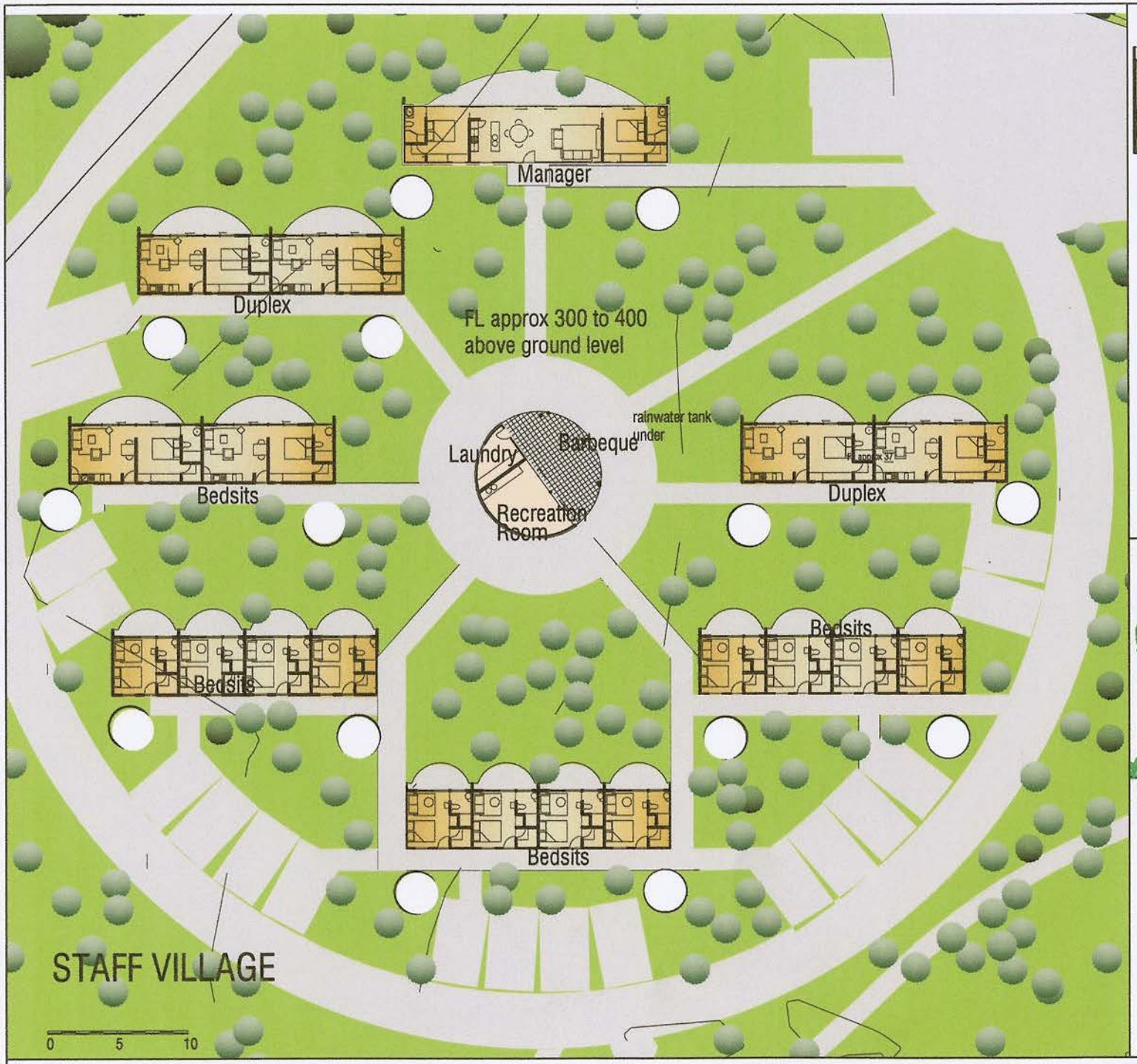


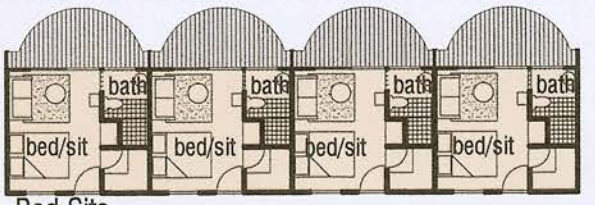
LODGE AND SUITES

SOUTHERN OCEAN LODGE HANSON BAY, KANGAROO ISLAND

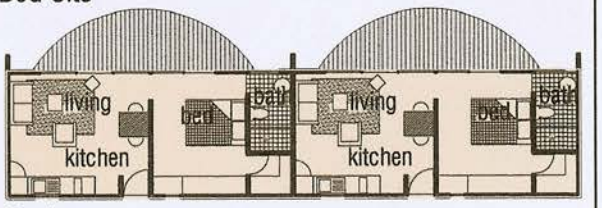
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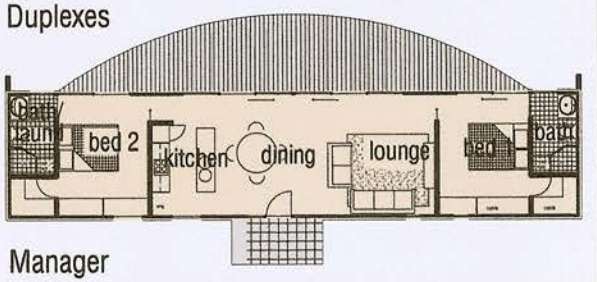




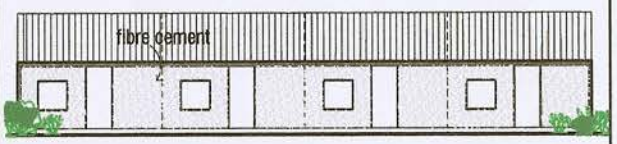
Bed Sits



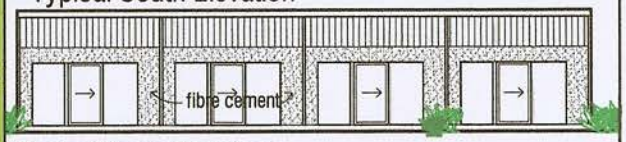
Duplexes



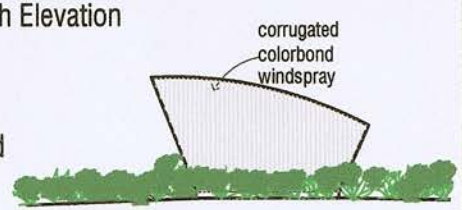
Manager



Typical South Elevation



Typical North Elevation



Typical End
Elevation

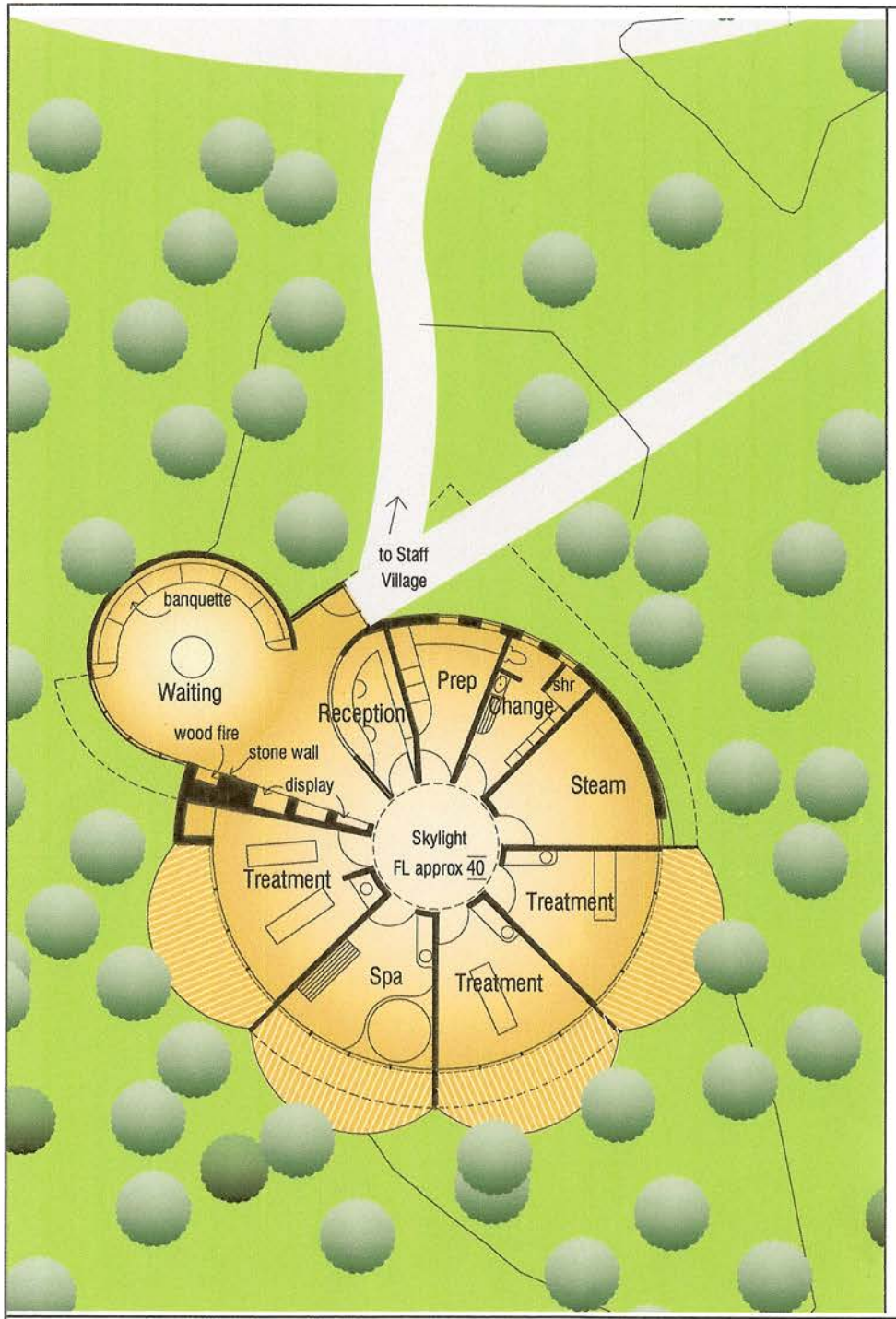


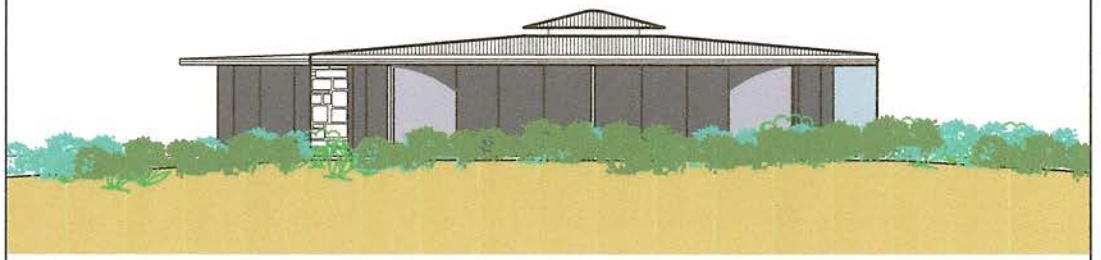
Recreation Room South East Elev Scale 1:250

SOUTHERN OCEAN LODGE HANSON BAY, KANGAROO ISLAND

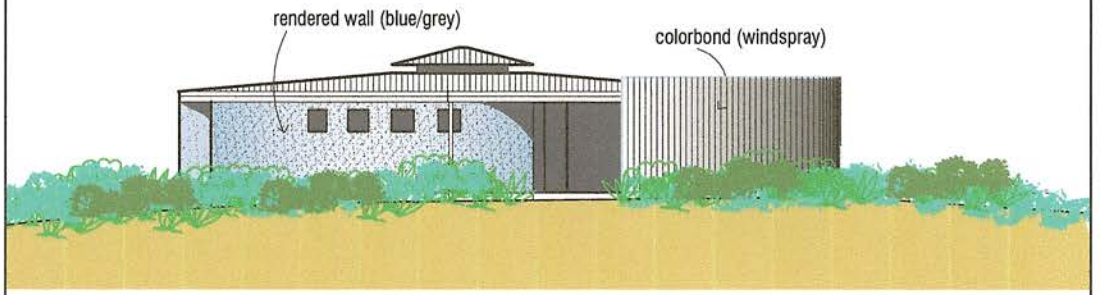
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SOUTH ELEVATION



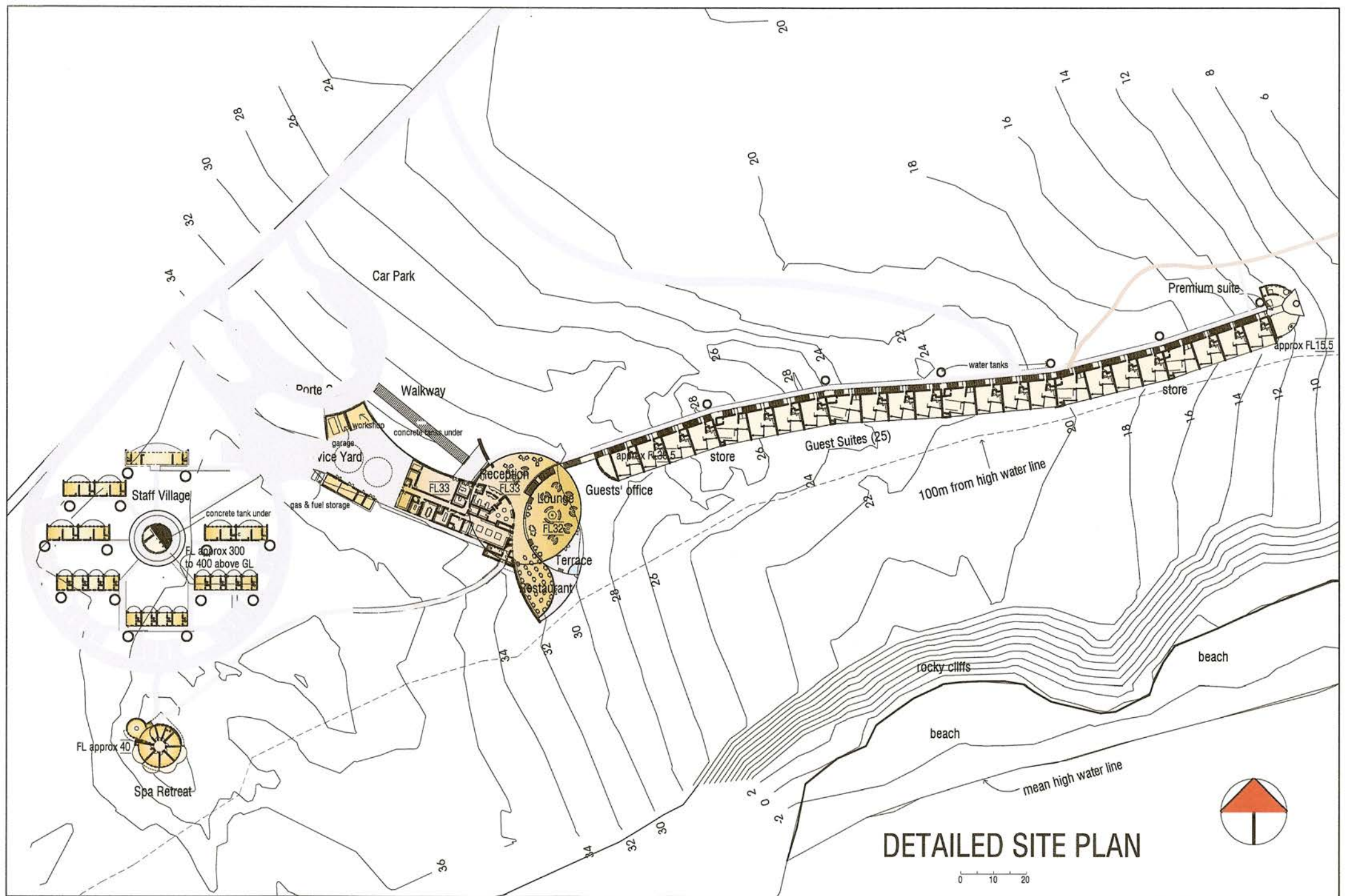
NORTH ELEVATION

SPA RETREAT Scale 1:200

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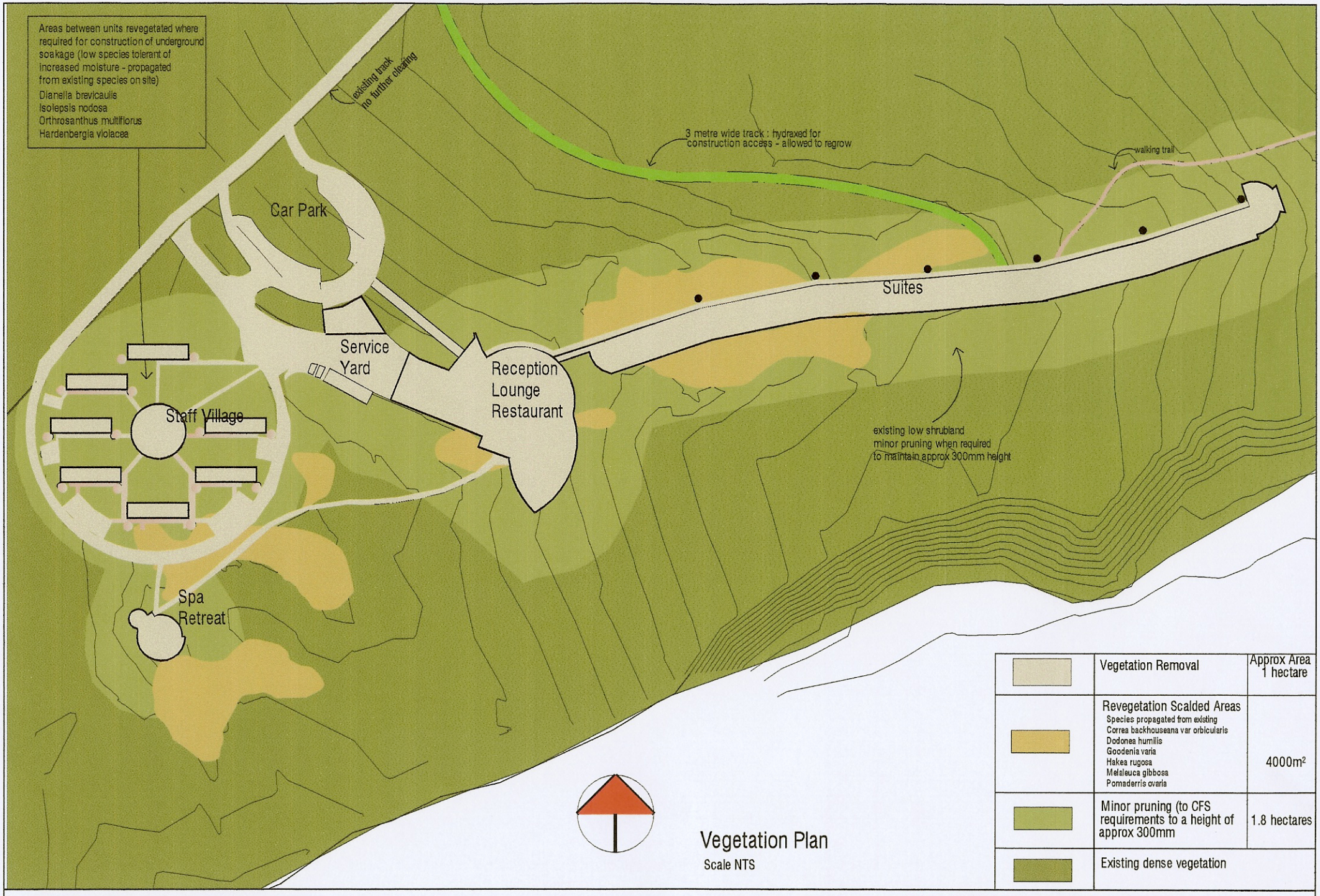
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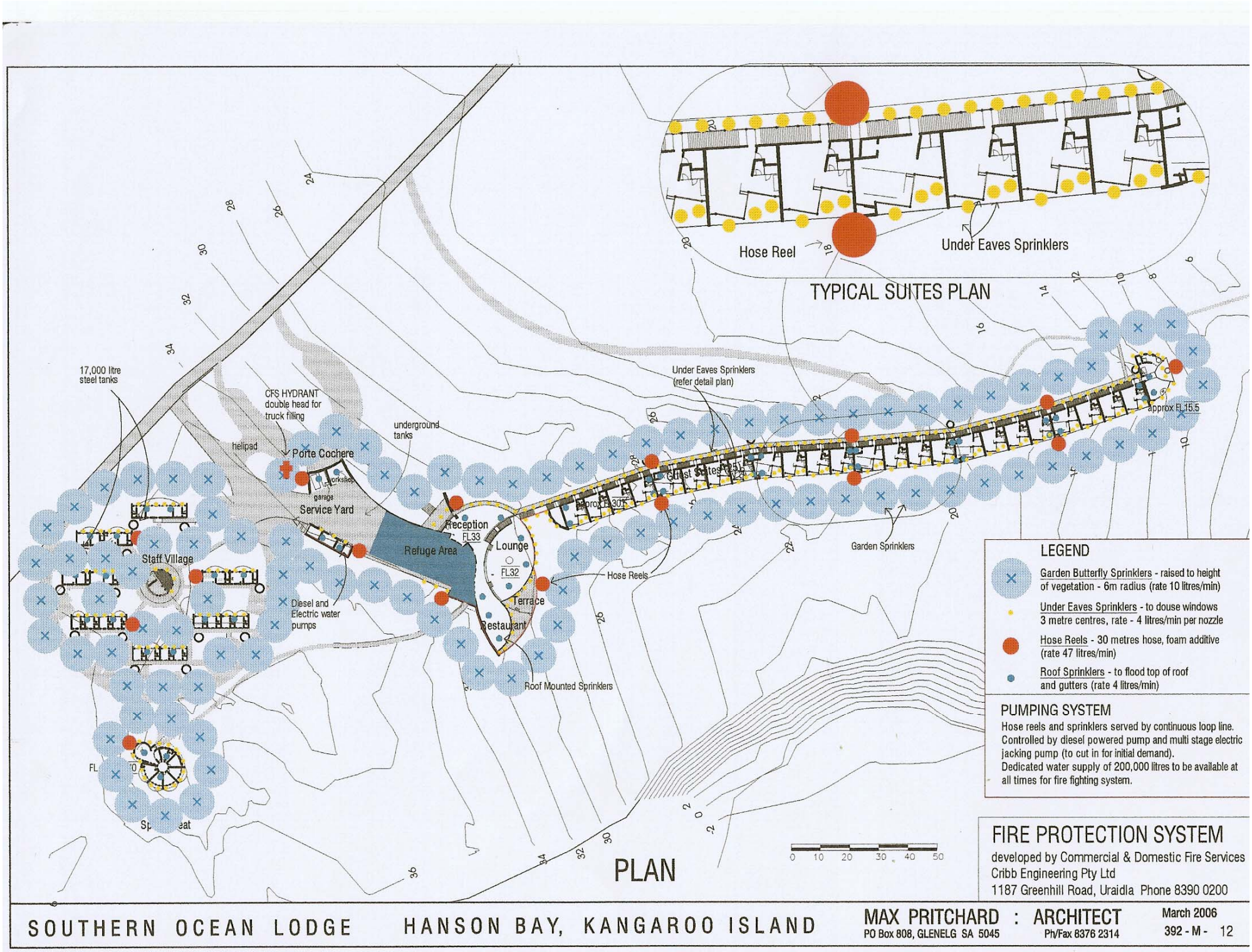
Vegetation Plan

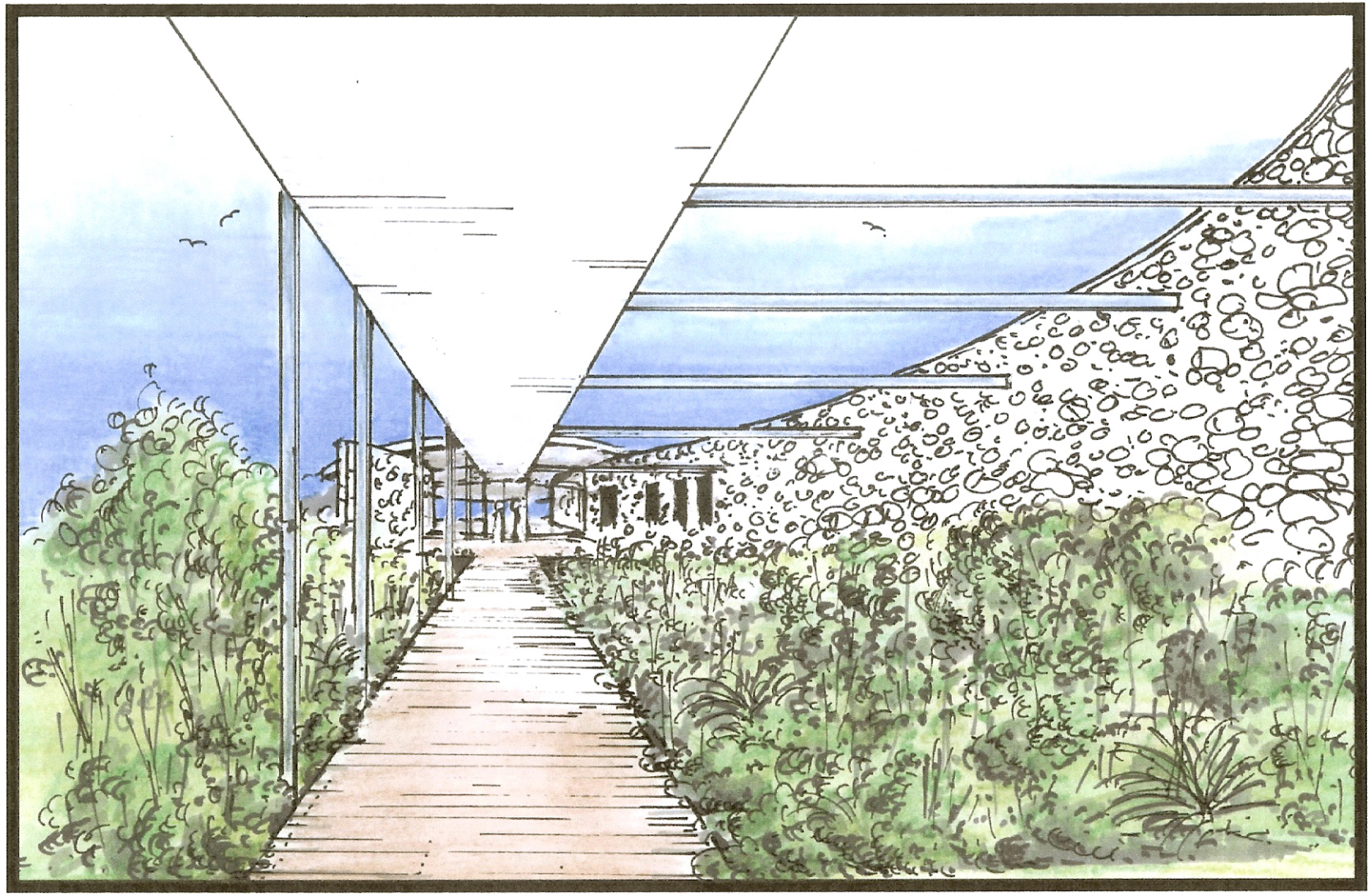
Scale NTS

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TYPICAL SUITES PLAN
Hose Reel
Under Eaves Sprinklers
17,000 litre steel tanks
CFS HYDRANT double head for truck filling
underground tanks
helipad
Porte Cochere
workshop
garage
Service Yard
Staff Village
Diesel and Electric water pumps
Refuge Area
Reception
FL33
Lounge
FL32
Terrace
Restaurant
Roof Mounted Sprinklers
Hose Reels
Under Eaves Sprinklers (refer detail plan)
Guest Suites
approx FL30
approx FL15.5
Garden Sprinklers
LEGEND
Garden Butterfly Sprinklers - raised to height of vegetation - 6m radius (rate 10 litres/min)
Under Eaves Sprinklers - to douse windows 3 metre centres, rate - 4 litres/min per nozzle
Hose Reels - 30 metres hose, foam additive (rate 47 litres/min)
Roof Sprinklers - to flood top of roof and gutters (rate 4 litres/min)
PUMPING SYSTEM
Hose reels and sprinklers served by continuous loop line. Controlled by diesel powered pump and multi stage electric jacking pump (to cut in for initial demand).
Dedicated water supply of 200,000 litres to be available at all times for fire fighting system.
0 10 20 30 40 50
PLAN
FIRE PROTECTION SYSTEM
developed by Commercial & Domestic Fire Services
Cribb Engineering Pty Ltd
1187 Greenhill Road, Uraidla Phone 8390 0200
SOUTHERN OCEAN LODGE HANSON BAY, KANGAROO ISLAND
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March 2006
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Entrance Walkway to Lodge

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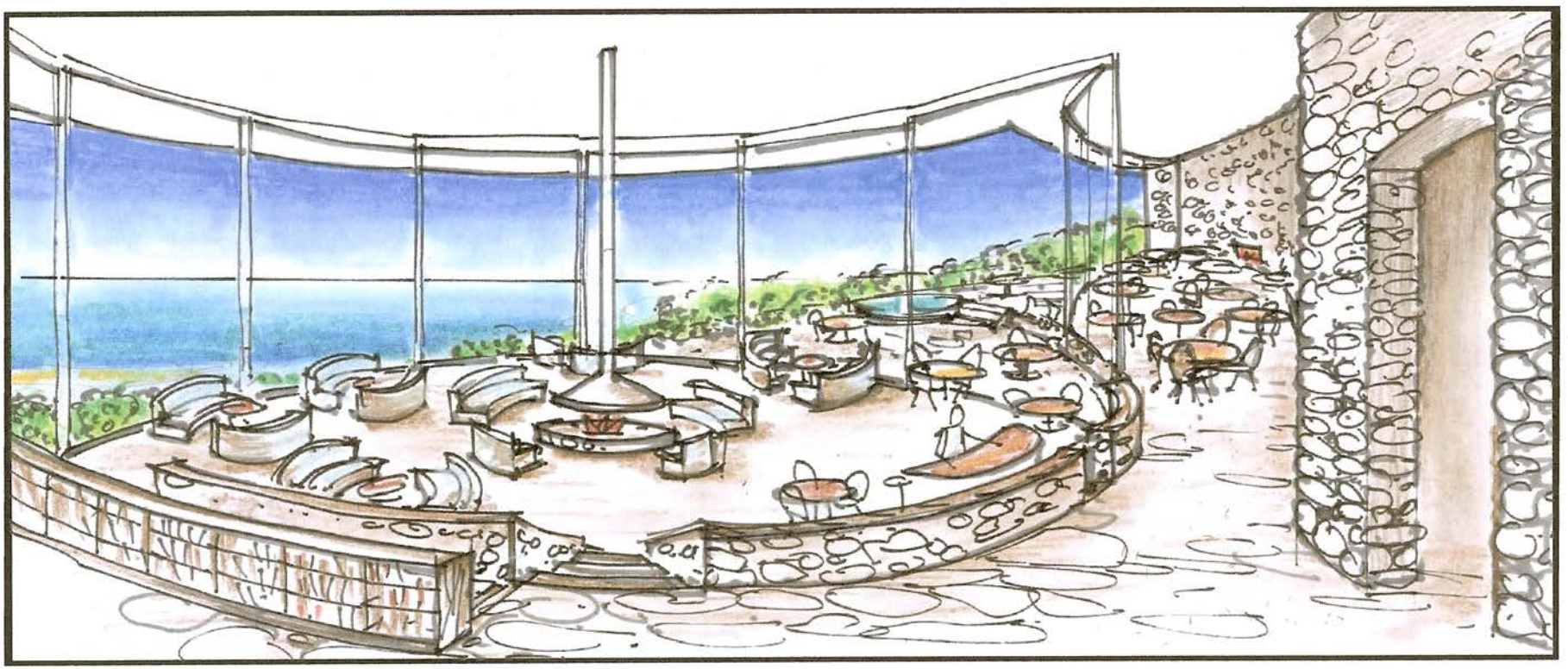
Restaurant and Lounge

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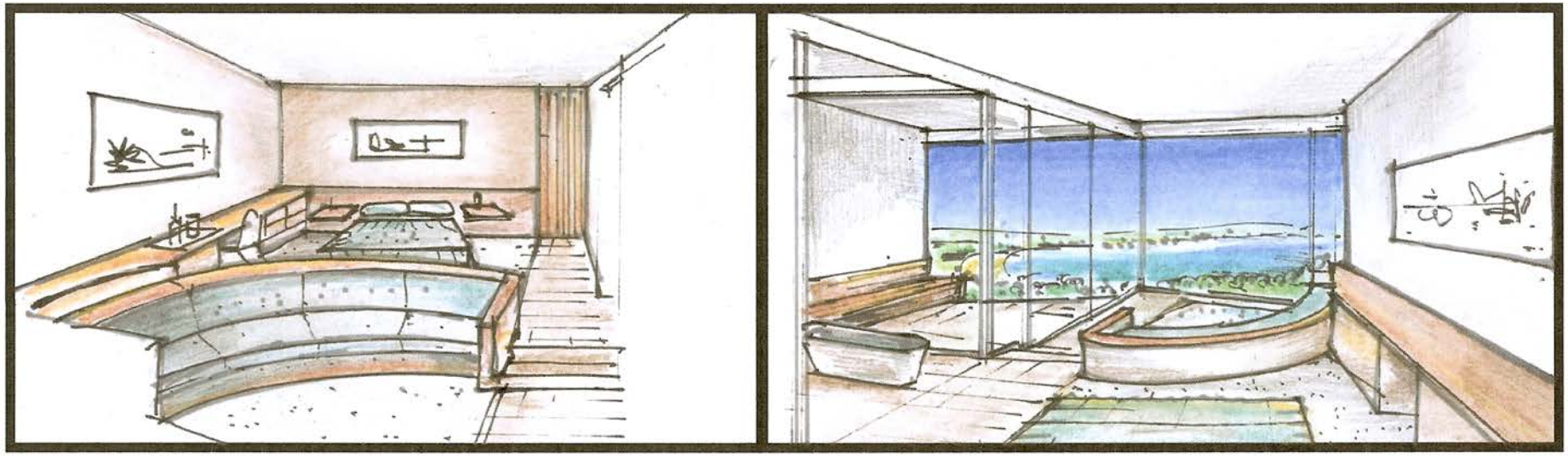
Suites Elevation

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Great Room

MAX PRITCHARD : ARCHITECT
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Guest Suite

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Southern Ocean Lodge : Viewed from eastern end of beach on adjoining property

Lodge appears as a low profile dark element in a vast landscape

Appendix E

Water management report

SOUTHERN OCEAN LODGE

WATER MANAGEMENT DEVELOPMENT REPORT

MARCH 2006

WAYNE PHILLIPS & ASSOCIATES
52 EVE RD
BELLEVUE HEIGHTS SA 5050

EXECUTIVE SUMMARY

This premium resort is to be constructed & operated in a wilderness area of Kangaroo Island, SA, adjacent to Hanson Bay.

1. OVERVIEW

The Southern Ocean Lodge Water Management Strategy will be as follows:

Rainwater will be collected, stored & treated for potable purposes within the facility.

Two 250kl storage tanks will be provided as well as 2 tanks (17kl each) per unit within the staff village & 6 tanks for the lodge building (total of 840,000l). any overflow will be directed to the 250kl bore water tank

This water , after appropriate treatment & disinfection, will be used for:

Potable water in suites, restaurant, staff lodge, reception area etc
Generation of steam for the spa retreat
Make-up water for the plunge pool & sauna areas

It is considered that the proposed use of treated bore water for potable purposes is a cost-effective contingency if rainwater supplies are lacking.

- Toilet flushing water will be provided from a bore water supply : this water will be pumped to the resort, stored in an appropriate 250kl tank – 200kl of which will be the reserve volume for fire-fighting - treated (chemical addition, flocculation, sedimentation & filtration) & disinfected prior to delivery to feeder tanks:

The possibility of reclaimed water reuse as toilet flushing water was fully assessed by calling for proposals & cost estimates for producing Class A Reclaimed Water as per Department of Health requirements : the capital, operating & testing requirements for provision of Class A Reclaimed water far exceeded the water balance benefits & hence a conventional approach will be adopted.

Fire water will be stored in the appropriately located 250kl bore water storage tank : an available volume of 200kl is required. This water will be bore water with make-up water available from the system.

Wastewater from all areas of the facility will be treated in a series of localized, compact, state of the art wastewater treatment package units (Biolytix) with all effluent (Class B) directed to the single subsurface irrigation area in and around the Staff Village. The Biolytix process enables all wastewater, including that from sinkerators (macerators) in the kitchens, to be fed directly to the processing unit without any pre-treatment (screening, oil & grease removal etc). The process is based on digestion of organic & other products by a complex eco-group of micro- & macro-organisms, including worms. There is no chemical addition : simply a small amount of air is delivered to each process vessel to ensure maintenance of aerobic (no odour) conditions.

Details of the proposed system are at Appendix A.

2. PROPOSED INTEGRATED WATER MANAGEMENT SYSTEM

A fully sustainable integrated water management system is proposed, incorporating:

Collection of all roof water for production (after appropriate treatment) of potable water :

- Harvested roof water stored in storage tanks sized to enable use throughout the year : surface run-off water from the resort will not be harvested.
- Contingency plan in times of potable (rain) water shortage : potable water supply augmented by using treated bore water.

Collection & treatment of all wastewater with reuse as prescribed under the SA Reclaimed Water Guidelines:

- Class B : Irrigation as per Guideline requirements : subsurface irrigation of grassed & garden(s) areas around the staff village in accordance with AS 1547.

Plunge pool & spa water : separately treated with make-up from potable supply.

POTABLE WATER SUPPLY -

Harvested rainwater from all of the roofs of the resort & staff village buildings will be delivered to two 250kl reinforced concrete storage & fourteen steel tanks (each 17kl) respectively: this volume has been calculated to sustain the rainwater supply over a full year.

Any excess rainwater collected will overflow to the bore water tank, which has float level control.

The concrete tanks will be constructed on-site & finished at ground level.

The treatment plant (filters & disinfection system) will be located in the service yard adjacent to the storage tanks.

It is feasible to co-locate this equipment with the plunge pool & spa treatment systems.

NON-POTABLE WATER SUPPLY -

Water from an existing bore some 2km from the resort will be pumped to a dedicated 250kl storage tank at the resort. The water will be treated to remove colour, turbidity and odour prior to disinfection & use within the resort buildings.

This water will be used for toilet flushing only.

The bore water supply will also provide & make-up the fire fighting reserve volume required by CFS (200kl)

WASTEWATER TREATMENT & EFFLUENT DISPOSAL SYSTEM -

In order to select the most appropriate & environmentally acceptable system, selected companies were invited to submit offers for either a single unit or multiple units, each servicing part of the complex.

As a result of this process, the selected company will provide a series of small, appropriately located state of the art wastewater treatment units for the whole resort with Class B Reclaimed Water (as per SA Department of Health) used for irrigation of landscaped areas around the Staff Village.

Class B reclaimed water will be pumped from a 22kl below ground storage tank to the designated subsurface irrigation area within & around the Staff Village area.

The effluent receiving area is all natural sand, which will be well mulched to conserve & hold water in the upper layer of the sand. The leaching of effluent below this mulched layer will be minimal.

The sand layer is nominally 3m thick overlying limestone.

There will be no other designated reuse applications for the reclaimed water.

ENVIRONMENTAL IMPACTS

WATER SUPPLY SYSTEM:

The treatment systems for rainwater & bore water will consist of suitably sized media filters followed by disinfection – probably UV or liquid chlorine. These

will be located in the service yard building of the complex. There would be no noise emanating outside of the building.

The dirty backwash water from the filters – backwashed automatically - will be delivered to the 3.3 kl/day WWTP : no discharges to the environment.

Contingency plan : treated bore water will be used as a back-up to the rainwater supply if required.

WASTEWATER TREATMENT SYSTEM:

The following environmental matters are presented:

Location & sizing : The selected units are small(nominally 1.8m diameter) & will be installed in excavated pits so that only top of units (small electrical control box containing the air pump as well) are visible.

Noise : The only noise emanating from each unit will be that from the small air pump (aeration unit) & effluent disposal pump (rated at less than 40 dBA). At 1m from the operating unit, noise levels are very low (less than 15 - 20 dBA).

Odour : The processes are aerobic biological : there will be no odour from any of the units.

DETAILED REPORT

Wayne Phillips & Associates have been engaged to develop the concepts for following systems for this project:

- Water supply
- Wastewater treatment & disposal

1. OVERVIEW

The Lodge is to be located on the southern coastline of Kangaroo Island : the whole approach is to be environmentally friendly in relation to native flora & fauna.

The Lodge consists of:

- 24 suites
  - w.c./shower
  - bath in 2 units only
- 1 x premium suite
- reception/restaurant/lounge complex
  - reception area
  - restaurant
  - kitchen
  - lounge
  - office/shop
  - manager/asst manager offices
  - store
  - meeting room
  - staff room
  - toilets (3) + disabled (1)
- staff village:
  - 12 x bed-sit : ensuites provided : 12 people
  - 3 x duplex units (2 person) : kitchen/toilet/shower/handbasin
  - 1 x manager's house : 2 people : kitchen/toilet/shower/handbasin
- spa retreat :
  - reception/lounge/waiting areas
  - steam room

spa bath room

2 x treatment rooms

1 x special treatment room : 4 x showers equivalent

small plunge pool for guests

own recirculation/filtration/disinfection system.

2. WATER SUPPLY & WASTEWATER OPTIONS

2.1 Water Supply

It is proposed to collect all run-off from the resort roofs & staff village, store in appropriately sized tanks, treat as required & distribute to all areas of the resort. The staff village may be self-sufficient in this regard.

Treatment may vary for different areas of the resort, e.g.:

- spa retreat :

  steam generation requires water of high purity

  slightly lesser quality for shower /treatment rooms : no odour or color: at least NHMRC Potable water quality

guest suites:

spa bath in premium suite : high quality water

shower, handbasin : potable quality meeting NHMRC potable water quality

toilets : lesser quality

kitchen :

potable quality water meeting NHMRC Guidelines.

Plunge pool:

Own recirculation/treatment & disinfection system

Make-up water : good quality (straight from treatment unit after storage tanks).

There will need to be a contingency plan for times when water is scarce/runs out : the possibilities (in engineering sense) are:

Pipe water from existing bore ~ 2km inland

bore rehabilitation may be required depending on the extent of refurbishment required.

delivery pipeline from the existing bore to the development

This water – assuming only reasonable quality & possibly higher than usual colour, would require additional treatment before use within the resort. Chemical dosing, flocculation &/or direct filtration is a possible treatment process.

Tanker in water from reliable source

This would be from the SAWC reticulated supply, possibly near Parndana. The contractor would have a metered hydrant for recording volume extracted per load.

tanker capacity : nominally 15kl

Desalination using RO technology

This will not be considered at this stage of the project. The impact of a pipeline from the sea to the resort & the need to dispose of the high TDS reject stream are the main factors in rejecting this option, together with the initial capital & operating costs for a relatively small & intermittent yield.

Reclaimed water (Class A) used for designated non-potable purposes

The use of Class A reclaimed water for defined non-potable purposes (toilet flushing, fire-fighting water etc) would reduce the demand on captured stormwater considerably. Secondary treated wastewater would be further treated to meet the DH requirements for Class A reclaimed water (coagulation, filtration, disinfection) – the treatment plant would be similar to that required to treat the bore water (see above).

It is therefore proposed to adopt the following strategy for the water supply to the resort & associated facilities:

capture all rainfall run-off from roofs of buildings, store & treat as appropriate to provide NHMRC quality potable water

toilet flushing:

install a pipeline from the available bore (nominally 2km removed) and pump to a dedicated storage tank at the facility : bore water to be used for toilet flushing throughout the whole resort – some treatment may be required to remove colour from the water (this will be further assessed when relevant water quality data is available). Bore pump operation controlled by level controls in the storage tank.

Fire fighting on-site reserve (nominally 200kl) to be provided by the bore water storage tank.

This bore water volume to be used, after appropriate treatment – potable quality water produced - for any contingency provision that may arise. A valved connection from the bore water treatment unit to the main rainwater storage tank(s) will be provided.

2.2 Wastewater

Will be collected by normal wastewater plumbing from all areas of the main building/resort : the two possible options for treatment include:

single WWTP:

septic tank & appropriately sized soakage area : no reclaimed water reuse at all. This option is not favoured (aesthetic & possible odours) & will not be considered further.

normal secondary treatment (Class B) & disposal to dedicated irrigated area(s) with subsurface system(s). This reclaimed water will be filtered & disinfected using liquid chlorine prior to disposal. Backwash water will be returned to the WWTP inlet.

several small, package (domestic capacity) units with treated (reclaimed) water pumped to single storage tank(s).

After secondary treatment (Class B), wastewater will be delivered to a storage tank & then pumped to the sub-surface disposal system which will be located at/adjacent to the car park area – the following option may be explored at some future time :

Tertiary treatment to Class A : a review of possible applications for this quality reclaimed water (which would only be used for toilet flushing) indicates a possible cost-effective balance when compared with the bore water option.

The agency responsible for approval of such measures requires an high level of weekly testing, with parameters including : BOD, SS, E-Coli, turbidity, specific viruses & helminths , Giardia & Cryptosporidium. In addition, dual pipework including back flow prevention devices would have to be provided to all suites, staff village, spa retreat & lounge/restaurant areas of the resort, reclaimed water pipework has to be colour coded.

NOTE : estimates of cost (capital & operating) obtained for producing 10kl/day of Class A reclaimed water are not cost-effective when compared with treatment of bore water supply & the use of this supply should potable water shortages occur.

3.0 WATER GENERATION ASSESSMENTS

The resort is to be located on the southern coast of Kangaroo Island : rainfall data is tabulated based on the Bureau of Meteorology Cape de Couedic results (up to 1973): it is assumed

that the annual rainfall data for the Cape is similar to Hanson Bay : both lie between the 700 & 600 isohyets.

This gauging station closed in 1973, but the data will be used as this is the closest to the site of the proposed resort.

For average assessment, the 80% capture factor initially used for run-off volumes is possibly conservative by 5% – 10% : use 85% in further assessments.

Monthly rainfall yields then become – using relevant Bureau of Meteorology (mean) data , total roof area of 4,900 m 2 & 85% capture factor:

Month	Av. Rainfall (mm)	Captured Volume (kl)
May	75.2	313
June	104.6	436
July	110.5	460
August	82.7	344
Sept	56.8	237
Oct	40.2	167
Nov	30.1	125
Dec	24.8	103
Jan	16.3	68
Feb	24.9	104
Mar	23.6	98
Apr	48.2	201
TOTAL	636.8	2,656 kl

NOTE ; if a nominal 6% reduction is made due to geographic location of the Cape (680 isohyet) & Hanson Bay (annual average rainfall ~ 640mm),then the annual volume collected from the resort equates to 2.50Ml.

This figure (2.5Ml) will be used for water balance evaluations.

4.0 WATER USE ASSESSMENT

The basis for wastewater volume estimation is the standard values/tabulation available in DH Waste Control System Code. Some of these values will be modified as indicated based on the assessed guest's daily time in the resort etc

The following initial estimates are based on the following:

guests & staff use facilities equally : irrespective whether in resort or staff village

restaurant is additional to the above

spa retreat used by 10 guests/day

all wastewater from resort, staff village & spa retreat is collected & treated in a single treatment facility.

On this basis, the following aspects are developed:

Guests : 100 lpd : 50 guests (max)	*5,000 lpd*
Staff village: 150 lpd : 20 staff	*3,000 lpd*
Sub-Total	***8,000 lpd***

Restaurant : max. number of guests over 7 day period: 15 lpd : assume 40 guests

600 lpd

Additional aspects: ***1,500lpd***

Spa retreat : shower (50lpd) +Vichy Shower (1,000 lpd) + spa bath (450 lpd)

TOTAL ***9,500 lpd***

ASSUMED ASSESSMENT TOTAL for water balance

9,500 lpd.

Water use can be assessed on either average conditions or by applying estimates of monthly occupancy rates based on relevant resort operator information : both aspects will be considered as follows:

(1) Assume 30 day x constant (70%) occupancy/staff levels as average useage case scenario: guests are not present all day as per normal domestic dwelling – nominally estimated at 50% absence period/day : this is partly reflected in 100lpd allowance above, but this can logically be reduced further : assume a further 15% reduction.

- Monthly water useage : 150 kilolitres per month.
- Annual water useage : 1.8 Ml

Annual water harvested : 2.5 Ml

Nominal annual excess : 0.7 Ml.

(2) Assuming a variable occupancy & related staff numbers as follows;

- Dec – Jan : full occupancy (50) + 12 staff : 8,500lpd
  - Wastewater volume : 510,000l : 510kl
- Nov, Oct, Feb, Mar, Apr, Sept : 45 guests & 12 staff : 7,820 lpd
  - Wastewater volume : 1,407,000l : 1,407 kl
- May, August : 40 guests + 8 staff : 6,580 lpd
  - Wastewater volume :395,000 l : 395 kl
- June, July : 35 guests + 8 staff : 5,895lpd
  - *Wastewater volume :353,700l : 354kl*
- ***TOTAL : 2,666kl***
- *As above, this volume to be reduced by 15% : 2.27Ml*
- *Nominal Excess : 0.23Ml*

(3) It is noted that staff numbers may be up to 50% higher than tabulated above : demand/usage figures increase by nominally 10% overall, resulting in a total annual water usage figure of 2.5Ml, with a nominal zero deficit, with monthly usage as follows;

Dec – Jan : full occupancy (50) + 20 staff : 9,600lpd
Wastewater volume :576,000l : 576kl
Nov, Oct, Feb, Mar, Apr, Sept : 45 guests & 20 staff : 8,910lpd
Wastewater volume : 1,604,570l 1,604kl
May, August : 40 guests + 12 staff : 7,130lpd
Wastewater volume : 427,860l : 428kl
June, July : 35 guests + 12 staff : 6,446lpd
Wastewater volume : 386,743l : 387kl
TOTAL : 2,995 kl
As above, this volume to be reduced by 15% : 2.55Ml
Nominal Deficit : 0.05 Ml

Therefore, it is clear that the water balance will be critical depending on the overall occupancy factor & time/day that guests are not in resort & hence not using facilities etc. : the only possibility for augmentation the availability of water in this resort (which will influence the water balance) is toilet flushing.

As detailed above, the use of appropriately treated bore water for this purpose is a preferred strategy & water use calculations will therefore be modified accordingly as follows: this volume is nominally (say) 10 litres/flush x (say) 60 persons x (say) 2 per day : total 1,200lpd or 440kl/year. This will effect a more positive water balance based on above estimates. The monthly water model then becomes as follows:

- Dec – Jan : full occupancy (50) + 20 staff : 8,400 lpd
  - Wastewater volume : 504,000l : 504kl
- Nov, Oct, Feb, Mar, Apr, Sept : 45 guests & 20 staff : 7,800lpd
  - Wastewater volume : 1,404,000l : 1,404kl

- May, August : 40 guests + 12 staff : 6,314 lpd
    - Wastewater volume :378,857 l : 379 kl
- June, July : 35 guests + 12 staff : 5,640 lpd
    - *Wastewater volume : 338,400 l* *: 338kl*
- ***TOTAL*** ***: 2,625 kl***
- *As above, this volume to be reduced by 15%* *: 2.23Ml*
- *Nominal Balance* *: 0.25 Ml*

Therefore, the assessment of water use incorporating:

the higher staff numbers (as above)

a 15% reduction for guest trip allowances etc

toilet flushing water provided from the separate bore water supply/reclaimed water, indicates that the total annual use equates to (nominally) 2.25 Ml : water available from captured rainwater : 2.5Ml : indicating that for a normal set of average rain years, the water balance will have a positive nett result.

Additional water may be required in times of extremely low rainfall/heavy occupancy rate : this could be sourced from :

- Pipeline from bore : treatment may still required depending on water quality assessment – in assessing possible use, the bore water may be suitable for toilet flushing only, with an option of blending with rainwater or feeding directly into the toilet flushing plumbing.
    - A small Package Water Treatment system may need to be included (for colour removal) in the water management system budget costs.

The preferred water supply arrangement at this stage of project development is:

Capture all rainfall run-off from the roofs of resort buildings : this water, after appropriate filtering & disinfection, to be used throughout the resort for all potable & personal uses (drinking, showers, hand-basins etc)

Use bore water to flush toilet systems throughout resort , staff quarters & spa retreat : treatment may be required (small package water treatment plant)

Bore water be used to provide the required fire fighting on-site storage requirement (nominally 60 kl)

A connection be made to enable (treated) bore water to be fed from the bore water storage tank to the main water storage tanks if required

In summary, the water balance within the resort is considered sustainable with bore water being used for toilet flushing & providing fire fighting reserves purposes only.

5. ONSITE RAINWATER STORAGE

In order to ensure that all rainfall is held in tanks & not lost (by overflow etc), the maximum difference (on a monthly basis) between rainwater available & water use needs to be assessed : it is assumed that the resort will commence operations/rainwater collection in May : storage tank(s) empty at the commencement of this month:

Month	Rainfall collected (kl) assuming 85% capture factor	Water usage (kl) : higher staff, 15% reduction & subtracting toilet flushing	Difference per Month (Rainfall – usage) (kl)	Stored volume at end of Month (kl)	Stored Volume **NOTE :** *200kl required for fire fighting purposes*
May	294	154	+140	140	140
June	410	136	+274	414	414
July	432	136	+296	710	710
August	323	154	+169	879	750
September	223	197	+ 26	905	750
October	157	197	- 40	865	710
November	118	197	- 79	786	631
December	97	220	- 123	663	508
January	64	220	- 156	507	352
February	98	197	- 99	408	253
March	92	197	- 105	303	148
April	189	197	- 8	295	140

It is clear that actual water usage will be a critical factor in ensuring a positive water balance assuming that all rainfall is collected for use within the resort. If the assumed roof capture

percentage is increased to 90%, then a more positive water balance is established : there is no way of really determining this factor – suffice to say that captured rain water will be between 2,500kl & 2,650kl per year.

The total water storage tank volume to be provided for the above scenario would be 750kl: if water use/guest is less than the designated volumes, then increased overflow will occur in winter months, with all toilet flushing water being provided from bore water system. Assuming the 15% reduction monthly usage values & 750kl effective water storage ,with an appropriate (200 kl) fire fighting volume, the annual overview becomes as per last column of above table : the system is fully sustainable, with overflows of rainwater occurring in winter months.

The fire fighting reserve water can be provided using bore water into a dedicated 250kl storage tank. This tank could feed the toilet flushing system, with level controls set such that there is always a reserve of 200kl in the tank.

It is therefore recommended as follows:

Rainwater storage:

- 2 x 250kl storage tanks (roofed reinforced concrete) be provided for the storage of rainwater to be used as potable water throughout the resort: overflow from the storage tanks will (in general) occur during winter.
- A number of 17kl rainwater tanks be installed in the staff village (14) & lodge (6) to augment main (500kl) storage.
- Total rainwater holding capacity : 840kl.
- Any overflow will be directed to the bore water tank.

Toilet flushing water be provided from a separate bore water supply delivered into a suitably sized storage tank (250 kl).

provision in this tank for a reserve of nominally 200kl of the stored volume for fire fighting purposes : water to be provided from bore water supply system.

Treated bore water could be used as a contingency measure to augment the rainwater storage if required.

6. RISK ASSESSMENT

It is clear that there is a reasonable risk with the volumes of water available when calculated using average rainfall data : the above analysis shows that there is a need for importing water to cover nominally 45 days/year (88% security of supply on a yearly basis).

Allowances have been made for:

6% lower rainfall (annual average) at Hanson Bay than for the Cape De Couedic : this may not actually be accurate if data since 1973 is addressed.

loss of volume in collecting from roofs (85% & 90% factors)

variable staff numbers : if actual staff numbers are lower than that assumed, water usage reduces accordingly.

use of water in spa retreat : large (25% of total daily resort use) assumed will be used by the Vichy showers : it is noted that if this daily volume was 1,100l instead of the assumed 2,100 l, then total water usage will be reduced by 30kl/month & 365kl/year : this factor on it's own reverses the need for import of water in March/April each year.

It is further noted that the annual Median rainfall (604.2mm) is some 32mm/year less than the annual average (Mean) of 636.8mm : if this data set was used for the performance of the storage tanks, then water would be required to be imported in for a greater period of time.

There were periods of up to 8 consecutive years when the annual rainfall was less than the annual average (Mean) : such repeated events would cause considerable negative impacts on the assumed water balances using Mean rainfall data.

The following definitions as taken from Bureau of Meteorology information are to be noted:

Mean A mean or average value over a stated period is the arithmetic mean. This is obtained by totalling the individual values and then dividing this total by the number of values. The mean of an element for a particular month is obtained by totalling all the values of that element for that month over the period of record and dividing by the number of values

Median The median for the month is the value of an element which exceeds half the occurrences for that element for that month over the period on record. That is, there is a 50% probability of the element being below the median value. If the values for a month are ranked or arranged in increasing order of magnitude and there are an odd number of values, then the median is the middle value. If the number of observations is even, then the median is calculated by taking the mean of the two middle values.

With many meteorological quantities the mean and median values are close and the use of either value is acceptable. Although this may often be the case with annual rainfall, for shorter periods the mean can differ significantly from the median, as the mean can be influenced by an extremely heavy or light value, while the median is not. Hence the median is usually taken as giving a better description of the characteristics of rainfall.

Deciles are used to give an element a ranking. For example, a decile rainfall map will show whether the rainfall is above average, average or below average for the time period and area chosen.

From the records of annual rainfall, the totals have been arranged in ascending order (from lowest to highest). They were then split into 10 equal groups, so that in this example there would be 10 groups generated from the set of full year data. The first group (lowest set of annual rainfalls on record) would be in decile range one, the second group in decile range two, up to the four highest annual totals (highest 10 per cent) being in decile range 10.

From the Bureau of Meteorology data, the fifth decile set (representing nominally 5 years) represents the Median value, while the 6^{th} decile set is marginally less than the Mean (average) value.

An analysis of the Bureau of Meteorology data shows:
Out of the 50 years with full data (each month) :

- 20 years exceeded the average annual rainfall
- there are blocks of 2 years(6 times), 3 years(1 time) of consecutive rainfalls greater than the annual average
- 30 years were less, including up to 8 (1 occurrence) consecutive years with other blocks of 2(6 times) & 3 (2 times) consecutive years : these blocks occur fairly regularly indicating that rainfall is not at all predictable or reliable in this area.

The Bureau has also provided the Standard Deviation values for the rainfall data sets : annually, this value is 132.0 mm : this means that 67% of the time, the annual rainfall will be between 504 & 768mm per year with a mean of 636.8mm per year – for the remaining 33% of the time, rainfall will be less than 504mm (nominally 16.5%) & more than 768mm (nominally 16.5%).
From these overviews, it can be seen that to have such a finely-balanced water management situation, as is the case without the bore water augmentation, imposes a considerably higher risk of sustaining a positive situation for the stored water volume.

It would be better, as is proposed by using bore water for toilet flushing, to have excess water available from the capture area, with overflow at times each year, thereby ensuring that there is always a reserve available in the resort's potable water storage tanks.

7. SYSTEM TECHNOLOGIES

The following section details various options for both the water supply & wastewater systems. Options presented are feasible from an engineering perspective & will be costed further in this report.

It is clear that the systems selected for this facility need to be robust, simple in operation & relatively maintenance free as far as operator attendance is concerned.

7.1. WATER SUPPLY

Rainwater that runs off from roofs of all buildings in the development will be collected in tanks for reuse within the resort.

The water supply is based on captured rainwater from both the roof of the resort & the staff quarters : the physical quality of this water is normally very acceptable : microbiological quality then becomes the key parameter in treatment.

There will be times when air-borne dust, bird droppings & leaf material will be deposited on the roofs of the resort buildings, which, with the on-set of rain will be collected in the main water supply storage tanks. This material will have an adverse effect on both the physical & microbiological characteristics of the stored water.

In order to obtain fully effective disinfection, low turbidity water is required – it is therefore proposed to filter all potable water through a media sand filter prior to disinfection.

It is not proposed to collect run-off from paved areas for potable purposes.

DISCUSSION:
To ensure compliance with NHMRC Drinking Water Guidelines, the collected water will need to be treated & disinfected to ensure that:

Turbidity is less than 1 NTU for aesthetic (incl. ice-making) & disinfection to be totally effective.
Color is within allowable limits (< 15 HU)
Microbiological quality is suitable (0 E-Coli/100ml)
pH : 6.5 – 8.5
TDS < 500 mg/l

There are three basic treatment options:

- Membrane technology : expensive & not warranted at this time – will not be considered further.

- Conventional chemical dosing/sedimentation/filtration
- Simple media filtration + UV disinfection : this is the favoured option at this time & will be the basis of system development.

In each case there is a “reject” stream:

High TDS stream from membranes : nominally (say) 15% of daily flow : 1,200 lpd

Sludge from conventional systems : say 5% of throughput : 400 lpd

Backwash water from filtration system – fed to wastewater system for disposal.

In each case, separate disposal of this reject stream has to be considered; normal options include:

Evaporation (high TDS stream)

Drying beds (sludge)

Wastewater system for dirty backwash water

Disinfection can be effected by:

- Chlorination
    - Good for bacterial, moderate for viral removals
    - Possible taste & odour (ex by-products)
    - Good reliability
    - Need for gas/solution delivery
- Membrane technology
    - Good for both bacterial & viral removals
    - Expensive, but one system performs both treatment & disinfection (RO level of membrane)
    - CIP required : output to be disposed
- UV disinfection : preferred system for this site.
    - Good for bacterial & viral removals
    - Simple systems
    - No need for delivery of chemicals
    - UV lamps replaced every 6,500 operating hours.

In general, a conventional water treatment package would incorporate:

- Chemical dosing of a coagulant/flocculant
- Pin-floc filtration
- Disinfection

For membrane systems, there would be minimal pre-treatment required for this water, with the stored water simply fed to the membrane plant for treatment, including disinfection.

For spas, steam production & other possible high water quality uses, membrane treated water is sometimes preferred. If such water quality is required only in this area, then point of use (small) membrane units are readily available & would be recommended for this project.
Treated water would be stored in treated water tanks & then supplied to the various areas of the resort as required. The proposed distribution system would comprise a constant pressure pump unit that supplies water as & when required : when water is used at any location, the pressure in the delivery line drops – this drop is reflected in the level in a pressure tank fitted to the delivery pump, which is activated at a pre-set pressure value.

The bore water (if this option is adopted) will be delivered to a 250kl storage tank – with allowance for a 200kl fire fighting reserve – with pump operation determined by level probes set in the tank at appropriate positions (pump start/pump stop).

Reclaimed water (Class B) would require further treatment prior to use as toilet flushing water – similar technology to that proposed for collected stormwater (filtration & disinfection).

RECOMMENDATION
For this development, it is RECOMMENDED that the treatment of all collected rainwater water prior to use within the resort , spa retreat & staff village be by :

Media(sand) filtration

Chlorine disinfection

BORE WATER
The treatment of the proposed toilet flushing water supply will be dependent on actual water quality : this information will be assessed when sampling undertaken at a later time.
At this stage of project planning, an allowance for a package water treatment unit incorporating:

- Flocculant/coagulant dosing system
  - Chemical storage tank
  - Dosing pump
- Media filter(s) with automatic backwash controls (time/head loss)
- Backwash pump for filter(s)
- Associated pipework & valving

7. 2. WASTEWATER

The following concept will be implemented for the resort & associated facilities:

COLLECTION:

Normal plumbing systems will be installed in all areas of the resort requiring wastewater disposal.

TREATMENT:

25 Suites:

Four Biolytix BF6 units, each treating wastewater from 6 or 7 suites.

Staff Village:

Two Biolytix BF6 units

Reception, Lounge & restaurant complex:

One 3.3kl/day Biolytix treatment plant

Spa Retreat

One Biolytix BF6 unit

DISPOSAL:

Treated (Class B) reclaimed water will be pumped from each of the four treatment locations to a 22kl treated water storage tank : from this tank, reclaimed water will be pumped to the 1,750 m2 sub-surface irrigation effluent disposal area, which will be located around the Staff Village : this system will irrigate grassed areas & associated landscaped garden beds.

In this application, because of the preferred sub-surface irrigation system, the form of disinfection proposed is liquid chlorine (sodium hypochlorite) from a bulk storage unit with a dosing pump to deliver the manually controlled dose rate into the filtered water system.

For the resort development as a whole, DH (Environmental Health Branch) approval is required for:

- collection system from all areas of the resort
- treatment facility
- disposal strategy

No EPA approvals/licence is required as the resort is under the stated population equivalent & is not in a declared Water Protection Area.

WASTEWATER TREATMENT PLANTS DETAILS

A decentralized wastewater treatment approach in lieu of a single centralised wastewater treatment facility is proposed for the whole facility.

It is proposed that low energy, robust Biolytix Filter units
be strategically located to treat wastewater close to source. The high secondary standard treated effluent would then be transferred cost effectively to the effluent storage treatment tank & then transferred directly to subsurface irrigation.

This proposed configuration provides a number of benefits including;

- Minimization of potential risk associated with raw sewage being stored and pumped in the vicinity of the guest suites and ocean shoreline.
- Low cost wastewater collection system as pressure sewer type system proposed transfers treated effluent in small bore polyethylene pipework that may be laid at minimum cover and is not restricted by topography (e.g. compared to gravity sewer).
- Easy isolation of any problem given the separation of the treatment units (e.g. compared to concentrated wastewater flows to a single larger treatment facility).
- Large buffer storage capacity in event of system failure. Individual treatment units have an emergency buffer storage capacity typically around 1-2 days.
- Network is easily expandable (if required for future growth)
- Treatment system units only require annual maintenance.
- Low greenhouse gas emission and embodied energy costs.
- System provides the opportunity for cost effective direct subsurface drip irrigation reuse in the vicinity of each treatment unit.

For the 25 guest suites it is propose that a Biolytix treatment filter model BF6 be installed to treat clusters of 6 or 7 suites. This filter has a normal operating capacity of 1,600l per day and would be suitable, based on the waste water volume calculation of 100 litres per person per day [SA Health Commission Code].

For the staff village, BF6 filters are also proposed. It is estimated that the total flow from the staff village will be approximately 3,000 litres per day and therefore 2 BF6 filters would be required.

A single Biolytix BF6 will be provided for the Spa Retreat.

For the reception, lounge and restaurant complex it is proposed to supply a 3.3Kl per day sewage treatment plant, which will adequately deal with peak restaurant loads.

Biolytix treatment systems do not require grease trap waste separation and it is proposed to incorporate in-sinkerator installations to add to the additional organic loading to the system.

BIOLYTIX FILTER DETAILS

Wastewater and food waste is treated in Biolytix Filters using Biolytix Filtration (see Appendix A, Figure A1), a patented passive aerobic process. The technology is based on layered, flexible modular filter elements that are designed to also be installed into a conventional septic tank unit but are equally
suitable to be used within any vertical cylindrical tank (normally a minimum depth of approximately 1.5m is required).

The Biolytix™ Filter utilises natural processes, accelerated by appropriate levels of aeration, to treat sewage, wastewater, food wastes and even scrap paper & cardboard. The filter is a robust organic soil ecosystem which is not only fed by the organic wastes that are filtered out of the wastewater but is actually structured from the fine humus produced, cleverly turning the problem into the solution. Just as humus is the key to soil fertility, it is also the key to the Biolytix Filters cleansing powers. Billions of microscopic organisms inhabit every gram and millions of worms beetles & other organisms structure it so that its drainage and air porosity are continually renewed and maintained indefinitely. It is normally a single pass filter where wastewater enters at the top of the bed and clear organically filtered water, is pumped out from the bottom.

A schematic of a single Biolytix Filter, BF6 is shown in the Appendix A, Figure A2. Normally the filter is constructed within a standard 2500 litre polymer tank (1.88m dia by 1.63m high). The only mechanical components in the standard treatment unit (BF6 filter) are a single phase industrial strength pump and a tiny (5 watt) air pump.

The BF2 filter is very effective at removing COD and may be used as a pretreatment module in a Biolytix Sewage Treatment Plant (Biolytix STP). When operating as a pretreatment module, an air pump is added to the standard BF2 filter to provide supplementary aeration. The modified

BF2 filter is marketed as a Biogrinder Pumping Station (BGPS). In the Biolytix Filter STP option, wastewater is initially pretreated in a BGPS unit before discharging to a number of BF6 units.

PERFORMANCE STANDARDS

SIA Global completed independent performance tests of the Biolytix Filters to Australian Standard, AS1546.3 On-site Domestic Wastewater Treatment Units Part 3: Aerated Wastewater Treatment Systems September 2003.
Table A1 summarises the results from the independent testing.
Essentially the independent testing showed that the Biolytix Filter (BF6) produces a high quality secondary effluent (at average flow rates they consistently produce a 5/5 BOD5/ TSS effluent). The Biolytix filter normally
achieves 3-4 log reduction in Thermotolerant Coliforms.

Characteristic Results Maximum Average
BOD5 100%<20 mg/L
90%<11.6 mg/L
14 mg/L 8.8 mg/L
Suspended solids All < 30 mg/L
90%<8.9 mg/L
14 mg/L 5.4 mg/L
Dissolved Oxygen 100%>2.0 mg/L Minimum
2.2 mg/L
4.26 mg/L

The BF6 filters are accredited in South Australia , with documentation of that approval in the following location : http://biolytix.com/biol2/docs/SA_BF6_Approval.

The Biolytix Filter BF6 is designed to be discrete with no above ground components, is approximately 1.8 metres in diameter, 1.6 high and easily installed given they weigh 400kg. These are prefabricated from HDPE or similar & directly coupled into waste collection system. The treated effluent from each unit would then be pumped to single tank, from where disposal/reuse options would be initiated.

EFFLUENT DISPOSAL

The area around the resort is basically sandy : soil percolation can be (initially) assessed as very good. The soil profile in the area that disposal would be undertaken is nominally 3m of sand overlying limestone. Bore tests indicate an EPR of at least 15 l/m2 /day.

The required application rate for shallow sub-surface irrigation systems using AS 1547 is 5 l/s.m./day based on 35mm/week DIR : on this basis, for a daily volume of 8,500litres, a disposal area of 1,700 m2 will be required – this area will be provided in & around the Staff Village.

This is the preferred option at this stage of project development.

8. SCHEMATIC OF WATER SYSTEMS*:*

The following schematic presents the preferred option for water management for the facility :

collection of all rainfall from resort & staff buildings

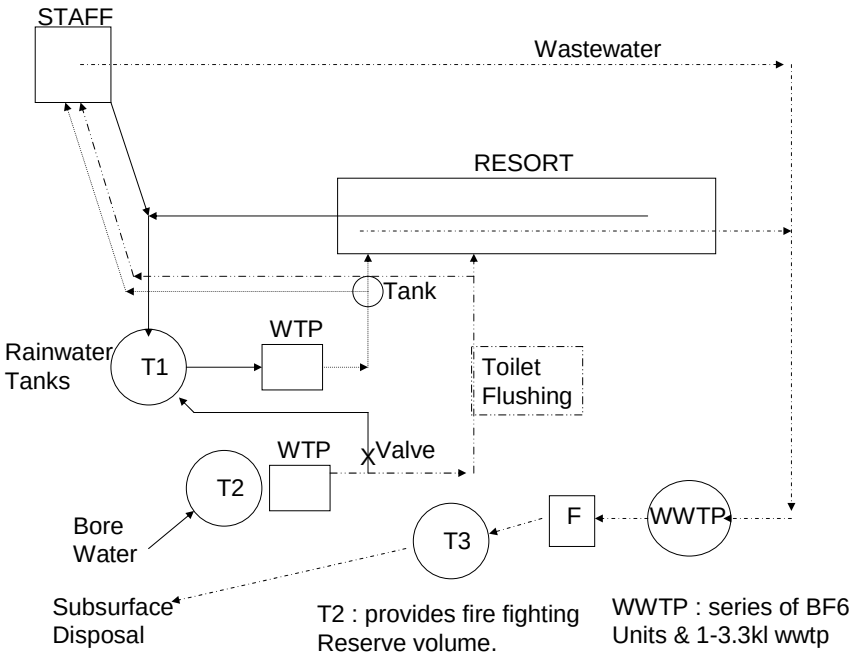
bore used for toilet flushing & provision of fire fighting reserve volume

all wastewater collected & treated to Class B, then filtered, disinfected & delivered to treated water tank

treated wastewater used subsurface irrigation system to be installed around staff village area.

Bore water used to augment the potable water supply as a contingency should such be required.

It is considered that this proposal minimises environmental factors, provides a reasonably well balanced water balance model (based on earlier derivations of inputs & outputs) with the ability to augment the water supply as required.



Appendix A. Biolytix Filter Details

A1. Wastewater Treatment Details

Wastewater and food waste is treated in Biolytix Filters using Biolytix Filtration (see Figure A1), a patented passive aerobic process. The technology is based on layered, flexible modular filter elements that are designed to also be installed into a conventional septic tank unit but are equally suitable to be used within any vertical cylindrical tank (normally a minimum depth of approximately 1.5m is required).

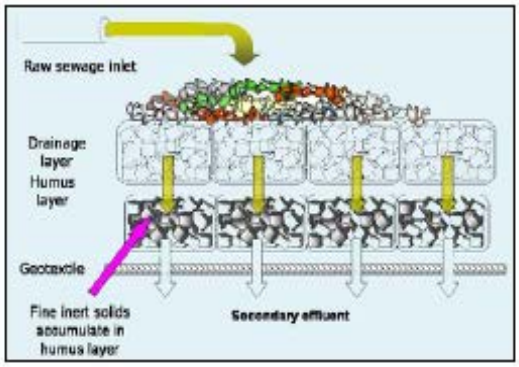


Figure A1 Biolytix Filtration Schematic

The Biolytix™ Filter unlocks nature's magic to odourlessly treat sewage, wastewater, food wastes and even scrap paper & cardboard. The filter is a robust organic soil ecosystem which is not only fed by the organic wastes that are filtered out of the wastewater but is actually structured from the fine humus produced, cleverly turning the problem into the solution. Just as humus is the key to soil fertility, it is also the key to the Biolytix™ Filters cleansing powers. Billions of microscopic organisms inhabit every gram and millions of worms beetles & other organisms structure it so that its drainage and air porosity are continually renewed and maintained indefinitely. It is normally a single pass filter where wastewater enters at the top of the bed and clear organically filtered water, is pumped out from the bottom.

There are effectively 2 versions of the Biolytix Filter marketed by Biolytix to treat domestic wastewater, a BF6 filter that treats domestic wastewater to produce a high secondary treated effluent and a BF2 filter that produces effluent similar to a septic tank.

A schematic of a single Biolytix Filter, BF6 is shown in the Figure A2. Normally the filter is constructed within a standard 2500 litre polymer tank (1.88m dia by 1.63m high). The only mechanical components in the standard treatment unit (BF6 filter) are a single phase industrial strength pump and a tiny (5 watt) air pump.

The BF2 filter is very effective at removing COD and may be used as a pretreatment module in a Biolytix Sewage Treatment Plant (Biolytix STP). When operating as a pretreatment module, an air pump is added to the standard BF2 filter to provide supplementary aeration. The modified BF2 filter is marketed as a Biogrinder Pumping Station (BGPS). In the Biolytix Filter STP option, wastewater is initially pretreated in a BGPS unit before discharging to a number of BF6 units.

A typical cross section of a BSTP-10kL filter is contained in Figure A3. The BF-STP-10kL filter configuration is capable of treating a daily wastewater flow of 10,000 litres per day. A BSTP-3.3kL is similar to a BSTP-10kL except that it contains two less BF6 filter unit and may treat a daily wastewater flow of 3,300 litres per day.

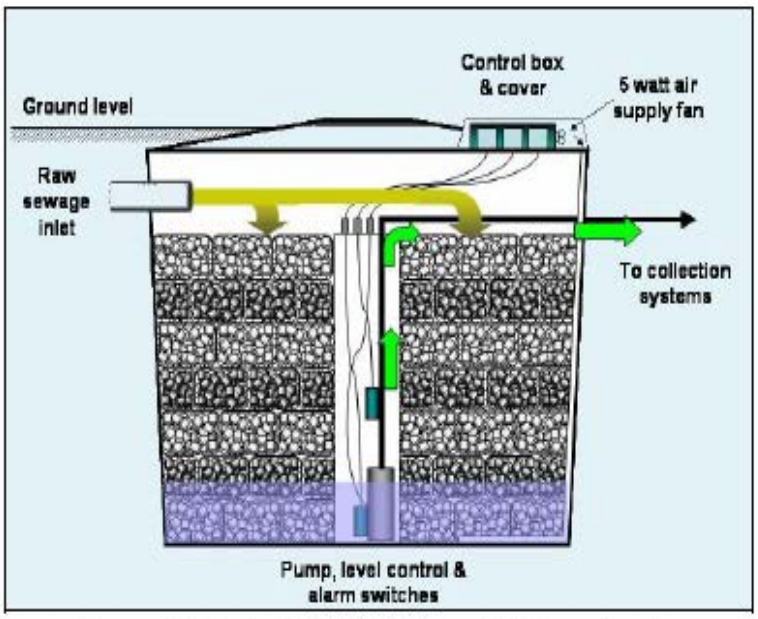


Figure A2 Typical Biolytix Filter – BF6 Cross Section

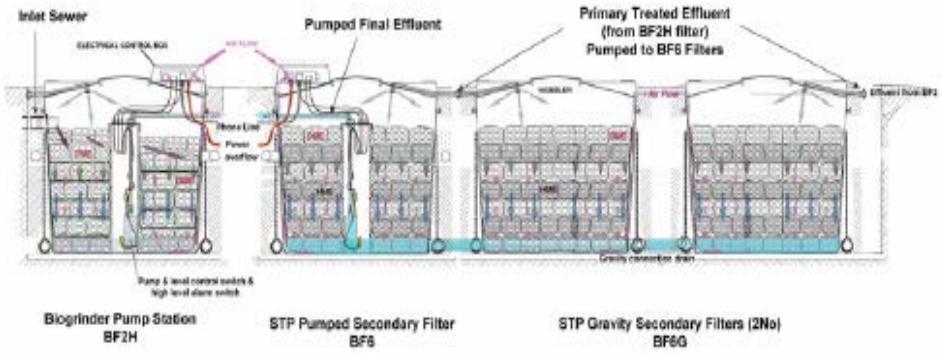


Figure A3 Biolytix® STP Cross Section

A2 Performance Standards

SIA Global completed independent performance tests of the Biolytix Filters to Australian Standard, AS1546.3 On-site Domestic Wastewater Treatment Units Part 3: Aerated Wastewater Treatment Systems September 2003. Table A1 summarises the results from the independent testing. Essentially the independent testing showed that the Biolytix Filter (BF6) produces a high quality secondary effluent (at average flow rates they consistently produce a 5/5 BOD_5/ TSS effluent). The Biolytix filter normally achieves 3-4 log reduction in Thermotolerant Coliforms.

Table A1: Effluent Characteristics Biolytix BF6 Filter

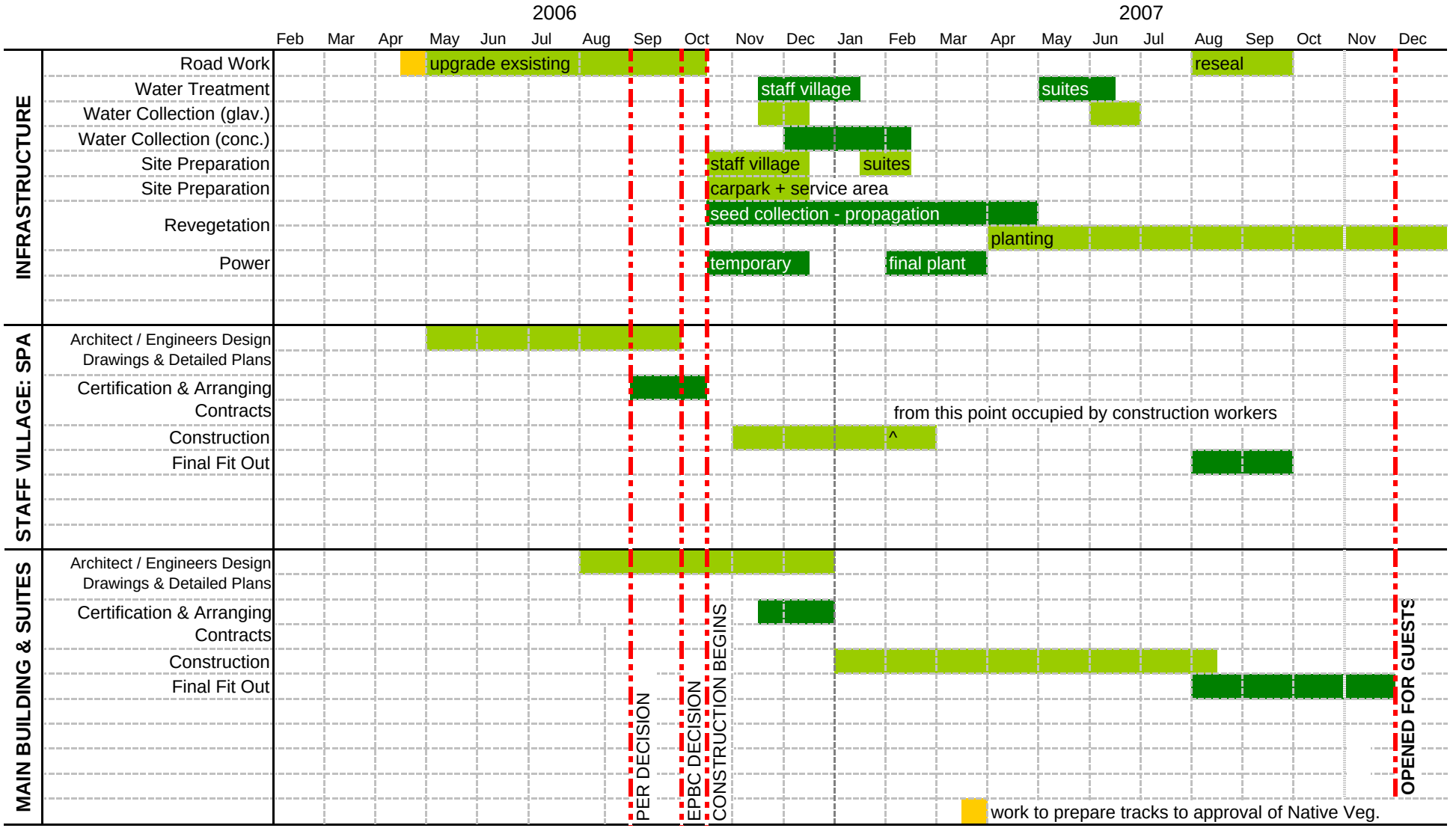
Characteristic	Results	Maximum	Average
BOD_5	100%<20 mg/L 90%<11.6 mg/L	14 mg/L	8.8 mg/L
Suspended solids	All < 30 mg/L 90%<8.9 mg/L	14 mg/L	5.4 mg/L
Dissolved Oxygen	100%>2.0 mg/L	Minimum 2.2 mg/L	4.26 mg/L

The BF6 filters are accredited in South Australia , with documentation of that approval in the following location http://biolytix.com/biol2/docs/SA_BF6_Approval.

Appendix F

Construction schedule

SOUTHERN OCEAN LODGE - **CONSTRUCTION SCHEDULE**



Appendix G

Botanical and bird survey report

SOUTHERN OCEAN LODGE

BOTANICAL and BIRD SURVEY
HANSON BAY, KANGAROO ISLAND, SOUTH AUSTRALIA

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INTRODUCTION

1.1 Background

In December 2004 Max Pritchard, architect approached, Ben DellaTorre of Environmental Footprints Interpretive Services, to undertake a botanical and bird survey for a proposed development called “Southern Ocean Lodge”. The location of the proposed development is with in the Hundred of McDonald, allotment 9, part section 14 on the south-western coast of Kangaroo Island between Flinders Chase National Park and Kelly Hill Conservation Park. The owner, James Baillie, requested that the survey assess the impact of the development on the surrounding natural environment. The proposed lodge would consist of 25 suites, a spa retreat, restaurant/lounge, and conference facilities. A staff village accommodating approximately 20 permanent staff would be located immediately west of the lodge. A map showing the proposed location is attached as Appendix 1.

1.2 Description

1.2.1 Climate

Kangaroo Island generally has a milder climate than much of mainland South Australia, being influenced by the surrounding Southern Ocean and the low elevation of the Islands. The western coastline, spanning from Cape Borda in the northwest to Cape Bouguer in the southwest, receives approximately 600 to 635 mm of rain each year. At Cape Bouguer, which lies 8km to the west of the proposed development, the long term mean rainfall of 629 mm is clearly characterised by a winter dominant rain fall pattern (Northcote, 2002). This can be considered a similar measure of rainfall to likely to be received in the area surrounding the proposed lodge development.

The mean monthly temperature range for this area of the Island ranges from 22 degrees in January and February down to 13.5 degrees in the cooler winter months. The prevailing winds tend to come from the southeast in the summer with the most frequent winter winds coming from the northwest to southwest ranging between 10 to 25 knots (Northcote, 2002).

1.2.2 Geology

The Island comprises a range of both rock and land forms contributing to a diverse geological history. The South Coast region of the island is dominated by a landscape of limestone cliffs and plains with scattered sand hills along the coast (Kangaroo Island Soil Conservation Board, 1994). The proposed development is located inland from a steep calcrete cliff between limestone shelfs and consolidated dunes. (Plate 1).



Plate 1- Proposed location of the development "Southern Ocean Lodge".
(photograph: S. Groom)

1.2.3 Biodiversity

Kangaroo Island's native vegetation is highly fragmented, with almost 90 percent of native vegetation occurring in individual areas of no greater than 20 hectares in size. The Biodiversity Plan for Kangaroo Island (Willoughby, 2001) categorises six Regional Ecological Areas based on previous studies of Kangaroo Island. The 102 hectares of remnant vegetation owned by Baillie Lodges contributes to the South Coast Regional Ecological Area, the largest continuous area of remnant vegetation occurring on Kangaroo Island. This 77,213-hectare area comprises 20 percent of the island's total land cover, and spans from Cape Borda in the east to Cape Willoughby in the southwest. Eighty six percent of its native vegetation remains, with 72 percent of this formally protected within National Parks, Conservation Parks and privately-owned Heritage Agreements. Directly to the east and west of allotment 9, part section 14 are two more privately owned titles owned by Hanson Bay Co Pty Ltd. It is important to note that these three privately owned land titles are located between Flinders Chase N.P. and Kelly Hill C.P.

The landscape of allotment 9, part section 14, is characterised by sandy soils over limestone, covered by remnant mallee vegetation dominated by *Eucalyptus diversifolia* (coastal white mallee) and *Eucalyptus rugosa* (coastal White mallee) (Plate 2). Calcareous cliffs form a spectacular coastline with the prevalent vegetation along these coastal areas consisting of remnant low coastal shrublands, dominated by *Melaleuca lanceolata* (Dryland Tea-tree), *Melaleuca gibbosa* (Slender Honey-myrtle), *Eucalyptus diversifolia* and *Eucalyptus rugosa* (Plate 3). To the east the cliffs give way to coastal sand dunes (Plate 4).



Plate 2 - Coastal white mallee community dominates the landscape around the proposed Southern Ocean Lodge. (photograph: C. Groom)



Plate 3 - Coastal shrublands are exposed to the extreme elements of the south coast of Kangaroo Island.
(photograph: C. Groom)



Plate 4 - To the east of the proposed development calcrete cliffs, give way to coastal sand dune systems.
(photograph : S. Groom)

The remnant vegetation communities across allotment 9, part section 14 support a diverse range of coastal flora and fauna species (Plate 5). *Eucalyptus diversifolia* (Coastal White Mallee) is the dominant vegetation community across the property. This vegetation community covers 77,000 hectares across Kangaroo Island, with 51,300 of these hectares formally protected. Due to low soil fertility, these areas were seldom used for farming practices and therefore 75 percent of the pre-European distribution of *Eucalyptus diversifolia* communities remain (Willoughby, 2001).



5a.



5b.



5c.

Plate 5 – The environment of the south-western coastline of Kangaroo Island support's a diverse range of species. Plate 4a. Little Penguin (*Eudyptula minor*), Plate 4b. Spiny-cheeked Honeyeater (*Acanthogenys rufogularis*), Plate 4c. Heath Goanna (*Varanus rosenbergi*). (photographs – Ben DellaTorre)

The coastal area contained within the hundred of McDonald, allotment 9, part section 14 is a fragile environment, highly sensitive to any human disturbances. Willoughby (2001) lists a number of threats to the coastal remnant vegetation communities of Kangaroo Island, including 'Native vegetation clearance due to coastal development' and 'Human impact due to the high scenic value of much of the coastline'. It is crucial before any development of this nature can proceed, that careful consideration is given to the impact it will inevitably produce.

1.2.4 Previous Biological Studies

Across Kangaroo Island a number of biological studies have occurred, the first being in 1884 (Robinson & Armstrong, 1999). The most comprehensive of these studies was completed by Biological Survey, Department for Environment and Heritage over the period 1989-1990. A number of subsequent surveys have been carried out focusing on specific monitoring and survey projects. The nearest Biological Survey sites to the proposed lodge site are located further west in Flinders Chase National Park and east in Kelly Hill Conservation Park (Robinson & Armstrong, 1999). Terry Dennis is monitoring coastal raptors across the island, including a pair of Osprey nesting immediately west of the proposed lodge site (T. Dennis, pers. comm., January 2005). Additionally, Beverly Overton (2004) has conducted a survey of the vegetation species present within and surrounding the proposed site.

1.3 Survey Aims

- Survey and document each vegetation community immediately around the proposed Southern Ocean Lodge, located within the Hundred of McDonald, allotment 9, part section 14 across the area.
- Document dominant vegetation species and their densities across each vegetation community immediately around the proposed Southern Ocean Lodge (Hundred of McDonald, allotment 9, part section 14)
- Assess birds present at the proposed Southern Ocean Lodge site and the immediate environments along the coastal section of the Hundred of McDonald, allotment 9, part section 14.
- Report on impacts on the vegetation and bird communities from the construction of access roads, buildings and increased human activity around the Southern Ocean Lodge, proposed development.
- Evaluate the conservation status of vegetation and bird species documented during the survey or species that are know to inhabit these coastal environments
- Recommendation for future management consideration to vegetation and bird communities from the proposed Southern Ocean Lodge development area.
- Recommendation for restoration of vegetation communities that will be affected by the development.

METHODS

The current study focussed only on vegetation and bird species present. Other fauna species and invertebrates were not surveyed. A full biological survey would give a more accurate account of the species present.

2.1 Vegetation

A vegetation survey was undertaken within the Hundred of McDonald, Allotment 9 part section 14 immediately around the proposed Southern Ocean Lodge development by Ben DellaTorre during the period 27/12/04 – 06/01/05, with assistance provided by Claire and Scott Groom.

As previously described, the two dominant vegetation communities with in the surveyed area are coastal white mallee and low coastal shrubland. Eight vegetation survey quadrats (30m by 30min size) were established across these two vegetation communities immediately around the proposed Southern Ocean Lodge development. Appendix 2 illustrates the location of the vegetation survey quadrats and a "site plan" of where the proposed development would be located. Each quadrat was positioned in an area that was considered to be homogeneous and representative of the vegetation community in question (Plate 6). The vegetation survey quadrats were formalised using Heard and Channon's (1997) *Guide to a Native Vegetation Survey (Agriculture Region): Using the Biological Survey of South Australia Methodology*.

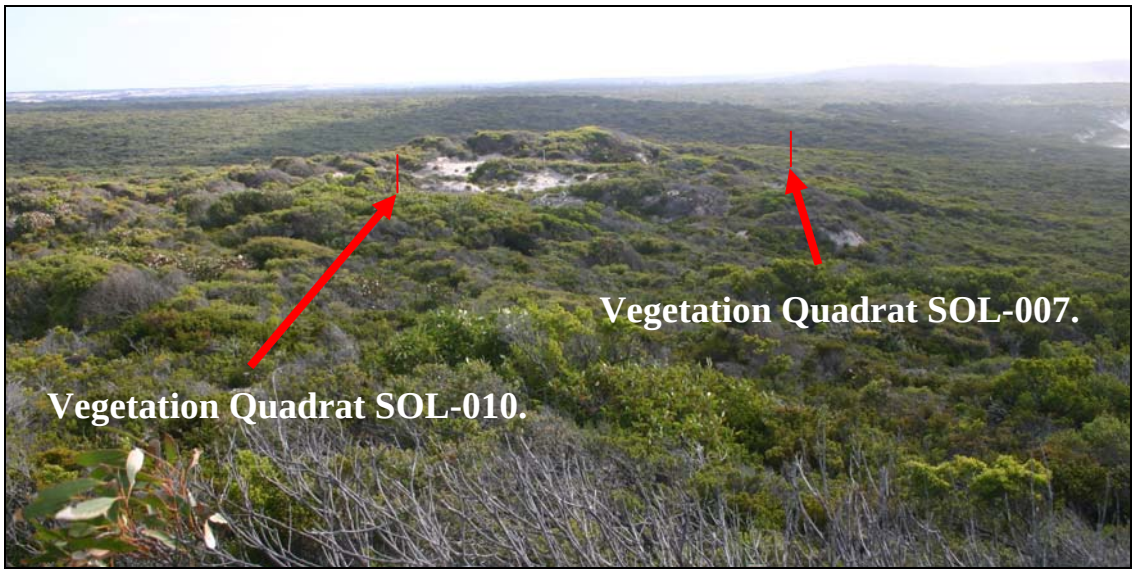


Plate 6 – Site locations of vegetation Quadrats SOL-010 and SOL-007. (photograph – Ben DellaTorre)

Each of the eight quadrats measures 30 by 30 metres in size. Within each quadrat, every plant species was recorded and vouchered for later verification by the South Australian State Herbarium. Measures were taken on species density, including percentage cover transects across the coastal shrubland vegetation sites. These density transects were established to gain a clear understanding of the species dominance in the community (Figure 1). A general description of the landscape was also recorded for each site. A

permanent peg is located at each vegetation survey quadrat, these pegs have all being GPS'ed for later relocation . From the permanent peg a series of four photos (Bearing north, east, south and west) that can be later used for photo comparisons were taken at each vegetation survey quadrat (Plate 7 and 8). In addition a number of GPS photo comparison sites were established along the proposed lodge site. All eight vegetation survey quadrats, are documented below in Table 1.

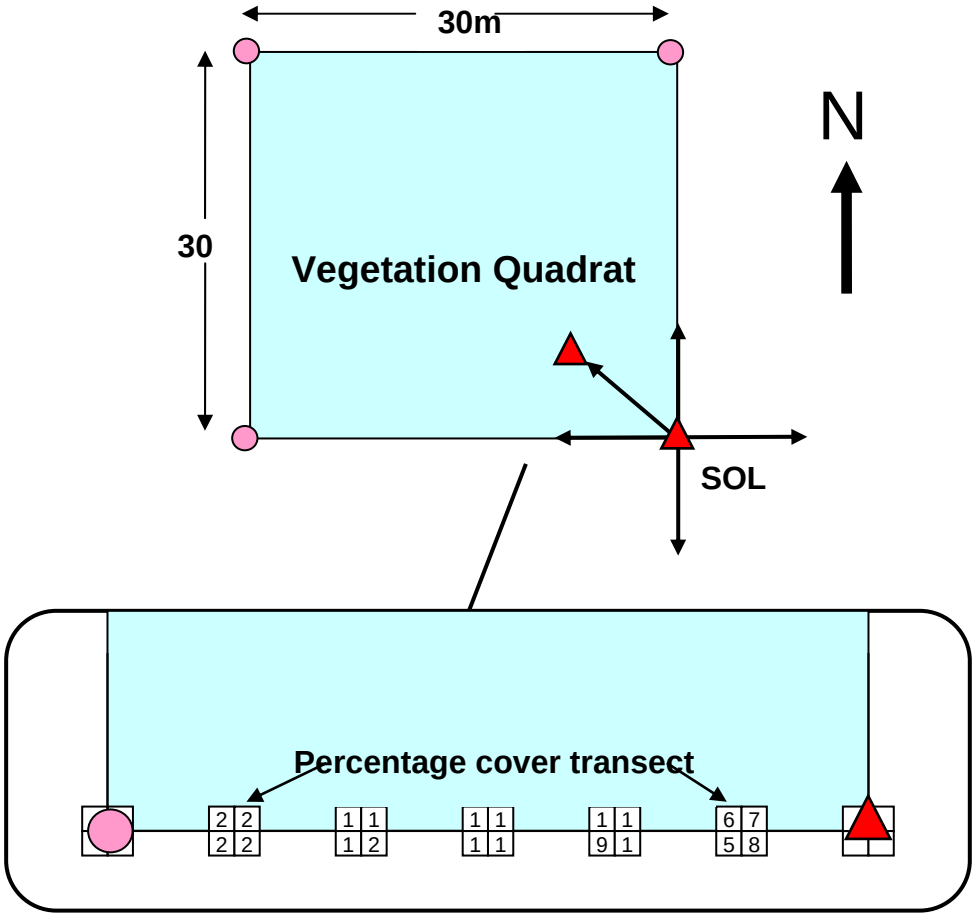


Figure 1 – Vegetation quadrat diagram.

Table 1 - Vegetation Quadrats site description. (Note – site number refers to pre-established surveyor pegs).

Site Number	Date Est.	Zone	Easting GDA 94	Northing GDA 94	Vegetation Community
SOL001(A)	06/01/2005	53	665449	6012221	Coastal Sand dune
SOL002	30/01/2004	53	665419	6012276	Coastal Shrubland
SOL005	30/01/2004	53	665354	6012279	Coastal Shrubland
SOL007	31/01/2004	53	665294	6012240	Coastal White Mallee
SOL010	31/01/2004	53	665216	6012239	Coastal Shrubland
SOL012	01/01/2005	53	665163	6012217	Coastal White Mallee
SOL020(A)	05/01/2005	53	665089	6012232	Coastal White Mallee
SOL020(B)	05/01/2005	53	665043	6012321	Coastal White Mallee



7a



7b



7c

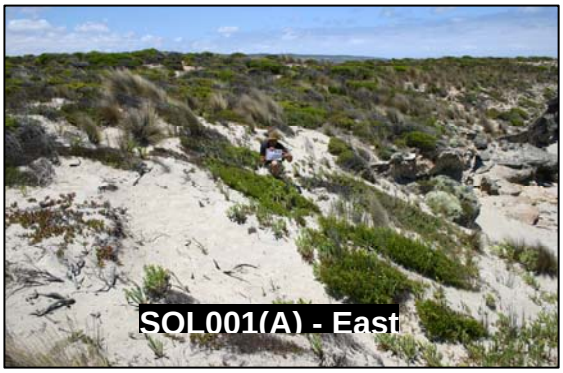


7d

Plate 7 – Photo sequence at Vegetation Quadrat SOL007, illustrating north (7a), east (7b), south (7c) and west (7d) directions. (photograph – S.Groom)



8a



8b



8c



8d

Plate 8 – Photo sequence at Vegetation Quadrat SOL001(A), illustrating north (8a), east (8b), south (8c) and west (8d) directions. (photograph – S. Groom)

Individual species recorded at the site were referenced against the Australian Government, Department of the Environment and Heritage, schedules of the *Environment Protection and Biodiversity Conservation Act* and South Australia's *National Parks and Wildlife Act 1972* to assess for conservation status.

2.2 Birds

Bird species presence and density was determined using transect counts for three habitats where clearance for building construction and access is proposed. Approximately an hour was taken to traverse each 1km transect in the three habitats on the mornings of 5 and 6 January 2005. All birds seen or heard within 25m of the transect in each habitat were identified and counted. Species observed or heard outside the 50m total transect width or in an adjacent habitat type were noted but not included in calculations. Densities calculated are simply averages of the two counts/area searched.

In the "low coastal shrubland" (including the area proposed for guest suites) the limited extent of similar contiguous habitat in the area made it necessary to repeat the count over 500m on both mornings to achieve a total distance of 1km. This 'mixed shrubland' actually comprised patchy interdigitation of the adjacent habitats assessed (i.e. low coastal shrubland habitat and dense low mallee over limestone land). Further areas of this 'mixed shrubland' patchy interface of low coastal and dense mallee habitats could be seen west of the area examined but were not included in this transect survey for two reasons:

1) limited practicality of carrying out bird counts in habitat so dense and tangled that observer progress on foot is extremely slow and noisy,
2) presence of a constantly calling agitated Osprey overhead whenever anyone entered that area.

An access track (recently re-cut in dense mallee/limestone and passing close to proposed sites for lodge/staff accommodation/service access/parking), provided a suitable path from which to count birds in this otherwise almost impenetrable habitat (Plate 9).



Plate 9 – The recently cleared access track at the proposed site was used as one of the bird transects.
(photograph – Ben DellaTorre)

Densities, in particular of cryptic species, must be regarded as minimums, as a large proportion of observations were heard only and conservatively estimated to be within the transect area, while individuals remaining quiet are overlooked in very thick vegetation. Locations of species distribution for mapping were obtained using a hand held GPS, or where in dense habitat, an estimate made of distance and direction from the nearest accessible point.

Additional searches were made in the beach and coastal cliff habitats and in the tall mallee/jumbled dune system along the access track (Plates 10 and 11) Species lists are provided for these areas (Appendices 4, 5 and 6).



Plate 10 – The beach and coastal cliff habitats were surveyed for additional bird species.
(photograph – Ben DellaTorre)



Plate 11 – The access track into the proposed development from the South West River Road was surveyed for addition bird species.
(photograph – Ben DellaTorre)

RESULTS

3.1 Vegetation

A total of 68 species were collected and vouchered from the eight survey quadrats. 64 of the species was native and 4 were classed as weed species. Of the 68 species, the dominant overstorey species were *Eucalyptus diversifolia, Eucalyptus rugosa* and *Melaleuca lanceolata*. These three species were present in seven of the eight quadrats, excepting the coastal dunal quadrat. The dominant understorey species were *Melaleuca gibbosa, Dodonea humilis, Pultanaea acerosa* and *Myoporum insulare*. A list of species recorded during the survey is attached in Appendix 3.

Species of conservation significance found within the quadrats were referenced to national and state conservation ratings. Vegetation species of regional conservation significance to Kangaroo Island have also been included:

***Bromus arenarius* (Sand Brome)** **Conservation Rating:**
Kangaroo Island – Endangered

This is the only native species of *Bromus* in Australia, distributed on all mainland states except the Northern Territory. Erect annual grass, 30-45 cm high flowering between July and October (Jessup & Toelken, 1986). *Bromus arenarius* was recorded at two of the eight vegetation quadrats. The two vegetation quadrats (SOL007 and SOL010) where *Bromus arenarius* was present are located immediately to the south of the proposed development. The survey indicated this species was frequently found between the proposed development and Cape Bouger, associated with low coastal shrublands over sandy soils.

Gahnia hystrix - (Spiky Saw-sedge) **Conservation Rating:**
South Australia – Rare
Kangaroo Island - Rare

Perennial plant measuring 4-15 cm in height, known to flower from November to January and April, located generally along watercourses (Jessup & Toelken, 1986). This small dwarf-like *Gahnia* species is endemic to Kangaroo Island. It was recorded at one of the eight vegetation quadrats (SOL007). The species is known to have a very restricted distribution in Australia. It is known to be adequately present in National Parks or conservation reserves with a total of at least 1000 plants present (Robinson & Armstrong 1999)

Hardenbergia violacea - (Native Lilac) **Conservation Rating:**
Kangaroo Island – Rare

Perennial twining to somewhat erect plant, often trailing around the bases of living trees and shrubs. *Hardenbergia violacea* is distributed across southeastern Australia, from NSW to Tasmania. Within South Australia, other than on Kangaroo Island this species has been recorded in the Southern Lofty and South East Botanical Region (Jessup & Toelken, 1986). The species was

surveyed at four of the eight vegetation quadrats in association with the mallee vegetation community (SOL005, SOL010, SOL020(A) and SOL020(B)).

Acacia retinoides var. uncifolia **(Coastal Silver Wattle)** **Conservation Rating:** Kangaroo Island – Rare

Tall perennial shrub and small trees up to 8m in height. Closely related to *Acacia retinoides* with *Acacia retinoides var. uncifolia* distinguishable by its smaller phyllodes only between 3-6 cm long and 4-6 mm in width comparative to *Acacia retinoides* 3-20cm long and 3-15mm in width (Jessup and Toelken, 1986). This species was only recorded at two of the eight vegetation quadrats (SOL020(A) and SOL020(B)).

3.1.2 Fire

Across the Australian landscape, fire has played a crucial role in the evolution of many of Australia's plants and animals. Noble (1986) explains how many of Australia's flora and fauna species need fire for their long-term survival. On the base of many remnant trees, fire scars were evident, particularly on the lignotubers of *Eucalyptus diversifolia* and *Eucalyptus rugosa*. The last known major fire that occurred within the area was in the summer of 1958. Overton (1994) reported that the fire burned from Cape du Couedic to the boundary of Kelly Hill Conservation Park for approximately six weeks.

3.2 Birds

Conditions for bird observation were favourable on both mornings, given limitations of very dense vegetation, wind and ocean noise.

All bird species identified during the survey are shown in Table 2. Appendix 4 lists all bird species recorded across all habitats identified during the survey. Species densities observed in each habitat are shown in Appendices 5 and 6. Locations where species of conservation significance were observed are mapped in Appendix 2.

Table 2 - Bird species identified during the survey

Scientific Name	Common Name	EPBC Status	S.A. Conservation Status
Alectura lathami	Australian Brush Turkey		**Introduced**
Eudyptula minor	Little Penguin		
Morus serrator	Australasian Gannet		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax varius	Pied Cormorant		
Pandion haliaetus	Osprey	**Vulnerable**	**Rare**
Accipiter cirrhocephalus	Collared Sparrowhawk		
Haliaeetus leucogaster	White bellied Sea-eagle		**Vulnerable**
Falco cenchroides	Nankeen Kestrel		
Falco peregrinus	Peregrine Falcon		**Rare**
Haematopus fuliginosus	Sooty Oystercatcher		
Thinornis rubricollis	Hooded Plover	**Vulnerable**	**Vulnerable**
Larus novaehollandiae	Silver Gull		
Larus pacificus	Pacific Gull		

Scientific Name	Common Name	EPBC Status	S.A. Conservation Status
Sterna bergii	Crested Tern		
Platycercus elegans	Crimson Rosella		
Phaps elegans	Brush Bronzewing		
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		
Trichoglossus haematodus	Rainbow Lorikeet		
Neophema elegans	Elegant Parrot		
Neophema petrophila	Rock Parrot		**Rare**
Malurus cyaneus	Superb Fairy-wren		
Stipiturus malachurus	Southern Emu-wren		**Rare**
Pardalotus punctatus	Spotted (Yellow-rumped) Pardalote		
Pardalotus striatus	Striated Pardalote		
Acanthiza pusilla	Brown Thornbill		
Acanthiza lineata	Striated Thornbill		
Sericornis frontalis	White-browed (Spotted) Scrubwren		
Acanthorhynchus tenuirostris	Eastern Spinebill		
Anthochaera carunculata	Red Wattlebird		
Gliciphila melanops	Tawny-crowned Honeyeater		
Lichenostomus cratitus	Purple-gaped Honeyeater		
Melithreptus brevirostris	Brown headed Honeyeater		
Phylidonyris novaeholandiae	New Holland Honeyeater		
Phylidonyris pyrrhoptera	Crescent Honeyeater		
Psophodes nigrogularis	Western Whipbird		**Rare**
Colluricincla harmonica	Grey Shrike-thrush		
Pachycephala pectoralis	Golden Whistler		
Rhipidura albiscapa	Grey Fantail		
Gymnorhina tibicen	Australin Magpie		
Strepera versicolor	Grey Currawong		
Corvus coronoides	Australian Raven		
Zoothera lunulata	Bassian Thrush		**Rare**
Hirundo neoxena	Welcome Swallow		
Petrochelidon nigricans	Tree Martin		
Zosterops lateralis	Silvereye		
Staganopleura bella	Beautiful Firetail		**Rare**

The most abundant species in coastal shrubland were mobile groups of Silvereyes which were feeding on *Leucopogon parviflorus* berries. Two Pardalote species, Tree Martins and Welcome Swallows were in significant numbers at least partly due to the proximity of nest sites in the coastal cliff faces, where many individuals were seen entering holes with food for nestlings.

3.3 Feral Pests

The presence or impact of feral animals on the proposed Southern Ocean Lodge site and its surroundings was not formally measured during this study. However several informal sightings and tracks of feral cats (*Felis catus*) were recorded (Plate 12). These tracks were common throughout the area.



Plate 12 - Feral cat tracks found along the coastal boundary, south of the proposed Southern Ocean Lodge development. (photograph – B. DellaTorre).

DISCUSSION AND RECOMMENDATIONS

4.1 Vegetation

Access to Surrounding Environment

Coastal white mallee and low coastal shrubland communities are fragile environments that can be adversely affected by even the smallest disturbance. The proposed location of the lodge immediately separates the mallee community from the windswept coastal vegetation (Plate 13). As previously described, the coastal shrubland community is a sensitive landscape that is highly susceptible to any human disturbances.

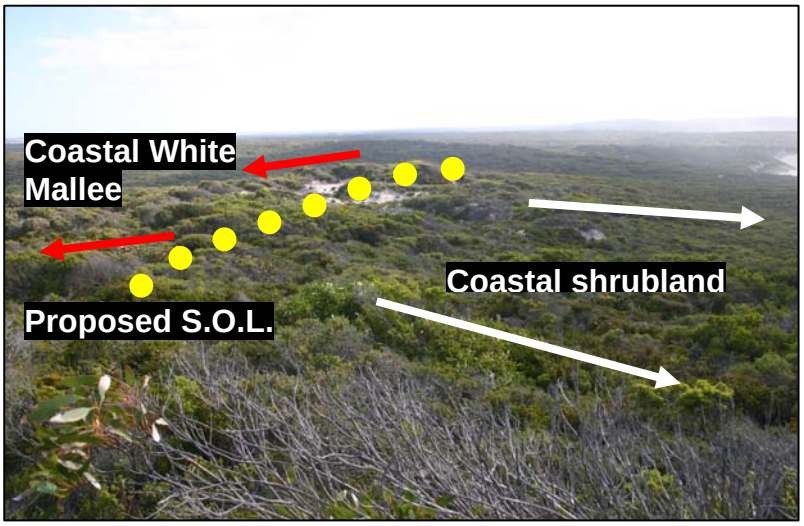


Plate 13 – Transitional zone between the coastal white mallee that dominates inland from the low shrublands of the southern coast. (Photograph – Ben DellaTorre)

Recommendation 4.1.1: Access should not be provided to the land immediately to the south of the proposed lodge. This is to stop any access to this fragile coastal environment. Establishment of walking trails, boardwalks and any native vegetation clearance should not be permitted. An alternative would be to use the existing access track to the east of the proposed development. Plates 14 and 15 illustrate the start and finish of the access track.

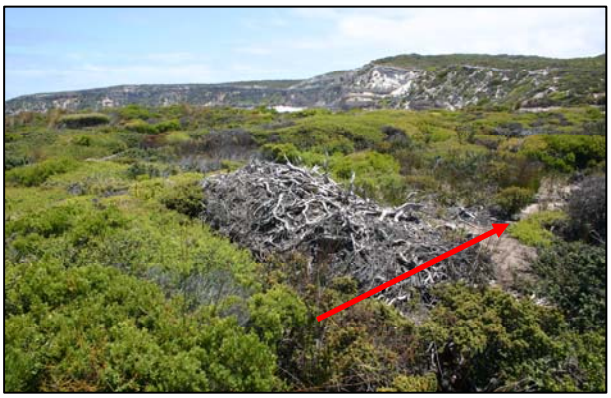


Plate 14 – Coastal end of access track (photograph – S. Groom)



Plate 15 – Mallee end of access track (photograph – S. Groom)

Native Vegetation Clearance

For this development to proceed, approximately one hectare of native vegetation will be cleared. The proposed development is located along an area marked by frequent scalding (Plate 16), the area being highly susceptible to erosion due to the sandy soil type and prevailing south-westerly winds. The proposed site chosen will therefore have a lesser impact on vegetation clearance than other locations within the Hundred of McDonald, Allotment 9, Pt Section 14.



Plate 16 – Example of scalds along proposed SOL site. (photograph – C. Groom).

Recommendation 4.1.2: Before any vegetation can be cleared, seed stock should be collected for future propagation in the areas affected by the development. A number of publications are available on the propagation of native plants. It is recommended that such measures be taken to rehabilitate any areas once cleared for development or areas that demonstrate existing scalding. Rehabilitation of the scalded areas will increase the local soil surface stability.

Preventing Spread of Pathogens

During the construction period, a number of contractors will be entering the site. This can potentially lead to a number of threats to the vegetation, in particular the introduction of weed species and pathogens. For example, *Phytophthora cinnamomi* is a soil-borne fungal pathogen that may be transported via road-building and construction machinery, or via the soles of shoes.

Recommendation 4.1.3: This human-aided pathogen may be prevented by taking the appropriate cautionary measures. All vehicles and workers entering the site must follow the guidelines established by *National Parks and Wildlife SA*. Information is also available in Furner (1998), *Managing Phytophthora on Kangaroo Island*.

Recommendation 4.1.4: Every person working during and after the construction period for the proposed Southern Ocean Lodge should be provided training on appropriate practices for working within this environment. On-ground works should be supervised to minimise risk to the environment.

Heritage Agreement

As discussed under the heading 'Biodiversity' in this report, the Southern Ocean Lodge property contributes to the largest remaining continuous area of remnant native vegetation. On Kangaroo Island, this privately owned land would form a valuable addition to the formal reserve system across the island. Under the *Native Vegetation Act 1991*, placing a Heritage Agreement on this privately owned land would legislatively protect it against any future vegetation clearance.

Recommendation 4.1.5: It is strongly recommended that an application for a Heritage Agreement be considered, through the Department for Environment and Heritage SA. Assistance in managing the area covered by the Heritage Agreement may also be available under the Heritage Agreement Grant Scheme.

Mundulla Yellows

Mundulla Yellows is only a recently discovered disease killing of native plants. It is a disease that is relatively unknown in its causes. The symptoms of Mundulla Yellows is characterised by gradual dieback of the effected plant, the foliage become a yellowish colour in appearance, intervainal chlorous on the leaves and epicormic growth over the affected species occurs (Hanold & Randles, 1999). Willoughby (2001) indicated that Mundulla Yellows occurs at the Rocky River Park Headquarters in Flinders Chase NP, in and around the township of Kingscote and possibly around Penneshaw.

Recommendation 4.1.6: Staff at the lodge need to be provided with training about the symptoms of Mundulla Yellows, and asked to immediately report any species that may appear affected by the disease to *National Parks and Wildlife SA* (NPWSA).

4.2 Birds

Species found in this area which have national or South Australian conservation ratings are discussed below.

Osprey (Pandion haliaetus) *– (S.A, Rare)*

The South Australian Osprey (Plate 17) population is only 26 pairs, an average of 8 pairs nesting on Kangaroo Island coasts (6-10 pairs) over the last 20 years (T. Dennis, pers. comm., January 2005). South Australia's population is isolated, over 800km from Western Australian and 1500km from coastal northern New South Wales populations.



Plate 17 – Osprey in flight, sighted along beach west of proposed SOL site (photograph - S. Groom).

An Osprey nest site between Cape Du Couedic and Remarkable Rocks was abandoned after road construction in its vicinity and this pair is suspected to have moved (T. Dennis, pers. comm., January 2005) to the site now in use west of Hanson Bay. Three Ospreys were present in January indicating successful fledging of a nestling seen in November by T. Dennis. The adults of this pair approached calling in an agitated manner whenever observers approached within 400m of the nest, which is on a low rock stack at the base of cliffs (appendix 2). Repeated disturbance of this nature particularly in the breeding period, July to February, is likely to result in failure of nesting attempts or permanent abandonment of nesting territories. Research has shown reduced Osprey breeding success where human activity occurred within 1km of Osprey nests (Swenson,1979.) and in Alaska, a radius determined of 1.6km from Osprey nests for no disturbance or development, (Richardson, 1997)

Recommendation 4.2.1: Access should not be permitted to both resident staff and guests of any development in this area, to coastal walking westwards from the proposed Southern Ocean Lodge.

White-bellied Sea-eagle *(Haliaeetus leucogaster)* - (S.A. Vulnerable)
Peregrine Falcon (*Falco peregrinus)* - (S.A. Rare)

Both these species are cliff nesters on the nearby southern coast of Flinders Chase National Park and observations of adult individuals of both species perched and flying in the vicinity of cliff tops indicates that the area under study is within the feeding territories of both species. As with the Osprey, these species are vulnerable to disturbance resulting in failure of breeding attempts and permanent abandonment of nest sites, due to human activities such as

bush walking along coastal cliff tops. The Sea Eagle is particularly sensitive and likely to abandon nests if these sites are approached within a few hundred metres early in the breeding season, this period extending from July to October.

Recommendation 4.2.2: Access should not be permitted to both resident staff and guests of any development in this area, to coastal walking westwards from the proposed Southern Ocean Lodge.

Hooded Plover (*Thinornis rubricollis*) –
(National Threatened Species. Vulnerable; S.A. Vulnerable)
A pair of Hooded Plovers (Plate 18) was present throughout late December and early January on beaches in the area under investigation and a prepared nest scrape (empty, but much visited as indicated by extensive plover tracks) found just above high water level on the beach nearest to proposed guest suites. It is possible that brief presence of observers resulted in abandonment of this nest site, and this scenario is likely to be repeated should staff and/or guests have access to beaches in this area, which are currently seldom visited by humans.



Plate 18 – Hooded Plover (photograph – L. Pedler)

The Hooded Plover population on Kangaroo Island has fallen by 30% since counts were conducted in 1985, with greatest declines found on beaches where human activity is highest (T. Dennis, pers. comm., January 2005). Mainland populations of this species have also declined as a result of human activity with the added impact of fox predation. Protection of breeding areas from human disturbance in fox free environments such as Kangaroo Island is an imperative for the conservation of this species.

Recommendation 4.2.3: Both resident staff and guests of any development in this area must be actively discouraged from walking along the beaches where hooded plovers are known to inhabit.

Southern Emu-wren (*Stipiturus malachunus ssp. halmaturinus*) –
(S.A. Rare)
The Southern Emu-wren *Stipiturus malachurus ssp. halmaturinus* is a subspecies confined to Kangaroo Island (Plate 19). These Emu-wrens were located at 15 sites in dense low *Melaleuca* or *Eucalyptus* habitat within 1.8km of coastal habitat examined. The densest populations of this subspecies *Stipiturus malachurus halmaturinus* confined to Kangaroo Island, occur in this

narrow belt of undisturbed dense cliff top vegetation up to approximately 1m in height along the south coast. Such habitat rarely extends much more than 100m inland before increasing to a height and structure less suitable for this species. Much sparser populations are found inland in these dense low mallee communities and low heath such as occurs in Flinders Chase N.P. and Gosselands.



Plate 19 – Southern Emu-wren (photograph – L. Pedler)

Any impacts such as walking tracks within this fragile habitat, especially informal foot pads, where there is a tendency to wander, not only remove or damage areas of vegetation but provide easier access to predators such as feral cats, goannas and avian predators. Any removal or damage to low coastal vegetation (especially dense *Melaleuca* and/or *Eucalyptus* thickets <1m high) will have a direct effect on the Southern Emu–wren population.

Recommendation 4.2.4: Both resident staff and guests of any development in this area must be actively discouraged from walking within this fragile environment.

The following observations are on other species of conservation significance.

Western Whipbird (*Psophodes nigrogularis* ssp *lashmari)* - (S.A. - Rare)
The Kangaroo Island population is a separate subspecies *Psophodes nigrogularis ssp. Lashmari* (Plate 20). This extremely secretive species was mainly detected by its loud territorial calls and approximate locations of these observations are mapped. As only those birds calling were detected a higher density of individuals is present than revealed by survey methods. Preferred habitat is very dense vegetation such as low mallee over limestone as shown by observations in January 2005. Elsewhere whipbirds also occupy the densest patches of low coastal shrubland and though not observed in January 2005, this is likely also in the Hanson Bay area.

Any removal or fragmentation of these areas of vegetation for buildings, vehicle access, fire suppression etc, is likely to result in proportional loss of population of this and other species reliant on such dense cover.



Plate 20 – Western Whipbird (photograph – L. Pedler)

Bassian Thrush (*Zoothera lunulate*) – (S.A Rare)
This unobtrusive ground foraging species was found at three sites in dense mallee over limestone along the access track, and is also likely to occur in the taller mallee-dune habitat. It is widespread on Kangaroo Island in a variety of dense and usually moist habitats. Any impact from the proposed development on this species will be proportional to the area of dense mallee habitat removed.

Beautiful Firetail (*Stagonopleura bella)* – (S.A. Rare)
At least three individuals were seen of this species which is widespread in small numbers across Kangaroo Island in a variety of usually low and densely vegetated habitats. The scale of the proposed development is unlikely to adversely impact this species which is sparsely distributed across various habitats.

Rock Parrot *Neophema petrophola)-* (S.A. Rare)
This small parrot is entirely coastal in its distribution, breeding on islands in the York and Eyre Peninsula regions and dispersing to nearby areas. It is not known to breed on Kangaroo Island where the numbers, distribution and requirements of the population are poorly known. Up to about six were seen briefly several times in low coastal shrubland or moving along the coast in January 2005. Intact littoral zone vegetation and low coastal shrubland may be required for continued presence of this species feeding in this area.

Other Species Known to Occur in These Habitats
Several other species are likely to be found in the habitats examined in January 2005 as is expected within limitations of the brief period of this survey. **Fantailed Cuckoo *Cacomantis flabelliformis***, **Scarlet Robin *Petroica multicolor*** and **Dusky Woodswallow *Artamus cyaneus*** are likely to occur in taller mallee areas such as along the entrance track. **Shy Hylacola *Sericornis***

cautus may occur in taller mallee or dense low mallee, but in long unburnt areas populations may not be high and easily missed if not calling. Higher numbers of some honeyeaters such as **Tawny crowned Honeyeater** and **Eastern Spinebill** may occur at other times of year in response to nectar sources, and **Little Wattlebirds *Anthochaera chrysoptera*** are also likely to be present at such times.

4.3 Feral Pests

As noted in the Results section, the widespread presence of feral cats was informally observed during this study.

Recommendation 4.3.1: The high frequency and volume of tracks observed along the coastline indicates that feral cats are posing a threat to the native fauna. It is recommended that in cooperation with surrounding landholders a management plan be established to eradicate any feral animals.

SUMMARY

The owners have informed me that they have secured encumbrances over the adjoining properties. They have also conveyed that this will severely limit any future developments on the adjoining properties.

The 102 hectares owned by James Baillie is an important area to protect, as it contributes to the largest continuous area of remnant vegetation occurring on Kangaroo Island, spanning from Flinders Chase National Park to Kelly Hill Conservation Park. Securing a Heritage Agreement over the majority of Mr Baillie's property will protect it against any future vegetation clearance and also contribute to the South Australian Reserve system.

The owner has indicated their intention in establishing a feral eradication program for the property and adjoining properties. This will reduce the threats to native fauna within the local area.

The proposed location of the lodge is situated along an area of extensive scalds and natural blowouts. It appears this proposed site would require the least clearance of native vegetation, compared to other sites across the property.

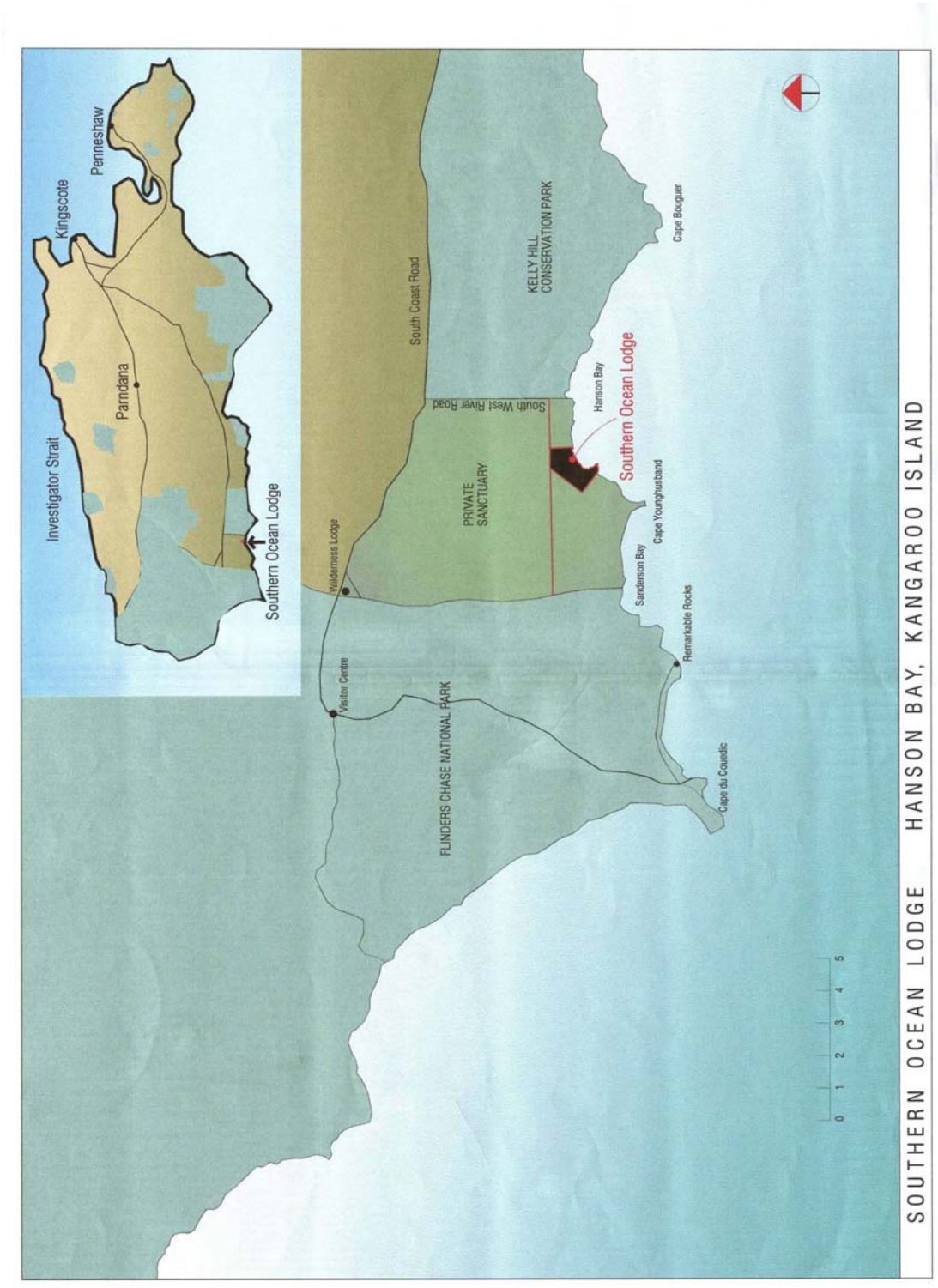
A proposal of this kind requires careful consideration not only towards the entire environment but also to individual species that exist within it. By following the recommendations outlined above, impacts to this environment caused by this development may be minimised.

5.1 Further Advice

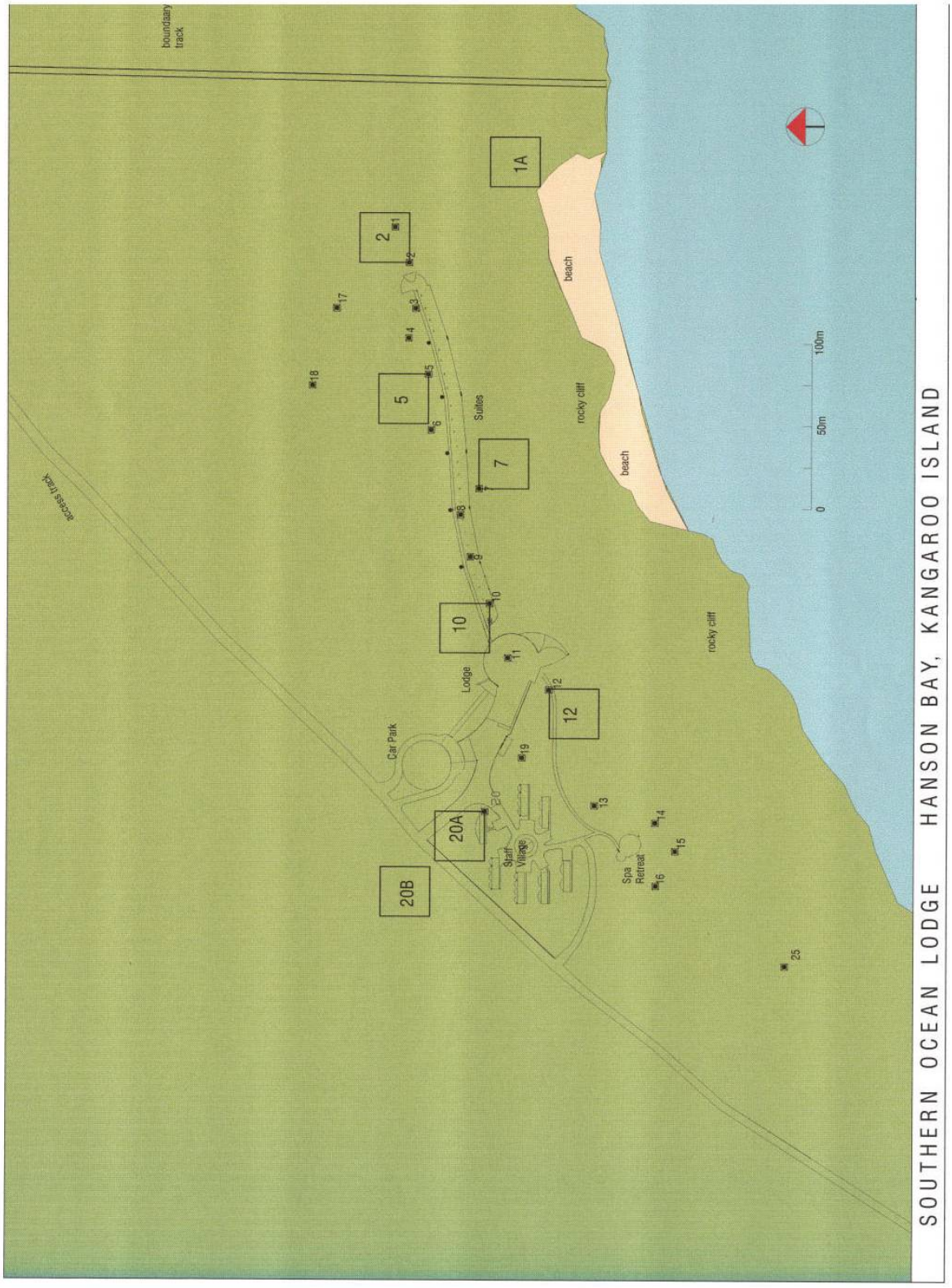
- Contact the *Department of Water, Land, Biodiversity and Conservation, Native Vegetation Council*, for further advice and assistance.
- Contact the *Department of Environment and Heritage, Coast Protection Board,* for further advice and assistance.
- Contact the *Department of Environment and Heritage, Bush Heritage Unit*, for further advice on a Heritage Agreement.
- Contact the *Department for Aboriginal Affairs and Reconciliation*, for further advice on cultural issues.

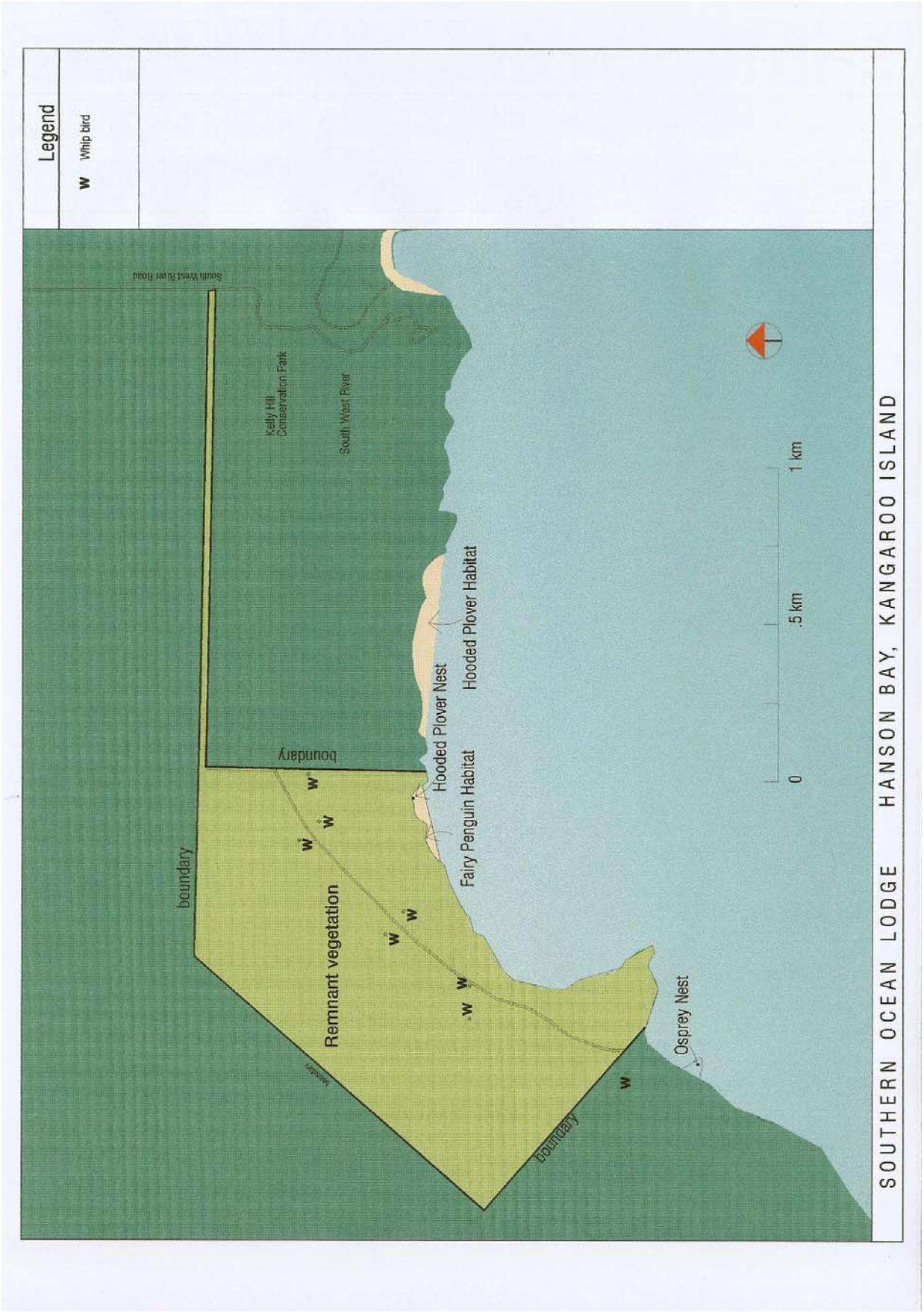
APPENDICES

Appendix 1 - Proposed location of "Southern Ocean Lodge. South-Western Kangaroo Island, South Australia.



Appendix 2 - Southern Ocean Lodge, Hanson Bay. Species of significance observed during the study.




Legend
Whip bird
SOUTHERN OCEAN LODGE HANSON BAY, KANGAROO ISLAND
South West River Road
Kelly Hill Conservation Park
South West River
boundary
Hooded Plover Nest
Hooded Plover Habitat
Fairy Penguin Habitat
Remnant vegetation
boundary
Boundary
Osprey Nest
0
.5 km
1 km

.Appendix 3 - Species recorded at the eight vegetation quadrats (data on conservation status sourced from Robinson & Armstrong, 1999)

Scientific Name	Common Name	Australia	South Australia	Kangaroo Island
Acacia longifolia var. sophorae	Coastal Wattle	-	-	-
Acacia myrtifolia var. myrtifolia	Myrtle Wattle	-	-	-
Acacia retinoides var. uncifolia	Coast Silver Wattle	-	-	-
Acrotriche cordata	Blunt-leaf Ground-berry	-	-	-
Agrostis aemula	Blown-grass	-	-	-
Austrostipa flavescens	Coast Spear-grass	-	-	-
Austrostipa stipoides	Coast Spear-grass	-	-	-
*Avellinia michelii**	Avellinia	-	-	-
Beyeria lechenaultii	Pale Turpentine Bush	-	-	-
Billardiera uniflora	One-flower Apple-berry	-	-	
Bromus arenarius	Sand Brome	-	-	**E**
Calytrix tetragona	Common Fringe-myrtle	-	-	-
Carpobrotus rossii	Native Pigface	-	-	-
Cassytha pubescens	Downy Dodder-laurel	-	-	-
Choretrum glomeratum var. glomeratum	White Sour-bush	-	-	-
Comesperma volubile	Love Creeper	-	-	-
Correa backhouseana var. orbicularis syn. C. reflexa	Common Correa	-	-	-
Crassula sieberiana ssp. tetramera	Australian Stonecrop	-	-	-
Dianella brevicaulis	Short-stem Flax-lily	-	-	-
Dichelachne microcantha	Short-hair Plume-grass	-	-	**K**
Dodonea humilis	Dwarf Hop-bush	-	-	-
Eucalyptus diversifolia	Coastal White Mallee	-	-	-
Eucalyptus rugosa	Coastal White Mallee	-	-	-
*Euphorbia paralias**	Sea spurge	-	-	-
Euphrasia collina ssp. tetragona	Coast Eyebright	-	-	-
Frankenia pauciflora	Southern Sea-heath	-	-	-
Gahnia hystrix	Spiky Saw-sedge	-	**R**	**R**
Gonocarpus tetragynus	Small-leaf Raspwort	-	-	-
Goodenia varia	Sticky Goodenia	-	-	-
Hakea rugosa	Dwarf Hakea	-	-	-
Hardenbergia violacea	Native lilac	-	-	**R**
Helichrysum leucopsideum	Coast Everlasting	-	-	-
Isolepis nodosa	Knobby Club-rush	-	-	-
Ixiolaena supina	Coast Plover-daisy	-	-	-

Scientific Name	Common Name	Australia	South Australia	Kangaroo Island
Ixodia achillaeoides ssp. achillaeoides	Coast Ixodia	-	-	-
Ixodia achillaeoides ssp. alata	Hills Daisy	-	-	-
Lasiopetalum discolor	Coast Velvet-bush	-	-	-
Lasiopetalum schulzenii	Drooping Velvet-bush	-	-	-
Leucophyta brownii	Coast Cushion-bush	-	-	-
Leucopogon parviflorus	Coast Beard-Heath	-	-	-
Lotus australis	Austral Trefoil	-	-	-
Melaleuca gibbosa	Slender Honey-myrtle	-	-	-
Melaleuca lanceolata ssp. lanceolata	Dryland Tea-tree	-	-	-
Myoporum insulare	Common Boobialla	-	-	-
Olearia axillaris	Coast Daisy-bush	-	-	-
Olearia ramulosa	Twiggy Daisy-bush	-	-	-
Orthrosanthus multiflorus	Morning Flag (annual onion-weed)	-	-	-
Pimelia glauca	Smooth Riceflower	-	-	-
Pimelia serpyllifolia ssp. serpyllifolia	Thyme Riceflower	-	-	-
Podolepis rugata var. littoralis	Coast Copper-wire Daisy	-	-	-
Podotheca augustifolia	Sticky Long-heads (annual herb)	-	-	-
Pomaderris obcordata	Wedge-leaf Pomaderris	-	-	-
Pomaderris paniculosa ssp. paralia	Coast Pomaderris	-	-	-
Poranthera microphylla	Small Poranthera	-	-	-
Pultanaea acerosa	Bristly Bush-pea	-	-	-
Rhagodia candolleana ssp. candolleana	Seaberry Saltbush	-	-	-
Samolus repens	Creeping Bookweed	-	-	-
Scaevola crassifolia	Cushion Fanflower	-	-	-
Senecio lautus	Variable Groundsel	-	-	-
Spinifex sericeus	Rolling Spinifex	-	-	-
Spyridium halmaturinum var. halmaturinum	Kangaroo Island Spyridium	-	-	-
Stipa exilis	Spear grass	-	-	-
Stipa flavescens	Spear grass	-	-	-
Swainsona lessertiifolia	Coast Swainson-pea	-	-	-
*Vellereophyton dealbatum**	White Cupweed	-	-	-
Veronica hillebrandii	Rigid Speedwell	-	-	-
*Vulpia bromoides**	Sqirrel-tail Fescue	-	-	-

Conservation Status (Lang & Kraehenbuehl, 1999)**:**

Australia	Australian status
South Australia	South Australian status
Kangaroo Island	Regional status for Kangaroo Island

SA and Regional Codes

E **Endangered:** Rare and in danger of becoming extinct in the wild.

R **Rare:** Has a low overall frequency of occurrence (may be locally common with a very restricted distribution, or may be scattered sparsely over a wider area). Not currently exposed to significant threats, but warrants monitoring and protective measures to prevent reduction of population sizes.

K **Uncertain:** Likely to be either threatened or rare, but insufficient data for a more precise assessment.

***** **Naturalised alien species**

Appendix 4 – Total birds recorded across all habitats Proposed SOL site, Hanson Bay, Kangaroo Island

Scientific Name	Common Name	Threatened Species Status	S.A. Conservation Status	Cliff and/or Beach	Low Coastal Shrubland	Mixed Coastal Shrubland	Dense Mallee / Limestone	Tall Mallee / Dunes
Alectura lathami	Australian Brush Turkey		**Introduced**					**X** (tracks)
Eudyptula minor	Little Penguin			among rocks, beach and cliff bases				
Morus serrator	Australasian Gannet			observed offshore				
Phalacrocorax carbo	Great Cormorant			on offshore rocks				
Phalacrocorax varius	Pied Cormorant			on offshore rocks				
Pandion haliaetus	Osprey	**Vulnerable**	**Rare**	**X**	**X**			
Accipiter cirrhocephalus	Collared Sparrowhawk				**X**	**X**		
Haliaeetus leucogaster	White bellied Sea-eagle		**Vulnerable**	**X**	**X**			
Falco cenchroides	Nankeen Kestrel			**X**	**X**	**X**		
Falco peregrinus	Peregrine Falcon		**Rare**	**X**	**X**			
Haematopus fuliginosus	Sooty Oystercatcher			on beach and offshore rocks				
Thinornis rubricollis	Hooded Plover	**Vulnerable**	**Vulnerable**	on sandy beaches				
Larus novaehollandiae	Silver Gull			on beach and offshore rocks				
Larus pacificus	Pacific Gull			on beach and offshore rocks				
Sterna bergii	Crested Tern			observed offshore				
Phaps elegans	Brush Bronzewing				**X**	**X**	**X**	
Glossopsitta porphyrocephala	Purple-crowned Lorikeet					**X**	**X**	**X**
Trichoglossus haematodus	Rainbow Lorikeet					**X**	**X**	**X**
Platycercus elegans	Crimson Rosella					**X**	**X**	
Neophema elegans	Elegant Parrot						**X**	
Neophema petrophila	Rock Parrot		**Rare**	**X**	**X**	**X**		
Malurus cyaneus	Superb Fairy-wren				**X**	**X**	**X**	
Stipiturus malachurus	Southern Emu-wren		**Rare**		**X**	**X**	**X**	
Pardalotus punctatus	Spotted (Yellow-rumped) Pardalote			**X**	**X**	**X**	**X**	**X**

Scientific Name	Common Name	Threatened Species Status	S.A. Conservation Status	Cliff and/or Beach	Low Coastal Shrubland	Mixed Coastal Shrubland	Dense Mallee / Limestone	Tall Mallee / Dunes
Pardalotus striatus	Striated Pardalote			X	X	X	X	X
Acanthiza pusilla	Brown Thornbill				X	X	X	
Acanthiza lineata	Striated Thornbill							X
Sericornis frontalis	White-browed (Spotted) Scrubwren			X	X	X	X	X
Acanthorhynchus tenuirostris	Eastern Spinebill							X
Anthochaera carunculata	Red Wattlebird					X	X	X
Gliciphila melanops	Tawny-crowned Honeyeater				X		X	
Lichenostomus cratitus	Purple-gaped Honeyeater				X	X	X	
Melithreptus brevirostris	Brown headed Honeyeater						X	
Phylidonyris novaeholandiae	New Holland Honeyeater				X	X	X	X
Phylidonyris pyrrhoptera	Crescent Honeyeater					X	X	X
Psophodes nigrogularis	Western Whipbird		**Rare**				X	
Colluricincla harmonica	Grey Shrike-thrush						X	
Pachycephala pectoralis	Golden Whistler						X	
Rhipidura albiscapa	Grey Fantail							X
Gymnorhina tibicen	Australin Magpie			X	X	X		
Strepera versicolor	Grey Currawong				X	X	X	X
Corvus coronoides	Australian Raven			X	X	X		
Zoothera lunulata	Bassian Thrush		**Rare**				X	
Hirundo neoxena	Welcome Swallow			X	X	X	X	
Petrochelidon nigricans	Tree Martin			X	X	X	X	
Zosterops lateralis	Silvereye			X	X	X	X	X
Staganopleura bella	Beautiful Firetail		**Rare**		X	X	X	

Appendix 5 - Bird species & density in low coastal shrubland, Proposed SOL site, Hanson Bay, Kangaroo Island

FAMILY	Scientific Name	Common Name	S.A. Conservation Status	Low coastal shrubland, number of birds /hectare
ZOSTEROPIDAE	*Zosterops lateralis*	Silvereye		**7.8**
PARDALOTIDAE	*Pardalotus striatus*	Striated Pardalote		**1**
MALURIDAE	*Stipiturus malachurus*	Southern Emu-wren	**Rare**	**0.9**
ACANTHIZIDAE	*Sericornis frontalis*	White-browed (Spotted) Scrubwren		**0.9**
HIRUNDINIDAE	*Petrochelidon nigricans*	Tree Martin		**0.8**
ACANTHIZIDAE	*Acanthiza pusilla*	Brown Thornbill		**0.4**
MALURIDAE	*Malurus cyaneus*	Superb Fairy-wren		**0.3**
HIRUNDINIDAE	*Hirundo neoxena*	Welcome Swallow		**0.3**
MELIPHAGIDAE	*Lichenostomus cratitus*	Purple-gaped Honeyeater		**0.2**
MELIPHAGIDAE	*Phylidonyris novaeholandiae*	New Holland Honeyeater		**0.2**
FALCONIDAE	*Falco cenchroides*	Nankeen Kestrel		**0.2**
PSITTACIDAE	*Neophema petrophila*	Rock Parrot	**Rare**	**0.1**
ESTRILDIDAE	*Staganopleura bella*	Beautiful Firetail	**Rare**	**0.1**
CORVIDAE	*Corvus coronoides*	Australian Raven		**0.1**
ACCIPITRIDAE	*Accipiter cirrhocephalus*	Collared Sparrowhawk		**0.1**
PARDALOTIDAE	*Pardalotus punctatus*	Spotted (Yellow-rumped) Pardalote		**X**
MELIPHAGIDAE	*Gliciphila melanops*	Tawny-crowned Honeyeater		**X**
FALCONIDAE	*Falco peregrinus*	Peregrine Falcon	**Rare**	**X**
COLUMBIDAE	*Phaps elegans*	Brush Bronzewing		**X**
ARTAMIDAE	*Gymnorhina tibicen*	Australian Magpie		**X**
ARTAMIDAE	*Strepera versicolor*	Grey Currawong		**X**
ACCIPITRIDAE	*Pandion haliaetus*	Osprey	**Rare**	**X**
ACCIPITRIDAE	*Haliaeetus leucogaster*	White bellied Sea-eagle	**Vulnerable**	**X**
PACHYCEPHALIDAE	*Colluricincla harmonica*	Grey Shrike-thrush		*****
MELIPHAGIDAE	*Anthochaera carunculata*	Red Wattlebird		*****
MELIPHAGIDAE	*Melithreptus brevirostris*	Brown headed Honeyeater		*****
MELIPHAGIDAE	*Phylidonyris pyrrhoptera*	Crescent Honeyeater		*****
EUPETIDAE	*Psophodes nigrogularis*	Western Whipbird	**Rare**	*****

Appendix 6 - Bird species & density in mixed coastal shrubland Proposed SOL site, Hanson Bay, Kangaroo Island

FAMILY	Scientific Name	Common Name	S.A. Conservation Status	Mixed Coastal Shrubland, number of birds / hectare
ZOSTEROPIDAE	*Zosterops lateralis*	Silvereye		**9.6**
PARDALOTIDAE	*Pardalotus striatus*	Striated Pardalote		**2.8**
MELIPHAGIDAE	*Phylidonyris novaeholandiae*	New Holland Honeyeater		**2.3**
ACANTHIZIDAE	*Sericornis frontalis*	White-browed (Spotted) Scrubwren		**1.7**
PARDALOTIDAE	*Pardalotus punctatus*	Spotted (Yellow-rumped) Pardalote		**0.8**
MALURIDAE	*Stipiturus malachurus*	Southern Emu-wren	**Rare**	**0.6**
HIRUNDINIDAE	*Petrochelidon nigricans*	Tree Martin		**0.6**
ACANTHIZIDAE	*Acanthiza pusilla*	Brown Thornbill		**0.5**
MELIPHAGIDAE	*Lichenostomus cratitus*	Purple-gaped Honeyeater		**0.4**
HIRUNDINIDAE	*Hirundo neoxena*	Welcome Swallow		**0.4**
MALURIDAE	*Malurus cyaneus*	Superb Fairy-wren		**0.3**
MELIPHAGIDAE	*Phylidonyris pyrrhoptera*	Crescent Honeyeater		**0.3**
PSITTACIDAE	*Platycercus elegans*	Crimson Rosella		**0.2**
CORVIDAE	*Corvus coronoides*	Australian Raven		**0.2**
FALCONIDAE	*Falco cenchroides*	Nankeen Kestrel		**0.1**
COLUMBIDAE	*Phaps elegans*	Brush Bronzewing		**0.1**
PSITTACIDAE	*Neophema petrophila*	Rock Parrot	**Rare**	**0.1**
ARTAMIDAE	*Gymnorhina tibicen*	Australian Magpie		**0.1**
ESTRILDIDAE	*Staganopleura bella*	Beautiful Firetail	**Rare**	**0.1**
ACCIPITRIDAE	*Accipiter cirrhocephalus*	Collared Sparrowhawk		**X**
PSITTACIDAE	*Glossopsitta porphyrocephala*	Purple-crowned Lorikeet		**X**
PSITTACIDAE	*Trichoglossus haematodus*	Rainbow Lorikeet		**X**
FALCONIDAE	*Falco peregrinus*	Peregrine Falcon	**Rare**	*****
PSITTACIDAE	*Neophema elegans*	Elegant Parrot		*****
MELIPHAGIDAE	*Acanthorhynchus tenuirostris*	Eastern Spinebill		*****
MELIPHAGIDAE	*Anthochaera carunculata*	Red Wattlebird		*****
MELIPHAGIDAE	*Gliciphila melanops*	Tawny-crowned Honeyeater		*****
MELIPHAGIDAE	*Melithreptus brevirostris*	Brown headed Honeyeater		*****

FAMILY	Scientific Name	Common Name	S.A. Conservation Status	Mixed Coastal Shrubland, number of birds / hectare
EUPETIDAE	*Psophodes nigrogularis*	Western Whipbird	**Rare**	*
PACHYCEPHALIDAE	*Colluricincla harmonica*	Grey Shrike-thrush		*
PACHYCEPHALIDAE	*Pachycephala pectoralis*	Golden Whistler		*
ARTAMIDAE	*Strepera versicolor*	Grey Currawong		*
MUSCICAPIDAE	*Zoothera lunulata*	Bassian Thrush	**Rare**	*

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Appendix H

Fauna and flora species lists

Fauna and flora species lists

This Appendix comprises all species lists from the two biological surveys undertaken for the proposed development. The first survey undertaken by DellaTorre and Pedler in 2005 covered vegetation and birds, and the second survey undertaken by EBS in 2006 covered Fauna (including birds again).

Table 1: Flora species recorded at the eight vegetation quadrats

Scientific name	Common name	Conservation status		
		Australia	South Australia	Kangaroo Island
Acacia longifolia var. sophorae	Coastal Wattle	-	-	-
Acacia myrtifolia var. myrtifolia	Myrtle Wattle	-	-	-
Acacia retinodes var. unifolia	Coast Silver Wattle	-	-	**R**
Acrotriche cordata	Blunt-leaf Ground-berry	-	-	-
Agrostis aemula	Blown-grass	-	-	-
Austrostipa flavescens	Coast Spear-grass	-	-	-
Austrostipa stipoides	Coast Spear-grass	-	-	-
*Avellinia michelii**	Avellinia	-	-	-
Beyeria lechenaultii	Pale Turpentine Bush	-	-	-
Billardiera uniflora	One-flower Apple-berry	-	-	
Bromus arenarius	Sand Brome	-	-	**E**
Calytrix tetragona	Common Fringe-myrtle	-	-	-
Carpobrotus rossii	Native Pigface	-	-	-
Cassytha pubescens	Downy Dodder-laurel	-	-	-
Choretrum glomeratum var. glomeratum	White Sour-bush	-	-	-
Comesperma volubile	Love Creeper	-	-	-
Correa backhouseana var. orbicularis syn. C. reflexa	Common Correa	-	-	-
Crassula sieberiana ssp. tetramera	Australian Stonecrop	-	-	-
Dianella brevicaulis	Short-stem Flax-lily	-	-	-
Dichelachne microcantha	Short-hair Plume-grass	-	-	**K**
Dodonaea humilis	Dwarf Hop-bush	-	-	-
Eucalyptus diversifolia	Coastal White Mallee	-	-	-
Eucalyptus rugosa	Coastal White Mallee	-	-	-
*Euphorbia paralias**	Sea spurge	-	-	-
Euphrasia collina ssp. tetragona	Coast Eyebright	-	-	-
Frankenia pauciflora	Southern Sea-heath	-	-	-
Gahnia hystrix	Spiky Saw-sedge	-	**R**	**R**
Gonocarpus tetragynus	Small-leaf Raspwort	-	-	-
Goodenia varia	Sticky Goodenia	-	-	-
Hakea rugosa	Dwarf Hakea	-	-	-
Hardenbergia violacea	Native lilac	-	-	**R**
Helichrysum leucopsideum	Coast Everlasting	-	-	-
Isolepis nodosa	Knobby Club-rush	-	-	-
Ixiolaena supina	Coast Plover-daisy	-	-	-
Ixodia achillaeoides ssp. achillaeoides	Coast Ixodia	-	-	-
Ixodia achillaeoides ssp. alata	Hills Daisy	-	-	-
Lasiopetalum discolor	Coast Velvet-bush	-	-	-
Lasiopetalum schulzenii	Drooping Velvet-bush	-	-	-

Scientific name	Common name	Conservation status		
		Australia	South Australia	Kangaroo Island
Leucophyta brownii	Coast Cushion-bush	-	-	-
Leucopogon parviflorus	Coast Beard-Heath	-	-	-
Lotus australis	Austral Trefoil	-	-	-
Melaleuca gibbosa	Slender Honey-myrtle	-	-	-
Melaleuca lanceolata ssp. lanceolata	Dryland Tea-tree	-	-	-
Myoporum insulare	Common Boobialla	-	-	-
Olearia axillaris	Coast Daisy-bush	-	-	-
Olearia ramulosa	Twiggy Daisy-bush	-	-	-
Orthrosanthus multiflorus	Morning Flag (annual onion-weed)	-	-	-
Pimelea glauca	Smooth Riceflower	-	-	-
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower	-	-	-
Podolepis rugata var. littoralis	Coast Copper-wire Daisy	-	-	-
Podotheca augustifolia	Sticky Long-heads (annual herb)	-	-	-
Pomaderris obcordata	Wedge-leaf Pomaderris	-	-	-
Pomaderris paniculosa ssp. paralia	Coast Pomaderris	-	-	-
Poranthera microphylla	Small Poranthera	-	-	-
Pultenaea acerosa	Bristly Bush-pea	-	-	-
Rhagodia candolleana ssp. candolleana	Seaberry Saltbush	-	-	-
Samolus repens	Creeping Bookweed	-	-	-
Scaevola crassifolia	Cushion Fanflower	-	-	-
Senecio lautus	Variable Groundsel	-	-	-
Spinifex sericeus	Rolling Spinifex	-	-	-
Spyridium halmaturinum var. halmaturinum	Kangaroo Island Spyridium	-	-	-
Stipa exilis	Spear grass	-	-	-
Stipa flavescens	Spear grass	-	-	-
Swainsona lessertiifolia	Coast Swainson-pea	-	-	-
*Vellereophyton dealbatum**	White Cupweed	-	-	-
Veronica hillebrandii	Rigid Speedwell	-	-	-
*Vulpia bromoides**	Sqirrel-tail Fescue	-	-	-

Table 2: Proposed revegetation species

Wet area for staff village	
Scientific name	**Common name**
Dianella brevicaulis	Flax Lily
Isolepis nodosa	Knobby Club Rush
Orthrosanthus multiflorus	Morning Flag
Hardenbergia violacea	Native Lilac

Revegetation around Lodge	
Scientific name	**Common name**
Correa backhouseana var orbicularis	Common Correa
Dodonaea humilis	Dwarf Hop-bush
Goodenia varia	Sticky Goodenia
Hakea rugosa	Dwarf Hakea
Melaleuca gibbosa	Slender Honey-myrtle
Pomaderris ovaria	Coast Pomaderris

Table 3: Total number of mammal species observed during the fauna survey

Class	Species name	Common name	No. observed
Mammalia	*Cercartetus concinnus*	Western Pygmy Possum	2
Mammalia	*Cercartetus lepidus*	Little Pygmy Possum	3
Mammalia	*Felis catus**	Feral Cat	1
Mammalia	*Macropus eugenii*	Tammar Wallaby	8
Mammalia	*Mus musculus*	House Mouse	14
Mammalia	*Rattus fuscipes*	Bush Rat	53
Mammalia	*Tachyglossus auculeatus*	Short-beaked Echidna	2
Mammalia	*Trichosurus vulpecula*	Common Brushtail Possum	19

*Note: *. Introduced species*

Table 4: Bird species identified during the first survey (2004/2005)

Scientific name	Common name	EPBC status	S.A. conservation status
Acanthiza lineata	Striated Thornbill		
Acanthiza pusilla	Brown Thornbill		
Acanthorhynchus tenuirostris	Eastern Spinebill		
Accipiter cirrhocephalus	Collared Sparrowhawk	Migratory	
Alectura lathami	Australian Brush Turkey		Introduced
Anthochaera carunculata	Red Wattlebird		
Colluricincla harmonica	Grey Shrike-thrush		
Corvus coronoides	Australian Raven		
Eudyptula minor	Little Penguin		
Falco cenchroides	Nankeen Kestrel	Migratory	
Falco peregrinus	Peregrine Falcon	Migratory	Rare
Gliciphila melanops	Tawny-crowned Honeyeater		
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		
Gymnorhina tibicen	Australian Magpie		
Haematopus fuliginosus	Sooty Oystercatcher		
Haliaeetus leucogaster	White bellied Sea-eagle	Migratory / Marine	Vulnerable
Hirundo neoxena	Welcome Swallow		
Larus novaehollandiae	Silver Gull		
Larus pacificus	Pacific Gull		
Lichenostomus cratitus	Purple-gaped Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Melithreptus brevirostris	Brown headed Honeyeater		
Morus serrator	Australasian Gannet		
Neophema elegans	Elegant Parrot		
Neophema petrophila	Rock Parrot		Rare
Pachycephala pectoralis	Golden Whistler		
Pandion haliaetus	Osprey	Migratory	Rare
Pardalotus punctatus	Spotted (Yellow-rumped) Pardalote		
Pardalotus striatus	Striated Pardalote		
Petrochelidon nigricans	Tree Martin		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax varius	Pied Cormorant		

Scientific name	Common name	EPBC status	S.A. conservation status
Phaps elegans	Brush Bronzewing		
Phylidonyris novaeholandiae	New Holland Honeyeater		
Phylidonyris pyrrhoptera	Crescent Honeyeater		
Platycercus elegans	Crimson Rosella		
Psophodes nigrogularis	Western Whipbird		Rare
Rhipidura albiscapa	Grey Fantail		
Sericornis frontalis	White-browed (Spotted) Scrubwren		
Staganopleura bella	Beautiful Firetail		Rare
Sterna bergii	Crested Tern		
Stipiturus malachurus	Southern Emu-wren		Rare
Strepera versicolor	Grey Currawong		
Thinornis rubricollis	Hooded Plover	Migratory	Vulnerable
Trichoglossus haematodus	Rainbow Lorikeet		
Zoothera lunulata	Bassian Thrush	Migratory	Rare
Zosterops lateralis	Silvereye		

Table 5: Bird species identified during the second survey (2006)

Scientific name	Common name	EPBC status	SA conservation status
Acanthiza lineata	Striated Thornbill		
Acanthiza pusilla	Brown Thornbill		
Acanthorhynchus tenuirostris	Eastern Spinebill		
Accipiter cirrhocephalus	Collared Sparrowhawk	Migratory	
Alectura lathami	Australian Brush Turkey		
Anthochaera carunculata	Red Wattlebird		
Cacomantis flabelliformis	Fantailed Cuckoo		
Chrysococcyx lucidus	Shining Bronze Cuckoo		
Colluricincla harmonica	Grey Shrike-thrush		
Corvus coronoides	Australian Raven		
Falco cenchroides	Nankeen Kestrel	Migratory	
Falco peregrinus	Peregrine Falcon	Migratory	Rare
Gliciphila melanops	Tawny-crowned Honeyeater		
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		
Gymnorhina tibicen	Australian Magpie		
Haliaeetus leucogaster	White bellied Sea-eagle	Migratory / Marine	Vulnerable
Hirundo neoxena	Welcome Swallow		
Lichenostomus cratitus	Purple-gaped Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Melithreptus brevirostris	Brown headed Honeyeater		
Neophema elegans	Elegant Parrot		
Neophema petrophila	Rock Parrot		Rare
Pachycephala pectoralis	Golden Whistler		
Pandion haliaetus	Osprey	Migratory	Rare
Pardalotus punctatus	Spotted (Yellow-rumped) Pardalote		
Pardalotus striatus	Striated Pardalote		
Petrochelidon nigricans	Tree Martin		

Scientific name	Common name	EPBC status	SA conservation status
Phaps elegans	Brush Bronzewing		
Phylidonyris novaeholandiae	New Holland Honeyeater		
Phylidonyris pyrrhoptera	Crescent Honeyeater		
Platycercus elegans	Crimson Rosella		
Psophodes nigrogularis lashmari	Western Whipbird		Rare
Rhipidura albiscapa	Grey Fantail		
Sericornis frontalis	White-browed (Spotted) Scrubwren		
Staganopleura bella	Beautiful Firetail		Rare
Stipiturus malachurus halmaturinus	Southern Emu-wren		Rare
Strepera versicolor	Grey Currawong		
Trichoglossus haematodus	Rainbow Lorikeet		
Thinornis rubricollis	Hooded Plover	Migratory	Vulnerable
Turnix varia	Painted Button-Quail		Rare
Zoothera lunulata	Bassian Thrush	Migratory	Rare
Zosterops lateralis	Silvereye		

Table 6: Bird species recorded and average density per hectare along each transect for 2004/2005 and 2006 surveys

Transect 1

Scientific name	Common name	Average density per Ha.
Lichenostomus cratitus	Purple-gaped Honeyeater	2.6
Zosterops lateralis	Silvereye	1.8
Sericornis frontalis	White-browed (Spotted) Scrubwren	1.6
Melithreptus brevirostris	Brown headed Honeyeater	0.7
Phylidonyris novaeholandiae	New Holland Honeyeater	0.6
Malurus cyaneus	Superb Fairy-wren	0.45
Anthochaera carunculata	Red Wattlebird	0.4
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	0.4
Pardalotus striatus	Striated Pardalote	0.35
Trichoglossus haematodus	Rainbow Lorikeet	0.35
Platycercus elegans	Crimson Rosella	0.3
Psophodes nigrogularis lashmari	Western Whipbird	0.3
Pachycephala pectoralis	Golden Whistler	0.25
Acanthiza pusilla	Brown Thornbill	0.2
Acanthiza lineata	Striated Thornbill	0.2
Zoothera lunulata	Bassian Thrush	0.15
Strepera versicolor	Grey Currawong	0.15
Neophema elegans	Elegant Parrot	0.1
Pardalotus punctatus	Spotted (Yellow-rumped) Pardalote	0.1
Colluricincla harmonica	Grey Shrike-thrush	0.1
Hirundo neoxena	Welcome Swallow	0.1
Phylidonyris pyrrhoptera	Crescent Honeyeater	0.05
Petrochelidon nigricans	Tree Martin	0.05
Phaps elegans	Brush Bronzewing	0.05
Staganopleura bella	Beautiful Firetail	0.05

Transect 1		
Scientific name	**Common name**	**Average density per Ha.**
Acanthorhynchus tenuirostris	Eastern Spinebill	0.05
Neophema elegans	Elegant Parrot	0.05
Falco peregrinus	Peregrine Falcon	0.05
Stipiturus malachurus halmaturinus	Southern Emu-wren	X
Gliciphila melanops	Tawny-crowned Honeyeater	X
Corvus coronoides	Australian Raven	X
Turnix varia	Painted Button-Quail	X
Haliaeetus leucogaster	White bellied Sea-eagle	X
Gymnorhina tibicen	Australian Magpie	X
Chrysococcyx lucidus	Shining Bronze Cuckoo	*
Cacomantis flabelliformis	Fantailed Cuckoo	*
Rhipidura albiscapa	Grey Fantail	*

*Notes: X = present observed in this habitat outside transect count, * = not observed but likely to occur in this habitat.*

Transect 2		
Scientific name	**Common name**	**Average density per Ha.**
Zosterops lateralis	Silvereye	5.2
Sericornis frontalis	White-browed (Spotted) Scrubwren	1.1
Stipiturus malachurus halmaturinus	Southern Emu-wren	0.8
Pardalotus striatus	Striated Pardalote	0.6
Petrochelidon nigricans	Tree Martin	0.55
Phylidonyris novaeholandiae	New Holland Honeyeater	0.5
Malurus cyaneus	Superb Fairy-wren	0.45
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	0.4
Hirundo neoxena	Welcome Swallow	0.2
Acanthiza pusilla	Brown Thornbill	0.2
Falco cenchroides	Nankeen Kestrel	0.15
Lichenostomus cratitus	Purple-gaped Honeyeater	0.1
Neophema petrophila	Rock Parrot	0.05
Gliciphila melanops	Tawny-crowned Honeyeater	0.05
Staganopleura bella	Beautiful Firetail	0.05
Corvus coronoides	Australian Raven	0.05
Accipiter cirrhocephalus	Collared Sparrowhawk	0.05
Pardalotus punctatus	Spotted (Yellow-rumped) Pardalote	X
Falco peregrinus	Peregrine Falcon	X
Phaps elegans	Brush Bronzewing	X
Gymnorhina tibicen	Australian Magpie	X
Strepera versicolor	Grey Currawong	X
Pandion haliaetus	Osprey	X
Haliaeetus leucogaster	White bellied Sea-eagle	X
Psophodes nigrogularis lashmari	Western Whipbird	*
Colluricincla harmonica	Grey Shrike-thrush	*
Anthochaera carunculata	Red Wattlebird	*
Melithreptus brevirostris	Brown headed Honeyeater	*
Phylidonyris pyrrhoptera	Crescent Honeyeater	*

*Notes: X = present observed in this habitat outside transect count, * = not observed but likely to occur in this habitat*

Transect 3		
Scientific name	**Common name**	**Average density per Ha.**
Zosterops lateralis	Silvereye	7.3
Pardalotus striatus	Striated Pardalote	1.7
Sericornis frontalis	White-browed (Spotted) Scrubwren	1.5
Phylidonyris novaeholandiae	New Holland Honeyeater	1.4
Stipiturus malachurus halmaturinus	Southern Emu-wren	0.75
Lichenostomus cratitus	Purple-gaped Honeyeater	0.55
Pardalotus punctatus	Spotted (Yellow-rumped) Pardalote	0.45
Acanthiza pusilla	Brown Thornbill	0.45
Malurus cyaneus	Superb Fairy-wren	0.45
Petrochelidon nigricans	Tree Martin	0.35
Platycercus elegans	Crimson Rosella	0.25
Hirundo neoxena	Welcome Swallow	0.2
Neophema elegans	Elegant Parrot	0.2
Phylidonyris pyrrhoptera	Crescent Honeyeater	0.15
Corvus coronoides	Australian Raven	0.1
Neophema petrophila	Rock Parrot	0.1
Falco cenchroides	Nankeen Kestrel	0.05
Phaps elegans	Brush Bronzewing	0.05
Gymnorhina tibicen	Australian Magpie	0.05
Staganopleura bella	Beautiful Firetail	0.05
Accipiter cirrhocephalus	Collared Sparrowhawk	0.05
Anthochaera carunculata	Red Wattlebird	0.05
Melithreptus brevirostris	Brown headed Honeyeater	0.05
Psophodes nigrogularis lashmari	Western Whipbird	0.05
Pachycephala pectoralis	Golden Whistler	0.05
Strepera versicolor	Grey Currawong	0.05
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	X
Trichoglossus haematodus	Rainbow Lorikeet	X
Alectura lathami	Australian Brush Turkey	X
Haliaeetus leucogaster	White bellied Sea-eagle	X
Falco peregrinus	Peregrine Falcon	*
Colluricincla harmonica	Grey Shrike-thrush	*
Zoothera lunulata	Bassian Thrush	*
Turnix varia	Painted Button-Quail	*
Acanthorhynchus tenuirostris	Eastern Spinebill	*
Gliciphila melanops	Tawny-crowned Honeyeater	*

*Notes: X = present observed in this habitat outside transect count, * = not observed but likely to occur in this habitat*

Table 7: Total birds recorded across all habitats at the project site during the first survey

Scientific name	Common name	Threatened species status	S.A. conservation status	Cliff and/or beach	Low coastal shrubland	Mixed coastal shrubland	Dense mallee / limestone	Tall mallee / dunes
Alectura lathami	Australian Brush Turkey		**Introduced**					**X** (tracks)
Eudyptula minor	Little Penguin			among rocks, beach and cliff bases				
Morus serrator	Australasian Gannet			observed offshore				
Phalacrocorax carbo	Great Cormorant			on offshore rocks				
Phalacrocorax varius	Pied Cormorant			on offshore rocks				
Pandion haliaetus	Osprey	**Vulnerable**	**Rare**	**X**	**X**			
Accipiter cirrhocephalus	Collared Sparrowhawk				**X**	**X**		
Haliaeetus leucogaster	White bellied Sea-eagle		**Vulnerable**	**X**	**X**			
Falco cenchroides	Nankeen Kestrel			**X**	**X**	**X**		
Falco peregrinus	Peregrine Falcon		**Rare**	**X**	**X**			
Haematopus fuliginosus	Sooty Oystercatcher			on beach and offshore rocks				
Thinornis rubricollis	Hooded Plover	**Vulnerable**	**Vulnerable**	on sandy beaches				
Larus novaehollandiae	Silver Gull			on beach and offshore rocks				
Larus pacificus	Pacific Gull			on beach and offshore rocks				
Sterna bergii	Crested Tern			observed offshore				
Phaps elegans	Brush Bronzewing				**X**	**X**	**X**	
Glossopsitta porphyrocephala	Purple-crowned Lorikeet					**X**	**X**	**X**
Trichoglossus haematodus	Rainbow Lorikeet					**X**	**X**	**X**
Platycercus elegans	Crimson Rosella					**X**	**X**	
Neophema elegans	Elegant Parrot						**X**	
Neophema petrophila	Rock Parrot		**Rare**	**X**	**X**	**X**		
Malurus cyaneus	Superb Fairy-wren				**X**	**X**	**X**	
Stipiturus malachurus	Southern Emu-wren		**Rare**		**X**	**X**	**X**	
Pardalotus punctatus	Spotted (Yellow-rumped) Pardalote			**X**	**X**	**X**	**X**	**X**

Scientific name	Common name	Threatened species status	S.A. conservation status	Cliff and/or beach	Low coastal shrubland	Mixed coastal shrubland	Dense mallee / limestone	Tall mallee / dunes
Pardalotus striatus	Striated Pardalote			X	X	X	X	X
Acanthiza pusilla	Brown Thornbill				X	X	X	
Acanthiza lineata	Striated Thornbill							X
Sericornis frontalis	White-browed (Spotted) Scrubwren			X	X	X	X	X
Acanthorhynchus tenuirostris	Eastern Spinebill							X
Anthochaera carunculata	Red Wattlebird					X	X	X
Gliciphila melanops	Tawny-crowned Honeyeater				X		X	
Lichenostomus cratitus	Purple-gaped Honeyeater				X	X	X	
Melithreptus brevirostris	Brown headed Honeyeater						X	
Phylidonyris novaeholandiae	New Holland Honeyeater				X	X	X	X
Phylidonyris pyrrhoptera	Crescent Honeyeater					X	X	X
Psophodes nigrogularis	Western Whipbird		**Rare**				X	
Colluricincla harmonica	Grey Shrike-thrush						X	
Pachycephala pectoralis	Golden Whistler						X	
Rhipidura albiscapa	Grey Fantail							X
Gymnorhina tibicen	Australin Magpie			X	X	X		
Strepera versicolor	Grey Currawong				X	X	X	X
Corvus coronoides	Australian Raven			X	X	X		
Zoothera lunulata	Bassian Thrush		**Rare**				X	
Hirundo neoxena	Welcome Swallow			X	X	X	X	
Petrochelidon nigricans	Tree Martin			X	X	X	X	
Zosterops lateralis	Silvereye			X	X	X	X	X
Staganopleura bella	Beautiful Firetail		**Rare**		X	X	X	

Table 8: Bird species and density in low coastal shrubland at the project site during the first survey

Family	Scientific name	Common name	S.A. conservation status	Low coastal shrubland, number of birds /hectare
ZOSTEROPIDAE	*Zosterops lateralis*	Silvereye		**7.8**
PARDALOTIDAE	*Pardalotus striatus*	Striated Pardalote		**1**
MALURIDAE	*Stipiturus malachurus*	Southern Emu-wren	**Rare**	**0.9**
ACANTHIZIDAE	*Sericornis frontalis*	White-browed (Spotted) Scrubwren		**0.9**
HIRUNDINIDAE	*Petrochelidon nigricans*	Tree Martin		**0.8**
ACANTHIZIDAE	*Acanthiza pusilla*	Brown Thornbill		**0.4**
MALURIDAE	*Malurus cyaneus*	Superb Fairy-wren		**0.3**
HIRUNDINIDAE	*Hirundo neoxena*	Welcome Swallow		**0.3**
MELIPHAGIDAE	*Lichenostomus cratitus*	Purple-gaped Honeyeater		**0.2**
MELIPHAGIDAE	*Phylidonyris novaeholandiae*	New Holland Honeyeater		**0.2**
FALCONIDAE	*Falco cenchroides*	Nankeen Kestrel		**0.2**
PSITTACIDAE	*Neophema petrophila*	Rock Parrot	**Rare**	**0.1**
ESTRILDIDAE	*Staganopleura bella*	Beautiful Firetail	**Rare**	**0.1**
CORVIDAE	*Corvus coronoides*	Australian Raven		**0.1**
ACCIPITRIDAE	*Accipiter cirrhocephalus*	Collared Sparrowhawk		**0.1**
PARDALOTIDAE	*Pardalotus punctatus*	Spotted (Yellow-rumped) Pardalote		**X**
MELIPHAGIDAE	*Gliciphila melanops*	Tawny-crowned Honeyeater		**X**
FALCONIDAE	*Falco peregrinus*	Peregrine Falcon	**Rare**	**X**
COLUMBIDAE	*Phaps elegans*	Brush Bronzewing		**X**
ARTAMIDAE	*Gymnorhina tibicen*	Australian Magpie		**X**
ARTAMIDAE	*Strepera versicolor*	Grey Currawong		**X**
ACCIPITRIDAE	*Pandion haliaetus*	Osprey	**Rare**	**X**
ACCIPITRIDAE	*Haliaeetus leucogaster*	White bellied Sea-eagle	**Vulnerable**	**X**
PACHYCEPHALIDAE	*Colluricincla harmonica*	Grey Shrike-thrush		*****
MELIPHAGIDAE	*Anthochaera carunculata*	Red Wattlebird		*****
MELIPHAGIDAE	*Melithreptus brevirostris*	Brown headed Honeyeater		*****
MELIPHAGIDAE	*Phylidonyris pyrrhoptera*	Crescent Honeyeater		*****
EUPETIDAE	*Psophodes nigrogularis*	Western Whipbird	**Rare**	*****

Table 9: Bird species and density in mixed coastal shrubland at the project site during the first survey

Family	Scientific name	Common name	S.A. conservation status	Mixed coastal shrubland, number of birds / hectare
ZOSTEROPIDAE	*Zosterops lateralis*	Silvereye		**9.6**
PARDALOTIDAE	*Pardalotus striatus*	Striated Pardalote		**2.8**
MELIPHAGIDAE	*Phylidonyris novaeholandiae*	New Holland Honeyeater		**2.3**
ACANTHIZIDAE	*Sericornis frontalis*	White-browed (Spotted) Scrubwren		**1.7**
PARDALOTIDAE	*Pardalotus punctatus*	Spotted (Yellow-rumped) Pardalote		**0.8**
MALURIDAE	*Stipiturus malachurus*	Southern Emu-wren	**Rare**	**0.6**
HIRUNDINIDAE	*Petrochelidon nigricans*	Tree Martin		**0.6**
ACANTHIZIDAE	*Acanthiza pusilla*	Brown Thornbill		**0.5**
MELIPHAGIDAE	*Lichenostomus cratitus*	Purple-gaped Honeyeater		**0.4**
HIRUNDINIDAE	*Hirundo neoxena*	Welcome Swallow		**0.4**
MALURIDAE	*Malurus cyaneus*	Superb Fairy-wren		**0.3**
MELIPHAGIDAE	*Phylidonyris pyrrhoptera*	Crescent Honeyeater		**0.3**
PSITTACIDAE	*Platycercus elegans*	Crimson Rosella		**0.2**
CORVIDAE	*Corvus coronoides*	Australian Raven		**0.2**
FALCONIDAE	*Falco cenchroides*	Nankeen Kestrel		**0.1**
COLUMBIDAE	*Phaps elegans*	Brush Bronzewing		**0.1**
PSITTACIDAE	*Neophema petrophila*	Rock Parrot	**Rare**	**0.1**
ARTAMIDAE	*Gymnorhina tibicen*	Australian Magpie		**0.1**
ESTRILDIDAE	*Staganopleura bella*	Beautiful Firetail	**Rare**	**0.1**
ACCIPITRIDAE	*Accipiter cirrhocephalus*	Collared Sparrowhawk		**X**
PSITTACIDAE	*Glossopsitta porphyrocephala*	Purple-crowned Lorikeet		**X**
PSITTACIDAE	*Trichoglossus haematodus*	Rainbow Lorikeet		**X**
FALCONIDAE	*Falco peregrinus*	Peregrine Falcon	**Rare**	*****
PSITTACIDAE	*Neophema elegans*	Elegant Parrot		*****
MELIPHAGIDAE	*Acanthorhynchus tenuirostris*	Eastern Spinebill		*****
MELIPHAGIDAE	*Anthochaera carunculata*	Red Wattlebird		*****
MELIPHAGIDAE	*Gliciphila melanops*	Tawny-crowned Honeyeater		*****
MELIPHAGIDAE	*Melithreptus brevirostris*	Brown headed Honeyeater		*****

Family	Scientific name	Common name	S.A. conservation status	Mixed coastal shrubland, number of birds / hectare
EUPETIDAE	*Psophodes nigrogularis*	Western Whipbird	**Rare**	*
PACHYCEPHALIDAE	*Colluricincla harmonica*	Grey Shrike-thrush		*
PACHYCEPHALIDAE	*Pachycephala pectoralis*	Golden Whistler		*
ARTAMIDAE	*Strepera versicolor*	Grey Currawong		*
MUSCICAPIDAE	*Zoothera lunulata*	Bassian Thrush	**Rare**	*

Table 10: Total number of reptile and amphibian species observed during the fauna survey

Class	Species name	Common name	No. observed
Reptilia	*Aprasia striolata*	Lined Worn-lizard	1
Reptilia	*Bassian duperreyi*	Eastern Three-lined Skink	5
Reptilia	*Christinus marmoratus*	Marbled Gecko	1
Reptilia	*Egernia whitii*	White's Skink	13
Reptilia	*Hemiergis peronii*	Four-toed Earless Skink	12
Reptilia	*Lerista bougainvillii*	Bougainville's Skink	3
Reptilia	*Nephrurus milii*	Barking Gecko	1
Reptilia	*Notechis ater*	Tiger Snake	2
Reptilia	*Varanus rosenbergi*	Heath Goanna	7
Amphibia	*Limnodynastes dumerili*	Bull Frog	2

Table 11: Weed species recorded at the eight vegetation quadrats

Scientific name	Common name
Avellinia michelii	Avellinia
Euphorbia paralias	Sea spurge
Vellereophyton dealbatum	White Cupweed
Vulpia bromoides	Sqirrel-tail Fescue

Appendix I

Fauna survey report

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SOUTHERN OCEAN LODGE FAUNA SURVEY

January 2006

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1. Introduction

The location of the proposed development is within the Hundred of McDonald, Allotment 9, part section 14 on the south-western coast of Kangaroo Island between Flinders Chase National Park and Kelly Hill Conservation Park. The proposed lodge consists of 25 suites, a spa retreat, restaurant/lounge, and conference facilities. A staff village accommodating approximately 20 permanent staff would be located immediately west of the lodge. A map showing the proposed location is attached as Appendix 1.

The development has been classified as a major project under the South Australian *Development Act 1993* and as a controlled action under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Major Development Panel has requested a fauna survey to be undertaken to provide information on mammals and reptiles that may occur within the proposed development area. The Panel also requested a repeat of the January 2005 (DellaTorre and Pedler 2005) bird survey be conducted. The Australian Government Department of Environment and Heritage has also indicated that it requires a mammal survey which includes targeted surveys for the Kangaroo Island Dunnart (*Sminthopsis aitkeni*) and the Southern Brown Bandicoot (*Isoodon obesulus obesulus*), to see if they occur in the immediate vicinity of the proposed development site.

The permits issued to allow this project to be undertaken include the Scientific Research Permit (Permit Number K24929) and the Wildlife Ethics Committee Permit (Reference No. 62/2005)

2. Methodology

2.1 Field Survey

The fauna survey was undertaken over a six day period between the 16th of January 2006 and the 21st of January 2006. All vertebrate species which were either caught, observed or heard were recorded. The species, the location (using a handheld GPS) and the number of individuals observed were recorded for each sighting.

The weather during the field survey did vary, however, the majority of the weather was fine with the maximum daily temperatures ranging between 25° and 37°. The night time temperatures were generally mild with temperatures ranging from 8° to 18°. Several days were overcast in the mornings before clearing to sunny afternoons. A large thunderstorm was encountered on the 19th of January, however it is unlikely that this would have resulted in more than 5 mm of rain falling. Several millimetres of rain also fell on the 20th of January.

2.2 Trapping Sites

A total of six trapping sites were established across the proposed development area, each trapping site had Elliott Traps, Pitfall Traps and Cage Traps all installed. The number of sites chosen was based on several factors. Firstly, within the proposed development area, two main habitats present were, open coastal white mallee and coastal open shrubland. By having six sampling sites across these two habitat types, meant each could be suitably sampled. Secondly, it allowed the maximum number of sites to be surveyed within the survey timeframe. Each site had a total of six Pitfall Traps, fifteen Elliott Traps and two Cage Traps installed. The traps were left out for a total of four nights per site.

Table 1 provides details on the trapping sites including their location, the habitat type of the trapping site and the dates of when sampling was commenced and finished at each site.

Table 1. Details on the trapping sites for the Southern Ocean Lodge Fauna Survey.

Site No.	Easting*	Northing*	Habitat type	Start date	Finish date
1	665016	6012456	Open coastal white mallee	16/01/2006	20/01/2006
2	665101	6012491	Coastal open shrubland	16/01/2006	20/01/2006
3	665233	6012545	Coastal open shrubland	16/01/2006	20/01/2006
4	665381	6012576	Coastal open shrubland	16/01/2006	20/01/2006
5	664968	6012473	Open coastal white mallee	17/01/2006	21/01/2006
6	665336	6012825	Open coastal white mallee	17/01/2006	21/01/2006

*Note: * Easting and Northing's are given for the start of the pitfall trap line, therefore indicating the one corner of the trapping site.*

2.3 Bird Transects

The bird survey component of the fauna survey consisted of determining the presence and density of birds by re-surveying the original January 2005 transects (DellaTorre and Pedler 2005). Each transect consisted of a total length of one kilometre across the different habitats present within the proposed development. In the mixed shrubland (including the area proposed for guest suites) the limited extent of similar contiguous habitat in the area made it necessary to repeat the count over 500m on each morning to achieve a total distance of 1km. This mixed shrubland habitat actually comprised patchy vegetation of the adjacent habitats assessed (i.e. open coastal shrubland habitat and open coastal white mallee over limestone).

2.4 Survey Methods

2.4.1 Pitfall Trapping

Pitfall trapping was conducted using the method outlined in '*Guidelines for Vertebrate Surveys in South Australia'* (Owens 2000). Briefly, six pitfall traps were installed for each trap line. Traps were placed 10 metres apart with a 60 metre mesh fence installed to connect the traps. Surface spray was utilised to kill ants where they were considered to be an issue.

The pitfall traps were left open for four nights. The traps were checked every morning at sunrise, in the early afternoon and again in the evening at sunset. This prevented any of the captured animals from being in the traps for an extended period of time.

2.4.2 Elliott Trapping

Elliott traps were utilised as detailed by Owens (2000). Elliott traps are a small aluminium trap which are approximately 330 mm long, 100 mm high and 90 mm wide. Each Elliott trap line consisted of 15 traps spaced at approximately 10 metre intervals. These were placed approximately 30 metres from the pitfall trap line and ran parallel with the pitfall line. A small ball of bait was placed in each of the Elliott traps which consisted of a mixture of peanut butter and oats.

The Elliott traps were placed on the ground and they were either located under shrubs or on the western side of shrubs to ensure that any captured animals were not subject to overheating from direct morning sun. The Elliott traps were left out for four nights and they were checked every morning at sunrise and each evening at sunset.

2.4.3 Cage Traps

Cage traps were utilised as per the vertebrate survey guidelines (Owens 2000). The cage traps are trip-plate release, measuring 550 mm long, 220 mm wide and 220 mm in height. At all sites, two cage traps were utilised at each trap line. The cage traps were left open for a total of four nights per site and were baited with a rolled oats and peanut butter mixture.

2.4.4 Active Searching

Active searching for fauna species was undertaken during the day after the traps had been checked in the morning. Searching was undertaken at a variety of sites and was not confined to just the six trapping sites that had been set up. This ensured that the maximum number of fauna species were identified. Some of the active searching occurred outside of the project area but within habitat that was similar to that of the project area. This was also undertaken to maximise the number of fauna species identified that would be likely to utilise the habitat within the project area.

2.4.5 Spotlighting

Spotlighting was undertaken as part of the fauna survey. However, the amount of time spent spotlighting was restricted due to several cool evenings and wet weather. Several hours were undertaken on the warmer nights, however, due to the dense nature of the vegetation and limited tracks through the vegetation there were limited areas to spotlight.

2.4.6 Opportunistic observations

Opportunistic observations were made throughout the survey period. These observations were made of all fauna species observed outside of trapping sites. This included whilst walking between trapping sites and around the camp utilised for the duration of the survey. All observations within these areas were recorded as opportunistic records.

2.4.7 Bird Survey

Bird species presence and density was determined using transect counts for the different habitat types where clearance for building construction and access is proposed. Approximately one hour was taken to traverse each 1 km transect in the different habitats on the mornings of 17th and 18th of January 2006. All birds seen or heard within 25 metres of the transect in each habitat were identified and counted. Species observed or heard outside the 50 meters total transect width or in an adjacent habitat type were noted but not included in calculations. Densities calculated are simply averages of the two counts/area searched.

Locations of species distribution for mapping were obtained using a hand held GPS, or where in dense habitat, an estimate made of distance and direction from the nearest accessible point. Additional searches were made in the tall mallee/jumbled dune system along the access track and in the beach and coastal cliff habitats.

2.5 Identification of Specimens

Each of the specimens that were either caught in a trap or caught when actively searching was, where possible, identified at the point of capture. If the species could be quickly identified to species level, then it was released at the point of capture straight away. Several specimens were harder to identify and therefore these individuals were kept overnight to allow identification to be undertaken. Species kept overnight were released at the point of capture and at a time which was appropriate for that species (eg species active at night such as the small mammals and reptiles were released early in the morning

to allow them to find refuge for the day whilst species active during the day such as most of the reptile species were released mid morning after the daily temperature had risen and they could increase their body temperature).

Fauna species were identified utilising a variety of sources including Cogger (1993), Strahan (1995), Houston (1998), Slater *et al* (1989), Triggs (1996) and Debus (2001). The scientific and common names used in this report follow Robinson *et al* (2000).

2.6 Survey Effort

The field survey was undertaken over a 6-day period. A total of six trapping sites were chosen and a total of four nights and four days of trapping was undertaken at each site. Therefore, the total trap nights for each site was 24 for pitfall traps (6 traps left open for 4 nights), 60 for Elliott traps (15 traps left open for 4 nights) and 8 for cage traps (2 traps left open for 4 nights. Therefore, the total number of trap nights for the project was 144 for the pitfall traps, 360 for the Elliott traps and 48 for the cage traps.

Two people spent approximately 36 hours actively searching for fauna species and signs of fauna species. This search effort was spread over the different habitat types which were located within the project area.

2.7 Limitations

There are several limitations to this fauna survey. Firstly, the survey was carried out mid summer which is not ideal for locating all fauna species. The most appropriate time for fauna surveys to be undertaken is in the spring when the majority of species are breeding and fauna activity is increased. This would increase the likelihood of observing a higher number of fauna species that utilise the project site.

Whilst a reasonable amount of time was spent on the site, the nature of fauna activity means that it is possible that not all species present within the site may have been observed. This has been overcome to some degree by the survey effort and survey methods which were implemented to record as many different fauna species as possible.

However, the survey results, the previous work undertaken in the area and the database search results are considered to be adequate to make a reasonable assessment of potential impacts of the proposed development on the fauna in the area. Further, the likely impacts of the project on fauna species of conservation significance can be estimated based on the known habitat occurring within the area and the ecology of the species in question.

2.8 Position-fixing and mapping

The location of each fauna species observed was recorded using a hand-held GPS (Garmin GPS12). The hand-held GPS was also used to locate the start and end point of each of the pitfall trap lines and the Elliott trap lines. Locations are given using the WGS 84 datum and all locations occur within Zone 53.

2.9 Conservation Ratings

The conservation status of fauna species is specified at the geographic scales of National, State and Regional.

Species of national conservation significance are listed under the *EPBC Act* 1999 as either Endangered (rare and in danger of becoming extinct in the wild) or Vulnerable (rare and at risk from potential threats or long term threats that could cause the species to become endangered in the future). Species which are listed under the *EPBC Act* 1999, as migratory (either protected directly by this legislation, and / or under international agreements) are also detailed.

State conservation status is based on Schedules of the *NPWS Act* 1972. Species are listed under the categories of Endangered, Vulnerable or Rare.

There are no formal designations of regional conservation significance. Assessment of regional significance relies on information provided in reports such as regional Biodiversity Plans, and discussion with experts familiar with the region. Species are listed under the regional categories of Endangered, Vulnerable, Rare and Uncommon in this report. The “Uncommon” category indicates that the species of interest is less common in the region, but is not rare enough to warrant special protective measures.

3. Results

The following section details the results of each of the methods that were utilised during the fauna survey.

3.1 Pitfall Traps

A total of 48 captures representing 12 species were identified in the pitfall traps. Four of the species were mammals, seven were species of reptile, whilst one amphibian species was captured.

Site 1 and 3 had the most captures at the site with 11; whilst Site 6 had the least with just 4 captures over the survey period (Table 2). Although an equal number of captures occurred at Site 1 and 3, Site 1 contained the highest species diversity by pitfall traps with a total of 6 different species caught. Site 6 was the least diverse with just 2 species caught.

Specimens of four species, the Western Pygmy Possum (*Cercartetus concinnus*), the Little Pygmy Possum (*Cercartetus lepidus*), Bush Rat (*Rattus fuscipes*) and Bull Frog (*Limnodynastes dumerili*) were collected on behalf of the South Australian Museum.

Table 2. Number of individuals and number of species caught at each trapping site in the pitfall traps

Site No.	No. of captures	No. of mammal species	No. of reptile species	No. of amphibian species	Total no. of species
1	11	1	5	0	6
2	5	2	2	0	4
3	11	2	3	0	5
4	7	2	3	0	5
5	10	3	2	0	5
6	4	0	1	2	2
Total	48	4	7	2	12

3.2 Elliott Traps

A total of 51 captures occurred in the Elliott traps which represented a total of two mammal species. The two species caught were the Bush Rat and the introduced House Mouse (*Mus musculus*). The Bush Rat was by far the most common species caught in the Elliott traps with 43 of the 51 captures.

The Elliott traps at Site 2 had the most captures with 13; while at all sites except for Site 4 Bush Rats were caught. The Elliott traps at Sites 3 and 6 caught only 6 and 2 respectively. The House Mouse was only caught at Sites 3 and 4 (Table 3).

Table 3. Number of species caught at each trapping site in the Elliott traps

Site No.	No. of Bush Rats	No. of House Mice	No. of captures
1	11	0	11
2	13	0	13
3	6	4	10
4	0	4	4
5	11	0	11
6	2	0	2
Total	43	8	51

3.3 Cage Traps

A total of 16 captures occurred in the cage traps which represented a total of two mammal species. The two species caught were the Common Brushtail Possum (*Trichosurus vulpecula*) and the Bush Rat (*Rattus fuscipes*). The Common Brushtail Possum was caught 11 times while the Bush Rat was only caught once in the cage traps.

The cage traps at Site 1 had the most captures with 5; while at all sites except for Site 5 Common Brushtail Possums were caught. One Bush Rat was caught in the cage traps at Site 5 (Table 4).

Table 4. Number of species caught at each trapping site in the Cage Traps.

Site No.	No. of Common Brushtail Possums	No. of Bush Rats	No. of captures
1	5	0	5
2	1	0	1
3	3	0	3
4	3	0	3
5	0	1	1
6	3	0	3
Total	15	1	16

3.4 Spotlighting

No species were observed while spotlighting. This may have been due to the dense growth of vegetation making it difficult to spot animals. Most nights were also relatively windy while spot lighting making it hard to hear any moving animals.

3.5 Active Searching

A total of 12 species were directly observed or evidence of the presence of species were observed whilst actively searching. This included seven reptile species and four mammal species.

Of the Eight reptile species that were observed whilst active searching, Four of the species Heath Goanna (*Varanus rosenbergi)*, Tiger Snake (*Notechis ater*), Barking Gecko (*Nephrurus milii*) and Marbled Gecko (*Christinus marmoratus*) were only identified using this method. Four mammal species where observed the Tammar Wallaby (*Macropus eugenii*), Short-beaked Echidna (*Tachyglossus auculeatus*) and the Common Brushtail Possum, while a skull from a Feral Cat (*Felis catus*) was collected near Site 1.

3.6 Bird Survey

In 2005 the most abundant species in coastal shrublands were mobile groups of Silvereyes (*Zosterops lateralis*) which were feeding on coast beard-heath (*Leucopogon parviflorus*) berries. Two Pardalote species, Tree Martins (*Petrochelidon nigricans*) and Welcome Swallows (*Hirundo neoxena*) were, at least partly due to the proximity of nest sites in the coastal cliff faces, where many individuals were seen entering holes with food for nestlings. Smaller numbers of these and other species seen in 2006 possibly reflect variations in seasonal conditions between years and weather conditions prevailing during surveys. A summary of bird species identified and species densities observed for each transects are shown in Appendix 4.

3.7 Feral Animals

During the survey two introduced species were recorded at the proposed development site. A number of house mice were captured in the pit fall lines and the Elliot traps while a skull of a feral cat was collected near the proposed development. Feral cat tracks were also observed during active searching especially along the cliff tops.

3.8 Summary of Results

A total of 8 mammal species were positively identified during the fauna survey. Of the 8 mammal species, only 2 were introduced species the Feral Cat and House Mouse, whilst the remaining 6 are native. The most commonly captured mammal was the Bush Rat which was caught a total of 53 times during the survey period (Table 5). No mammal species of national or state conservation significance were captured during the survey.

A total of 9 reptile species were identified during the fauna survey. All of the species were native species and they comprised of 1 species of goanna, 1 snake species, 4 lizard species, 1 species of legless lizard and 2 gecko species (Table 5). One reptile species of state conservation significance was observed within the survey area. *Varanus rosenbergi* has a state conservation rating of rare with 7 individuals being observed across the survey area.

A total of 41 birds were either observed or heard along the three transects. The January 2005 bird survey totalled 47 birds, 6 more then the current survey. Of the total number of birds recorded during both the 2005 and 2006 survey's 12 species are listed as having conservation significance as "migratory or marine" under the *EPBC Act* 1999 or state rated under the *NPWS Act* 1972. These are discussed in more detail in species of conservation significance.

Table 5. Total number of mammal, reptile and amphibian species observed during the fauna survey.

Class	Species Name	Common Name	No. observed
Mammalia	*Cercartetus concinnus*	Western Pygmy Possum	2
Mammalia	*Cercartetus lepidus*	Little Pygmy Possum	3
Mammalia	*Felis catus**	Feral Cat	1
Mammalia	*Macropus eugenii*	Tammar Wallaby	8
Mammalia	*Mus musculus*	House Mouse	14
Mammalia	*Rattus fuscipes*	Bush Rat	53
Mammalia	*Tachyglossus auculeatus*	Short-beaked Echidna	2
Mammalia	*Trichosurus vulpecula*	Common Brushtail Possum	19
Reptilia	*Aprasia striolata*	Lined Worn-lizard	1
Reptilia	*Bassiana duperreyi*	Eastern Three-lined Skink	5
Reptilia	*Christinus marmoratus*	Marbled Gecko	1
Reptilia	*Egernia whitii*	White's Skink	13
Reptilia	*Hemiergis peronii*	Four-toed Earless Skink	12
Reptilia	*Lerista bougainvillii*	Bougainville's Skink	3
Reptilia	*Nephrurus milii*	Barking Gecko	1
Reptilia	*Notechis ater*	Tiger Snake	2
Reptilia	*Varanus rosenbergi*	Heath Goanna	7
Amphibia	*Limnodynastes dumerili*	Bull Frog	2

*Note: *. Introduced species*

Table 6: Birds observed during 2006 survey.

Scientific Name	Common Name	Aus	SA
Acanthiza lineata	Striated Thornbill		
Acanthiza pusilla	Brown Thornbill		
Acanthorhynchus tenuirostris	Eastern Spinebill		
Accipiter cirrhocephalus	Collared Sparrowhawk	#	
Alectura lathami	Australian Brush Turkey		
Anthochaera carunculata	Red Wattlebird		
Cacomantis flabelliformis	Fantailed Cuckoo		
Chrysococcyx lucidus	Shining Bronze Cuckoo		
Colluricincla harmonica	Grey Shrike-thrush		
Corvus coronoides	Australian Raven		
Falco cenchroides	Nankeen Kestrel	#	
Falco peregrinus	Peregrine Falcon	#	R
Gliciphila melanops	Tawny-crowned Honeyeater		
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		
Gymnorhina tibicen	Australian Magpie		
Haliaeetus leucogaster	White bellied Sea-eagle	#	V
Hirundo neoxena	Welcome Swallow		
Lichenostomus cratitus	Purple-gaped Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Melithreptus brevirostris	Brown headed Honeyeater		
Neophema elegans	Elegant Parrot		
Neophema petrophila	Rock Parrot		R
Pachycephala pectoralis	Golden Whistler		
Pandion haliaetus	Osprey	#	R
Pardalotus punctatus	Spotted (Yellow-rumped) Pardalote		
Pardalotus striatus	Striated Pardalote		
Petrochelidon nigricans	Tree Martin		
Phaps elegans	Brush Bronzewing		
Phylidonyris novaeholandiae	New Holland Honeyeater		
Phylidonyris pyrrhoptera	Crescent Honeyeater		
Platycercus elegans	Crimson Rosella		
Psophodes nigrogularis lashmari	Western Whipbird		R
Rhipidura albiscapa	Grey Fantail		
Sericornis frontalis	White-browed (Spotted) Scrubwren		
Staganopleura bella	Beautiful Firetail		R
Stipiturus malachurus halmaturinus	Southern Emu-wren		R
Strepera versicolor	Grey Currawong		
Trichoglossus haematodus	Rainbow Lorikeet		
Thinornis rubricollis	Hooded Plover	#	V
Turnix varia	Painted Button-Quail		R
Zoothera lunulata	Bassian Thrush	#	R
Zosterops lateralis	Silvereye		

Note: # represents a species that is listed under the EPBC Act 1999 as Migratory or Marine.

4. Discussion

4.1 Likely impact on Fauna Species

The proposed development is unlikely to have a significant long-term impact on any one fauna species however it is likely that there will be localised impacts on individuals of a range of fauna species. It is likely that individuals of ground-dwelling fauna species, particularly small mammals and reptiles and possibly some bird species, may be either killed or displaced during the vegetation removal process. There will also be an impact on the same group of species through the loss of available habitat through the development of the site. However, due to the large area of habitat surrounding the proposed project site, it is unlikely that the impact on any one species will be significant.

4.2 Likely Impact on Mammals Species of Conservation Significance

No mammal species of national or state conservation significance were observed during the fauna survey. However, it is possible that two species of conservation significance may occur within the project area. These are the Kangaroo Island Dunnart (*Sminthopsis aitkeni*) and the Southern Brown Bandicoot (*Isoodon obesulus obesulus*) both of which are listed as nationally endangered under the *EPBC Act* 1999. Under the South Australian *National Parks and Wildlife Act* 1972, the Kangaroo Island Dunnart is also listed as endangered while the Southern Brown Bandicoot is listed as vulnerable.

Kangaroo Island Dunnart (*Sminthopsis aitkeni*)

The Kangaroo Island Dunnart is a small marsupial insectivore weighing around 20-25g which is endemic to Kangaroo Island. Little is known of the ecology of this marsupial, as trapping efforts have largely been unsuccessful (Gates 2001; Robinson & Armstrong 1999; Herbert 1996). The most comprehensive survey for the Kangaroo Island Dunnart was conducted by Gates (2001) over a two year period 43 survey sites where established with over 13,700 pitfall trap nights and 8,900 Elliot trap nights carried out. From this intensive trapping effort only 22 Kangaroo Island Dunnarts were captured.

Gates (2001) suggested the largest area of potential habitat for the Kangaroo Island Dunnart occurs within the Flinders Chase National Park and the land to the north of the park which consists of Kangaroo Island Mallee-ash (*Eucalyptus remota*) and Brown Stringybark (*Eucalyptus baxteri*) associations. These two vegetation association where not recorded at the proposed site as described in the botanical survey conducted by DellaTorre and Pedler in 2005. However there are two historic records from 1979 of the Kangaroo Island Dunnart occurring with in the same vegetation association of Coastal White Mallee (*Eucalyptus diversifolia*) approximately 10 kilometres north of Seal Bay (Gates 2001).

Not capturing any Kangaroo Island Dunnarts during the survey does not necessarily mean that they are not present within the site. Gates (2001) showed that a significant amount of trapping effort is required to detect a small number of individuals. Whilst Gates (2001) did not capture any Kangaroo Island Dunnarts within coastal vegetation, little trapping effort was put into these habitat types (Gates, pers. comm. 2006). The project area is part of a

very large tract of native vegetation which is located between Flinders Chase National Park and Kelly Hill Caves Conservation Park. Therefore, there is a significant amount of protected native vegetation within the region offering similar vegetation types to those found within the project area.

The removal of the vegetation for the proposed development is not considered likely to have a significant long-term impact on the species given that it is only a possibility that the species occurs within the project area. The area of disturbance is considered to be relatively small when the large tracts of native vegetation surrounding the site are considered and therefore, the proposed development is unlikely to have a significant impact on the area of occupancy of the species.

Southern Brown Bandicoot (*Isoodon obesulus obesulus*)

The Southern Brown Bandicoot is a small robust marsupial, which was once widespread across much of mainland Australia. Within South Australia it is now restricted to the Mount Lofty Ranges, Kangaroo Island and in the southeast of South Australia (Paull, 1995). The species has been recorded in a variety of vegetation associations including woodland, coastal and mallee communities, however Paull (1995) describes the most common community the species to inhabit on Kangaroo Island being Brown Stringybark or Sugar Gum (*Eucalyptus cladocalyx*) woodlands. Records however show the species has being recorded within open coastal white mallee communities across the southern area of Kangaroo Island (Robinson and Armstrong 1999).

Southern Brown Bandicoots can be difficult to trap, even in sites where they are abundant. However, this species does leave distinctive conical shape holes in the ground as it digs looking for food including earthworms, insects and fungi. Extensive active searching was undertaken across the project area looking for evidence of the Southern Brown Bandicoot. No traces of the species were recorded at or around the site. It is considered unlikely that the Southern Brown Bandicoot inhabits the project area due to no captures of this species and no evidence of their presence being observed. It is therefore considered that the proposed development is not likely to have a significant long-term impact on the Southern Brown Bandicoot.

4.3 Likely Impact on Reptile Species of Conservation Significance

Heath Goanna (*Varanus rosenbergi*)

One reptile species the Heath Goanna has a state rating of “rare” for South Australia under the *NPWS Act* 1972 and was frequently observed during the fauna survey. A biological survey of Kangaroo Island by the Department for Environment and Heritage (Robinson and Armstrong 1999) referred to the Heath Goanna as being”*very common and frequently encountered on Kangaroo Island, this is a stark contrast with the remainder of its range on mainland South Australia*”. Due to the common nature of this species and the small area proposed to be developed, it is considered that there will not be a significant impact on the Heath Goanna.

4.4 Likely Impact on Bird Species of Conservation Significance

Osprey (*Pandion haliaetus*)

The Osprey is listed as a migratory species under the *EPBC Act* 1999 and rated as "rare" under the South Australian *NPWSA Act* 1972. It is generally common and secure in Australia, particularly in the north, while it is uncommon and local in southern Australia (Debus 2001). The Osprey's on Kangaroo Island occur across all coastal areas, where it nests in spring and summer on rocky faces, rock stacks, Islets, headlands or man made structures (Baxter 1995). The South Australian Osprey population is reported to be 43 pairs with an average of 9.5 pairs nesting on Kangaroo Island coasts (6-12 pairs) over the last 21 years (T. Dennis pers comm. February 2006).

Little research on the impact of human disturbance on Osprey breeding success has been published within Australia. It has been shown that Osprey's will nest successfully within close proximity to human activity as shown in Broome, Western Australia where an artificial platform is occupied along the "Town Beach" (WPMS 1997). There are also examples of artificial nesting sites erected in the centre of the towns of Grafton and Ballina in New South Whales that have being successfully utilized by ospreys. There have also being reports of them occasionally nesting on buildings (Spencer-Smith 2004).

A number of overseas studies have been undertaken which look at various human disturbance activities and their impact on Osprey's. These studies have a range of results with a wide range of management recommendations. It appears that the impact of different disturbance activities is dependent on the nature of the disturbance, the timing of the disturbance and the pre-existing level of disturbance within an area. Several studies show that human activities have impacted on the breeding success of Osprey's (Swenson 1979; D'Eon and Watt 1994; Richardson and Miller 1997). Human activities included extensive logging programs within close proximity to nest sites.

Van Daele and Van Daele (1982) indicate that Osprey pairs vary in their ability to tolerate human disturbance. Several studies suggest that the tolerance to human activities depends on the timing and frequency of activities and on the degree of habituation that the individual pairs develop to them (in Vana-Miller 1987). Human activities which are initiated during incubation and early nesting are probably most disturbing to Osprey, as when the birds leave the nest too frequently or for extended periods of time, the embryo's may die. Additionally, Ospreys which are initiating nesting in or near areas frequented by humans may be more tolerant of subsequent human activities than those unaccustomed to humans (Swenson 1979; Van Daele and Van Daele 1982).

D'Eon and Watt (1994) have recommended a range of zones where different levels of human activity (in their case, logging) can occur and not impact on the breeding success of Osprey's. A 200m buffer zone around the nest was recommended where no human activity could occur within the breeding season. An additional 600m buffer zone was recommended where only limited human activity could occur within the breeding season (D'Eon and Watt 1994). These buffer zones are related to logging which is considered to be a very noisy operation with large machinery being used continuously.

Rodgers and Schwikert (2002) undertook a study to determine the flush distance of a range of waterbird species, including Osprey's, to personal watercraft (jet ski) and outboard boats. They found that Osprey were flushed at an average distance of 49.5m using the personal watercraft. That is, the personal watercraft got to within 49.5m before the birds moved away. The outboard boat got to within 57.5m, on average, before the Osprey moved away. Rodgers and Schwikert (2002) recommend a buffer zone of 150m for both personal watercraft and outboard boats at foraging and loafing sites. The authors also suggest that this buffer should be adequate to protect nesting birds from these disturbances.

Trimper *et al* (1998) showed that nesting success in Ospreys was unaffected by jet overflights which generated a median noise level of 89 dBA (ranged 66.3 – 95.5) at nest sites and single noise events of between 90 and 121 dBA. However, the Osprey's did have a level of habituation to the jet noise prior to the study which would affect their reaction at the time of the study. It was shown that the Osprey detected the aircraft visually before the aircraft were visible (Trimper *et al* 1998) indicating that the visual aspects of disturbance are also important. Trimper *et al* (1998) also indicated that Osprey's reacted strongly (42 of 51 occasions) to humans entering and leaving their viewing blinds. These blinds ranged from 100 to 200 m from the nest sites. The overt behaviour diminished within 15 minutes (Trimper *et al* 1998).

No studies relating the impact of walking near an Osprey nest and nesting success could be found. The studies, which were found, related to quite obtrusive and loud activities (jet ski's, jet aircraft, logging). All activities detailed in the studies are considered to be louder and significantly more obtrusive to Osprey's compared to the proposed development. The relevant management recommendations from all studies was setting up buffer zones where certain activities should not be undertaken. Additional management recommendations focussed on particular disturbance activities, for example, leaving Osprey nest trees standing in a logging operation. The additional management recommendations were not considered to be relevant for the current project.

At the Hanson Bay site, a pair of Osprey's were observed along the coastline adjacent to the project area with a nest site approximately 1 km from the proposed development. The nest site is located on a stack adjacent to a coastal cliff area in the water. Due to the close proximity of the nest site to the proposed development, there is a possibility that the Osprey may be disturbed at certain phases during the construction process due to the noise and construction activity. However, the duration of the construction phase will be short and the majority of activities will not be noise creating, particularly at 1km from the development site.

The activity generating the most noise is likely to be the initial site clearance which will last approximately one week. After this activity, the loudest activity is likely to be the use of a nail gun and general construction noise (e.g. vehicles, tradesman talking, moving building materials around the site). It is thought that at more than one kilometre (ie at the nest site) from the construction site the noise levels generated from the development site will be low with the majority of noise being undetectable at the nest site.

The noise generated as a result of the site clearance should be kept to a minimum. All contractors and tradesman should undergo a brief training session to educate them in relation to the requirements for the Osprey.

Additionally, there will be no visual impact of the construction process at the nest site due the topography of the site and the location of the nest site, providing construction workers keep within the development site.

It is considered that the main impact on the Osprey, in the longer-term, is potentially as a result of disturbance by visitors to the proposed development. Visitors walking past or near the nest site (a current track exists along the top of the cliff adjacent to the nest site) have the potential to interrupt the pair. Abandonment of the nest site could occur if the disturbance occurred frequently during the breeding season, particularly during the incubation period.

Management of guests and staff at the proposed development is considered to be critical to minimising the impact on the Osprey. It is considered unlikely that guests will want to walk approximately 3.8km return distance over rough terrain along the cliff tops (distance from the suites to the Osprey nest). The majority of guests are likely to stay for short periods with most of their time sight-seeing the tourist destinations within the region.

To ensure the disturbance to the Osprey is kept to absolute minimum, a buffer of 250m should be outlined on the property where human activity is not allowed within the breeding season (July – February). The proponent does not have control over any activities undertaken on the water (e.g. boating), within the coastal reserve area (adjacent to the high tide mark) or from the adjoining private property (e.g. bushwalkers) and therefore cannot implement a 250m buffer zone in every direction. The buffer zone could only apply to the guests at the lodge where they would be educated, advised of the restrictions and signage would be implemented. The proponent would have no control over access to the Osprey nest by the general public. However, by implementing the education program and the buffer, the proponent can ensure that the level of human disturbance to the Ospreys is not significantly increased by the proposed development.

The buffer distance of 250m is based on the previous studies on Osprey (recommended buffers range from 150m for boats to 800m for some logging operations). It is considered that a 250m buffer is a conservative distance considering the type of disturbance which may occur adjacent to the buffer area (e.g. bush walking which has a very low noise and visual impact). Rodgers and Schwikert (2002) suggested a 150m buffer for personal watercraft and outboard boats which are significantly noisier and more disruptive than walking. An education program (including brochures, educational signs and staff training) is required to ensure all guests and staff are aware of the buffer requirements.

It is considered that, if the above management strategies are implemented appropriately, the proposed development is unlikely to have a long-term significant impact on the Osprey population on Kangaroo Island.

Hooded Plover (*Thinornis rubricollis*)

The Hooded Plover is listed as a migratory species under the *EPBC Act* 1999 and rated as "rare" under the South Australian *NPWSA Act* 1972. The Hooded Plover occurs across coastal beaches of southern Australia, on Kangaroo Island it is widespread across sandy beaches (Baxter 1995) with recent counts held by the Department for Environment and Heritage SA indicating Hooded Plover located on such popular beaches as Vivonne Bay, Pennington Bay, Stokes Bay, Hanson Bay and Emu Bay. At a number of these beaches, a high volume of human activity is present. This includes swimming, walking along the beach, launching of boats and fishing. At Hanson Bay (near the proposed development) a boat ramp is present as well as a section of the walking trail from the Kelly Hill Conservation Park visitor information area to Hanson Bay. This section of the walking trail is on the beach.

The Hooded Plover population on Kangaroo Island has remained relatively stable, between 160-180 birds recorded since 1985 (Dennis 2001). A pair of Hooded Plovers was present throughout late December and early January 2005 on the beaches immediately to the east of the proposed development with a prepared nest scrape found just above high water level on the beach nearest to proposed guest suites. A pair was again present in January 2006 on beaches but they had moved further to the east of the proposed development (approximately 1km from the proposed development). The nest scrape from the previous year was no longer present at the beach nearest to the proposed development in January 2006.

Hooded Plover numbers are declining across many parts of southern Australia, with a range of human activities having an impact on their numbers. These impacts range from direct human impacts such as the destroying habitat, nest scrapes, eggs and chicks (from vehicles and pedestrians) to increased indirect impacts such as the presence of pet dogs and predation from feral and native species. These impacts can lead to birds abandoning there nest sites which can attract potential predators of eggs and young chicks (Silver Gulls, Pacific Gulls, Australian Ravens, Heath Goannas, Brush-tailed Possums).

Hooded Plovers are extremely sensitive to the impacts of beach recreation, due to its long incubation and nesting periods (approximately 2 months), which increase its susceptibility to disturbance and subsequent breeding failure. While the impacts of human disturbance appear to be critical, most of these threats can be alleviated by changing human behaviour, such as keeping people and vehicles on hard sand areas during the breeding season and improving compliance with dog leashing laws.

Hooded Plovers occur at a number of beaches (on Kangaroo Island as well as other parts of Australia) which are frequented regularly by beach goers (swimmers, walkers) as well as by fisherman (boats as well as beach fisherman). At these beaches the number of Hooded Plovers is often higher than a single pair observed near the proposed development. Generally, the management of this species at other beaches is through the erection of informative signage indicating the presence of the species and details on strategies to minimise potential impacts. These include keeping to the hard sand areas during breeding season (both vehicle and pedestrian traffic), not disturbing nest scrapes and keeping pets (mainly dogs) on leashes during the breeding season.

Vehicle access to the beaches adjacent to the development site is not possible due to the rough terrain adjacent to the beach. Dogs will not be allowed in the proposed Lodge and therefore, two of the main threats to this species have been eliminated from the area. The main issue with the Hooded Plover and the proposed development is the possible impact of guests and staff using the beaches on which the Plovers occur and nest. To minimise the impacts that may occur to the Hooded Plovers on the beaches immediately to the east of the proposed development a number of management strategies should be implemented. Hooded Plovers breeding season occurs from September through to March, during this period repeated human disturbance can lead to the abandonment of nesting sites. Therefore, staff and guests should be educated about the species and should only use the hard sand areas during the breeding season.

Appropriate signage should be displayed along beaches to inform and educate staff and guests on the presence and significance of Hooded Plovers. These signs can inform staff and guests to walk on hard sand below the high water mark and not disturb nests sites where eggs and chicks may be present. Similar signage is currently being used by the Department for Environment and Heritage South Australia on the beaches around Kangaroo Island, such as those present at Vivonne Bay. Ongoing monitoring of the Hooded Plovers should also occur on a regular basis during construction and once the development has being completed to determine if there are ongoing impacts on the species within the area.

White-bellied Sea-Eagle (*Haliaeetus leucogaster*) and Peregrine Falcon (*Falco peregrinus*)

The White-bellied Sea Eagle is listed as a migratory species under the *EPBC Act* 1999 and rated as “vulnerable” under the State *NPWSA Act* 1972 while the Peregrine Falcon is rated as “rare” under the State *NPWSA Act* 1972. There is no known nests site within the immediate vicinity of the proposed development. Both these species are cliff nesters that are known to inhabit the cliffs of the southern coast of Flinders Chase National Park.

Observations of adult individuals of both species perched and flying in the vicinity of cliff tops indicates these species use the area as feeding territories. On several occasions in January 2006 single adults of both White bellied Sea Eagle and Peregrine Falcon were seen soaring with the latter apparently hunting as judged by reactions of other birds (up to about 1km inland over dense mallee). This behaviour was possibly partly influenced by strong onshore winds.

These two species are vulnerable to human activity resulting in failure of breeding attempts and permanent abandonment of nest sites. However, no nest sites have been located within close proximity to the project area and therefore possible impacts on the species are considered to be low. If, in the future, nest sites of either of these species are located within close proximity to the proposed development, staff and guests should avoid the areas surrounding the nest site with similar strategies to those recommended for the Osprey being implemented.

Southern Emu-Wren (*Stipiturus malachurus halmaturinus*)

The Southern Emu-wrens is a subspecies confined to Kangaroo Island and is more secure than other subspecies found on the mainland South Australia. The species has a state

rating of “rare” under the *NPWSA Act* 1972. Across Kangaroo Island they inhabit primarily coastal shrublands and coastal mallee shrublands. Baxter (1995) reports this subspecies to be widespread and a moderately common breeding resident to Kangaroo Island.

Emu-wrens were located at 15 sites in dense low *Melaleuca* or *Eucalyptus* habitat within 1.8km of low coastal habitat examined in 2005 and 10 sites in this habitat in 2006 despite strong windy conditions unsuitable for thorough searching. Some of the 2006 observations were at or near sites of previous sightings. The densest populations of this sub-species occur in the narrow belt of undisturbed dense cliff top vegetation (up to approximately 1m in height) along the south coast of Kangaroo Island. Large areas of this vegetation type are conserved in Flinders Chase National Park and Kelly Hill Conservation Park.

There is potential for the proposed development to have a localised impact on the Southern Emu-wren. It is likely that the construction process will result in birds within the immediate vicinity of the project site moving out of the area (into the adjacent large tract of native vegetation), however, after construction is complete they should move back into the area. A small loss in the area of available habitat for this species will occur as a result of the proposed development, however, this impact is not considered to be significant due to the presence of extensive areas of similar vegetation adjacent to the project area. Ongoing disturbance from the proposed development is likely to be minimal, but several management strategies should be implemented to ensure this occurs.

Walking tracks within the areas surrounding the proposed development should be kept to an absolute minimum, preferably avoided. The area is a fragile habitat, especially if informal paths are used where there is a tendency to wander. These paths not only remove or damage areas of vegetation but provide easier access to predators such as feral cats, goannas and avian predators which are considered to impact on Emu-wrens.

The proposed development also has the potential to increase or concentrate the feral cat population within the area. This would adversely affect the Southern Emu-wrens as cats would potentially predate heavily on this species. Therefore, an appropriate feral animal management plan should be implemented to manage this issue.

Western Whipbird (*Psophodes nigrogularis lashmari*)

The Kangaroo Island population of the Western Whipbird is considered to be a separate subspecies to the mainland species. The Western Whipbird has a state rating of “rare” under the *NPWS Act* 1972. They most commonly occur in coastal and sub-coastal mallee from Cape Borda south to Cape du Couedic and east to Cape Willoughby, Baxter (1995) also reports of them being reasonably common across the inland of the Island.

This extremely secretive bird was mainly detected by its loud territorial calls along the survey transects. This species prefers habitat in very dense vegetation such as low mallee over limestone (as shown by observations in January 2006), elsewhere Western Whipbirds also occupied the densest patches of low coastal shrubland and one was seen under low *Melaleuca*.

Walking tracks within the areas surrounding the proposed development should be kept to an absolute minimum, preferably avoided. The area is a fragile habitat, especially if

informal paths are used where there is a tendency to wander. These paths not only remove or damage areas of vegetation but provide easier access to predators such as feral cats, goannas and avian predators which are considered to impact on Western Whipbirds.

Any removal of habitat of these areas for the proposed development may result in a reduction in available habitat for the species. However, this is considered to be minimal due to the large areas of similar vegetation and habitat conserved within the vicinity of the project area.

The proposed development also has the potential to increase or concentrate the feral cat population within the area. This would adversely affect the Western Whipbirds as cats would potentially predate heavily on this species. Therefore, an appropriate feral animal management plan should be implemented to manage this issue.

It is considered that the proposed development is unlikely to have a significant long-term impact on the Western Whipbird.

Bassian Thrush (*Zoothera lunulata*)

The Bassian Thrush has a state rating of "rare" under the *NPWS Act* 1972. This unobtrusive ground foraging species was found in January 2005 at three sites in dense mallee over limestone along the access track, and is also likely to occur in the taller mallee-dune habitat. While not observed in 2006 this is likely to reflect its infrequent calling and cryptic behaviour rather than absence.

It is widespread on Kangaroo Island in a variety of dense and usually moist habitats. The possible impacts from the proposed development on this species include a reduction in area of available habitat and an increase predator presence and access associated with dwellings and fragmentation of dense habitat by roads and tracks.

Any removal of habitat of these areas for the proposed development may result in a reduction in available habitat for the species. However, this is considered to be minimal due to the large areas of similar vegetation and habitat conserved within the vicinity of the project area.

The proposed development also has the potential to increase or concentrate the feral cat population within the area. This would adversely affect the Bassian Thrush as cats would potentially predate heavily on this species. Therefore, an appropriate feral animal management plan should be implemented to manage this issue.

It is considered that the proposed development is unlikely to have a significant long-term impact on the Bassian Thrush.

Beautiful Firetail (*Stagonopleura bella*)

The Beautiful Firetail has a state rating of "rare" under the *NPWS Act* 1972. The Kangaroo Island population remains moderately common compared with areas of the mainland (Baxter 1995).

At least three individuals were seen in 2005 and one in 2006. This species is widespread in small numbers across Kangaroo Island in a variety habitat, usually low and densely vegetated.

Any removal of habitat of these areas for the proposed development may result in a reduction in available habitat for the species. However, this is considered to be minimal due to the large areas of similar vegetation and habitat conserved within the vicinity of the project area. Additionally, this species is considered to be sparsely distributed across various habitats.

It is considered that the proposed development is unlikely to have a significant long-term impact on the Beautiful Firetail.

Rock Parrot (*Neophema petrophila*)

The Rock Parrot has a state rating of "rare" under the *NPWS Act* 1972. This small parrot is entirely coastal in its distribution, breeding on islands in the York and Eyre Peninsula regions and dispersing to nearby areas. It is not known to breed on Kangaroo Island where the numbers, distribution and requirements of the population are poorly known. Up to about six were seen briefly several times in low coastal shrubland or moving along the coast in January 2005 and a single bird was seen in 2006. Intact littoral zone vegetation and low coastal shrubland may be required for continued presence of this species feeding in this area.

The amount of preferred habitat to be removed with the proposed project is considered to be minimal due to the small size of the impact area in comparison to the large areas of similar vegetation and habitat conserved within the vicinity of the project area. It is considered that the proposed development is unlikely to have a significant long-term impact on the Rock Parrot.

Painted Button-quail (*Turnix varia*)

The Painted Button-quail has a state rating of "rare" under the *NPWS Act* 1972. While no individuals of this species were seen, clear evidence of their presence was found in January 2006 in dense mallee/limestone habitat, in the form of feeding scrapes, many small (~15cm) round bare patches of soil exposed in the leaf litter as this species feeds using a circular motion while scratching with its feet. This cryptic ground dwelling and nesting species is easily overlooked in dense habitats. Populations, movements and requirements of this species are not well known however fragmentation and reduction of *Eucalyptus* habitats with generally dense intact litter and understorey will not be beneficial and will allow easier access to predators of ground dwelling birds such as feral cats.

Any removal of habitat of these areas for the proposed development may result in a reduction in available habitat for the species. However, this is considered to be minimal due to the large areas of similar vegetation and habitat conserved within the vicinity of the project area.

The proposed development also has the potential to increase or concentrate the feral cat population within the area. This would adversely affect the Painted Button-quail as cats would potentially predate heavily on this species due to its ground-dwelling nature. Therefore, an appropriate feral animal management plan should be implemented to manage this issue.

It is considered that the proposed development is unlikely to have a significant long-term impact on the Painted Button-quail.

Glossy Black Cockatoo (*Calyptorhynchus lathami*)

The Glossy Black Cockatoo is rated as "endangered" under the *EPBC Act* 1999 and also has a rating of "endangered" under the South Australian *NPWS Act* 1972. The main type of habitat this endangered species requires is drooping sheoak (*Allocasuarina verticillata*) woodlands for foraging and large hollows in eucalypts species such as sugar gum and blue gum. These habitats are not present at the proposed development site or within close proximity to the development site, making it unlikely that this species would utilise the proposed development area accept possibly for the occasional individual passing through the area. The proposed development will not have an adverse effect on the population of Glossy Black Cockatoo occurring on Kangaroo Island.

4.5 Likely impacts from Feral Animals

As previously described the House Mouse and the Feral Cat were both observed across the proposed development area. Both species can become a threat to the biodiversity of an environment especially the Feral Cat. Feral Cats feed on a range of different native species from reptiles, small mammals to birds. Any increased population of Feral Cats to the area will increase the pressure on the native species especially a number of threatened bird species such as the Southern Emu-wren, Western Whip-bird, Bassian Thrush and Painted Button-quail.

To reduce the likely impacts that feral animals may have on local native species surrounding the proposed development a feral animal management plan should be developed. This would include the implementation of a number of management strategies including waste management and feral animal control.

All food scraps and rubbish from the proposed development should be stored in an area so no feral animals can gain access to waste. Staff and guests should be educated on the importance of not littering especially disposing of food scraps into the native vegetation which increases the available food source for feral animals. Staff (before and after construction) or guests should not be allowed to have pets (cats or dogs) stay at the development. A feral animal eradication program should be implemented, potentially involving the adjoining properties. This could start with baiting and trapping of feral cats.

4.6 Other potential Impacts

Feeding of Native Animal

Staff and guests from the proposed development may want to feed native animals that occur across the project area. This can be done by people hand feeding native animals or

by leaving food scraps and litter around for native animals to feed on. The potential is for some native animals (e.g. Common Brush-tail Possum and Heath Goanna) becoming more dependant on non-native food sources. Staff and guests should be educated and informed through signage, brochures, information packs and verbal communication on the impacts to the environment which are caused by the feeding of native animals or littering in a natural environment. An appropriate management plan addressing these issues that may occur should be developed.

Roads/Access Tracks - Potential Fauna Deaths and Potential Fauna Barriers

The proposed development has currently one access track which leads to the building site. Access roads and track can create potential for fauna deaths as is commonly seen on many of Kangaroo Island roads. To minimise the risk of fauna deaths occurring along the access track a number of management strategies should be adopted. Lowering the speed limit would give staff, constructions workers and guests a greater chance of avoiding fauna. Signage along the access track informing people of the presence of native animals and to drive carefully should also be used to reduce the risk to native fauna deaths.It is unlikely the access track will act as a potential barrier for native animals moving between habitats. The access track is approximately 4 meters wide with the developers planning on widening the track to between 4 and 5 meters, increasing the width only marginally. Therefore, it is unlikely that the upgrade of the access track will reduce the range or movements of small foraging birds or other native animals that may occur in the area.

Night and Noise Pollution

During the construction stage of the proposed development machinery and construction work will create some noise population. The short-term effect of this work may lead to the movement of some fauna and bird species from the area. However it is unlikely to impact on the fauna and bird species in the long term as it would be expected that these species will return once the construction stage is complete. It is important to consider the timing of construction, as not to impact on the breeding seasons of bird species of conservation significance.

During night time the proposed development will produce artificial light which may impact on some species that occur within the area. Many of the mammals which occur across the area are most active during the night, light associated with building facilities and car parks may discourage these species from entering into these lit areas. However it may also encourage some species to use these lit areas as a source of capturing insects and other small invertebrate that may be attracted to the light. The amount of artificial light produced from the development is unlikely to have a significant impact on any species occurring at with in the area/

Edge Effects and Habitat Fragmentation

The proposed development will require some removal of native vegetation for buildings, access tracks, car parks and walking tracks. Any removal of habitat of these areas for the proposed development may result in a reduction in available habitats for the animals. However, this is considered to be minimal due to the large areas of similar vegetation and habitat conserved within the vicinity of the project area.

Glass Windows (Bird Strike)

It is unlikely a substantial number of bird strikes will occur from the Glass windows associated with the proposed development. The height of the windows is around 2 metres along the southern end of the proposed Lodge. A number of the birds that inhabit the area (eg Southern Emu-Wren) forage from shrub to shrub or across the ground amongst the dense litter understorey. It would be unlikely these species of birds would strike the windows due to the nature of their movements. Other significant species in the area, such as the Osprey and White-bellied Sea-eagle are unlikely to fly low enough over the development area to hit any of the windows.

5. Recommendation

The following recommendations have been developed to gain a better understanding of the fauna species likely to be impacted upon by the proposed development and also to reduce the impact of the proposed development on the fauna species occurring within the proposed project area. The recommendations are:

Construction Phase

- Staff working during the construction period should be provided training on appropriate practices for working within this environment. An appropriately qualified person should be involve in the supervision of the construction activities to ensure the minimum impact on the environment is achieved.

- A 250m buffer zone should be established (within the property) around the Osprey nest and be deemed a no-go zone for all staff and construction works.

- On-ground works should be regularly audited by an appropriately qualified environment officer, to minimise the risk to the environment.

- During the vegetation clearance required for the project, fauna fleeing the site should be captured and relocated to adjacent suitable habitat by a suitably qualified person;

- Disturbance due to the noise generated when undertaking the site clearance could be minimised by undertaking this activity outside of the breeding season for the majority of fauna species.

- Any trenches and holes left open for more than a few hours should be inspected for trapped fauna first thing in the morning and again late in the afternoon. Any trapped fauna should be caught and released into the nearby habitat. This will help reduce the impact of the project on the local fauna species;

- Movement of soil onto the site and around the site should be avoided, in order to minimise the spread of weeds and/or soil borne diseases.

- A designated wash down bay should be established before entering on the site to enable all vehicles to be properly quarantined from soil borne diseases and seeds from weed species.

- Stockpiles of materials and any associated infrastructure (e.g. tracks) should be placed in cleared land where no native vegetation will be impacted upon, thus reducing the impact on native flora and minimising the destruction of fauna habitat.

- All machinery and vehicles should not be parked or stored underneath the drip-line of trees or within areas containing native vegetation.

- Water run-off that contains a high silt content should be filtered (by the use of silt fences or straw bales) before it drains from the site. This will ensure that the water quality is not affected in any way.

Operational Phase

- Education of staff and guests on the local environment through brochures, general training, information packs and workshops should be used as a tool in managing people within this environment.

- A 250m buffer (within the property) should be implemented with no human activity occurring within this area, particularly during the breeding season.

- Signage should be installed as discussed for the Osprey and Hooded Plover to educate staff and guests.

- Strict policies should be adopted by the developers on managing of food waste, staff and guests feeding native animals or littering within the area and walking trails.

- On-going monitor of the level of impacts the development may be having on the local environment.

An appropriate mitigation method should be implemented as part of the project. This could include one or more of the following mitigation options to offset the impact of any vegetation clearance required;

- Prepare and implement a revegetation plan, which utilises local indigenous plant species grown from seed which has been locally collected (i.e. within a 5km radius of the site);
- Investigate the option of placing part or all of the area surrounding the proposed development under a Heritage Agreement, or
- Making a nominated payment to the Native Vegetation Fund.

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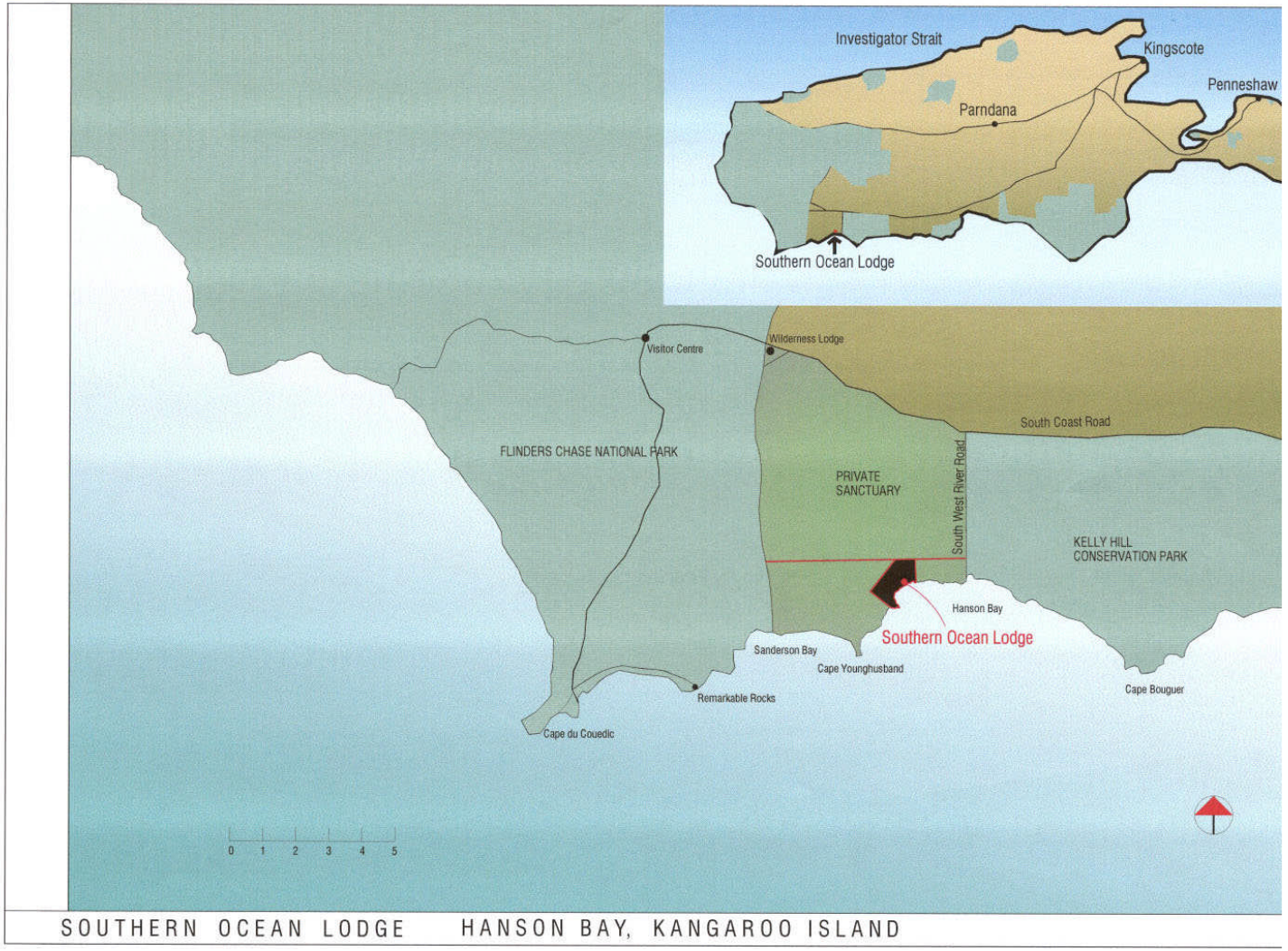
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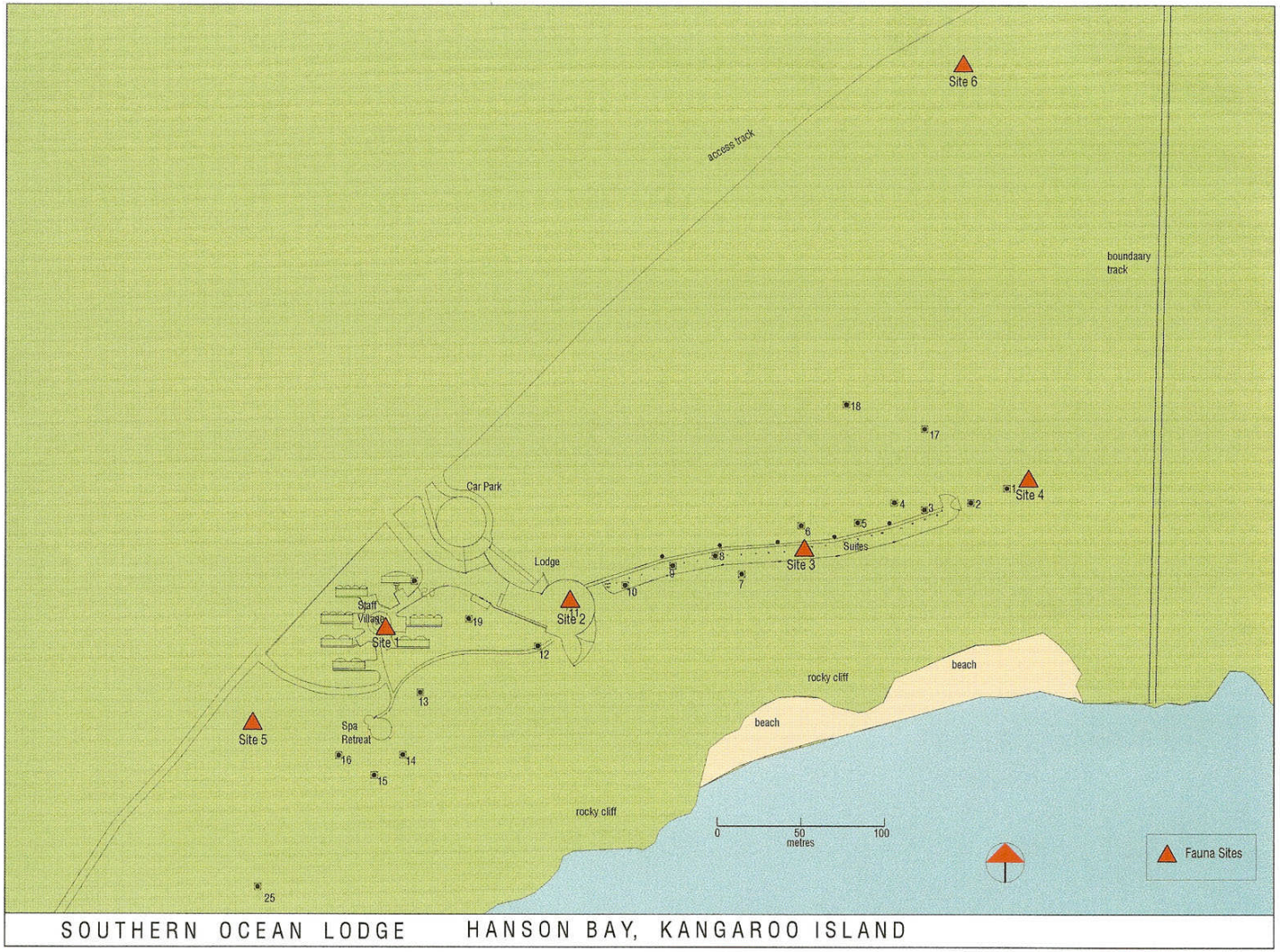
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7. Appendix

7.1 Proposed location of "Southern Ocean Lodge" on Kangaroo Island



7.2 Location of Fauna Survey Sites across the Proposed Development



7.3 All species (excluding birds) recorded during the Fauna Survey across the proposed development area.

Class	Species Name	Common Name	No. observed
Mammalia	*Cercartetus concinnus*	Western Pygmy Possum	2
Mammalia	*Cercartetus lepidus*	Little Pygmy Possum	3
Mammalia	*Felis catus**	Feral Cat	1
Mammalia	*Macropus eugenii*	Tammar Wallaby	8
Mammalia	*Mus musculus*	House Mouse	14
Mammalia	*Rattus fuscipes*	Bush Rat	53
Mammalia	*Tachyglossus auculeatus*	Short-beaked Echidna	2
Mammalia	*Trichosurus vulpecula*	Common Brushtail Possum	19
Reptilia	*Aprasia striolata*	Lined Worn-lizard	1
Reptilia	*Bassiana duperreyi*	Eastern Three-lined Skink	5
Reptilia	*Christinus marmoratus*	Marbled Gecko	1
Reptilia	*Egernia whitii*	White's Skink	13
Reptilia	*Hemiergis peronii*	Four-toed Earless Skink	12
Reptilia	*Lerista bougainvillii*	Bougainville's Skink	3
Reptilia	*Nephrurus milii*	Barking Gecko	1
Reptilia	*Notechis ater*	Tiger Snake	2
Reptilia	*Varanus rosenbergi*	Heath Goanna	7
Amphibia	*Limnodynastes dumerili*	Bull Frog	2

7.4 Bird Species recorded and Average Density per Hectare along each Transect for 2005 and 2006 surveys.

Transect 1		
Scientific Name	**Common Name**	**Average Density per Ha. 05/06**
Lichenostomus cratitus	Purple-gaped Honeyeater	2.6
Zosterops lateralis	Silvereye	1.8
Sericornis frontalis	White-browed (Spotted) Scrubwren	1.6
Melithreptus brevirostris	Brown headed Honeyeater	0.7
Phylidonyris novaeholandiae	New Holland Honeyeater	0.6
Malurus cyaneus	Superb Fairy-wren	0.45
Anthochaera carunculata	Red Wattlebird	0.4
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	0.4
Pardalotus striatus	Striated Pardalote	0.35
Trichoglossus haematodus	Rainbow Lorikeet	0.35
Platycercus elegans	Crimson Rosella	0.3
Psophodes nigrogularis lashmari	Western Whipbird	0.3
Pachycephala pectoralis	Golden Whistler	0.25
Acanthiza pusilla	Brown Thornbill	0.2
Acanthiza lineata	Striated Thornbill	0.2
Zoothera lunulata	Bassian Thrush	0.15
Strepera versicolor	Grey Currawong	0.15
Neophema elegans	Elegant Parrot	0.1
Pardalotus punctatus	Spotted (Yellow-rumped) Pardalote	0.1
Colluricincla harmonica	Grey Shrike-thrush	0.1
Hirundo neoxena	Welcome Swallow	0.1
Phylidonyris pyrrhoptera	Crescent Honeyeater	0.05
Petrochelidon nigricans	Tree Martin	0.05
Phaps elegans	Brush Bronzewing	0.05
Staganopleura bella	Beautiful Firetail	0.05
Acanthorhynchus tenuirostris	Eastern Spinebill	0.05
Neophema elegans	Elegant Parrot	0.05
Falco peregrinus	Peregrine Falcon	0.05
Stipiturus malachurus halmaturinus	Southern Emu-wren	X
Gliciphila melanops	Tawny-crowned Honeyeater	X
Corvus coronoides	Australian Raven	X
Turnix varia	Painted Button-Quail	X
Haliaeetus leucogaster	White bellied Sea-eagle	X
Gymnorhina tibicen	Australian Magpie	X
Chrysococcyx lucidus	Shining Bronze Cuckoo	*
Cacomantis flabelliformis	Fantailed Cuckoo	*
Rhipidura albiscapa	Grey Fantail	*

*Notes: X = present observed in this habitat outside transect count, * = not observed but likely to occur in this habitat.*

Transect 2		
Scientific Name	**Common Name**	**Average Density per Ha. 05/06**
Zosterops lateralis	Silvereye	5.2
Sericornis frontalis	White-browed (Spotted) Scrubwren	1.1
Stipiturus malachurus halmaturinus	Southern Emu-wren	0.8
Pardalotus striatus	Striated Pardalote	0.6
Petrochelidon nigricans	Tree Martin	0.55
Phylidonyris novaeholandiae	New Holland Honeyeater	0.5
Malurus cyaneus	Superb Fairy-wren	0.45
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	0.4
Hirundo neoxena	Welcome Swallow	0.2
Acanthiza pusilla	Brown Thornbill	0.2
Falco cenchroides	Nankeen Kestrel	0.15
Lichenostomus cratitus	Purple-gaped Honeyeater	0.1
Neophema petrophila	Rock Parrot	0.05
Gliciphila melanops	Tawny-crowned Honeyeater	0.05
Staganopleura bella	Beautiful Firetail	0.05
Corvus coronoides	Australian Raven	0.05
Accipiter cirrhocephalus	Collared Sparrowhawk	0.05
Pardalotus punctatus	Spotted (Yellow-rumped) Pardalote	X
Falco peregrinus	Peregrine Falcon	X
Phaps elegans	Brush Bronzewing	X
Gymnorhina tibicen	Australian Magpie	X
Strepera versicolor	Grey Currawong	X
Pandion haliaetus	Osprey	X
Haliaeetus leucogaster	White bellied Sea-eagle	X
Psophodes nigrogularis lashmari	Western Whipbird	*
Colluricincla harmonica	Grey Shrike-thrush	*
Anthochaera carunculata	Red Wattlebird	*
Melithreptus brevirostris	Brown headed Honeyeater	*
Phylidonyris pyrrhoptera	Crescent Honeyeater	*

*Notes: X = present observed in this habitat outside transect count, * = not observed but likely to occur in this habitat*

Transect 3		
Scientific Name	**Common Name**	**Average Density per Ha 05/06**
Zosterops lateralis	Silvereye	7.3
Pardalotus striatus	Striated Pardalote	1.7
Sericornis frontalis	White-browed (Spotted) Scrubwren	1.5
Phylidonyris novaeholandiae	New Holland Honeyeater	1.4
Stipiturus malachurus halmaturinus	Southern Emu-wren	0.75
Lichenostomus cratitus	Purple-gaped Honeyeater	0.55
Pardalotus punctatus	Spotted (Yellow-rumped) Pardalote	0.45
Acanthiza pusilla	Brown Thornbill	0.45
Malurus cyaneus	Superb Fairy-wren	0.45
Petrochelidon nigricans	Tree Martin	0.35
Platycercus elegans	Crimson Rosella	0.25
Hirundo neoxena	Welcome Swallow	0.2
Neophema elegans	Elegant Parrot	0.2
Phylidonyris pyrrhoptera	Crescent Honeyeater	0.15
Corvus coronoides	Australian Raven	0.1
Neophema petrophila	Rock Parrot	0.1
Falco cenchroides	Nankeen Kestrel	0.05
Phaps elegans	Brush Bronzewing	0.05
Gymnorhina tibicen	Australian Magpie	0.05
Staganopleura bella	Beautiful Firetail	0.05
Accipiter cirrhocephalus	Collared Sparrowhawk	0.05
Anthochaera carunculata	Red Wattlebird	0.05
Melithreptus brevirostris	Brown headed Honeyeater	0.05
Psophodes nigrogularis lashmari	Western Whipbird	0.05
Pachycephala pectoralis	Golden Whistler	0.05
Strepera versicolor	Grey Currawong	0.05
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	X
Trichoglossus haematodus	Rainbow Lorikeet	X
Alectura lathami	Australian Brush Turkey	X
Haliaeetus leucogaster	White bellied Sea-eagle	X
Falco peregrinus	Peregrine Falcon	*
Colluricincla harmonica	Grey Shrike-thrush	*
Zoothera lunulata	Bassian Thrush	*
Turnix varia	Painted Button-Quail	*
Acanthorhynchus tenuirostris	Eastern Spinebill	*
Gliciphila melanops	Tawny-crowned Honeyeater	*

*Notes: X = present observed in this habitat outside transect count, * = not observed but likely to occur in this habitat*

Appendix J

Planning analysis

Development plan

The proposed development is situated at Hanson Bay, on the south-west coast of Kangaroo Island, South Australia. The proposed development is located within the Coastal Landscape Zone as depicted in the Kangaroo Island Development Plan, consolidated 7 August 2003.

In determining the merits or otherwise of the proposal, the provisions of the Development Plan have been considered as they apply generally throughout the Kangaroo Island Council area and more specifically the Coastal Landscape Zone.

The development is not listed as a complying or a non-complying development in the Coastal Landscape Zone; therefore the development should be assessed on merit. This merit based analysis suggests that the proposed development is not at variance with Objectives and Principles outlined by the Kangaroo Island Development Plan.

Economic

General Provisions

Objective 1: To identify and provide sustainable economic development opportunities based on existing resources, while maintaining the viability of all industries; as well as identifying opportunities for further innovation.

Objective 2: To encourage value adding of existing agricultural and natural products and activities.

Objective 3: To encourage investment and development of new ventures which complement the environmental and community aims and objectives for Kangaroo Island.

Objective 4: To achieve and maintain an economically viable and ecologically sustainable tourism industry on Kangaroo Island by positioning it as one of Australia's most pre-eminent nature based destinations.

Objective 17: Orderly and economic development.

PDC 2 Development should be orderly and economic.

Comment:

The proposed Southern Ocean Lodge development provides a sustainable economic development opportunity based on marketing of the natural resources of Kangaroo Island. The development will create 20-30 new jobs for the local area and increase the awareness and market positioning of Kangaroo Island.

Other areas in Australia well known as tourist destinations for nature and wildlife experiences (e.g. Tasmania, Great Barrier Reef, Central Australia) have very high quality, icon tourism accommodation, designed specifically for their unique sites. Southern Ocean Lodge will become the icon tourist Lodge for Kangaroo Island and the state. Catering for the rapidly expanding premium experiential tourism markets from the UK, Europe and the USA, at present not adequately catered for in this state. Therefore, the proposed development will diversify tourism activities on Kangaroo Island.

The proposed development will complement the environmental and community aims and objectives for Kangaroo Island outlined by the South Australian Government in the Planning Strategy for Regional South Australia, the South Australian Tourism Plan and the Responsible Nature based Tourism Strategy (a joint initiative of the SA Tourism Commission and the Department of Environment and Heritage).

The proposed Southern Ocean Lodge Development will fill this gap for regional medium scale accommodation in an economically viable way with ecologically sustainable tourism principles considered during every aspect of the project from design to operation.

Section 7.2 of this report outlines how the proposed development aligns with the Planning Strategy for Regional South Australia.

The concept, design and operation of Southern Ocean Lodge will be an example of premium nature based tourism. This will in turn flow on to Kangaroo Island being marketed as one of Australia's most pre-eminent nature based destinations.

Environmental

General Provisions

Objective 5: Kangaroo Island should aim to:

(a) To manage the natural environment to maintain biodiversity
(b) To conserve and enhance the cultural environment
(c) To ensure the efficient and sustainable use of water resources and maintenance of water quality.
(d) To encourage the building of energy efficient dwellings that utilise passive energy design end reduce the energy requirements of the Island.
(e) To ensure sustainable land use practices.
(f) To ensure the building of fire resistant dwellings in a fire prone environment.

Objective 6: To maintain existing townships as the primary areas of urban development, with development outside townships being in either designated development zones or on a limited and controlled basis.

Objective 7: To encourage the rehabilitation, restoration and monitoring of degraded or badly managed land and habitats of threatened species.

Objective 8: To encourage, in order of preference, waste avoidance, reduction, reuse and recycling, and safe treatment and disposal.

Objective 9: To manage visitor impacts to ensure visitor impacts do not degrade the natural and cultural environment.

Objective 10: To maintain and protect the spectacular coastal scenery, vistas and scenic outlooks and surrounding marine areas.

Specific Provisions

Objective 57: The conservation, preservation, or enhancement, of scenically attractive areas, including land adjoining water or scenic routes.

Objective 58: Development should ensure the protection of the Island's unique and endemic flora and fauna. Particular regard must be given to threatened and endangered species and their habitat, including the Glossy Black Cockatoo.

Objective 62: The retention of environmentally significant areas of native vegetation.

Objective 63: The retention of native vegetation where clearance is likely to lead to problems of soil erosion, soil slip and soil salinisation, flooding, or a deterioration in the quality of surface waters.

Objective 64: The retention of native vegetation, particularly areas containing threatened plant species or communities for amenity purposes, for livestock shade and shelter, and for the movement of native wildlife.

Objective 65: The protection of fragile coastal area, including native vegetation, scenic landscapes and geological features, from degradation by human activity and potentially damaging development.

PDC 183 Development should be undertaken with the minimum effect on natural features, significant stands of native vegetation, land adjoining water, scenic routes or scenically attractive areas.

PDC 186 Development liable to cause soil erosion or contribute to the silting of any watercourse should not be undertaken.

PDC 188 Development likely to degrade any area of historic, scientific or cultural value or any natural resource of significance, including drainage systems, water catchment areas, mangrove or samphire wetlands, native vegetation, heritage sites, fauna habitats and areas of scenic beauty, should not be undertaken.

PDC 189 Development should incorporate actions to enhance the value of historic, scientific, cultural or natural resources of significance, such as revegetation of wildlife corridors and watercourses.

PDC 191 Power and telephone lines should be located so as to preserve roadside vegetation and placed wherever practicable along the inside of fences.

PDC 193 Trees of historical or local significance and single trees or groups of trees of particular visual significance, should be preserved and protected against disfigurement. If it is necessary to fell these trees, replanting should proceed.

PDC 195 Native vegetation should not be cleared if it:

(a) provides important habitat for wildlife;
(b) has a high plant species diversity or has rare or threatened plant species and plant associations;
(c) has high amenity value;
(d) contributes to the landscape quality of an area;
(e) has high value as a remnant of vegetation associations characteristic of a district or region prior to extensive clearance for agriculture;
(f) is associated with sites of scientific, archaeological, historic, or cultural significance; or
(g) is growing in, or is characteristically associated with, a wetland environment.

PDC 196 Native vegetation should not be cleared if such clearance is likely to:

(a) create or contribute to soil erosion;
(b) decrease soil stability and initiate soil slip;
(c) create, or contribute to, a local or regional soil salinity problem;
(d) lead to the deterioration in the quality of surface waters; or
(e) create or exacerbate the incidence or intensity of local or regional flooding.

PDC 200 Development should not be undertaken where any wastes produced are likely to contribute to the pollution of surface or underground water resources, or present a risk to health.

PDC 203 Development liable to degrade the natural qualities of the landscape or to cause adverse environmental impacts should not be undertaken.

PDC 204 Buildings should not be erected where they would require substantial earthworks which would be prominently visible from adjoining areas, or be susceptible to erosion.

PDC 205 Development, including flood, erosion and wave protection measures, should not adversely affect the ecology and stability of coastal areas, and riverine areas, the seabed or coastal waters and other environmentally sensitive features by pollution, significant loss of habitat, interference with coastal or riverine processes or any other means.

PDC 206 Development should not be located in delicate or environmentally-sensitive coastal or river/stream features such as sand dunes, wetlands or important remnants of native vegetation.

PDC 207 Development should not be undertaken where it will create or aggravate coastal or river bank erosion, or where it will require protection works that cause or aggravate erosion.

PDC 208 Development should not, nor be likely in the future to, adversely affect the ecology and stability of environmentally sensitive coastal features.

PDC 210 Development should be designed for solid or fluid wastes and stormwater run-off to be disposed of so that it will not cause pollution or other detrimental impacts on the marine, on-shore environment of coastal areas and river systems.

PDC 211 Effluent disposal systems incorporating soakage trenches or a similar system should be located not less than 100 metres or greater where it is necessary to avoid effluent migration onto the intertidal zone, the 100 metres to be measured from:

(a) the mean high water mark at spring tide adjusted for any subsidence for the first 50 years of development plus a sea level rise of one metre; or

(b) the nearest boundary of any erosion buffer determined in accordance with the relevant principle of development control in this Development Plan.

PDC 212 Development should preserve natural drainage systems and should not significantly increase or decrease the volume of water flowing to the sea. Where necessary it should incorporate stormwater management schemes including:

(a) onsite harvesting of water and land based disposal systems;
(b) retention basins to facilitate settlement of pollutants and to regulate water flow; and
(c) infiltration.

Coastal Landscape Zone

PDC 5 Development of land should not prejudice the landscape quality and natural bushland of the zone.

PDC 6 Clearance of native vegetation should not occur.

PDC 7 In locations where public access is necessary in sensitive locations, the construction of walkways and appropriate fencing should be provided to effectively control access.

PDC 8 Development should not be undertaken on coastal dune systems, tidal wetlands, man groves, sand dunes or other environmentally sensitive areas.

Comment:

In order to manage the natural environment and maintain biodiversity an ecological report and field investigations have been conducted (refer Section 6). These reports establish what flora and fauna exists at the site and how the development may impact on the areas biodiversity.

The proposed development has been sited in an area where a sand 'blow-out' has occurred reducing the level of vegetation clearance required by the development. The owners are also seeking to place the site under a Heritage Agreement, preventing any vegetation clearance and further protecting the areas biodiversity.

The proposed development is outside an urban development zone but will be developed in an orderly and controlled way using existing roads and tracks and limiting the projects demand on external water and power supplies. The proposed development will include the following sustainable land practices:

- Water harvested and reused
- Building material and construction (light weight or natural) will minimise construction impact
- Organic waste will be composted on site for the productive garden
- Hard waste will be separated for collection and delivery to appropriate facilities off site.

Therefore, waste avoidance, reduction, reuse and recycling, and safe treatment and disposal will be encouraged during both construction and operation.

The proposed developments design has considered fire protection because of its siting in a fire prone area. The building has been designed with fire resistant materials whilst water hoses, sprinklers, pumps will provide active protection. Refer to Section 17 for an outline of fire management for the proposed development.

Visitor impacts will be limited on the project site with guest movements being confined to designated paths and/ or where appropriate only with guided tours.

The design incorporates a low profile (single storey) and follows the contours of the land in order to protect the spectacular coastal scenery, vistas and scenic outlooks of the area surrounding the proposed development. The building has been set below the ridge line with the colours muted and dark to blend with the existing environment.

Community

General Provisions

Objective 11: To encourage regional economic initiatives which broaden the employment base of rural areas and provide opportunities for employment.

Objective 12: To create employment opportunities for the local population, particularly for post school aged persons.

Objective 14: To preserve the natural and cultural heritage and amenity enjoyed by local residents and visitors to the Island.

Objective 15: To upgrade and expand community services and infrastructure, including health, education, public transport, sport and recreation, arts and culture.

Comment:

The proposed development will diversify the tourism industry on Kangaroo Island to include a premium nature based tourism development. The development will also provide direct employment opportunities for 20 people (including local wildlife experts and guides) and substantial indirect employment in the areas of maintenance, laundry and external guided tours as well as Kangaroo Island products and produce. The guests' restaurant will showcase Kangaroo Island products so as well as direct sales it will help promote further growth of these unique Kangaroo Island industries.

The island provides a stable recruitment base for staff reducing the high staff turnover rates of many tourist developments. Island residents will be employed and trained as appropriate. The staff village will provide quality on site accommodation to allow selected local staff to partially live on site to minimise travelling at inconvenient times.

The Development also provides a base for additional studies, researching flora and fauna of the area and providing an outlet for experts to educate guests and the community.

The preservation of the natural and cultural heritage of the project area as well as preservation of the areas amenity for local residences and visitors is an important priority for the project. As part of this report both the environment and cultural heritage have been investigated (see Sections 6 and 8). The proposed development has also been designed to limit its effect on visual amenity through the use of materials and siting the buildings below the ridge line.

Form of development

General Provisions

PDC 3 New housing, holiday accommodation and other urban development should:

(a) form a compact and continuous extension of an existing built-up area;
(b) be located so as to achieve economy in the provision of public services; and
(c) create a safe, convenient and pleasant environment in which to live.
(d) be designed to promote energy and water conservation.
(e) not result in the clearance of valuable native vegetation or impact on any Conservation Zone.

PDC 4 Development which is likely to be affected adversely by flooding should not take place where:

(a) there is a significant risk of flooding or aggravation of flooding of other land; or
(b) proposed flood protection measures, e.g., land fill, levees, will increase the risk of flooding or aggravation of flooding of other land; or
(c) there is a likelihood that life or property would be at risk in the event of a 1 in 100 year return period.

Comment:

There will be a minimal requirement for the provision of public services as existing roads and tracks will be used for access, water harvesting will supply water to the site and diesel generators will be used to power the site.

The proposed development will not be affected by flooding as the development will be on cliffs, 100 metres from the high water mark.

Appearance of land and buildings

General Provisions

Objective 28: The amenity of localities not impaired by the appearance of land, buildings and objects.

PDC 5 The appearance of land, buildings and objects should not impair the amenity of the locality in which they are situated.

PDC 6 Buildings and other structures should be of a high standard of design with particular emphasis on the external appearance and siting of buildings so as to blend with, preserve and enhance the character and amenity of the locality.

PDC 7 Buildings and car parking areas should be setback from boundaries, public roads and the coastal reserve and be sited so as not to be obtrusive or obstruct significant views.

PDC 8 Buildings should be sited below ridgetops or prominent points, set well back from watercourses, located to avoid vegetation clearance and landscaped to reduce visual impact. Specifically, the siting, design and construction should not impair the views from vantage points such as the sea, headlands, ridgelines and scenic routes.

PDC 9 Development should be landscaped to enhance the appearance of buildings, to screen service, loading, utility and storage areas, to introduce shade into car parking areas and to contribute towards an aesthetically pleasing environment complementary to the natural character of the locality. Where landscaping is implemented regard should be given to bushfire management. Landscaping should not be intense so as to conflict with policies to maintain fire safety.

PDC 10 Planting associated with landscaping of the site should use local and endemic species in preference to introduced plants.

PDC 11 Buildings and structures should be of a high standard of design with regard to external appearance, building materials, colours, siting, landscaping, and provision for future maintenance, so as to preserve and enhance the appearance and character of the locality.

PDC 12 Buildings and structures should enable adequate privacy and daylight for neighbouring residential allotments and the maintenance of amenity and landscape quality in the locality.

PDC 14 The external materials of a building should:

(a) avoid the use of bright and highly reflective materials and finishes; and
(b) be of colours that enhance the character of the locality and are unobtrusive; and
(c) compliment the landscape and the existing built form, whether that be coastal, rural or urban and minimise any visual intrusion.

PDC 15 The frontage of a dwelling site, other than the driveway area should be landscaped. Landscaping may comprise a combination of vegetation and paved surfaces, however paving should not constitute more than half the area between the site frontage and the forward most building alignment of a dwelling. The driveway width should not exceed 30 percent of the frontage of the site.

PDC 17 With the exception of domestic sheds or buildings for industrial commercial or farming purposes, no building having external walls composed of a material other than clay brick, stone, slate, timber, rendered masonry, or fibre cement board should be erected unless such a building is not likely to detract from the character and amenity of the locality.

PDC 18 No building, should be erected which is elevated on posts, or lacking a solid brick, stone or concrete block base upon the perimeter footings enclosing the space between the floor of the building and the ground surface.

PDC 19 Development involving the erection of any building of more than one storey in height, should only be undertaken where:

(a) the building will be in visual harmony with existing buildings in the locality;
(b) the building is designed and sited to minimize any resultant loss in privacy or natural light with respect to existing development; and
(c) the development will not detract from the amenity of the locality.

Coastal Landscape Zone

PDC 9 Development should be of a high standard of design with regard to external appearance, building materials, colours, siting, landscaping and provision for future maintenance, so as to preserve and enhance the appearance of land in the zone.

PDC 10 Buildings and structures should be sited unobtrusively or set-back from roads, and screened from view with vegetation so as to preserve the landscape qualities and amenity of the locality and the scenic character of the coastal environment.

PDC 11 Detached dwellings and other structures should be associated with farming use of the land.

PDC 12 Buildings and other structures should not detrimentally affect the conservation of the coastal landscape qualities of the zone.

PDC 13 Development should not be located on prominent sites or open land. Where land is in view from the coast or coastal road, the most unobtrusive portion of the allotment should be used, preferably where existing vegetation will substantially screen the development. Tree planting should be undertaken to screen any exposed views of the development.

PDC 14 The design of buildings should:

(a) be of a character and design which will blend with the surrounding landscape;
(b) incorporate low-pitched roofs of a non-reflective texture and natural earth colours;
(c) have walls finished in natural colours in sympathy with the landscape;
(d) involve excavations and reshaping of landform with minimum detrimental effect on any vegetation on the site or the natural appearance of the land;
(e) have fencing of non-reflective materials and be of a design, height and colour that will not impair the surrounding landscape; and
(f) have any access road, drive-ways and associated excavations located so as to cause minimum impairment to the natural appearance of the zone.

PDC 15 Buildings and structures should not be prominently located on cliffs, headlands, or similar visually exposed locations.

Comment:

The proposed development has been designed to minimise visual impact by:

- locating the Lodge below ridge line and partially dug into side of ridge
- following the contours of the land, with low profile roof
- using dark colours and materials to blend into the environment.

The proposed development will not be visible from existing roads or recreation reserves e.g. Hanson Bay beach and other developments (Hanson Bay cabins, 1.5 kilometres away) being screened by the ridge between the two areas.

The proposed development will be set back more than 100 metres from the mean high water mark. This should ensure that the buildings will not be visible directly out from the shoreline or the sea (unless some distance out to sea). The dark colours and non reflective materials will mean that the buildings would be 'lost' in the vegetation from most vantage points.

Although not a designated walking track, the cliff top trail from Remarkable Rocks to Hanson Bay appears to be occasionally used. The Lodge would be visible for a small section of this walk, but would not dominate being well set back, of low profile, dark colours and partially screened by foreground vegetation.

The principle materials used in the development will be local limestone walling and grey colorbond and fibre cement to blend with the natural environment.

The buildings will not be elevated on posts and will be single store and has been designed as contemporary structures that reflect and respect the Australian and Island bush spirit. The main Lodge is partially dug into the side of the ridge to reduce its height and impact. A thin curved plane of roof over circular glass walls reinforces the soft low impact nature of the project.

The staff village appears as small lightweight cabins of iron and glass, relating to the Lodge and its natural bush setting.

The car park along with the buildings will be set back from boundary fences, public roads and coastal reserves. Within the car park separate parking bays will be formed within the bush to provide shade, avoid large areas of paving, and maintain the wilderness setting. The car park and driveway will be formed using compacted limestone to allow the surface to blend with the environment.

Any additional landscaping will be with local endemic species with seed collection already occurring. Additional planting will include *Melaleuca lanceolata* ssp. *lanceolata, Eucalyptus diversifolia, Myoporum insulare, Leucopogon parviflorus, Correa backhouseana* var. *orbicularis* syn. C. *reflexa*

Service areas are screened by existing vegetation and a long limestone wall.

A bushfire management plan has been developed that allows the existing surrounding vegetation to be a fire suppressant, with sprinklers saturating the perimeter of the development. The existing low vegetation will therefore require little modification allowing excessive vegetation clearance to be avoided.

Energy efficiency

General Provisions

Objective 29: To ensure development and revitalisation is consistent with the principles of energy efficiency.

PDC 21 Development should minimise energy requirements, maximise efficient use of energy and reduce greenhouse gas emissions through:

(a) being sited and designed to maximise solar access through both lot orientation, and roof orientation/pitch to enable effective use of solar collectors;

(b) providing adequate thermal comfort for occupants while minimising the need for fossil fuel sources of energy for heating and cooling; and

(c) using low embodied energy materials, and materials which enable development to be climate responsive (e.g., enable good thermal performance).

PDC 22 The use of renewable energy sources in new development where possible.

Comment:

The proposed development has considered energy efficiency in all aspects of the design. The suites have been orientated east west to maximise the solar gain in winter and avoid excessive heat in summer. The walkways/ corridors between the suites will act as greenhouse collectors in winter and will transfer the warmth to rooms via low speed fans reducing heating requirements in winter. The roof has also been designed to overhang to shade the suites in summer.

The linear placement of the suites will also encourage cross ventilation to further reduce energy required to cool suites in summer.

The large window area in the main Lodge will face north to allow for passive heat gain in winter and reducing direct sunlight from entering and heating the main Lodge in summer.

Roof mounted solar collectors will be used for hot water though this will be augmented by diesel boiler when required.

In the staff village all units are located east west for maximum sun in winter and breeze in summer to reduce the need for heating and cooling.

Movement of people and goods

General Provisions

Objective 31: The safe and efficient movement of people and goods by road.

Objective 33: Establishment and upgrading of scenic roads, whilst minimising the impacts on the environment and cultural values.

PDC 39 Development and associated points of access and egress should not create conditions that cause interference with the free flow of traffic on adjoining roads.

PDC 40 Development should conform with the following principles relating to traffic, parking and vehicles access, in addition to any relevant land use specific parking standards:

(a) Development should provide safe and convenient access for private vehicles, cyclists, pedestrians, service vehicles, emergency vehicles and public utility vehicles;

(b) Development adjacent to arterial roads and outside centre zones should be confined to land uses which generate low traffic volumes;

(c) Access points onto public roads should be designed and located so as to minimize traffic hazards, queuing on public roads, and intrusion into adjacent residential areas;

(d) The number, design and location of access points onto the arterial roads shown on Map Kangaroo Island/1 (Overlay 1) should be such as to minimize traffic hazards, queuing on the roads, right turn movements and interference with the function of intersections, junctions and traffic control devices;

(e) Where development is located adjacent to an intersection it should not create an obstruction or impair the visibility for drivers of motor vehicles entering arterial roads;

(f) Development should provide sufficient off-street parking and manoeuvring areas to accommodate resident, visitor, customer, employee, and service vehicles;

(g) Where a development is required to provide car parking of 25 spaces or more, at least one car parking space should be provided in every 25 spaces for the disabled; and

(ii) Parking spaces for the disabled should be conveniently located in relation to building entrances, ramps, and other specialised access facilities required or necessary for use by the disabled;

(h) Car parking areas should be designed and located so as to ensure safe and convenient pedestrian access from vehicles to facilities, and safe and convenient traffic circulation. Adequate provision should be made for manoeuvring into and out of parking bays, and, in the case of centre type development, parking areas and access ways should be designed to minimize conflict between customers and service vehicles;

(i) The layout of all parking areas should be designed so as to obviate the necessity for vehicles to reverse onto public roads;

(j) Car parking areas should be sealed or constructed to minimize muddy or dust related hazards and provide an even, low maintenance pavement;

(k) Car parking areas should:

(i) be line marked to indicate parking bays, movement aisles and direction of traffic flow;
(ii) be graded and drained to efficiently remove surface water; and
(iii) be landscaped to screen and shade vehicles in the parking area whilst retaining suitable lines of sight for safe vehicle and pedestrian movements;
(iv) provide sufficient drainage system and use appropriate surface materials to manage water run off efficiently

(l) Individual car parking areas should, wherever possible, be designed and located so that:

(i) vehicular movement between them does not require the use of public roads; and
(ii) the number of access points is minimized;

(m) Development should provide an opportunity for shared use of car parking facilities, and integration of car parking areas with adjacent development so as to reduce the total extent of car parking areas and reduce the number of access points;

(n) Where traffic control measures, public works and other relevant facilities are required as a direct result of a development being undertaken, the cost of such works or facilities should be borne by the developer;

(o) Residential development located within centre zones should have access and car parking facilities separate from any access and car parking areas serving centre facilities;

(p) Landscaping should be provided and maintained to screen, shade and enhance the appearance of car parking area. To this end parking spaces should not be located closer than two metres from any adjacent street alignment to allow the provision of adequate screen planting;

(q) Car parks should be orientated to facilitate direct and convenient access of pedestrians between them and the facilities they serve; and

(r) Parking areas should be consolidated and coordinated into convenient groups, rather than located individually, and access points should be minimized. Landscaping should form an integral part of centre design, and be used to foster human scale, define spaces, reinforce paths and edges, screen utility areas, and generally enhance the visual amenity of the locality.

PDC 46 Development of a kind prescribed in Table Kangaroo Island/2 should have car parking spaces on the site or on an approved site nearby, at a rate as prescribed in Table Kangaroo Island/2. All other developments should provide adequate off-street car parking facilities, having regard to anticipated traffic, availability of kerbside parking, and safety.

PDC 47 Car parking areas should provide for the efficient movement and parking of vehicles, and ensure ease of maintenance.

PDC 48 All development should be adequately serviced by providing:

(a) unobtrusive, screened areas for the storage and removal of and recycling of waste materials;

(b) in the case of centre-type development, adequate provision on the site to enable the loading, unloading and manoeuvring of vehicles without the necessity to use public roads, and in a manner which results in minimal conflict between customer and service vehicles; and

(c) and adequate on-site area which enables the manoeuvring, loading, unloading, fuelling and storage of vehicles associated with the use of the site, and which facilitates the entry and exit of vehicles in a forward direction.

Comment:

People and goods will arrive at the airport then travel by road to South West River Road. This section of public road may be sealed in the future but is not included in this application. The access road within the property would be of compacted crushed limestone to allow it to blend with the environment.

Table Kangaroo Island/2 outlines that nine car parking spaces are required for the development though 17 will be provided (along with manoeuvring areas). A maximum of 20 staff will also be on site with 20 car parking spaces provided for staff in the staff village and services areas. No additional car parking spaces have been provided for the restaurant as this will be for guests only.

Due to the relative isolation of the development, there is unlikely to be a significant impact on the flow of traffic along South Coast Road. Access to and from South Coast Road has been designed to minimise traffic hazards.

Internal roads have been designed to ensure the safe and convenient access for private vehicles, service vehicles, emergency services and pedestrians.

Bushfire protection

General Provisions

Objective 38: Protection of life and property from the effects of bushfire.

Objective 39: To direct development away from sites and areas with an unacceptably high level of bushfire hazard.

PDC 60 The size, proportion and location of new allotments intended for residential use or tourist accommodation, should contain a site suitable for building development for that use so as to minimise the danger of damage from bushfires whilst considering the fire risk of the location.

PDC 62 Buildings should be sited to minimise the danger of damage from bushfire. Ridgetops, deep gullies and steep slopes, particularly slopes with northerly or westerly aspects, should be avoided and the flatter portion of any allotment used as sites for buildings.

PDC 63 New buildings including alterations to existing buildings such that the total floor area of the extension exceeds 50 percent of the total floor area should have available sufficient independent water supply for fire fighting at all times and in particular:

(a) where an allotment is connected to a reticulated mains water supply, an independent storage of at least 5000 litres should be maintained at all times. Where an allotment is not connected to a reticulated mains water supply, an independent storage of at least 22000 litres should be maintained at all times;

(b) should be easily identifiable and accessible to fire fighting appliances at all times;

(c) be fitted with a fuel-driven pump or equivalent system independent of main electricity capable of pressurising water for fire fighting;

(d) in cases where water is held in a close tank, be fitted with a fire service approved adaptor; and

(e) a hose and nozzle capable of withstanding the pressures of the supplied water.

PDC 64 Landscaping should include bushfire protection features which minimise the risk of damage to buildings and property in the event of a fire and assist in preventing or slowing the spread of fire.

In particular:

(a) existing vegetation in the immediate vicinity of the building should be selectively thinned so that there is not a continuous cover of thick undergrowth surrounding the building;

(b) trees should not overhang the roof of any building;

(c) where trees are to be planted, they should be located such that when mature they will not touch or overhang buildings or overhead wires and will be at a distance from buildings and overhead wires which is equivalent to the mature height; and

(d) in areas of thick vegetation, clearing of vegetation may be required to protect life and property.

PDC 65 Buildings and structures should be designed and constructed to minimise loss of life and property during bushfires.

PDC 66 Any development should be in accordance with a fire response and management plan for the site which addresses:

(a) safety of life;
(b) safety of buildings and property;
(c) hazard reduction;
(d) active suppression systems; and
(e) evacuation strategy.

PDC 67 Development should not require the clearance of roadside vegetation to satisfy fire fuel reduction requirements.

PDC 68 Tourist accommodation and associated facilities should ensure adequate water is contained on site to enable efficient protection to be provided during demands of high fire risk.

Comment:

The design of the proposed development has considered the fire risk of the location with buildings located below the ridge line on a flatter portion of the site.

A sufficient independent water supply for fire fighting will be included as part of the development. A tank of approximately 200,000 kilolitres will be provided along with appropriate sprinklers, hoses and pumps.

A Bushfire Management Plan has been included in this report as Section 17.

Landscaping

General Provisions

PDC 69 Development should incorporate landscaping as an integral part of the design of the development and include plants with a mature height, scale and form to complement and relate to that of the development.

PDC 70 Planting associated with landscaping of the site should use local and endemic species in preference to introduced plants.

Comment:

Landscaping will be used by the proposed development for screening of service area and for rehabilitating scalded areas. All landscaping will be with local endemic species. Seed collection has commenced from the site to ensure mature plants are available for planting once construction is complete.

Utilities

General Provisions

PDC 51 Development should be provided with an adequate, reliable and potable water supply.

PDC 52 New dwellings not readily capable of connection to a reticulated water supply should provide rainwater storage tanks with a total capacity not less than 45 000 litres.

PDC 55 Development should not be undertaken unless effluent and other wastes can be effectively disposed of on-site without risk to public health or damage to the environment.

PDC 56 Collection, treatment and disposal of effluent generated from the development should be designed to ensure that no effluent is discharged into the watertable, watercourses, or adjacent marine waters.

PDC 57 Waste water treated to satisfy the South Australian Health Commission Guidelines.

PDC 58 Stormwater collection should be designed where practicable, to harvest and use water for irrigation purposes, ensuring that pollutants are not discharged into the watertable, watercourses, or adjacent marine waters.

Comment:

The proposed development will be self sufficient with regard to water supply by collecting and storing sufficient rainwater.

The development will manage its own effluents and other waste on site with no effluent discharged into the watertable, watercourses or adjacent marine waters. The waste water will be treated (to Class B) and dispersed below ground in a dedicated grassed area adjacent to the Staff Village. By treating the water to a high standard and then dispersing it in a controlled managed area, the risks of soil contamination and weed infestation normally associated with septic dispersal in native bushland are overcome. The SA Health Commission has indicated approval in principle of this system.

All roof water will be collected and reused following filtration and UV treatment. The main storage will be in underground concrete tanks located under buildings and paved areas to provide approximately 1,000,000 litres of water storage.

Tourism

Land Use Provisions

Objective 53: To maintain a viable tourism industry that provides reliable, friendly and quality services.

PDC 125 Development should provide for a wide range of accommodation types to cater for tourist needs.

The following forms of development should, in particular, be encouraged in zones designated for such development, e.g. hikers hut in a Conservation Zone:

(a) bed and breakfast; small scale establishments providing basic bed and breakfast needs, often utilising existing .character. buildings;
(b) farm stay; farmhouse, cottage or bunkhouse style accommodation in a working farm atmosphere;
(c) guesthouse; small scale owner-operated establishments;
(d) hikers huts; 4 to 6 person, small-scale huts with limited services often in remote locations;
(e) nature retreats and eco-style tourist accommodation; low impact and designed to encourage and facilitate an appreciation of the natural environment; and
(f) serviced apartments; small to medium scale accommodation usually within townships and settlements, or zones designated for tourist accommodation.

PDC 126 Development of major tourist accommodation should primarily be located within existing townships, settlements, urban areas or within a designated Tourist Accommodation Zone.

PDC 127 Tourist developments should not be located within areas of conservation value, indigenous cultural value, high landscape quality or significant scenic beauty.

PDC 128 Tourist developments should not require substantial modification to the landform, particularly in visually prominent locations.

PDC 129 Tourist developments should be low profile and should utilise natural materials such as stone or timber, and be of a design and colour that blends with the surrounding landscape or dominant local features and enhance the character of the locality.

PDC 130 Development of tourist facilities should incorporate native landscaping and screening where appropriate, and be complementary to the existing indigenous vegetation.

PDC 131 Tourist developments should provide adequate areas for the parking, loading and unloading, and manoeuvring of vehicles, suitably screened from public view.

PDC 132 Tourist facilities should be designed and located to minimize impact on surrounding uses by:

(a) provision of safe and convenient vehicle access;
(b) preventing overshadowing, overlooking and buildings out of scale with surrounding buildings; and
(c) avoid noise, air, water and soil pollution.

PDC 133 Tourist facilities outside townships should:

(a) complement the scenic value, visual sensitivity and cultural significance of the landscape; and
(b) not adversely affect the use and condition of roads.
(c) not result in the clearance of valuable native vegetation
(d) not result in bushfire threat or a threat to biodiversity

PDC 134 Tourist facilities in rural areas should be developed in association with:

(a) agricultural, aquaculture, forestry, viticultural and winery development;
(b) heritage buildings and areas;
(c) linear parks; or
(d) walking and cycling trails.

PDC 135 The scale, siting, design, height, mass, intensity, colour, materials, paving, landscaping and orientation of buildings and structures should be complementary to the natural environment so as to achieve a coordinated development where there is low density site coverage, set within an attractive and preserved natural environment.

PDC 136 Buildings should be of a high standard of external appearance and be designed, sited, orientated and landscaped, to minimize disturbance to adjoining properties through noise, light spillage, car parking, intrusion on privacy or interference with general farming activities.

PDC 137 Building elements should be broken up to avoid large flat surfaces with a horizontal emphasis or steep rooflines. This can be achieved by stepping facades and roofs horizontally and vertically.

PDC 138 Design and siting of buildings and structures should take account of:

(a) ground conditions, including suitability of soils for building sites, suitable sites for waste disposal;
(b) vegetation type, species and distribution, particularly with regard to natural wind breaks, dense screens for privacy, potential fire hazards; and
(c) animal tracks, nests, breeding areas and habitats to establish areas suitable and unsuitable for development.

PDC 141 Buildings and structures should not exceed a height of 6.5 metres above natural ground level. Scope exists however for some elements of a development to have a greater height provided the maximum height is no greater than the mature height of predominant indigenous vegetation species.

PDC 142 Tourist accommodation and support facilities should be set-back:

(a) a minimum distance of 100 metres from public roads and adjoining allotment boundaries; and
(b) a minimum distance of 100 metres from the high water mark or cliff face of any coastal or waterfront area.

PDC 143 Development, including access roads and driveways, should require minimal earthworks, be designed to minimize pavement areas and be unobtrusive.

PDC 145 Clearance of remnant indigenous vegetation for the purpose of siting tourist accommodation or related facilities should be avoided.

PDC 146 To maximise visitor enjoyment of the development as environmentally sensitive, sufficient on-site parking should generally be provided, with car parking areas generally removed from accommodation units.

PDC 147 Car parking should be designed and sited in small clusters to avoid large expanses of land being set aside for car parking.

PDC 148 Storage areas should be screened by appropriate fencing or by landscaping.

PDC 149 Retail and associated tourist facilities should be limited to small scale, ancillary facilities incorporated with tourist accommodation development.

Comment:

The design and operation of the proposed development will consistently follow the ideals of eco-tourism with the development designed as an environmentally sustainable nature based tourist Lodge, offering a wide range of education, interpretive wild life experiences.

The proposed development will diversify the range of accommodation types on Kangaroo Island helping to maintain a viable tourism industry on the island.

The Lodge has been sited in the most appropriate area from an environmental view point in that it is located in an area suffering erosion from “blowouts” and “scalds” and will benefit from rehabilitation by replanting with species endemic to the area. The conservation value of the proposed development is already evident from the detailed environmental reports which substantially increase knowledge of the area. This report will be the starting point for ongoing research, rehabilitation etc of the area (refer Section 6).

The proposed development consists of 25 suites which is allowed for in the Coastal Landscape Zone and is therefore not classed as a major tourism development.

The development has been sited and designed to minimise visual impact with the use of integrating techniques of dark colours, articulated facades and roof, low profile roof forms. The Staff Village and back of house facilities are set back and completely out of sight from publicly accessible areas.

The proposal will result in limited modification to the lands form as the development follows the natural ground slope. This will minimise soil and vegetation disturbance with any disturbance not visible from readily accessible public areas.

The development will be set back 100 metres from the high water mark.

There is minimal clearance of native vegetation with any areas of clearance compensated by the rehabilitation of eroded areas. Carefully design of buildings, fire control systems, and access roads

reduce the threat of bushfire damage. Access roads will follow the boundary or existing tracks to minimise earthworks and vegetation clearance. Further minor road widening will be designed to minimise vegetation clearance.

Car parking will be sited unobtrusively in vegetation and well removed from the accommodation units. Individual car parking bays are formed within the existing vegetation to avoid a large unshaded and visually dominant cleared area

Open space – coastal areas

Specific Provisions

Objective 72: Preserve sites of heritage, cultural, scientific, environmental, educational or landscape importance.

Objective 74: Development which recognises and allows for hazards to coastal development such as inundation by storm tides or combined storm tides and stormwater, coastal erosion and sand drift; including an allowance for changes in sea level due to natural subsidence and predicted climate change during the first 100 years of the development.

Objective 77: Locate all housing, including holiday houses, tourist accommodation, marinas and rural living located on land zoned for that purpose and for it to be environmentally acceptable and consistent with orderly and economic development.

Objective 79: Manage development in coastal areas to sustain or enhance the natural coastal environment.

Objective 80: Protect the coast from development that will adversely affect the marine and onshore coastal environment whether by pollution, erosion, damage or depletion of physical or biological resources, interference with natural coastal processes or any other means.

Objective 81: Development which does not interfere with environmentally important features of coastal areas, including mangroves, wetlands, dune areas, stands of native vegetation, wildlife habitats and estuarine areas.

Objective 82: Preserve areas of high landscape and amenity value including stands of vegetation, exposed cliffs, headlands, islands and hill tops, and areas which form an attractive background to urban and tourist developments.

Objective 83: Development which maintains or enhances public access to coastal areas in keeping with objectives for protection of the environment, heritage and amenity by provision of:

(a) planned, appropriate easy to use public access to and along beaches;
(b) coastal reserves and lookouts;
(c) convenient and safe public boating facilities at selected locations;
(d) convenient vehicular access to points near beaches and selected points of interest; and
(e) adequate car parking.

Objective 84: Development only undertaken on land which is not subject to, or can be appropriately protected from, coastal hazards such as:

(a) inundation by storm tides or combined storm tides and stormwater;
(b) coastal erosion; or
(c) sand drift.

Objective 85: Development located and designed to allow for changes in sea-level due to natural subsidence and probably climate change during the first 100 years of the development.

Objective 91: Development of coastal urban settlements, coastal rural living areas, tourist complexes and marinas only in environmentally acceptable areas.

Comment:

The proposed development has been designed to prevent the development having an effect on the scenic value of the surrounding landscape. Refer to the comments relating to amenity in Section 12 for examples of how the development will 'blend' with the coast.

Native vegetation will be preserved where possible with the Environmental Management Plan ensuring that the impact of the development is limited.

Public access will be maintained as the development is set back from the existing walking track and will not prevent access except where required for habitat protection.

The proposed development will not adversely affect the scenic value of the zone as the design and siting of the buildings has been chosen to ensure the development is as unobtrusive as possible.

Public access

Specific provisions

PDC 227 Development adjacent to the coast should not be undertaken unless it has or incorporates the provision of a public reserve, not including a road or erosion buffer provided in accordance with Principle 239, of at least 50m width between such development and the toe of the primary dune or the top edge of the escarpment, unless the development relates to small scale infill development in a predominantly urban zone.

PDC 229 All development, including marinas and aquaculture development, should be located and designed for public access along the waterfront, to beaches and coastal reserves to be maintained, if not increased.

PDC 231 Access to beaches and reserves should be, by means of walkways and roads suitably designed and constructed to meet the environmental objectives and principles of development control for coastal areas.

Comment:

The proposed development is located more than 50 metres from the top of the escarpment. The area between the development and coast will not be altered except for rehabilitation of eroded areas. There will be no loss of public access to the coast but some restrictions may be required to protect habitat.

A walkway will link the development to the existing boundary access track to the east. This boundary track then leads to the rocky shelf between the two beaches. Access beyond this point will be guided by sensitivity to the bird habitats i.e. access may be restricted during the hooded plover nesting season.

Hazard risk minimisation

General Provisions

PDC 233 Development should not occur on land where the risk of flooding is unacceptable having regard to personal and public safety and to property damage.

PDC 234 For the purposes of assessing coastal developments the standard sea-flood risk level for a development site is defined as the 100 year average return interval extreme sea level (tide, stormwater and associated wave effects combined), plus an allowance for land subsidence for 50 years at that site.

PDC 239 Development should be set-back a sufficient distance from the coast to provide an erosion buffer which will allow for at least 100 years of coastal retreat for single buildings or small-scale developments, or 200 years of retreat for large-scale developments such as new towns, unless:

(a) the development incorporates private coastal works to protect the development and public reserve from the anticipated erosion, or
(b) the council is committed to protecting the public reserve and development from the anticipated coastal erosion.

Comment:

The proposed development is not on land that is at risk of flooding. The development is at the top of a cliff face (15.5 to 40 metres high) and is set back 100 metres from the mean high tide mark.

Coastal landscape zone – general provisions

Objective 1: A zone comprising land which has high landscape qualities, where little or no urban development is located, and where the scenic beauty and natural features of the coastal landscape are preserved.

Objective 2: The preservation and management of coastal land and features, environmentally important natural features, including lakes, wetlands, dunes, stands of native vegetation, wild life habitat, estuarine areas, exposed cliffs, headlands, hilltops and areas which form an attractive background to urban and tourist developments.

Objective 3: The preservation and management of sites of heritage, cultural, scientific, environmental or educational importance.

Objective 4: Development only undertaken on land which is not subject to, or can be appropriately protected from, coastal hazards and does not adversely effect the natural coastal processes.

Objective 5: Avoid development which is likely to adversely effect the coast by pollution, erosion, damage or depletion of physical or biological resources.

Objective 6: Development should maintain or enhance public use and access to the coastline.

Objective 7: Development which will not require now, or in the future, public expenditure on protection of the development or the environment.

PDC 3 Tourist facilities including accommodation should not be developed within the zone unless it can be demonstrated that the fundamental scenic and landscape features of the zone will not be adversely affected.

Comment:

The proposed development has been designed to preserve the adjacent landscape. Refer to the comments relating to preservation of amenity in Section 12 for examples of how the development will 'blend' with the coast.

Native vegetation will be preserved where possible with the Environmental Management Plan ensuring that the impact of the development is limited.

Public access will be maintained as the development is set back from the existing informal walking track and will not prevent access except where required for habitat protection.

The proposed development will not have an adverse effect the landscape of the zone as the development has been designed to 'blend' with the environment.

Conclusion

The proposed development is not at variance with a eco-tourism development of this scale allowed for within the Coastal Landscape Zone.

The development will be an iconic nature based tourist Lodge complements the strategic aim of the Development Plan in stimulating the Kangaroo Island economy with a unique world class development that will enhance the appreciation of the Island's biodiversity and provide a net gain to the environment of the area.

The building's location and design ensures that there is minimal visual and environmental impact.

The proposed development will be a model for sustainable development by including energy efficient building design, efficient use of rainwater, treatment and use of waste water and integrating the buildings into the landscape while including a comprehensive fire protection system.

Southern Ocean Lodge will bring a tourist development to South Australia and Kangaroo Island that will rival substantial nature based developments in other states. It will be a unique signature development that will have benefits well beyond the provision of tourism accommodation. The development will have a direct impact on perceptions of the State and Kangaroo Island, help strengthen brand, increase marketing critical mass, improve demand levels and improve visitor yield. It has the capacity to significantly enhance the State's and the Island's competitive position in nature based tourism.

Appendix K

Soil and geotechnical report

ABN 77 007 916 225

Directors
EA Pocius, B.E., Grad. Dip. Munc.Eng., M.A.I.B.S., R.P.E.Q., M.I.E. Aust., C.P. Eng.
Ruta Pocius. Adv. Cert. Int. Des.

POCIUS & ASSOCIATES PTY. LTD.

Consulting Civil, Structural Engineers & Private Certifiers

132 Rose Terrace, Wayville, SA. 5034 Telephone (08) 8272 5711, Fax (08) 8272 0333, Email: pocius@bigpond.net.au

SITE INVESTIGATION & SITE CLASSIFICATION

JOB REFERENCE NO:	**5415**
DATE OF ISSUE:	18 JANUARY 2006
SITE LOCATION:	**HANSON BAY, KANGAROO ISLAND**
CLIENT:	BAILLIE LODGES
DESIGNER:	MAX PRITCHARD ARCHITECT
CONTENTS:	SOIL ASSESSMENT BORE LOGS BOREHOLE LOCATION PLAN

NOTE:
This is an important document and should be read and understood in its entirety and passed on to future owners.

SOIL ASSESSMENT AND SITE CLASSIFICATION

SITE: **HANSON BAY, KANGAROO ISLAND** **REF: 5415**

SOIL PROFILE
The soils encountered in the test bores on this site consisted of surface sand generally overlying silty calcareous sand and then terminating on a limestone base. The surface sands varied in depth from approximately 0.5m to 3.0m.

SOIL GROUP
The soil profile is associated with the following:

Soil Groups Dune Sands
Soil Type DS

SITE CLASSIFICATION
The site is assessed as being of class: 'A' STABLE

SOIL MAPS
Soil maps for the locality indicates the following: Outside limits of maps

OTHER RELEVANT SITE INVESTIGATIONS
Soil types found in investigation of nearby sites: None available

SITE CLASSIFIER
The site classifier is Pocius & Associates Pty Ltd.

FOUNDATION BEARING PRESSURE
The allowable bearing pressure at foundation level is assessed as 100 kPa.

The footings are to be founded on: Firm natural soil.

GROUND WATER
Not encountered

POCIUS & ASSOCIATES PTY LTD

per:



POCIUS & ASSOCIATES PTY LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS

DATE: 20 & 21 DECEMBER 2005

REF: 5415

CLIENT: BAILLIE LODGES

SITE: HANSON BAY, KANGAROO ISLAND

SOIL BORELOG

HORIZON	DEPTH MM				COLOUR	CONSISTENCY	SOIL DESCRIPTION	VISUAL ASSESSMENT OF PROPERTIES			
	Bore 1	Bore 2	Bore 3	Bore 4		TEXTURE & STRUCTURE		Symbol	Reactivity	Bearing	MC of PL
A1	*0-750*	*0-400*	*0-600*	*0-750*	*Brown.*	*Fine grained.*	*SAND. Trace clay.*	*SP*	*NIL*	*L+*	*Dry*
A2	*750-1800*	*400 650*	*600-1100*	*750-1500*	*Cream grey brown.*	*Fine grained.*	*SAND. Silty calcareous, few limestone gravels.*	*SM*	*NIL*	*L+*	*Dry*
	-	*650-1000*	-	-	*White.*	-	*LIMESTONE FRAGMENTS*	-	-	*H*	-
	-	-	*1100-2000*	-	*Yellow grey.*	*Fine grained.*	*SAND. Trace clay.*	*SP*	*NIL*	*L+*	*Damp*
C	*1800+*	*1000+*	*2000+*	*1500+*			*REFUSAL. LIMESTONE FRAGMENTS.*				

NOTE: For borehole location and site description refer to attached site plan

SAMPLING METHOD: Push Tubes

SYMBOLS: **Refer to explanatory notes over**

LOGGED: **FE**

POCIUS & ASSOCIATES PTY LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS

DATE: 20 & 21 DECEMBER 2005

REF: 5415

CLIENT: BAILLIE LODGES

SITE: HANSON BAY, KANGAROO ISLAND

SOIL BORELOG

HORIZON	DEPTH MM				COLOUR	CONSISTENCY	SOIL DESCRIPTION	VISUAL ASSESSMENT OF PROPERTIES			
	Bore 5	Bore 6	Bore 7	Bore 8		TEXTURE & STRUCTURE		Symbol	Reactivity	Bearing	MC of PL
A1	*-*	*0-200*	*0-150*	*0-250*	*Grey brown.*	*Fine grained.*	*SAND.*	*SP*	*NIL*	*L+*	*Dry*
A2	*0-2000*	*200-1500*	*150-1000*	*250-750*	*Creamy grey.*	*Fine grained.*	*SAND. Silty calcareous, abundant limestone gravels.*	*SM – GP*	*NIL*	*L – M*	*Damp*
C	*2000+*	*1500+*	*1000+*	*750+*			*REFUSAL. LIMESTONE FRAGMENTS.*				

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SYMBOLS: **Refer to explanatory notes over**

SAMPLING METHOD: Push Tubes

LOGGED: **FE**

POCIUS & ASSOCIATES PTY LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS

DATE: 20 & 21 DECEMBER 2005

REF: 5415

CLIENT: BAILLIE LODGES

SITE: HANSON BAY, KANGAROO ISLAND

SOIL BORELOG

HORIZON	DEPTH MM				COLOUR	CONSISTENCY	SOIL DESCRIPTION	VISUAL ASSESSMENT OF PROPERTIES			
	Bore 9	Bore 10	Bore 11	Bore 12		TEXTURE & STRUCTURE		Symbol	Reactivity	Bearing	MC of PL
A1	*0-400*	*0-600*	*0-1050*	*0-700*	*Yellow brown.*	*Fine grained.*	*SAND. Trace clay.*	*SP*	*NIL*	*L+*	*Damp*
	400-500	*600-750*	*1050-1100*	*700-750*	*White.*	-	*LIMESTONE FRAGMENTS.*	-	-	*H*	-
C	*500+*	*750+*	*1100+*	*750+*			*REFUSAL. LIMESTONE FRAGMENTS.*				

NOTE: For borehole location and site description refer to attached site plan

SYMBOLS: **Refer to explanatory notes over**

SAMPLING METHOD: Push Tubes

LOGGED: **FE**

POCIUS & ASSOCIATES PTY LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS

DATE: 20 & 21 DECEMBER 2005

REF: 5415

CLIENT: BAILLIE LODGES

SITE: HANSON BAY, KANGAROO ISLAND

SOIL BORELOG

HORIZON	DEPTH MM				COLOUR	CONSISTENCY TEXTURE & STRUCTURE	SOIL DESCRIPTION	VISUAL ASSESSMENT OF PROPERTIES			
	Bore 13	Bore 14	Bore 15	Bore 16				Symbol	Reactivity	Bearing	MC of PL
A1	*0-750*	*0-750*	*0-400*	*0-400*	*Yellow brown.*	*Fine grained.*	*SAND. Trace clay.*	*SP*	*NIL*	*L+*	*Damp*
A2	*750-1000*	*750-2000*	*400-800*	*400-1000*	*Yellow - Orange.*	*Fine grained.*	*SAND. Clayey.*	*SC*	*Very L*	*M*	*Damp*
C	*1000+*	*2000+*	*800+*	*1000+*			*REFUSAL. LIMESTONE FRAGMENTS.*				

NOTE: For borehole location and site description refer to attached site plan

SYMBOLS: **Refer to explanatory notes over**

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DATE: **20 & 21 DECEMBER 2005**

REF: **5415**

CLIENT: **BAILLIE LODGES**

SITE: **HANSON BAY, KANGAROO ISLAND**

SOIL BORELOG

HORIZON	DEPTH MM				COLOUR	CONSISTENCY TEXTURE & STRUCTURE	SOIL DESCRIPTION	VISUAL ASSESSMENT OF PROPERTIES			
	Bore 17	Bore 18	Bore 19	Bore 20				Symbol	Reactivity	Bearing	MC of PL
A1	*0-1500*	*0-2400*	*0-1700*	*0-1000*	*Grey.*	*Fine grained.*	*SAND. Trace clay.*	*SP*	*NIL*	*L+*	*Damp*
A2	*1500-2300*	*2400 2700*	*1700-2500*	*1000-2100*	*Yellow – Grey.*	*Fine grained.*	*SAND.*	*SP*	*NIL*	*L+*	*Damp*
	-	*2700-3000*	*2500-3000*	*2100-2300*	*Yellow.*	*Fine grained.*	*SAND. Trace clay.*	*SP*	*NIL*	*L – M*	*Damp*
	2300-2500	-	-	-	*Cream.*	-	*LIMESTONE FRAGMENTS*	-	-	*H*	-
C	*2500+*			*2300+*			*REFUSAL. LIMESTONE FRAGMENTS AT BASE.*				

NOTE: For borehole location and site description refer to attached site plan

SYMBOLS: **Refer to explanatory notes over**

SAMPLING METHOD: Push Tubes

LOGGED: **FE**

POCIUS & ASSOCIATES PTY LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS

DATE: 20 & 21 DECEMBER 2005

REF: 5415

CLIENT: BAILLIE LODGES

SITE: HANSON BAY, KANGAROO ISLAND

SOIL BORELOG

HORIZON	DEPTH MM				COLOUR	CONSISTENCY TEXTURE & STRUCTURE	SOIL DESCRIPTION	VISUAL ASSESSMENT OF PROPERTIES			
	Bore 21	Bore 22	Bore 23	Bore 24				Symbol	Reactivity	Bearing	MC of PL
A1	-	-	*0-450*	*0-400*	*Grey brown.*	*Fine grained.*	*SAND.*	*SP*	*NIL*	*L+*	*Dry*
A1	*0-750*	*0-800*	-	-	*Grey.*	*Fine grained.*	*SAND. Silty.*	*SM*	*NIL*	*L+*	*Dry*
A2	*750-1500*	*800 1400*	-	-	*Cream grey.*	*Fine grained.*	*SAND. Silty calcareous.*	*SM*	*NIL*	*L – M*	*Dry*
	-	-	*450-500*	*400-500*	*White.*	-	*LIMESTONE FRAGMENTS*	-	-	*H*	-
	1500-2000	*1400-2200*	-	-	*Grey brown.*	*Fine grained.*	*SAND. Silty, trace clay.*	*SM*	*NIL*	*L – M*	*Damp*
C	*2000+*	*2200+*	*500+*	*500+*			*REFUSAL. LIMESTONE FRAGMENTS.*				

NOTE: For borehole location and site description refer to attached site plan

SAMPLING METHOD: Push Tubes

SYMBOLS: **Refer to explanatory notes over**

LOGGED: **FE**

POCIUS & ASSOCIATES PTY LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS

DATE: **20 & 21 DECEMBER 2005**

REF: **5415**

CLIENT: **BAILLIE LODGES**

SITE: **HANSON BAY, KANGAROO ISLAND**

SOIL BORELOG

HORIZON	DEPTH MM				COLOUR	CONSISTENCY	SOIL DESCRIPTION	VISUAL ASSESSMENT OF PROPERTIES			
	Bore 25	Bore 26	Bore 27	Bore 28		TEXTURE & STRUCTURE		Symbol	Reactivity	Bearing	MC of PL
A1	*0-750*	*0-800*	*0-100*	*0-100*	*Grey.*	*Fine grained.*	*SAND. Silty trace clay.*	*SM*	*NIL*	*L+*	*Dry*
A2	*750-2000*	*800-1900*	-	-	*Grey brown.*	*Fine grained.*	*SAND. Trace clay.*	*SP*	*NIL*	*L+*	*Damp*
			100-800	*100-600*	*Light grey brown.*	*Fine grained.*	*SAND. Silty, abundant limestone fragments.*	*SM – GP*	*NIL*	*L – M*	*Damp*
C	*2000+*	*1900+*	*800+*	*600+*			*REFUSAL. LIMESTONE FRAGMENTS.*				

NOTE: For borehole location and site description refer to attached site plan

SYMBOLS: **Refer to explanatory notes over**

SAMPLING METHOD: Push Tubes

LOGGED: **FE**

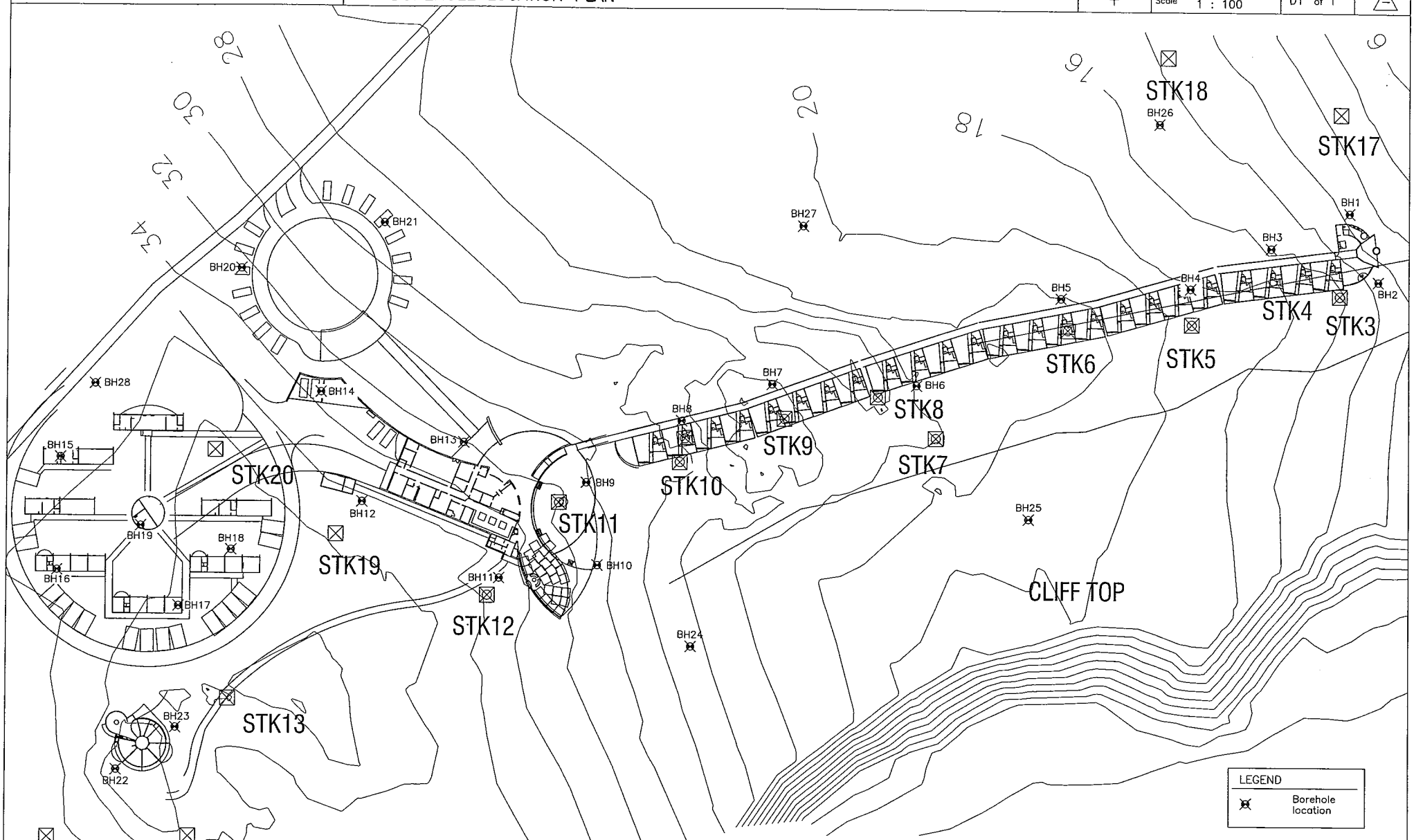
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ABN 77 007 916 225

SITE: HANSON BAY, KANGAROO ISLAND

TITLE: BOREHOLE LOCATION PLAN

Project North

Design	—
Drawn	MP
Date	21/12/2005
Scale	1 : 100
Ref. no.	5415
Sheet	D1 of 1
Rev.	A



The following data has been visually assessed and hence is approximate only. Site features noted are shown only to bring their existence to the owners attention.

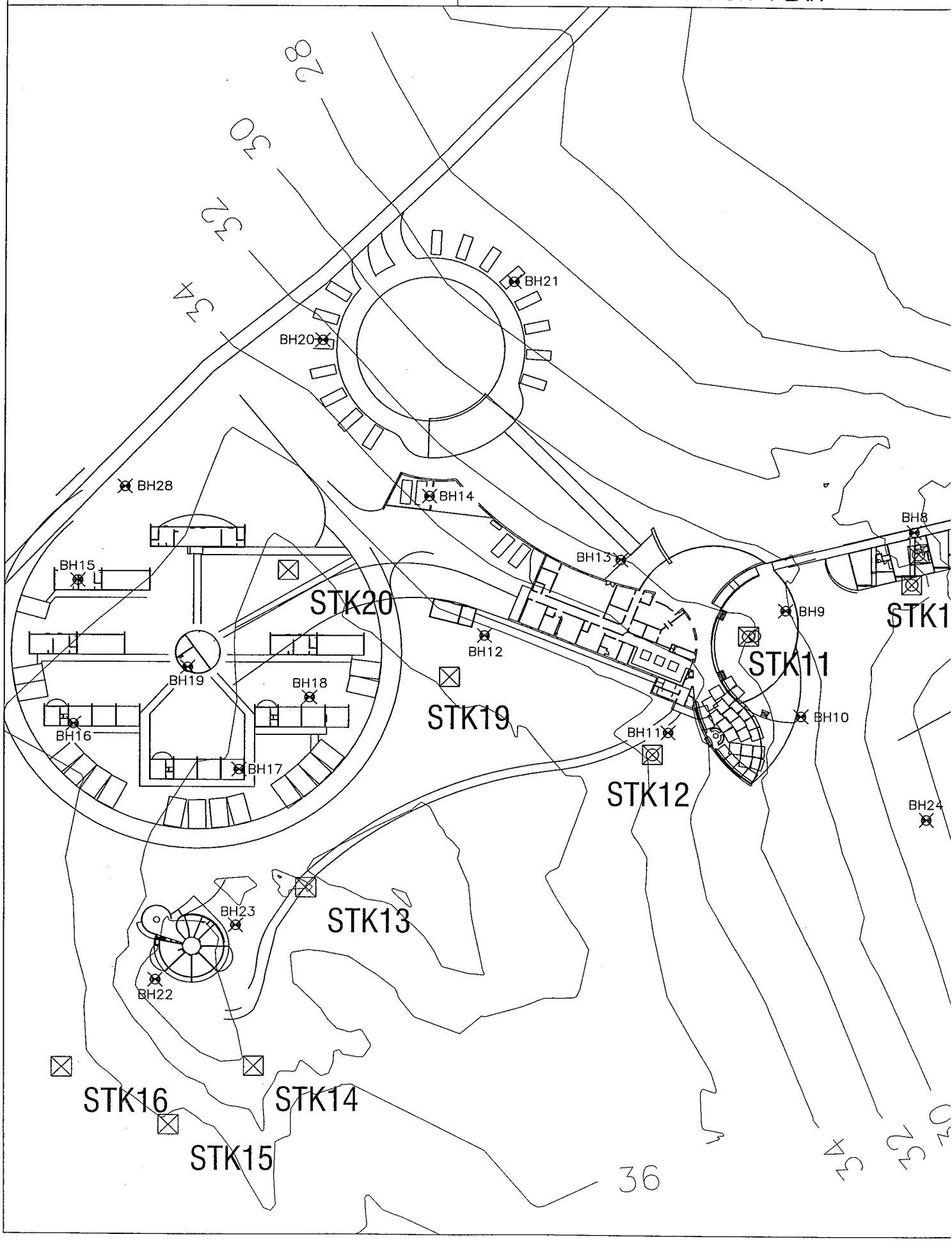
For an accurate assessment of the site, the measurements and levels should be taken and a contour plan prepared.

The approximate positions of the soil boreholes are as shown. Please refer to the borelogs for a description of the soil samples.

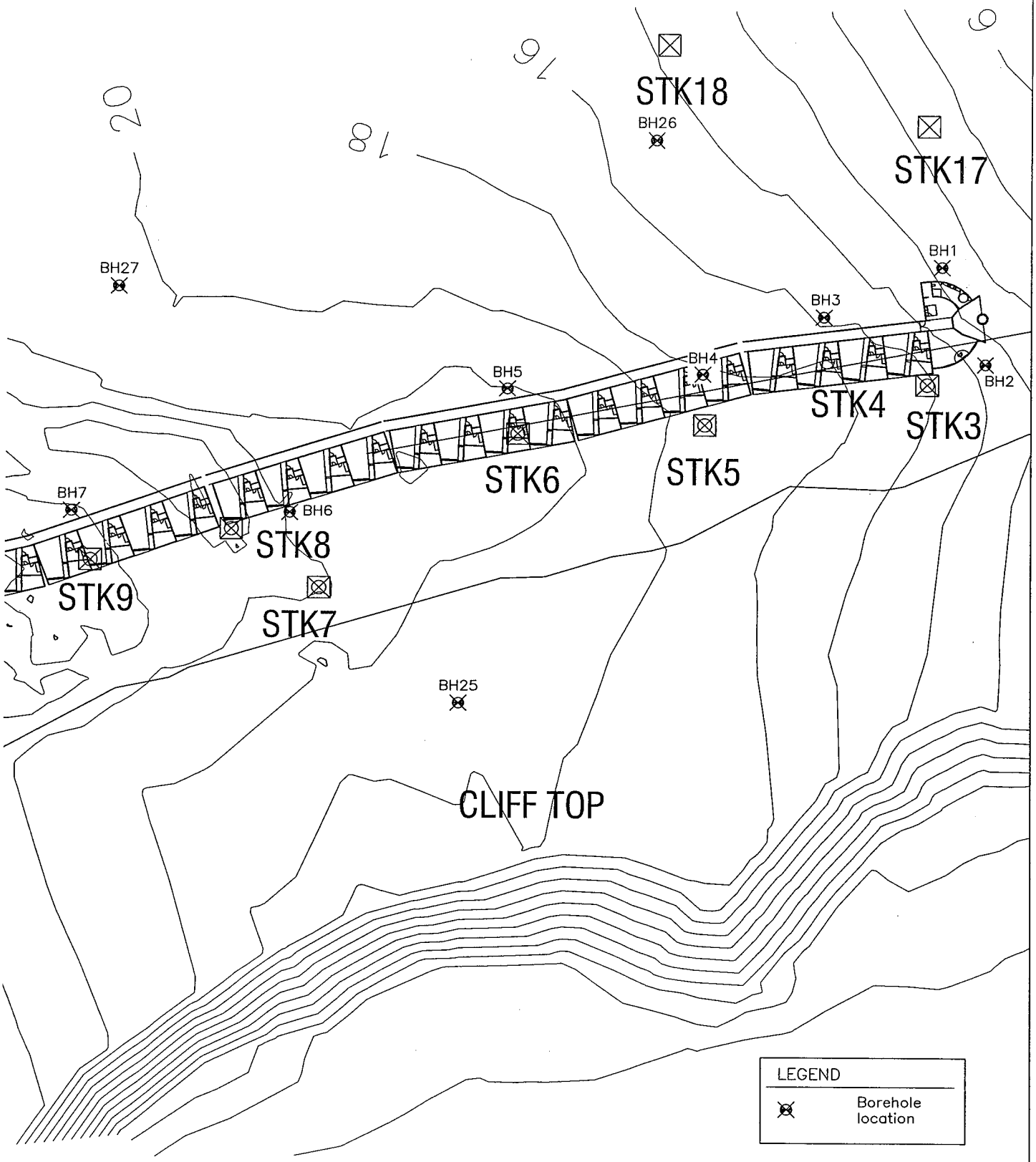
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TITLE: BOREHOLE LOCATION PLAN



Project North	Design —	Ref. no.	5415
	Drawn MP		
	Date 21/12/2005	Sheet D1 of 1	Rev.
	Scale 1 : 100		



The following data has been visually assessed and hence is approximate only. Site features noted are shown only to bring their existence to the owners attention.

For an accurate assessment of the site, the measurements and levels should be taken and a contour plan prepared.

The approximate positions of the soil boreholes are as shown. Please refer to the borelogs for a description of the soil samples.

Appendix L

Economic assessment

Economic Impact of Southern Ocean Lodge

Prepared for

South Australian Tourism Commission

Prepared by

Syneca Consulting

15 March 2005

For further information, please contact:
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2. Visitors to South Australia **5**

3. Estimates of job creation **8**

Executive summary

Table 1 provides a summary statement of the spending and employment impacts of Southern Ocean Lodge (SOL), the main points being that:

- The operator expects guests of SOL to spend about $7.65 million/year on Kangaroo Island, most of which ($7.2 million) would be spent at SOL itself. Additional spending on mainland South Australia has been put at $1.15 million/year, mainly in recognition of Adelaide's gateway function. Total additional spending is $8.8 million/year.
- Based on conservative estimates of the direct employment multipliers, 35.2 FTE (full time equivalent) jobs will be created on Kangaroo Island, and 42.1 FTE jobs in South Australia as a whole. These are jobs in the 'front line' businesses that provide services directly to visitors.
- The intermediate jobs estimate is higher again – 44 FTE on Kangaroo Island and 63.1 in South Australia. These estimates allow for jobs created in businesses that supply the front line, or provide goods and services to the direct employees. The larger multiplier for South Australia reflects the greater depth of the mainland economy, capturing more of the flow-on effects than on Kangaroo Island. Regard these as the medium term impacts, starting in the 5th year of operations.
- The final jobs estimate is 50.6 FTE on Kangaroo Island and 78.9 FTE in South Australia. It allows for jobs in the provision of infrastructure and public services to the general population. These are longer term effects.

These estimates make no allowance for net positive external effects of SOL on the pace and mix of tourism investment in South Australia. Given the close fit between SOL and the state's current *Tourism Plan* – in terms of product development, cost effective marketing, and investor competence and confidence – these external effects may be significant over the longer term. There appear to be no significant constraints on the expansion of this type of enterprise on Kangaroo Island itself – for example, in terms of displacement of existing tourism operations or congestion of infrastructure or attractions. However a minority of residents may oppose the development.

Table 1 Summary statement of spending and employment impacts of SOL

Spending/employment area	*Southern Ocean Lodge*	*Elsewhere on Kangaroo Island*	*Total on Kangaroo Island*	*Elsewhere in South Australia*	*Total in South Australia*
1. Visitor spending ($ million)	7.2	0.45	7.65	1.15	8.8
2. Direct employment multiplier (jobs/$M)	4.5	6.0		6.0	
3. Total direct jobs (= 1 * 2)	32.5	2.7	35.2	6.9	42.1
4. Intermediate employment multiplier			1.25		1.5
5. Total intermediate jobs (= 3 * 4)			44.0		63.1
6. Final employment multiplier			1.15		1.25
7. Total final jobs (= 5 * 6)			50.6		78.9

1. Visitors to Kangaroo Island

Visitors come to Kangaroo Island mainly because they have general interest in wildlife and the natural environment; that is the consistent finding of periodic visitor surveys. Visitors take in its natural beauty, experience native wildlife, and relax. These factors all score 7.5 or better for importance, on a scale of 1 to 10[1]. By contrast, the quality of accommodation and the experience of local produce are only of moderate importance. They score 5 out of 10.

Southern Ocean Lodge (SOL) is designed to offer something quite different, targeting a decidedly high-yield market. The interest in wildlife and nature is still the core but with world-class accommodation, meals, service and facilities. Guest expenditures will be of the order of $1,000-$1,200 per person per night. This section reviews the possible effect on overall visitor traffic to Kangaroo Island, providing a basis for the assessment of economic impacts.

1.1 Operator's expectations for occupancy of Southern Ocean Lodge (SOL)

Table 2 reports the operator's expectations for occupancy at SOL. The 25 suites are expected to achieve 65% occupancy after 5 years, with an average of 2.1 persons per suite and an average stay of 2.8 days. Annually this means that there will be a total of 4,500 guests staying for a total of 12,500 nights.

This is a 4.5% increase on national survey estimates of the number of overnight visitors to Kangaroo Island and a 2.8% increase in the number of visitor-nights. The increase in visitor nights is somewhat less because the operator puts the average stay at SOL (2.8 nights) at a level that is somewhat lower than the figure returned by the national surveys (4.1 nights).

In addition to the overnight visitors there are also 30-40,000 day-trippers. However their economic impact is qualitatively different to that of overnight visitors.

Table 2
Operator's estimates of occupancy

Rooms	25
Average persons per room	2.1
Average stay	2.8
Occupancy	65%
Number of guests per year	4,500
Total visitor nights per year	12,500

1.2 Scope for negative external effects

Direct impacts on existing tourism operators

It seems unlikely that SOL will directly take much business from existing operators. The general facts about visitor accommodation on Kangaroo Island are as follows:

- 200 accommodation providers are registered with Tourism KI, which is the local booking agency. They provide the bulk of the available rooms.

[1] These findings are from the Visitor Exit Surveys conducted by the Kangaroo Island Tourism Optimisation Management Model (TOMM), published in annual reports of the TOMM Management Committee.

- Charges are relatively modest with plenty of options at the budget end:
  - Camping sites - $5.50/night
  - Backpackers - $20-70/night
  - Caravans - $70-80/night
  - Holiday homes and units - $70-200/night
  - Bed & Breakfast - $100-$150/night
  - Hotels - $140-250/night. There are about 6 establishments in this range, all situated in townships.
- Most accommodation is in coastal areas but with the important exception the hotels, all of which are situated in one or other of the townships on the North coast - Kingscote, Penneshaw and American River. Basically people must choose between two imperfect options. They can stay in town and travel relatively long distances to visit the attractions around the coast. Or they can stay on the coast, carrying all or most of their supplies and taking 2-3 hour round-trips to a township for resupply.
- The quantity of accommodation is growing steadily in response to increasing demand, possibly by 1-2% per year.
- There are only a few establishments providing anything like a broad range of services on-site, and these would usually only extend to meals and organised tours. The dominant pattern is for people to use their accommodation as a base and find their own way around the island.

Displacement of day tripper traffic
There is likely to be some displacement of day-tripper traffic to the island. Many up-market visitors to the island are on a one-day excursion from their accommodation on the mainland. They fly in on the early plane, visit the iconic sites by hire car, and fly out on a late plane. It is reasonable to expect that a proportion of these will convert to an on-island holiday if suitable accommodation is available.

This type of displacement would be very welcome on Kangaroo Island. Day trippers are regarded as intensive users of public infrastructure during their short stay – particularly roads, public amenities and waste disposal – but provide little additional business for the on-island economy.

Congestion of physical infrastructure
There are issues of infrastructure quality on the island, particularly unsealed roads. However there are no significant issues of infrastructure congestion of the kind that cannot be relieved through the normal processes of local government planning and investment.

Destination congestion
Based on visitor surveys, virtually all visitors (97%) report satisfaction with their visit and would recommend it to others. In particular they report high levels of satisfaction on their main objective, which is to see wildlife – scoring 8.5 out of 10.

Based on discussions with operators, there can be large numbers of people at the icon sites (eg, Seal Bay and Flinders Chase), but not enough to detract from the experience.

Accordingly, this assessment assumes there are no significant issues of congested destinations.

Resident attitudes
Visitors report high levels of satisfaction with the levels of personal service. And periodic resident surveys indicate that residents are generally supportive of increased tourism activity. Key findings from the most recent survey are that:

- KI residents live lives that are peaceful, safe and healthy, with little traffic, uncrowded parks and beaches. And they enjoy interacting with visitors.

- 80% favour continued population growth. But they are divided on the issue of residential development in coastal areas.
- The balance of opinion is similarly favourable to tourism. 80% understand the potential for KI to be a world-leader in environmentally-friendly nature-based tourism.
- Residents were asked to respond to a carefully worded question about coastal developments. They were asked about developing visitor accommodation … *in a limited number of coastal strategic locations provided they are attractively situated, small to medium scale, and achieve excellence in environment design and management*. While two thirds responded positively it is apparent that there is minority opposition to tourism developments in the coastal zone.
- There is general opposition to the development of large scale luxury hotels and resorts.

For the purposes of this assessment it is assumed that SOL would not be regarded as a large luxury hotel or resort; that concerns about protection of the coastal zone are addressed; and that the harmonious relationship between visitors and residents is not degraded. Probably the key is the activities undertaken by visitors, in particular that they are consistent with the current focus on wildlife and environment.

1.3 Scope for positive external effects

A new development can create positive external effects of various kinds. For example:

- *Development of local supply chain:* SOL will create a new set of demands for local suppliers, including for restaurants, local produce and touring/sightseeing services. These enhanced services will then be available directly to other visitors and to other operators on the island.
- *Local skill base:* SOL expects to make a considerable and ongoing investment in staff training. There is a prospect of setting up remote training services provided by the Hotel School at the University of Adelaide. Given the normal turnover of staff in the hospitality industry, these skills will become available to the tourism industry more generally on Kangaroo Island.
- *Beneficial change in economic geography:* SOL will create a new focus for activity on the Western and Southern sides of the island. By contrast, the existing townships are located centrally or on the Northern and Eastern sides. This may relieve some of the tension between visitor preferences for both more remote accommodation and access to township services, which are currently difficult to reconcile except by spending considerable time travelling. The new options may attract more visitors or induce them to stay longer.
- *Marketing externalities:* Kangaroo Island already has an international reputation for the mix of visitor experiences currently provided. It is apparent that the visitor-to-visitor grapevine is important, given the flow of off-season European visitors who have never been to the island before; they are making a once-in-a-lifetime visit. SOL will initiate the grape-vine effect in entirely new circles and networks, to the general benefit of tourism operators on the island.

1.4 Conclusion

Overall, it appears that Kangaroo Island is subject to no significant constraint that threatens to crowd-out existing business through negative external effects. The operator's estimates for visitors to SOL may therefore be taken as a minimum estimate of the additional visitors to Kangaroo Island. These are put at 4,500 guests per year and 12,500 guest-nights per year – see table 2.

2. Visitors to South Australia

Impacts at the state level can be quite different to those at the local level. In a worst case scenario, for example, the additional visitor spending on Kangaroo Island might simply be at the expense of spending elsewhere in the state. On the available evidence, however, there will also be net positive external effects at the state level. This section explains the basis for that conclusion. It is organised around a series of issues identified in the *South Australian Tourism Plan: 2003 to 2008*, the *South Australian Tourism Export Strategy*, and SATC's Briefing Paper on regional investment *Stimulating Tourism Investment in Regional South Australia*.

2.1 Product development

Based on the market analysis presented in the *Tourism Plan*, South Australia rates highly in consumer perceptions for 'food and wine' experiences, but low for 'rich natural assets' and 'integrated coastal' experiences. 65% of Sydney and Melbourne residents recognise the former qualities but the latter qualities have only 12% and 6% recognition respectively. Obviously, people can get a taste for South Australia's food and wine from a distance, most obviously by consuming a bottle of wine from the Barossa Valley. South Australians now have long experience and considerable expertise in presenting food and wine experiences in a memorable way that generates repeat and flow-on visits.

The lack of recognition for natural assets and coastal experiences is not for any lack of natural endowment. Currently, however, these experiences are only available to those who know when and where to look and are prepared to do without some creature comforts, which may include travelling over some rough roads and taking a chance on the quality of accommodation provided. Potential new visitors need more structure than that, if they are to come away with a strongly positive experience. South Australians need to learn how to present these experiences in a memorable way that generates repeat and flow-on visits for these market segments.

The *Tourism Plan* also identifies a need to develop experiences for visitors who are looking for more intensive or even participatory activities (in contrast to the generic 'drive' market). They are willing to get out of their cars for extended periods, do a certain amount of walking or cycling, and give time and attention to the local culture, history and natural environment. The *Plan* sees this as a particular market segment in which South Australians must become more proficient.

Accepting that analysis, it seems clear that SOL would not be competing primarily in the market for 'food and wine' experiences and does not threaten to crowd-out existing operators. From the state perspective, SOL is a new product that diversifies the visitor traffic. It breaks new ground in the sense of providing the structure that the non-expert needs in order to come away with memorable experiences of nature and wildlife. For example, SOL's Development Application explains that:

> *… A key member of staff will be an ecologist/naturalist responsible for the environmental management of the site, the organisation of tours within and beyond the site, liaising with expert researchers to increase knowledge of the area, the organisation of in-house lectures and tours with wild life experts and generally ensure that not only do guests share a unique experience but that the total site is managed in a sustainable manner*. (SOL Development Application, Feb 2005)

While the structure provided by SOL is necessarily 'private', in the sense that it is provided on-site at SOL, it provides a template for the provision of more open structures,

jointly delivered by commercial operators, local governments and other government agencies. It is like a meal in many ways – intensive, reasonably expensive and highly structured – but for many better than food and wine.

2.2 Cost effectiveness of marketing activity

The cost of international marketing is seen as a particular impediment, not only for individual operators but also for SATC. The situation is that SATC organises international marketing activities around coherent packages of South Australian tourism products, and with the active participation of operators in the focus areas. These activities will be reorganised if SOL is added to the product range. The following markets will be given more attention:

- Incentives market, that is, where an organisation rewards its staff with high-value trips to destinations such as SOL.
- Small meeting and conventions market, which require a minimum of 10-15 rooms plus on-site facilities.
- Luxury market, particularly from North America.

SATC would not have any more money to spend but expects to spend its budget more cost effectively with SOL taking a prominent place in some packages.

A key element of the marketing plan is to develop Adelaide's reputation as a gateway to destinations beyond the immediate regional areas such as Barossa, Adelaide Hills and Fleurieu Peninsula. Looking around the compass, Adelaide can develop as a gateway to the North and West (the Outback and Nullarbor), to the East (the Murray), and to the South (Kangaroo Island and the Coorong). The effect of additional visitor traffic to Kangaroo Island is to strengthen that spoke in the wheel, driving down the unit cost of gateway facilities and infrastructure for all uses of the gateway, and stimulating tourism activity in general.

2.3 Investor competence and confidence

Tourism is a highly specialised and demanding business, presenting very particular challenges of:

- market analysis and the matching for facilities to markets;
- planning and approvals processes;
- demand that fluctuates seasonally and from year to year;
- exposure to international competition, of which the exchange rate is a constant reminder;
- need to constantly refresh and re-invigorate the product through innovation.

As in any industry, only experienced and knowledgeable investors will succeed. A significant part of the challenge for South Australia, recognised in the *Plan*, is to build up the competence and confidence of local investors. A particular need is investment in regional accommodation, which is currently stalled at the Bed & Breakfast stage. There are large gaps at the next level of accommodation, which are medium-sized establishments with 30-50 units. How might SOL further that cause?

SOL approximates the next level of accommodation, with 25 suites. One effect may be to cause investors to think again and question their assumptions about what can be achieved in regional South Australia. This is the so-called demonstration effect.

A second effect is to build up the information base that is available to investors. There are various sources:

- SOL's participation in the marketing activities organised by SATC;

- visitor surveys that will now include a sprinkling of SOL guests;
- networking with SOL staff and ex-staff;
- social and commercial interaction with the new visitors to Kangaroo Island;
- social and commercial interaction with SOL's managers and owners;
- observing how SOL copes with fluctuations, be they seasonal, cyclical or caused by movements in the exchange rate.

SOL may also change visitor expectations in general, prompting enquires about similar accommodation elsewhere and sending positive new signals to potential investors.

2.4 Public sector competence and confidence

SATC's various planning documents recognise a need for government agencies to participate actively in the development of new tourism activity. This goes beyond the creation of demand through promotional and marketing activities. There is also a supply side strategy, broadly designed to bring businesses and product opportunities to the investment-ready stage. Public sector perceptions of what constitutes viable tourism products are critical, a particular danger being that the opportunities to develop niche markets for intensive activities will simply not be recognised.

Again the effect of SOL may simply be to provide a high-profile challenge to conventional assumptions about tourism, initiating a re-think in the public sector.

2.5 Conclusion

We conclude that SOL creates significant positive externalities at the state level, delivering economies of scale and scope for the existing tourism infrastructure, and some inspiration and challenge to boot. The operator's estimates for visitors to SOL may therefore be taken as a minimum estimate of the additional visitors to South Australia. These are estimated to be 4,500 guests per year and 12,500 guest-nights per year – see table 2.

3. Estimates of job creation

Based on the analysis presented in the first two sections, it is therefore reasonable to take the operator's estimates of SOL guests as a minimum estimate of the additional visitors to Kangaroo Island and to South Australia, building the assessment of economic impacts on that foundation.

The assessment comes together in three stages, starting with the operator's estimates of job creation (section 3.1), adding flow-on effects to the economy of Kangaroo Island (3.2), and then repeating the analysis for the economy of South Australia (3.3). The final section puts this in a timeframe, dealing separately with the shorter term and longer term impacts.

3.1 Operator's estimates of job creation

The operator has provided the following estimates of the direct economic impacts in the longer term, that is, with occupancy stabilising at 65%.

- $7.2 million - guest expenditure for accommodation and services at SOL, 60% of which would be for accommodation.
- 24.5 full-time equivalent (FTE) employees in hospitality, service and activities. These comprise an average of 26 staff during a 9 month peak/shoulder season and 20 staff for a 3 month off season.
- 8 FTEs in management, sales and marketing, and accounting.
- $0.45 million – guest expenditure elsewhere on the island, for tours etc.

The total number of direct jobs is 32.5 FTE (= 24.5 + 8). The implied ratio of jobs to guest spending at SOL is 4.5 jobs per million dollars of expenditure. This is somewhat outside the conventional range of estimates, which is 6-8.5 jobs per million dollars[2]. However, the development is capital intensive, reflecting its remoteness. This not only raises the unit cost of construction but also requires the construction of roads and other infrastructure. Costs are higher by a factor of 4 or 5. Accepting that a disproportionately large part of guest expenditure is to cover high construction costs, the figure of 4.5 jobs per million dollars is taken as reasonable.

The operator expects relatively little additional expenditure elsewhere on the island - $0.45 million. Assuming a direct jobs multiplier from the low end of the range (6 FTE per million dollars), this would create an additional 2.7 jobs (= 6 * 0.45).

Accordingly the total number of direct jobs is put at 35.2 FTEs (= 32.5 + 2.7).

3.2 Job creation on Kangaroo Island

The additional activity and employment at SOL and in other businesses that service visitors directly will also have flow-on effects to the rest of the local economy. These effects are estimated in two further stages, characterised by an *intermediate employment multiplier* and a *final employment multiplier*.

The intermediate jobs estimate allows for (a) the employment effects on local businesses that supply the front-line businesses, for example, the butchers and bakers that supply the

[2] This is range reported by the Bureau of Tourism Research in its recent study of the relationship between tourism expenditure and employment in regions – Johnson L, LM Foo, I Buchanan & B Hendrick (2001) *Regional Tourism Employment: A Case Study Approach,* BTR Occasional Paper No. 33.

restaurants, and (b) employment effects flowing from the spending of the incomes earned in jobs supported by visitor spending, for example, in local retailing[3]. These flow-on effects are expressed here as an intermediate employment multiplier, which is the ratio of the total number of jobs created at the intermediate stage to the number of direct jobs. The available estimates are in the range 1.25 - 1.75[4], which is to say that about 1.5 intermediate jobs, including direct jobs, is created for each direct job in businesses that provide goods and services directly to visitors. A multiplier from the low end of the range (1.25) is adopted for present purposes, considering that the supplier structure is relatively thin, reflecting the remoteness and small size of the local economy. The estimate of total jobs at the intermediate stage is therefore 44 (= 35.2 * 1.25).

The final jobs estimate includes an allowance for the public sector and infrastructure jobs that provide the physical and service framework in which the market operates. These services are funded by taxation revenue and investment capital. They include, for example, local builders and manufacturers who provide buildings and equipment for the local economy, employees of KI Council, teachers and health workers employed by the South Australian government, and social security workers employed by the Commonwealth government. It would be reasonable to add 15% to the intermediate estimate to allow for these effects. Accordingly, the final employment multiplier has been put at 1.15 and the final estimate of additional jobs is 50.6 (= 44 * 1.15).

3.3 Job creation in South Australia

The same analytical framework can be applied to obtain estimates of additional jobs that SOL would provide for South Australia. (We include the jobs created on Kangaroo Island in the state wide estimate.) The state-wide estimate is significantly larger, for 3 reasons:

- Visitor expenditure for services provided on Kangaroo Island is only part of the total cost of organising a trip to the island. Visitors also incur off-island costs, for example, expenditure on transport to and from the island and expenditure on accommodation and meals in Adelaide or elsewhere in transit to Kangaroo Island.
- The intermediate employment multiplier is also larger, reflecting the much greater depth of the South Australian economy compared with that of Kangaroo Island. Many of the production-induced and consumption-induced effects will be captured by the mainland economy.
- The final employment multiplier is larger for much the same reasons. Many of the public sector and infrastructure tasks required by the residents of Kangaroo Island are undertaken from the mainland.

Direct employment in South Australia

Regarding the first of these 3 effects, table 3 shows the results of a recent assessment of how expenditures of visitors to Kangaroo Island are allocated between Kangaroo Island, the rest of South Australia, and the rest of the world. The estimates are drawn from a study commissioned by *National Parks and Wildlife SA*[5]. Estimates are provided at three levels.

- The first reports total expenditure by overnight visitors to Kangaroo Island in 2001. The total is $76.4 million, with the largest share ($29 million) contributed by international visitors.

[3] These two effects are referred to as *production-induced* and *consumption-induced* effects respectively.

[4] These are estimates reported in the Tourism Impact Model, developed by the Commonwealth Department of Industry Tourism and Resources – DITR (2004), *Tourism Impact Model for Australian Local Government: A user manual and CD.*

[5] Hudson Howells, Economic Research Consultants & T Mules (2002), *Assessment of the Economic Impacts of the Protected Areas of Kangaroo Island*, Report to National Parks and Wildlife SA, July.

- The second level is expenditure on services provided within South Australia, obtained by deducting allowances for international and interstate travel and other expenditures at source or in transit to South Australia.
- The final level is expenditure on Kangaroo Island, obtained by deducting allowances for travel from the mainland to Kangaroo Island and other in-transit expenditures, most of which would be in Adelaide.

The bottom panel of table 3 reports the ratio of expenditure in South Australia to expenditure on Kangaroo Island. The ratio is somewhat higher for South Australian visitors (1.2) than for international visitors (1.1), possibly reflecting a judgement that intrastate visitors are more likely to stock up with food and other supplies before the trip. Whatever the reason, however, the broad finding is that there should be an allowance for additional expenditure within South Australia equal to 10-20% of the estimated expenditure on Kangaroo Island.

Taking an intermediate figure of 15% this figuring suggests that the visitor spending that SOL would bring to South Australia has three elements: $7.6 million at SOL; $0.45 million for other spending on Kangaroo Island; and $1.15 in Adelaide or elsewhere in South Australia. We have estimated the direct jobs from the first two elements at 32.5 and 2.7 FTE respectively. Assuming a direct jobs multiplier of 6/$M for the mainland spending, the third element adds another 6.9 FTE (= 1.15 * 6). The tally of direct jobs for South Australia is 42.1 FTE.

Table 3
Estimated expenditure by overnight visitors to Kangaroo Island, 2001

	International visitors	*Interstate visitors*	*South Australian visitors*	*All visitors*
Total expenditure ($ m)	29.0	20.7	26.7	76.4
Expenditure in South Australia ($m)	19.1	15.5	23.2	57.8
Expenditure on Kangaroo Island ($ m)	17.4	13.9	19.3	50.6
Memo: Ratio of SA expenditure to KI Expenditure	1.10	1.12	1.20	1.14

Source: Hudson Howells, Economic Research Consultants & T Mules (2002), *Assessment of the Economic Impacts of the Protected Areas of Kangaroo Island*, Report to National Parks and Wildlife SA, July.

Intermediate and final employment estimates for South Australia
In scaling up from the Kangaroo Island economy to the South Australian economy, we have allowed for modest increases in the intermediate and final employment multipliers. This recognised the greater depth of the mainland economy and the capture of additional flow-on effects on the mainland. The intermediate multiplier has been increased from 1.25 to 1.5, and the final multiplier has been increased from 1.15 to 1.25.

Given those assumptions, the additional jobs at the intermediate stage are estimated at 63.1 FTE (= 42.1 * 1.5). The additional jobs at the final stage are estimated at 78.9 FTE (= 63.1 * 1.25).

3.4 Economic impacts in space and time

Table 4 provides a summary statement of the estimates described in sections 3.1 to 3.2; it is repeated as table 1 in the Executive Summary. View it as a spatial account of the impacts, spreading out from SOL to the economy of Kangaroo Island and subsequently to the economy of South Australia. Taking all flow-on effects into account, the final impact

on the South Australian economy (78.9 FTE) is about 2.4 times larger than the direct employment at SOL (32.5 FTE).

There is a corresponding time profile, with the following broad characteristics:

- SOL could be fully operational for 2006/07 season and will start to have a direct impact in the later years of the current *Tourism Plan,* which is for the period 2003 to 2008.
- The estimates of direct and intermediate impacts presented in table 4 may be regarded as outcomes that will be observed in the medium term; they reflect the operator's expectations for the fifth year of operation. This is the period after construction is complete and SOL has settled into its work.
- The final employment effects may be regarded as longer term impacts as the general population adjusts to the new pattern of economic activity, and providers of infrastructure and government services adjust to the population movements.

It remains to briefly note other shorter and longer term effects that have not been fully quantified.

Construction and ramp-up phase

The operator expects SOL to achieve early success, with occupancy of 40% in the first year and growing to a mature level of 65% over 5 years. At worst, therefore, the jobs created in the early years of the projects will be somewhat lower than the medium term projection. During the 12 month construction phase, for example, it is expected that there will be 20 construction workers on-site, compared with projected SOL staffing of 32.5 FTEs. Making a reasonable allowance for the early recruitment of managers and the need to start work on marketing and sales during the construction phase, it seems the early phases of the project will provide a level of job creation that is broadly similar to the medium term projection.

Longer term developments

The outlook over the longer term is that the estimates presented in table 4 will be augmented by positive external impacts. While there is a reasonable understanding of how these effects operate, as discussed in sections 1 and 2, it is not feasible to provide an estimate of their quantitative significance.

Table 4
Summary statement of spending and employment estimates

Spending/employment area	*Southern Ocean Lodge*	*Elsewhere on Kangaroo Island*	*Total on Kangaroo Island*	*Elsewhere in South Australia*	*Total in South Australia*
1. Visitor spending ($ million)	7.2	0.45	7.65	1.15	8.8
2. Direct employment multiplier	4.5	6.0		6.0	
3. Total direct jobs (= 1 * 2)	32.5	2.7	35.2	6.9	42.1
4. Intermediate employment multiplier			1.25		1.5
5. Total intermediate jobs (= 3 * 4)			44.0		63.1
6. Final employment multiplier			1.15		1.25
7. Total final jobs (= 5 * 6)			50.6		78.9