LINDEMAN GREAT BARRIER REEF RESORT PROJECT

ENVIRONMENTAL IMPACT STATEMENT

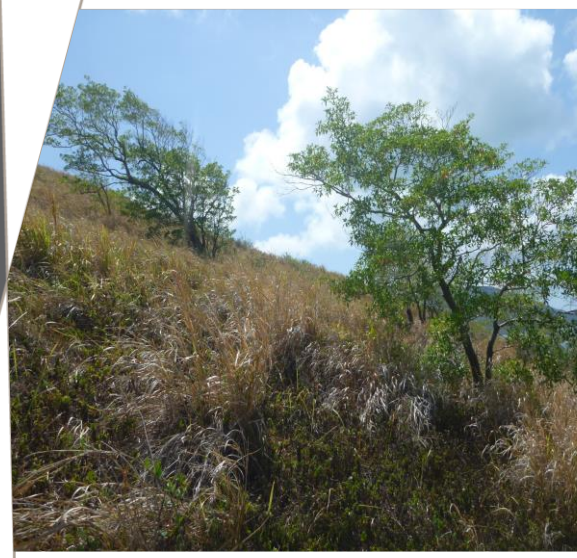
APPENDIX R - BIOSECURITY

Addendum: *This EIS was initially prepared assuming that the safe harbour was to be part of the Lindeman Great Barrier Reef Resort Project. With the commencement of the Great Barrier Reef Marine Park Authority's (GBRMPA) Dredging Coral Reef Habitat Policy (2016), further impacts on Great Barrier Reef coral reef habitats from yet more bleaching, and the recent impacts from Tropical Cyclone Debbie, the proponent no longer seeks assessment and approval to construct a safe harbour at Lindeman Island. Instead the proponent seeks assessment and approval for upgrades to the existing jetty and additional moorings in sheltered locations around the island to enable the resort's marine craft to obtain safe shelter under a range of wind and wave conditions. Accordingly, remaining references to, and images of, a safe harbour on various figures and maps in the EIS are no longer current.*

Lindeman Island Integrated Tourist Resort

Biosecurity Assessment

HRP15078



Prepared for
White Horse Australia Lindeman Pty Ltd

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Contact Information

Cardno (Qld) Pty Ltd
ABN 57 051 074 992

Level 11 Green Square North Tower
515 St Paul's Terrace
Locked Bag 4006
Fortitude Valley Qld 4006

Telephone: 07 3369 9822
Facsimile: 07 3369 9722
International: +61 7 3369 9822

www.cardno.com.au

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Executive Summary

White Horse Australia Lindeman Pty Ltd (WHA) propose to redevelop the existing resort at Lindeman Island into three world class tourist resorts. The proposed design incorporates environmental improvements to protect the values of the Great Barrier Reef World Heritage Area and set new international standards in environmental sustainability and resort design. Key aspects of the proposed development include:

- Beach Resort - redevelopment of the existing resort to achieve a new 5 star Beach Resort with 136 units, conference centre, beach club and a central facilities building with restaurants, bars and lounges;
- Spa Resort - a new 6 star Spa Resort with 59 units, central facilities, entry lounge, spa, sea view restaurant, pool and a signature rock bar providing spectacular alfresco dining close to the sea;
- Eco resort - a new 5 star Eco Resort near the existing lake consisting of 41 units, a central facility, boathouse and a waterside restaurant;
- Tourist villa precincts - two precincts accommodating 89 tourist villas are proposed to the north-east and north-west of the existing resort;
- Village - a central village precinct comprising restaurants, bar, night club, conference facility buildings, arrival centre, shops, sport and recreation centre and a staff village;
- Services infrastructure precinct - a new precinct with services including power generation (solar with diesel back-up), sewage treatment and water treatment designed to reflect current best practice;
- Airstrip - the existing airstrip is proposed to be upgraded to provide for near all-weather status, capable of landing light aircraft and helicopters;
- Golf course – a recreational golf course is proposed;
- Safe Harbour - a new Safe Harbour is proposed to provide reliable access for the transfer of guests via ferries, luxury vessels and private charters offering greater protection from the prevailing wind direction;
- Ecotourism facilities - a National Park and Great Barrier Reef Educational Centre and 30 glamping facilities are being investigated in consultation with the State Government; and
- Environmental enhancements – native vegetation replanting, improvements to stormwater management and a shift towards renewable energy sources are proposed.

This assessment addresses the existing and potential biological threats to Lindeman Island, and where applicable, the legislation that governs their management including the *Biosecurity Act 2014* and the *Public Health Act 2005*. This includes biological threats posed by:

- non-native plant species;
- non-native animal species;
- non-native marine plant and animal species;

Recommendations relating to the potential biological threats have been outlined with the aim to:

- limit the introduction of new threats;
- limit the spread of existing threats; and
- control threats.

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1 Project Background and Scope

1.1 Project Background

White Horse Australia Lindeman Pty Ltd has proposed a redevelopment of the existing resort complex on Lindeman Island. Lindeman Island is located approximately 35 km south east of Shute Harbour. Lindeman Island is part of the Whitsunday Islands aggregation.

White Horse Australia Lindeman Pty Ltd (WHA) propose to redevelop the existing resort at Lindeman Island into three world class tourist resorts. The proposed design incorporates environmental improvements to protect the values of the Great Barrier Reef World Heritage Area and set new international standards in environmental sustainability and resort design. Key aspects of the proposed development include:

- Beach Resort - redevelopment of the existing resort to achieve a new 5 star Beach Resort with 136 units, conference centre, beach club and a central facilities building with restaurants, bars and lounges;
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- Safe Harbour - a new Safe Harbour is proposed to provide reliable access for the transfer of guests via ferries, luxury vessels and private charters offering greater protection from the prevailing wind direction;
- Ecotourism facilities - a National Park and Great Barrier Reef Educational Centre and 30 glamping facilities are being investigated in consultation with the State Government; and

Environmental enhancements – native vegetation replanting, improvements to stormwater management and a shift towards renewable energy sources are proposed.

The proposed site is bound on its northern and eastern borders by the Lindeman Island National Park. The island itself form part of the Great Barrier Reef World Heritage Area.

1.2 Scope

This Biosecurity Assessment has been prepared in response to *Clause 13.33 of the Terms of Reference:*

> *The construction and operation of the project should aim to ensure:*
>
> *(a) the spread of weeds and pest animals is minimised*
>
> *(b) existing weeds and pests are controlled.*
>
> *13.33 Identify the presence of existing pests and weeds on Lindeman Island and in the Marine Park. Propose detailed measures to control and limit the introduction or spread of pests (including possible disease vectors) and weeds on the project site and adjacent areas. This includes declared plants under the Plant Protection Act 1989 and the Land Protection (Pest and Stock Route Management) Regulation 2003, weeds of national significance, and designated pests under the Public Health Act 2005.*

This document identifies existing and potential pests and weeds, provides an assessment of the current extent of biological threats, and provides strategies to limit further spread and ensure no new introductions of biological threats occur. It is the aim of these strategies to maintain the ecological integrity of the island and national park. Whilst broad measures for pest and weed control are included as part of this risk assessment, detailed measures for control are beyond the scope of this document. Specific measures for the control and management of pests (including possible disease vectors) and weeds on the project site and adjacent areas will be covered by the Environmental Management Plan (EMP) and Pest Management Plan (PMP) for the Project.

2 Statutory and Strategies Context

2.1 Legislation

2.1.1 Land Protection (Pest and Stock Route Management) Act 2003

The *Biosecurity Act 2014* commenced on 1 July 2016. The Act effectively supersedes the parts of the *Land Protection (Pest and Stock Route Management) Act 2003* and the *Plant Protection Act 1989* that dealt with pest plants and/or animals. The *Biosecurity Act 2014* adopts a risk-based and less prescriptive approach to biosecurity in Queensland. Under the *Biosecurity Act 2014* certain species are regulated as either 'Prohibited matters' or 'Restricted matters':

- **Prohibited Matter**

  Prohibited matters are those not found in Queensland, but would have a significant adverse impact if it entered the State. Prohibited matters are listed in Schedule 1 of the Act.

- **Restricted Matter**

  Restricted matters presently found in Queensland and have significant impacts on human health, social amenity, the economy or the environment. Restricted matters are listed in Schedule 2 of the Act. They fall into seven categories (any one species may be included in multiple categories):

  - Categories 1 & 2

    Category 1 and 2 restricted matter have specific urgent reporting requirements. You must report restricted matter from these categories if it is present in, or on, something in your possession or under your control or at a place where you are the occupier, unless an appropriately authorised officer has already been advised or you possess a permit for the restricted matter.

  - Categories 3, 4, 5, 6 & 7

    These categories relate to a restricted matter that is in a person's possession, under their control and is also about not feeding particular restricted matters. Specific requirements for each include:

    - Category 3 – A person must not distribute (e.g. by gifting, selling, trading and/or releasing) this restricted matter unless authorised under a permit.
    - Category 4 – A person must not move this restricted matter to ensure that it does not spread into other areas of the state
    - Category 5 – Unless authorised under a permit a person must not possess or keep this restricted matter under your control
    - Category 6 – A person must not feed this category of restricted matter.
    - Category 7 – This category includes certain fish. A person must kill the restricted matter and dispose of the carcass by burying the who carcass (no parts removed) in

the ground above the high tide water mark or placing it in a waste disposal receptacle, if they have them in their possession.

2.1.2 Public Health Act 2005

The *Public Health Act 2005* aims to protect and promote the health of the Queensland public. Through the cooperation between State Government, Local Governments, healthcare providers and the community, the Act provides basic safeguards necessary to ensure ongoing protection of public health.

The supporting subordinate legislation is the *Public Health Regulation 2005* and details specific measures for the control of "designated pests," including mosquitoes, rats and mice.

2.2 Strategies and Plans

2.2.1 Weeds of National Significance

Based on an assessment on weed species invasiveness, potential to spread, and environmental, social and economic impacts, 32 Weeds of National Significance (WoNS) have been agreed to by Australian governments since 1999. State governments are responsible for developing legislation, regulation, and enforcement in regards to WoNS, while landowners and managers are responsible for managing WoNS.

Each WoNS has a specific strategic plan developed to outline responsibilities and identify strategies and actions to control the species. The management of WoNS requires coordination at all levels of government.

2.2.2 Mackay Regional Council

Mackay Regional Council has developed its Pest Management Plan in accordance with the superseded LP Act. It outlines Council's aims, scope and actions regarding declared pests, locally significant pest species, control and enforcement procedures, and preventative measures. Mackay Regional Council is in the process of completing a draft Biosecurity Plan in accordance with the *Biosecurity Act 2014* and intend for the draft Biosecurity Plan to be released by mid-June 2017.

3 Existing Exotic Species

3.1 Existing Terrestrial Pest Plant Species

3.1.1 Existing Exotic Species

Flora studies (Northern Resource Consultants, 2016) identified a total of 30 existing exotic species across the Lindeman Island Resort, identified in Table 3-1. The area for this survey covered the resort perpetual and term lease areas of Lindeman Island. A number of these species are present throughout the existing resort grounds and gardens, with others persisting in native regrowth and non-native grassland areas. While a total of 30 exotic species have been recorded, not all represent a significant environmental threat. For example, the garden plant Golden Cane (*Dypsis lutescens*) is very unlikely to spread, however the *Biosecurity Act 2014* Class 3 - Restricted species Broad-leaved Pepper Tree (*Schinus terebinthifolius*) produces abundant seed and has potential to cause environmental harm. Species not listed under the *Biosecurity Act 2014*, such as Leucaena (*Leucaena leucocephala*), do have significant potential to cause harm and have consequently been a focus of Queensland National Parks and Wildlife Service (QPWS) pest control efforts. Table 3-1 highlights the status of species as pests/weeds.

Current threats from these exotic species include the impacts on native grassland integrity resulting from *Lantana camara* Lantana and non-native grass species invasion.

Exotic species were found across four remnant Regional Ecosystems, including:

- **8.12.11A** Semi-evergreen microphyll vine thicket +/- *Araucaria cunninghamii*, on islands and coastal headlands, on Mesozoic to Proterozoic igneous rocks and Tertiary volcanics
- **8.3.2** *Melaleuca viridiflora* woodland on seasonally inundated alluvial plains with impeded drainage
- **8.12.12D** *Eucalyptus tereticornis* and/or *Corymbia spp*. and/or *E. platyphylla* and/or *Lophostemon suaveolens* woodland to open forest on hill slopes on Mesozoic to Proterozoic igneous rocks
- **8.12.13A** Tussock grassland, or *Xanthorrhoea latifolia* shrubland, including areas recently colonised by *Timonius timon* var. *timon* shrubland, on slopes of islands and headlands, on Mesozoic to Proterozoic igneous rocks and Tertiary acid to intermediate volcanics

Table 3-1 indicates the distribution of exotic plants in these remnant Regional Ecosystems and non-remnant areas.

Table 3-1 Non-native plants identified

Family	Species	Common name	Status	Dispersal/	8.3.2	8.12.11	8.12.12	8.12.13	8.12.14	Non-remnant areas
Amaranthaceae	*Alternanthera brasiliana*	Purple joyweed		Humans, water, soil movement		X				X
Anacardiaceae	*Mangifera indica*	Mango		Humans, animals						X
Anacardiaceae	*Schinus terebinthifolius*	Brazilian pepper tree	Category 3	Animals, water						X
Apocynaceae	*Gomphocarpus fruticosus*	Narrow leaf cotton bush		Wind, animals				X		X
Apocynaceae	*Gomphocarpus physocarpus*	Balloon cotton bush		Wind, animals			X			
Apocynaceae	*Nerium oleander*	Oleander		Humans						X
Araceae	*Monstera deliciosa*	Fruit salad plant		Humans, animals						X
Arecaceae	*Caryota* sp.	Fishtail palm		Humans, animals, water						X
Arecaceae	*Dypsis lutescens*	Golden cane		Humans, animals						X
Asteraceae	*Ageratum conyzoides*	Billygoat weed		Water, wind animals, humans	X	X	X			X
Asteraceae	*Bidens alba* var. *radiata*	Bidens		Animals, humans, wind, water	X		X	X		X
Asteraceae	*Sphagneticola trilobata*	Singapore daisy	Category 3	Water, humans		X				
Asteraceae	*Tridax procumbens*	Tridax daisy		Wind						X
Caesalpiniaceae	*Delonix regia*	Poinciana		Animals, water, soil movement						X
Cyperaceae	*Cyperus involucratus*	Umbrella Sedge		Water						X
Fabaceae	*Centrosema molle*	Common centro		Humans, animals	X		X	X		X
Fabaceae	*Crotalaria pallida*	Streaked rattlepod		Water			X	X		X
Fabaceae	*Leucaena leucocephala*	Leucaena	Locally significant pest – Mackay	Animals, humans, water, wind		X				X

Family	Species	Common name	Status	Dispersal/	8.3.2	8.12.11	8.12.12	8.12.13	8.12.14	Non-remnant areas
			Regional Council							
Fabaceae	*Macroptilium atropurpureum*	Siratro	Environmental weed	Water, explosive dehiscence	X		X	X		X
Fabaceae	*Mimosa pudica*	Sensitive weed		Animals, humans	X		X	X		X
Fabaceae	*Senna pendula*	Cassia	Environmental weed	Humans, water soil movement						X
Fabaceae	*Stylosanthes scabra*	Shrubby stylo		Humans, animals, soil movement	X					
Malvaceae	*Hibiscus rosa-sinensis*	Chinese hibiscus		Humans						X
Malvaceae	*Sida hackettiana*	Golden sida		Humans, animals			X			X
Malvaceae	*Triumfetta rhomboidea*	Chinese Burr	Environmental Weed	Humans, animals, water, soil movement	X	X	X	X		X
Nyctaginaceae	*Bougainvillea sp.*	Bougainvillea		Humans						X
Passifloraceae	*Passiflora suberosa*	Corky passionflower	Environmental weed	Animals		X	X	X	X	X
Passifloraceae	*Passiflora foetida*	Stinking passion	Environmental weed	Animals			X	X		
Poaceae	*Digitaria didactyla*	Couch grass		Humans, animals, wind, water, soil movement				X		X
Poaceae	*Megathyrsus maximus*	Guinea grass	Environmental weed	Humans, animals, wind, water, soil movement			X	X		X
Poaceae	*Melinis repens*	Red natal	Environmental weed	Humans, animals, wind, water, soil movement			X	X		
Poaceae	*Sporobolus sp.*	Rat-tail grass	Category 3	Humans, animals, wind, water, soil movement			X			
Poaceae	*Themeda quadrivalvis*	Grader grass	Environmental weed	Humans, animals, wind, water, soil movement		X	X			X
Rutaceae	*Murraya paniculata*	Mock orange		Humans, animals						X

Family	Species	Common name	Status	Dispersal/	8.3.2	8.12.11	8.12.12	8.12.13	8.12.14	Non-remnant areas
Verbenaceae	*Lantana camara*	Lantana	Category 3, WONS	Animals, water, soil movement	X	X	X	X		X
Verbenaceae	*Stachytarpheta cayennensis*	Snake weed	Locally significant pest – Mackay Regional Council	Humans, animals, soil movement			X	X		X

Category 3 = Restricted weed under *Biosecurity Act 2014*, WONS = Weed of National Significance, Environmental weed = those exotic species likely to cause environmental harm through impacts on remnant vegetation.

Potential impacts and mitigation strategies relating to these species are included in Section 5 of this Report.

3.1.2 Fire and non-native plants

Queensland Parks and Wildlife Service Fire Strategy for the Whitsunday Islands Aggregation provides advice for the management of weed species with the use of fire (Queensland Parks and Wildlife Service, 2008).

Megathyrsus maximus var. maximus Guinea grass is fire tolerant, regenerating quickly after fire and increasing fine fuel loads. Guinea grass exists on Lindeman Island and has been promoted by frequent fire. Regrowth of Guinea grass that is burnt for the protection of life and property should be managed chemically. Managing regrowth is more effective than managing mature plants. Refer to the Lindeman Island Great Barrier Reef Resort Project Bushfire Hazard and Risk Assessment (Cardno, 2016) for further information.

Lantana camara Lantana thickets can be managed through strategic burns in fire-adapted ecosystems to reduce thicket densities. Further control relies on chemical application of post-fire regrowth.

Melinis repens Red natal grass has been observed to have varying response subject to fire. Mortality rates ranging from less than 30% to greater than 70% have been observed when subject to 100% leaf scorch. A second planned burn can be used after wet season grass recovery to further reduce infestations

3.2 Existing Terrestrial Pest Animal Species

The Northern Resource Consultants 2016 study recorded the following exotic species:

- *Rhinella marina* Cane toad
- *Rattus rattus* Black rat
- *Hemidactylus frenata* Asian house gecko

Under *Schedule 2* of the *Public Health Act 2005*, rats are prescribed as *designated pests*. Provisions of the *Public Health Regulation 2005* provide Local Governments with guidance on the requirements of proofing from rat entry and ensuring rats do not live or breed on land around a dwelling.

The Cane toad is considered a significant pest in Queensland (Department of Employment, Economic Development and Innovation, 2010) but is not scheduled under the *Biosecurity Act 2014*.

The Asian House Gecko is considered a "significant threat" to the abundance of native gecko species across its naturalised range (Department of Employment, Economic Development and Innovation, 2009). The species is common throughout many parts of Queensland in domestic environments.

3.3 Myrtle Rust

There have been no documented accounts of Myrtle Rust, *Uredo rangelii* or *Puccinia psidii,* on Lindeman Island. The current Queensland Government mapping for Myrtle rust distribution shows Lindeman Island as Myrtle Rust free (Department of Agriculture and Fisheries, 2012).

3.4 Mosquitoes

No mosquito surveys to date have been conducted nor have any species of mosquito been specifically identified on Lindeman Island.

3.5 Marine Pests

Baseline surveys conducted as part of the EIS have not recorded any marine pests in the location.

4 Potential Pest Species

4.1 Pest Plants

The proposed development of the resort has the potential to introduce exotic plant species not previously recorded on Lindeman Island through the construction and operational phases of development. Furthermore, there is the potential for native species from outside of the region to be introduced that could become pests (e.g. *Corymbia torelliana*). These species have the potential to pose serious local environmental impacts if they are permitted to invade. Exotic species of particular note include:

- *Pennisetum polystachion* Mission grass;
- *Cryptostegia grandiflora* Rubbervine[1]; and
- *Opuntia* spp. Opuntia cactus.

4.2 Pest Animals

The proposed development of Lindeman Island Integrated Tourist Resort has the potential to introduce exotic animal species not recorded on Lindeman Island previously through the construction and operational phases of development. These species may have the potential to pose serious local environmental impacts if they are permitted to invade. Exotic species of particular note include:

- Tramp ants (including Anoplepis gacillipes Yellow crazy ant, Solenopsis invicta Red imported fire ant, Pheidole megacephala African big-headed ant, and Wasmannia auropunctata Electric ant);
- House mouse *Mus musculus*;
- Pest birds (e.g. Acridotheres fuscus Indian myna and Passer domesticus House sparrow);
- *Felis catus* Cat; and
- *Sus scrofa* Feral pig.

4.3 Mosquitoes

Mosquitos have the potential to act as vectors of human disease. Increasing cases of Barmah Forest virus, Ross River Virus, and dengue have occurred in Queensland in recent years (Queensland Government, 2010). Species of note include:

- *Culex annulirostris* prefers to breed in ephemeral rain-filled ground pools is a known vector for Ross River Fever and Barmah Forest virus. The species is found throughout Queensland.
- *Aedes albopictus* is an exotic vector of dengue and chikungunya and is established on several islands in the Torres Strait. This species would pose a significant biosecurity threat if it became established on the mainland.
- *Aedes aegypti* is a vector of dengue and is dispersing across Queensland. It has been detected in central and southwest Queensland.

4.4 Fungus

The current Queensland Government mapping for Myrtle rust distribution shows Lindeman Island as Myrtle Rust free (Department of Agriculture and Fisheries, 2012). There is the potential for the pest to be introduced to the island through introduction of infected nursery stock.

4.5 Marine pests

Marine pests have the potential to pose serious economic, environmental, and social impacts if they are permitted to invade. Increased ship use of the jetty, barge landing point and moorings poses a biosecurity risk for new introductions. A desktop search on the National System for the Prevention and Management of Marine Pest Incursions database returned the following for marine pests in Queensland waters:

[1]Rubbervine was been previously observed, and subsequently controlled, at a dumping site on the western end of the cross-strip runway. This 'spot infestation' is also identified in the "Whitsunday Islands National Parks and adjoining State Water Management Statement 2013".This species was not observed during Northern Resource Consultants' ground-truthing surveys and therefore appears to have been eradicated.

- *Amathia distans* A Bryozoan
- *Anteaeolidiella indica* Japanese aeolid
- *Antennella secundaria* Knotted thread hydroid
- *Botrylloides leachi* Colonial ascidian
- *Botryllus schlosseri* Star ascidian
- *Bugula flabellata* A Bryozoan
- *Bugula neritina* A Bryozoan
- *Caulerpa taxifolia* Aquarium caulerpa
- *Ciona intestinalis* A Solitary ascidian
- *Cordylophora caspia* A Hydroid
- *Cryptosula pallasiana* A Bryozoan
- *Halecium delicatulum* A Hydroid
- *Hopkinsia plana* Sea slug
- *Hydroides elegans* Fouling serpulid
- *Hydroides sanctaecrucis* Caribbean serpulid tubeworm
- *Megabalanus tintinnabulum* Acorn barnacle
- *Obelia dichotoma* A Hydroid
- *Paracerceis sculpta* Sponge isopod
- *Paradella dianae* Sphaeromatid isopod
- *Perna viridis* Asian green mussel
- *Plumularia setacea* A Hydroid
- *Schizoporella unicornis* A Lace coral
- *Sphaeroma walkeri* Marine pill bug
- *Styela plicata* A Solitary ascidian
- *Teredo navalis* Naval shipworm
- *Ulva fasciata* Sea lettuce
- *Watersipora arcuata* A Lace coral

Section 5 provides an overview of the potential impacts and mitigation strategies relating to pest species.

5 Potential Impacts and Mitigation Measures

5.1 Risk Assessment Approach

The Terms of Reference requires the Environmental Impact Statement to identify the "measures to control and limit the introduction or spread of pests (including possible disease vectors) and weeds on the project site and adjacent areas."

The risk of creating the circumstances where existing pests can spread, new pests are introduced and facilitating the environment in which vectors of disease can prosper is the degradation of the natural environment (terrestrial and marine) and potential impacts on human health. An assessment approach has been developed to assess the circumstances that could result in such impacts. The assessment follows a risk assessment approach, presented in **Table 5-1.** This risk evaluation process affords a score ranging from Low (1) to Extreme (25).

Table 5-1 Standard Risk Assessment Matrix

RISK MATRIX	CONSEQUENCES				
PROBABILITY	Catastrophic Irreversible Permanent (5)	Major Long Term (4)	Moderate Medium Term (3)	Minor Short Term Manageable (2)	Insignificant Manageable (1)
Almost Certain (5)	(25) Extreme	(20) Extreme	(15) High	(10) Medium	(5) Medium
Likely (4)	(20) Extreme	(16) High	(12) High	(8) Medium	(4) Low
Possible (3)	(15) High	(12) High	(9) Medium	(6) Medium	(3) Low
Unlikely (2)	(10) Medium	(8) Medium	(6) Medium	(4) Low	(2) Low
Rare (1)	(5) Medium	(4) Low	(3) Low	(2) Low	(1) Low

The resulting risk assessment is presented in **Table 5-2**.

Table **5-2**. **Risk assessment matrix - Biosecurity.**

Potential Impact	Significance of Impact: Unmitigated	Mitigation Measure			Significance of Impact: Mitigated
		Design	Construction	Operation	
Terrestrial pest plants					
Movement of existing weed seed and/or introduction of new weeds in soil and mud on vehicles and machinery.	High (15)	• A Pest Management Plan (PMP) is developed that includes weed management strategies to be implemented across all natural environments. Declared weeds must be controlled as per the requirements of the *Biosecurity Act 2014*. A Construction Environmental Management Plan (CEMP), prepared prior to construction stages, incorporates weed management measures in reference to those outlined in the PMP.	• As part of the CEMP, vehicle and machinery hygiene measures are documented. These aim to prevent the introduction of weed seed and spreading of weeds during construction. • The CEMP also identifies that prior to decommissioning, significant weed species (e.g. those declared under the *Biosecurity Act 2014*) are treated to minimise the risk of spread. • CEMP outlines maintaining a clean, supervised loading point for machinery and vehicles on the mainland. • Implement Pest Management Plan • Rehabilitate all disturbed surfaces with local native plants.	• Implement Pest Management Plan	Low (3)
Introduction of new weeds or pathogens in construction materials (e.g. soil, fill and sand).	High (15)	• Preparation of a CEMP prior to the commencement of construction stages and incorporating measures to manage the introduction of construction materials or planting stock are documented.	• Implement Pest Management Plan • CEMP outlines maintaining a clean, supervised loading point for construction materials on the mainland. • Implementation of the CEMP • Rehabilitate disturbed areas with plant species indigenous to Lindeman Island. Local provenance planting stock is preferentially used.	• Implement Pest Management Plan • Include educational signage at island landing point alerting visitors of their responsibilities relevant to biosecurity matters • Implementing footwear washdown/scrub station at island landing point to reduce weed and pathogen incursions, as shown below	Low (3)

Potential Impact	Significance of Impact: Unmitigated	Mitigation Measure			Significance of Impact: Mitigated
		Design	Construction	Operation	
					
Introduction of exotic plants in landscapes.	Medium (9)	• Landscape design and plantings to be dominated by plant species indigenous to Lindeman Island. Other non-invasive native species can be utilised in accordance with a Landscape Management Plan	• CEMP outlines maintaining a clean, supervised loading point for landscaping materials on the mainland • Rehabilitate disturbed areas with plant species indigenous to Lindeman Island. Local provenance planting stock is preferentially used. • Implementation of the Landscape Management Plan	• Educational / awareness material for visitors and villa apartments • Include educational signage at island landing point alerting visitors of their responsibilities relevant to biosecurity matters • Maintenance of landscape to remove any invasive species or those not suitable for the Island • Implement Pest Management Plan	Low (3)
Terrestrial pest animals					
Introduction of pests.	High (15)	• A Pest Management Plan (PMP) is developed that includes pest management strategies to be implemented across all natural environments. Declared pests must be controlled as per the requirements of the *Biosecurity Act 2014* • Preparation of a CEMP prior to the commencement of construction stages incorporates measures to	• Strict hygiene for vehicles and materials using construction barge are enforced • Implement CEMP • Implement Pest Management Plan	• Implement Pest Management Plan • Include educational signage at island landing point alerting visitors of their responsibilities relevant to biosecurity matters	Low (3)

Potential Impact	Significance of Impact: Unmitigated	Mitigation Measure			Significance of Impact: Mitigated
		Design	Construction	Operation	
		prevent the introduction of pest animals such as species selection in landscaping, identifying the construction barge as a high-risk vector.			
Spread of pest animals.	High (15)	• A Pest Management Plan (PMP) is developed that includes pest management strategies to be implemented across all natural environments. Declared pests must be controlled as per the requirements of the *Biosecurity Act 2014*. • Preparation of a CEMP prior to the commencement of construction stages incorporating measures to prevent the introduction of pest animals, such as prevention and limitation of nesting and roosting opportunities in structures, management of waste etc.	• Implement eradication program for black rats. • Implement Pest Management Plan	• Implement Pest Management Plan • Implement eradication program for black rats.	Low (4)
Disease vectors					
Increase in mosquito activity.	High (12)	• Design structures and landscaping to limit pooling of water. • Landscape planting to avoid dense plantings adjacent to where visitors gather. • Design structures to include clear ways and adequate air circulation (e.g. ceiling fans) • Design structures to include screening: Commercial outdoor eating areas could be designed with insect screens.	• Ensure the stockpile/storage areas do not provide opportunities for pooling of water	• Subject to an aquatic species survey, the dam should be stocked with a mosquito predator species such as Pacific Blue-eye (*Pseudomugil signifer*) • Source Reduction: Implement a regular maintenance program involving: o removal/ o eradication of container breeding sites generally associated with human habitation; and	Low (4)

Potential Impact	Significance of Impact: Unmitigated	Mitigation Measure			Significance of Impact: Mitigated
		Design	Construction	Operation	
				o keeping roof gutters and drain traps free of vegetation and other extraneous matter.	
Increase in rats and mice.	High (12)	• Minimise potential rat/mice habitat through design of dwellings/structures. • Design waste management areas to exclude rats/mice. • Identifying the construction barge as a high risk vector	• Maintain a clean construction worksite. • Ensure construction barge is free of vermin and regularly inspect stowaway areas	• Manage populations through baiting around infrastructure.	Medium (8)
Introduction of myrtle rust.	High (16)	-	• Ensure landscape material is free from affected *Myrtaceae* materials. This includes mulch, soil, and mud on vehicles. • Ensure *Myrtaceae* nursery stock is free from affected plants and accredited with Plant Health Assurance Certificates for myrtle rust under the ICA-42 Operational Procedure.	• Ensure landscape material is free from affected *Myrtaceae* materials. This includes mulch, soil, and mud on vehicles. • Ensure *Myrtaceae* nursery stock is free from affected plants and accredited with Plant Health Assurance Certificates for myrtle rust under the ICA-42 Operational Procedure • Implementing footwear washdown/scrub station at island landing point to reduce pathogen incursions • Include educational signage at island landing point alerting visitors of their responsibilities relevant to biosecurity matters	High (12)
Marine pest species					
Introduction of marine pests.	High (12)	• Undertake risk assessment process as part of the development of the site environmental management plan. This assessment will inform the inspection of high-risk vessels.	• Educate construction contractors about the voluntary national biofouling management guidelines under the National System for the	• Educate mooring users about the voluntary national biofouling management guidelines under the National System for the Prevention	Medium (6)

Potential Impact	Significance of Impact: Unmitigated	Mitigation Measure			Significance of Impact: Mitigated
		Design	Construction	Operation	
			Prevention and Management of Marine Pest Incursions. • Standard practice procedure such as compliance with Australia's mandatory ballast water management requirements.	and Management of Marine Pest Incursions. • Rigorous inspection and cleaning of niche areas of commercial vessels before travelling to and from the island.	

6 References

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