

RUNWAY EXTENSION FEASIBILITY STUDY

PRELIMINARY ENVIRONMENTAL ASSESSMENT

Lord Howe Island Board | 30 October 2018

Preliminary Environmental Assessment

Lord Howe Island Airport Runway Extension

Client: Lord Howe Island Board

Prepared by

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Table of Contents

Executive Summary	i
Abbreviations	iii
1.0 Introduction	1
1.1 Purpose	1
1.2 Overview of the project	1
2.0 Project location	3
2.1 Site description	3
3.0 Project description and options	5
3.1 Project components	5
3.2 Construction timing	7
3.3 Runway extension: Option 1 – land reclamation design	7
3.3.1 Description	7
3.3.2 Construction	8
3.4 Runway extension: Option 2 – deck on pile	11
3.4.1 Description	11
3.4.2 Construction	11
3.5 Other project components	14
3.5.1 Turning head extension	14
3.5.2 Apron extension	14
3.5.3 Taxiway widening	14
3.5.4 Lagoon Road adjacent to the airstrip traffic changes	14
3.5.5 Drainage system	15
3.5.6 Other	15
3.6 Indicative cost estimates	15
4.0 Methodology	16
5.0 Statutory framework	17
5.1 Commonwealth	17
5.1.1 Environment Protection and Biodiversity Conservation Act 1999	17
5.2 State Legislation	18
5.2.1 Environmental Planning and Assessment Act 1979	18
5.2.2 State Environmental Planning Policy (Infrastructure) 2007 (ISEPP)	18
5.2.3 State Environmental Planning Policy (State and Regional Development) 2011	18
5.3 Local legislation and regulations	19
5.3.1 Lord Howe Island Act 1953	19
5.3.2 Lord Howe Island Local Environmental Plan 2010	19
5.3.3 Lord Howe Island Biodiversity Management Plan (DECC, 2007)	21
5.3.4 Lord Howe Island Development Control Plan 2005	21
5.4 Other NSW legislation and regulations	21
5.4.1 National Parks and Wildlife Act 1974	21
5.4.2 Marine Estate Management Act 2014	21
5.4.3 Biodiversity Conservation Act 2016	24
5.4.4 Biosecurity Act 2015	24
5.4.5 Heritage Act 1977	24
5.4.6 Roads Act 1993	24
5.4.7 Protection of the Environment Operations Act 1997	24
5.4.8 Contaminated Land Management Act 1997	25
5.5 Local Strategies	26
5.5.1 Lord Howe Island Weed Management Strategy 2016 – 2025	26
5.5.2 Strategic Plan for the Lord Howe Island Group World Heritage Property 2010	26
5.5.3 Lord Howe Island Biosecurity Strategy 2016	26
6.0 Consultation	27
6.1 Community engagement for the feasibility study	27
6.2 Target audiences	27

6.3	Community issues	27
7.0	Existing environment	29
7.1	World Heritage listing	29
7.2	Heritage	30
7.3	Geology and hydrology	30
7.4	Contamination	31
7.5	Biodiversity	34
	7.5.1 Biosecurity risks	38
7.6	Flooding	38
8.0	Environmental risk identification	40
8.1	Methodology	40
8.2	Preliminary environmental risk assessment	40
9.0	Preliminary environmental impact assessment	44
9.1	Potential construction impacts	44
	9.1.1 World Heritage and Local heritage	44
	9.1.2 Surface water (quality and hydrology)	45
	9.1.3 Coastal processes	46
	9.1.4 Contamination	46
	9.1.5 Climate change and flooding	47
	9.1.6 Aviation safety	48
	9.1.7 Traffic, transport and access	48
	9.1.8 Biodiversity and biosecurity	49
	9.1.9 Air quality	51
	9.1.10 Noise and vibration	52
	9.1.11 Landscape and visual amenity	53
	9.1.12 Resource use and waste management	54
	9.1.13 Social and economic	55
9.2	Potential operational impacts	58
	9.2.1 World heritage	58
	9.2.2 Surface water (quality and hydrology)	58
	9.2.3 Coastal processes	58
	9.2.4 Contamination	59
	9.2.5 Climate change and flooding	59
	9.2.6 Traffic, transport and access	60
	9.2.7 Biodiversity and biosecurity	60
	9.2.8 Air quality	61
	9.2.9 Landscape and visual amenity	61
	9.2.10 Social and economic	62
10.0	Significance of potential impacts	63
11.0	Planning approval pathways and associated risks	64
12.0	Conclusion and recommendations	69
13.0	References	71

Executive Summary

This preliminary environmental assessment has been undertaken based on a desktop review of the potential impacts of a runway extension at the Lord Howe Island Airport. Two runway extension options have been identified, a land reclamation design and deck on pile structural design. In addition to the physical runway extension, the additional civil works component required around the airfield to accommodate the operation of the largest 30+ seater candidate aircraft (expansion of the eastern turning head, widening of the taxiway, new apron, and realignment of Lagoon Road adjacent to the airstrip and associated fence line) have also investigated.

There are currently regular airline services operating from Sydney and Brisbane to the island, although the current route agreement is scheduled to end in March 2022 and Qantas have indicated they will no longer be operating the DHC8-200 aircraft servicing the island beyond this date. The existing runway at 888m long, does not allow for any candidate 30+ seater aircraft to take off or land without restrictions which limits the financial viability of the route for airline operators. Therefore an extension of the runway may be the only viable solution to ensure continuation of a 30+ seater aircraft service to Lord Howe Island.

The options analysis for the runway extension includes two design options - a land reclamation design or a deck on pile structural design. The proposed runway extension would protrude into parts of the Lord Howe Island Lagoon Sanctuary Zone. The desktop assessment carried out has determined potential environmental risks and approval risks associated with the environmental aspects of the marine and land based components of proposed works.

Environmental issues associated with the potential construction and operation of a runway extension which were identified to have a medium to high risk were assessed in this preliminary environmental assessment (PEA). Environmental impacts which are predicted to be of a high significance as a result of the project include:

- World Heritage;
- surface water (quality and hydrology);
- coastal processes;
- contamination;
- climate change and flooding;
- biodiversity and biosecurity;
- noise and vibration; and
- landscape and visual amenity.

The assessment identified that a runway extension has the potential to impact on the Lord Howe Island Group (LHIG) World, Commonwealth and State Heritage listings. Construction activities have the potential to affect the Island's heritage significance through the following;

- changing the visual amenity of the area;
- changing the land use;
- impacts to biodiversity;
- impacts to the environment by introducing pests and weed species;
- affecting water and air quality; and/or
- introducing or spreading contamination on the Island.

The assessment of significance for the potential impacts identified that Option 2 (Deck on piles) would have an overall lower level impact to the environment during compared to Option 1 (Land reclamation) for construction and operational impacts. The primary differences between the two options are the potential impacts associated with coastal processes, surface water, traffic and transport and air quality.

During operation, the assessment of significance identified that Option 2 (Deck on piles) would have an overall lower level of environmental impact compared to Option 1 (Land reclamation). During operation, Option 1 (Land reclamation) would act as a complete barrier and become an accumulation zone for sand and floating and suspended matter. This option would also impact on the wave patterns and sand volumes within the Lagoon.

The assessment involved a review of the legislative framework which is applicable to the project, and informed a relevant approvals pathway for a proposed future runway extension project. In summary, such a project would require multiple approvals at the State and Commonwealth levels, the certainty of which is not assured due to the potential approvals risks and environmental impacts associated with the project.

This PEA was limited to a desktop assessment and as such if the project is to progress, the environmental issues identified would need to be assessed in further detail including fieldwork based technical assessments. If it is decided that the runway extension would progress further, the next steps would be to begin with a formal planning application for the development, involving the preparation of a State significant scoping report to the Department of Planning and Environment (DP&E) and the preparation of an Environmental Impact Statement (EIS).

Abbreviations

Term	Meaning
AHD	Australian Height Datum
BC Act	Biodiversity Conservation Act 2016
BoM	Bureau of Meteorology
CASA	Civil Aviation Safety Authority
CLM Act	Contaminated Land Management Act 1997
CO	Carbon monoxide
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DCP	Development Control Plan
DECC	Department of Environment Climate Change
EIS	Environmental Impact Statement
EPL	Environment Protection Licence
EP&A Act 1979	Environmental Planning and Assessment Act 1979
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPBC	Environment Protection and Biodiversity Conservation Act 1999
IHO	Interim Heritage Order
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LEP	Local Environment Plan
LHIB	Lord Howe Island Board
LHIG	Lord Howe Island Group
LOR	Limit of Reporting
MNES	Matters of National environmental significance
MOWP	Methods of Work Plans
NEPM	National Environmental Protection Measures
NOTAM	Notice to Airmen
NPW Act	National Parks and Wildlife Act 1974
OEH	Office of Environment and Heritage
OLS	Obstacle limitation surface
PEA	Preliminary Environmental Assessment
PFAS	Per-and poly-fluoroalkyl substances
PIR	Preferred Infrastructure Report
PM	particulate matter
PMST	Protected Matters Search Tool
PoEO	Protection of the Environment Operations Act 1997
RCPs	Representative Concentration Pathways
RPT	Regular Public Transport
SEPP	State Environmental Planning Policy
SHR	NSW State Heritage Register
UNESCO	United Nations Educational, Scientific and Cultural Organization

1.0 Introduction

The Lord Howe Island Board (LHIB), a statutory authority responsible to the NSW Minister for the Environment, is undertaking a feasibility study of a proposed runway extension at the Lord Howe Island Airport. AECOM Australia Pty Ltd has been engaged to undertake a number of services as part of this feasibility study, including geotechnical investigations, the preparation of design options, construction cost estimations, environmental review of the identified options and a preliminary business case.

1.1 Purpose

This preliminary environmental assessment (PEA) provides an initial review of the potential impacts of the two design options developed for the proposed runway extension. The proposed runway extension would be constructed from the western extent of the existing runway. At this stage there are two design options:

- a land reclamation design – Option 1; and
- a deck on pile structural design – Option 2.

This PEA has been prepared on the basis of desktop research and a site visit to identify potential approval risks, environmental risks and environmental impacts that may be associated with the construction and operation of both the marine and land based components of the proposed runway extension for both design options.

This PEA will be utilised by the LHIB in their decision making and will form part of the preliminary business case for the project.

1.2 Overview of the project

Regular airline services currently operate from Sydney and Brisbane to Lord Howe Island, although the current route agreement is scheduled to end in March 2022. Qantas, currently providing between 1-3 flights per day to Lord Howe Island, has indicated they will no longer be operating the DHC8-200 aircraft which is currently servicing the island beyond this date.

The existing runway at 888 metres long provides insufficient length for 30+ seater aircraft commercially operating in Australia for take-off and landing without weight restrictions which places a limit on the financial viability of the route for airline operators. **Figure 1-1** shows the existing airport layout.



Figure 1-1 Aerial photo of the existing airport layout

In order to ensure an appropriate 30+ seat candidate aircraft (ATR 72 or DHC8-400) is able to operate to the island; the existing airfield requires significant upgrades to meet Civil Aviation Safety Authority (CASA) standards.

As recommended in the *Detailed Assessment of Extended Runway Requirements and Suitable Aircraft* report (AECOM 2018a) a 570 metre physical extension to the western end of the existing runway into the Lagoon has been adopted for the concept design. In order to meet CASA requirements, the physical extension has been designed to be a minimum of 90 metres wide, which includes a 30 metre wide runway pavement.

Two design options are being considered for the extension (refer to *Concept Design Report* (AECOM 2018)), which are both assessed in this PEA. The two design options are described further in **Section 3.0**.

2.0 Project location

Lord Howe Island is located in the Tasman Sea approximately 590 kilometres east of Port Macquarie and 790 kilometres north-east of Sydney. The island is part of the Lord Howe Island Group (LHIG).

2.1 Site description

The island was first settled in 1834 when three couples arrived from New Zealand. The existing airstrip was opened in 1974 which enabled twin-engine planes to begin flying to the island. As of 2016, there are 382 people living on Lord Howe Island (ABS 2016). The number of tourists on the Island at any one time is capped at 400 under the *Lord Howe Island Local Environment Plan 2010*. This is to ensure that stress on infrastructure and environmental impact is minimised and to maximise amenity.

Lord Howe Island airport is located in a 500 metre wide central section of the Island, between the Lagoon and Blinky Beach. This area is flat, with an elevation ranging from 3.1 to 4.5 m Local AHD. The airport is bounded by Lagoon Road.

The LHIG is a volcanic remnant that was included as a World Heritage Area in the UNESCO World Heritage List in 1982, as “*an outstanding example of oceanic islands of volcanic origin containing a unique biota of plants and animals, as well as the world’s most southerly true coral reef*”. Other significant values of Lord Howe Island include the landscapes, volcanic mountains, and diverse low-lying rainforests, palm forests and grasslands. There are also colonies of endangered seabirds and many species of native plants, many of which are endemic to Lord Howe Island.

The LHIG is one of six world heritage listings in NSW and comprises Lord Howe Island (main island), Admiralty Islands, Mutton Bird Island, Gower Island, Ball’s Pyramid, and associated coral reefs and marine environments. Lord Howe Island is crescent shaped, approximately 11 kilometres long and 2.8 kilometres wide at its widest point (refer to **Figure 2-1**). The island encloses a coral reef Lagoon on the south-west side and is the only island within the LHIG with a settlement.

The proposed runway extension would be located on the western side of Lord Howe Island within the coral reef Lagoon, extending north-west of the existing airport runway.



FIGURE 2-1 THE LORD HOWE ISLAND GROUP



Legend



Lord Howe Island Airport

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3.0 Project description and options

3.1 Project components

As recommended in the *Detailed Assessment of Extended Runway Requirements and Suitable Aircraft* (AECOM 2018) a 570 metre long and 90 metre wide physical extension to the existing western end of the runway has been adopted for the concept design.

The Lagoon sea bed level within the extension footprint is significantly lower than both reclaimed land (Option 1) and the deck on pile (Option 2) options.

The runway extension project includes the following components:

- runway extension (Option 1 and Option 2) – refer to **Figure 3-1**;
- existing turning head extension;
- existing apron extension;
- existing taxiway widening; and
- existing Lagoon Road adjacent to the airstrip realignment.



FIGURE 3-1 PROJECT COMPONENTS

Legend

- - - Extent of flyover area
- Extent of runway strip
- Terminal building
- Aircraft stand
- Existing island road
- New aircraft pavement
- Deck on piles or reclaimed land



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3.2 Construction timing

The indicative duration for construction is expected to be up to 18 months for Option 1 (Land reclamation) and up to 12 months for Option 2 (Deck on piles). For both runway extension options, it is expected that unrestricted access for construction during daylight hours will be limited to four consecutive days per week for the duration of the construction period, as was the case during the 2015 runway overlay project. However, this would need to be agreed upon by the incumbent operating commercial airline. Flights to and from the airport would operate on the remaining three days per week.

The airport does not operate at night. Access for construction activities at night may be possible, subject to other constraints, approvals and community consultation.

Construction activities during both day and night may be limited during the breeding season of certain migratory birds, marine mammals and sea turtles. As a minimum, noise restrictions are expected to apply during any night works. It is assumed that over-water pile driving will not be allowed at night, although quieter construction activities such as welding, steel fixing and concrete pouring may be considered.

Light spill restrictions are expected to apply during night time construction activity.

Vibratory equipment may be required in place of piling hammers, as restrictions on significant underwater vibrations due to pile driving may apply, for example, during sea turtle seasonal restrictions where sea turtles migrate to tropical and temperate waters such as Lord Howe Island to breed.

It is assumed that there is no local availability of construction plant or materials and as such these must be brought in by air or by sea. There are very limited construction personnel on the island, requiring the majority to be brought in from the mainland.

The island is serviced by the MV Island Trader vessel which runs freight between Port Macquarie and Lord Howe Island on average every two weeks. The vessel enters the Lagoon at high tide before ballasting down to sit on the seabed at the island's only wharf during cargo transfer. The use of a wharf structure was previously deemed unsuitable for construction of the runway overlay project in 2015 due to concerns over its structural loading capacity. The construction contractor delivered plant and material via shallow barges across the Lagoon which docked at the south-west extent of the runway.

Limited onshore area is available for the storage of construction plant and materials, and this may be required to be stored on barges moored outside the reef until a sufficient portion of the runway extension has been constructed to provide the required storage area without penetrating the airport's obstacle limitation surface (OLS).

3.3 Runway extension: Option 1 – land reclamation design

3.3.1 Description

The land reclamation design of the runway extension portion of the project would involve the construction of a rubble/concrete berm with rock armour structure, and a wave trip structure adjacent to the rock armour structure.

3.3.1.1 Sea wall structure

The rock armour structure has been designed as a conventional double layer rubble structure, with fill underneath. The rubble and concrete fill is separated from the rock armour by a layer of geotextile.

Rock armour is carried over the crest of the berm structure, with a pre-cast concrete head wall installed.

3.3.1.2 Wave trip structure

A wave trip structure made out of rubble with a primary rock armour layer is proposed along and beyond the western and southern edges of the runway extension in order to prevent inundation of the

runway due to wave movements. The trip structure would absorb wave energy and break the waves, with the resultant wave reduced in height beyond the trip structure, towards the sea wall structure.

The structure is proposed to be located 50 metres offshore from the runway to provide a body of water that would absorb the wave breaking as shown in **Figure 3-2**.

It is noted that this element of the design will need to be revisited in subsequent design stages using physical modelling to refine and assess the wave interactions with the structures.

3.3.1.3 Drainage system

The stormwater design system is considered as best practice given that the surface water from the additional runway extension will be drained through the use of grated drains along both edges of the runway extension, falling into pits spaced at 120 metre centres with outflows onto the seawall rock armour.

The runway drainage pits have been designed to intercept both oil and sediments through the use of an internal dividing wall. To ensure that collected fuel spills do not flow into the downstream drainage system, a constant water level needs to be maintained above the centre berm. The airport's operation crew, whilst conducting regular routine maintenance, will therefore need to ensure that the water level is kept at a minimum 0.4 metres from the invert of pit. The oil and sediment collection will also need to be included as part of the regular maintenance.

Where stormwater discharge has the potential to cause scouring of the seabed, scour protection will be provided. An example of this is a sand-filled geotextile mattress, which can simply be laid on the seabed and will automatically adjust to variations in the shape of the seabed.

3.3.2 Construction

Construction of the land reclamation option for the runway extension would involve the following activities and methodology:

1. construction will begin onshore, creating access as it progresses;
2. good quality fill material will be tipped over the "end" of the reclamation with reworking of the external faces. The quality of the fill material is used given the location of the works being in an extremely sensitive marine environment;
3. to manage turbidity, perimeter bunds will be constructed initially using high grade clean fill to allow confined placement of the remaining material. If perimeter bunds are used, back filling can be undertaken in a controlled environment. Silt curtains may be required;
4. as works progress the external faces will be armoured with the final armour solution;
5. material placed below the water level cannot be directly compacted and therefore compaction will begin once fill material is above the water level;
6. the use of granular fill should limit the risk of delayed settlement issues, although the use of overburden may be required to bring about final settlement of fill and underlying soils. However the materials on this project should not require extended periods of loading to achieve settlement (a method used with cohesive sediments);
7. after compaction is achieved, the surface of the fill material will be trimmed and airport civil works would commence (drainage, pavements, etc.); and
8. the trip structure would be constructed using floating plant or by working outwards from the shoreline if existing depths are too restrictive, largely independent of the runway works. This structure does not utilise fill and the methodology is primarily place and trim the relevant armour material.

The importation and transfer of large volumes of material may likely result in damage to local infrastructure. A pre and post construction condition assessment may need to be undertaken and it is anticipated that the repair and remediation may also need to be undertaken on roads and marine facilities if and where necessary.

3.3.2.1 Fill requirements

The construction of the reclaimed land runway extension will require a large volume of fill (~280,000m³). The fill material requires good geotechnical properties to provide a suitable compacted base for the runway construction. Key features of the good quality fill material:

- fill placed below the water level must be granular to allow saturated compaction under overburden;
- unconfined fill in the Lagoon must be clean (low fines content) to minimise plume impacts;
- fill needs to have suitable engineering properties near the surface to facilitate airport works and maintenance (California bearing ratio (CBR) 10%-15%); and
- fill material is required to be sterilised for bio security purposes.

If fill could be sourced locally by dredging or from a land based source this would provide the project with an affordable, logistically simple solution. However the potential environmental impacts and approval requirements for such a solution would require further consideration.

At this stage it is understood that fill cannot be sourced from Lord Howe Island or adjacent waters. As such fill will need to be imported. Importing fill provides opportunity to be more selective about the fill quality used. Industrial scale civil suppliers from anywhere in the region (Australia, New Zealand, New Caledonia etc.) could be used, opening up an opportunity to adopt a material that is best fit for purpose at market driven prices. The logistical and handling risks for remote material sources are the double and triple handling of material onto and off barges at remote locations and long-distance haulage and the spill risks associated with this at those locations.

It has been assumed that no local or remote dredging would be undertaken for the project.

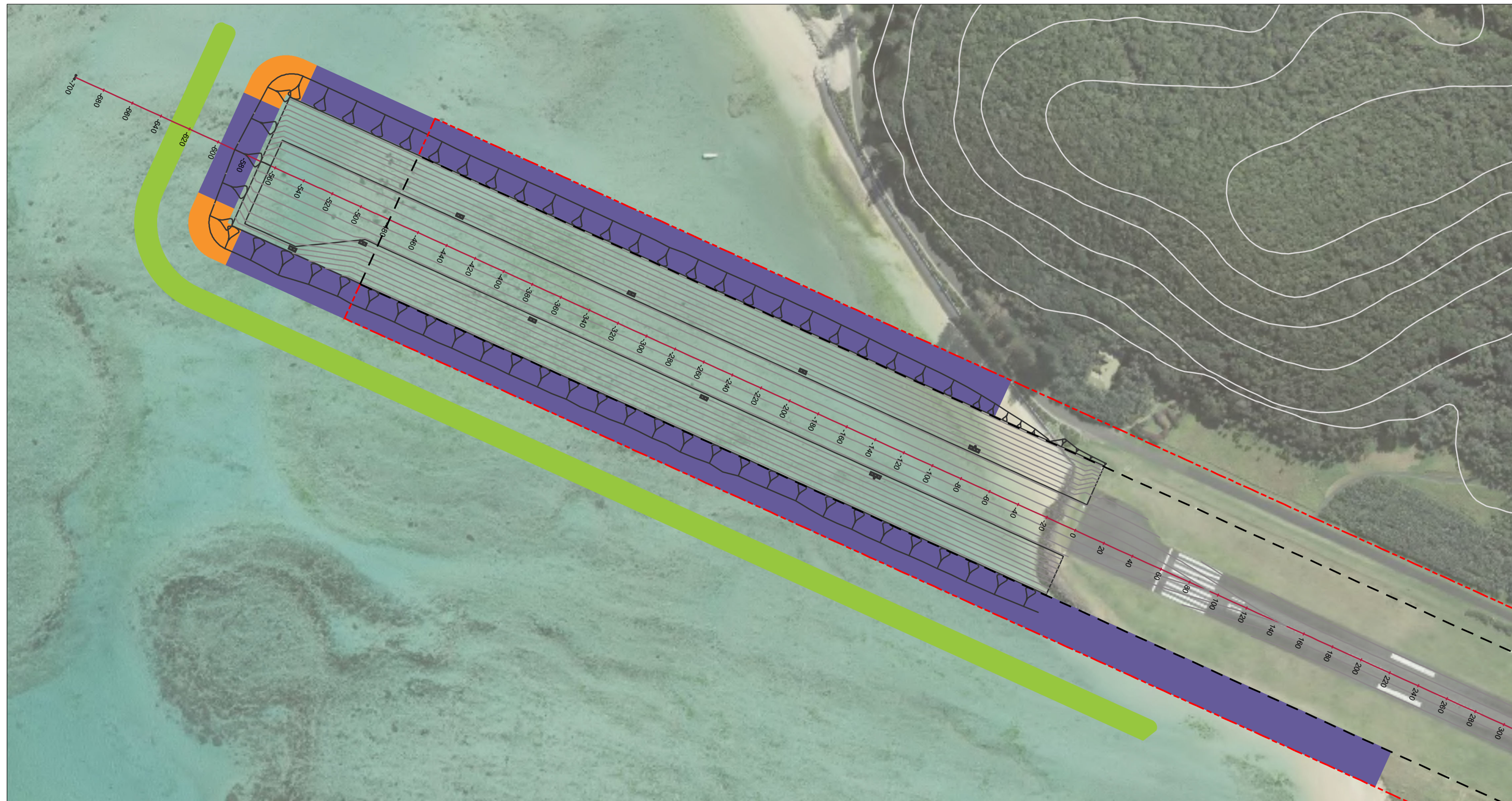


FIGURE 3-2 RUNWAY EXTENSION OPTION 1 – LAND RECLAMATION



- Legend**
- - - Extent of flyover area
 - Extent of runway strip
 - Design contour
 - Existing contour
 - Trip structure
 - Seawall - Type 1
 - Seawall - Type 2

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3.4 Runway extension: Option 2 – deck on pile

3.4.1 Description

The deck on pile option would comprise precast concrete deck panels supported on precast reinforced concrete beams and steel pile footings. No wave trip structure is required for the deck on pile option. **Figure 3-3** illustrates the runway extension for Option 2, with the flyover area outlined in red.

This option would maximise the scope for prefabrication and minimise on-site construction time.

The deck panels are fixed to the beams via *in situ* small concrete pours. The main deck support beams run parallel to the runway 6 metres apart, and are supported on piles 8 metres apart.

Typically the beams would be 1.1 metres wide and 1.2 metres long. Some of the beams may be slightly wider (around 1.3 metres) in order to accommodate drainage infrastructure and to support deck panels designed for crawler crane access during construction.

3.4.1.1 Pile system

The piles comprise steel tubes of 0.6 metres diameter, with a wall thickness around 16 millimetres. Reinforced concrete plugs will be poured inside the piles, extending from the soffit (overhanging section) of the beams down to approximately RL-1.0m Australian Height Datum (AHD). The piles would be approximately seven to 10 metres deep into the seabed (this is subject to further geotechnical investigations).

The piles will either be pre-coated with a suitable paint system, or will be wrapped with a proprietary protection system after installation which would extend to the seabed.

Sheet piles would be used during construction around the abutment at the landward connection (i.e. closer to the existing runway).

3.4.1.2 Wave action consideration

Due to the low level of the existing runway, the inshore section of the deck structure will be subject to wave action during extreme events. These will reduce as the deck rises seawards.

3.4.1.3 Drainage system

The additional runway extension will be drained through the use of grated drains along both edges of the runway falling into pits spaced at 120 metres centres. The deck on pile extension option will have the drains inbuilt into the deck infrastructure, the outlet pipes from the pits discharging vertically downwards into the Lagoon. The runway drainage pits have been designed to intercept both oil and sediments through the use of an internal dividing wall. As with the land reclamation option, a constant water level needs to be maintained above the centre berm to ensure that collected fuel spills do not flow into the downstream drainage system. The airport's operation crew, whilst conducting regular routine maintenance, will therefore need to ensure that the water level is kept at a minimum 0.4 metres from the invert of pit. The oil and sediment collection will also need to be included as part of the regular maintenance.

3.4.2 Construction

3.4.2.1 Piles

Piles will be fabricated and coated offshore (most likely in Asia) and brought in by a large barge; several trips will be required over the piling period. This barge will moor outside the Lagoon. The piles will be offloaded using a smaller crane barge, which will transfer the piles to the island wharf or south-west extent of the runway.

The piles will be unloaded onto chassis for transport to a pile storage area adjacent to the airfield. The piles will be offloaded from the chassis using a small mobile crane or fork lift. The piles will be stacked, using packing to protect the pile coating.

When required, the piles will be loaded onto a chassis and delivered to a hammer piling rig via a temporary runway perimeter road (to avoid plant deliveries using the runway). A small stockpile of piles will be maintained at the piling rig in order that piling can continue during airport operating hours (subject to OLS restrictions), when shore access to the work front would be restricted.

3.4.2.2 Deck slab units and deck beams

Reinforced concrete deck slab units and deck beams will be prefabricated offshore (likely in Australia or NZ) and will be brought to the island via a barge. The slab units will be offloaded in similar fashion to the piles, and delivered to a storage area adjacent to the airfield.

As for the piles, a small stockpile of deck units and beams will be maintained at the work front to enable construction work to continue during airport operating hours.

3.4.2.3 Construction sequence

The concept design is based on construction using large crawler cranes which will operate over specific deck spans designed for this purpose. Construction will commence at the Lagoon end of the existing runway strip, working progressively seaward. This will only occur outside of airfield operations in order to avoid OLS infringements.

Initial construction will focus on a 30 metre wide section which will act as a roadway for construction activities. Construction will be by hand-over-hand installation of piles, beams and deck units, using a large crawler crane travelling on the central span. The crawler crane will be of sufficient size to reach an additional two spans each side; these will be completed as required to provide access for other construction plant, and for temporary stockpiling of materials on the extension, subject to OLS restrictions.

Once the initial 30 metre wide section has been constructed 450 metres beyond the end of the existing runway, the crawler crane (assumed 15 metre height) will no longer infringe upon the OLS, therefore multiple construction fronts can be opened up using the designated crawler crane spans to move laterally as well as longitudinally.

Contractor's plant and material stockpiles can be based at the outer end of the runway extension, clear of the OLS. As more deck area becomes available, more plant and materials can be stockpiled subject to height and runoff limitations, minimising conflict between airport operations and materials delivery.

Pile driving will be the activity most affected by the OLS, due to the crane boom height required. This is dictated by pile length, with a boom height in the order of 25 metres potentially being required. In addition, for safety reasons, piling is usually only carried out during daylight and will be managed around aircraft flight schedules.

As previously stated the installation of beams and deck units will not require the same crane boom height (around 15 metres should suffice), and could be carried out under artificial light, subject to environmental and amenity constraints.



FIGURE 3-3 RUNWAY EXTENSION OPTION – DECK ON PILES



- Legend
- Extent of flyover area
 - - Extent of runway strip

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Source:

3.5 Other project components

3.5.1 Turning head extension

The turning head at the south-eastern end of the existing runway would require an additional 445m² of aircraft pavement to ensure larger aircraft have sufficient space to turn around.

3.5.2 Apron extension

An addition 7,275m² of apron pavement is required. The new apron has been sized to accommodate two DHC8-400 aircraft (refer to **Figure 3-4**), based on the following scenarios:

- Lord Howe Island continues being serviced by two aircraft per day; or
- Lord Howe Island is serviced by 1 aircraft per day, and a second aircraft may be required to transport an engineer or parts for another broken down aircraft.

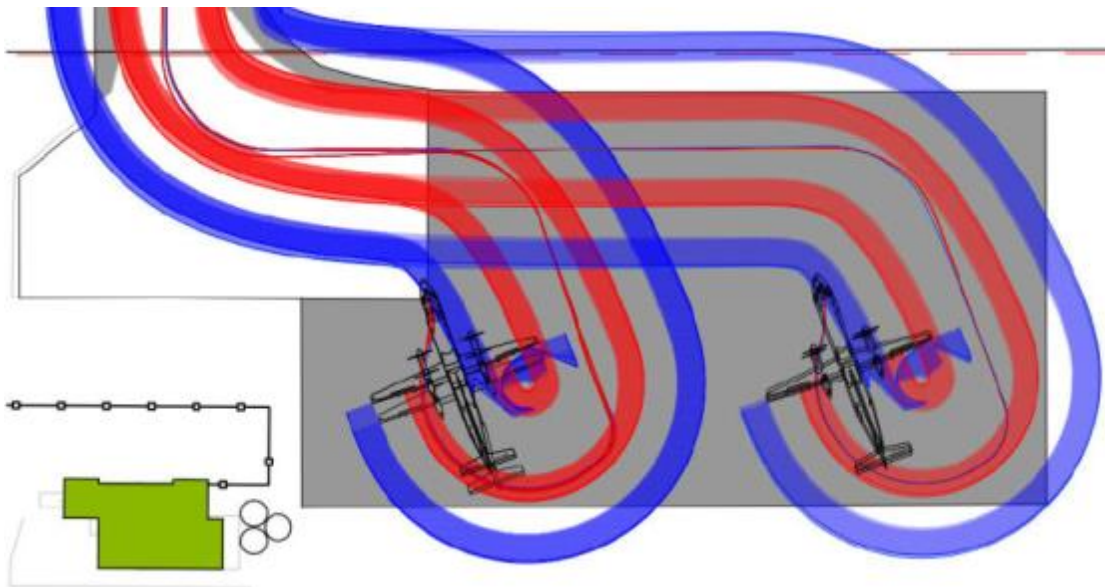


Figure 3-4 Apron layout and tracking

It is assumed there will continue to be aircraft refuelling operations required on Lord Howe Island; therefore the stormwater drainage infrastructure for the additional 7,275m² of apron pavement will include a downstream oil/water interceptor with a treatment flow rate of 130L/s for fuel spill mitigation purposes.

3.5.3 Taxiway widening

The taxiway between the existing runway and aircraft apron is currently 15 metres wide and would need an additional four metres of new aircraft pavement to be constructed on each side to accommodate larger aircrafts.

3.5.4 Lagoon Road adjacent to the airstrip traffic changes

The portion of Lagoon Road adjacent to the airstrip (refer to **Figure 3-5** and **Plate 7 of Appendix C**) and existing security fence are currently located within the 'fly-over area plane' of the runway strip. In order to avoid vehicles and the fence line impinging the 'fly-over area plane' and OLS restrictions a new road alignment and fence line are to be constructed beyond the extent of the 'fly-over area' footprint. The current realignment of the road would result in the removal and some trimming of the vegetation (including Kentia palms) currently located north of the road, the alignment could be changed during subsequent design stages once accurate topographic survey information is available.



Figure 3-5 Lagoon Road adjacent to the airstrip (SIX Maps)

3.5.5 Drainage system

It is assumed that the existing drainage infrastructure servicing the airport is suitable to meet relevant drainage design criteria.

The only existing form of stormwater treatment at the airport is at the southern end of the runway which drains through a water course containing mangroves prior to discharging. It is recommended that prior to discharging into the ocean, any runoff from new pavement areas is collected and any oil or sediment is removed prior to discharging into the ocean.

3.5.6 Other

In addition to the above works, the following minor works would be completed:

- removal of existing paint markings along the existing taxiway, runway and apron;
- addition of new white and yellow paint markings along the taxiway, runway, apron and new runway extension;

The following works may be required either as part of the project or under a separate approval process:

- upgrade of wharf to north of the airport (refer to **Figure 2-1**), subject to the contractor's transportation methodology;
- terminal expansion and upgrade to meet new security requirements; and
- perimeter fence upgrades to meet new security requirements.

3.6 Indicative cost estimates

Initial cost estimates have been completed to +/- 30% accuracy for both options. Option 1 (Land reclamation) is estimated to be approximately \$300 million to design and construct, whereas Option 2 (Deck on piles) is approximately \$187 million.

Given that development has a capital investment value of more than \$30 million and is included in Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* (refer to **Section 5.2.3**), the project is considered to be a State Significant Development (SSD).

4.0 Methodology

This PEA has been based on a desktop assessment which identified potential environmental impacts and future planning approval pathways for the two runway extension design options. This included a review of publicly available information and databases, and previous investigations undertaken for relevant projects on Lord Howe Island to identify general environmental issues to be considered for the two runway extension design options. An environmental risk rating process was applied to identify those impacts that are likely to be associated with a medium to high risk to the environment (refer to **Section 7.6**). Those issues rated with a medium to high risk were then further assessed in **Section 9.0**, while environmental issues with a 'nil' or 'low' risk rating were not considered further in this assessment.

An assessment of the potential construction and operational environmental impacts associated with the two runway extension design options was undertaken. The level of significance of those potential impacts was determined (where possible) with respect to each design option (refer to **Section 8.0**).

Recommendations have been made where the need for further field-based investigations or studies may be required in order to assess specific environmental issues for the project.

5.0 Statutory framework

5.1 Commonwealth

5.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides the legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places. These are defined in the Act as: 'matters of National environmental significance' (MNES), which include:

- World Heritage properties;
- National Heritage places;
- wetlands of international importance (listed under the Ramsar Convention);
- Nationally threatened species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- a water resource, in relation to coal seam gas development and large coal mining development.

A search of the EPBC Protected Matters Search Tool (PMST) was conducted for the study area, including a 1 kilometre buffer. The PMST search identified:

- 1 World Heritage property – Lord Howe Island Group consisting Lord Howe Island (main island), Admiralty Islands, Mutton Bird Island, Gower Island, Ball's Pyramid, and associated coral reefs and marine environments;
- 1 National Heritage place – Lord Howe Island Group, detailed as above;
- 45 listed threatened species;
- 42 listed migratory species; and
- 43 listed marine species.

Refer to **Section 7.1** and **Section 7.5** for the discussion of the World Heritage listing and existing biodiversity.

Under the EPBC Act, proposed 'actions' that have the potential to significantly impact on MNES, the environment of Commonwealth land or actions that are being carried out by a Commonwealth agency, must be referred to the Commonwealth Government.

Assessments of significance based on criteria listed in Significant Impact Guidelines 1.1 issued by the Commonwealth (2013) are used to determine whether the proposed action is likely to have a significant impact (i.e. is likely to be considered a 'controlled action').

If the Commonwealth Minister for Environment and Energy determines that a referred project is likely to have a significant impact on a matter protected by the EPBC Act, (controlled action), the approval of that minister would be required for that project.

If a proposal requires approval under the EPBC Act, the proposal may be assessed by the NSW Government under the bilateral agreement between the Commonwealth and NSW Government under section 45 of the EPBC Act. In this case, the NSW Government assesses the proposal and prepares an Assessment Report and recommendation for the Commonwealth on whether the development should be approved, and what conditions should apply, considering impacts to MNES. The Commonwealth Government would then need to grant approval for the controlled action.

5.2 State Legislation

5.2.1 Environmental Planning and Assessment Act 1979

The Environmental Planning and Assessment (EP&A) Act is the primary legislation that governs land use and provides a framework for development control and environmental assessment in NSW. The EP&A Act is supported by the Environmental Planning and Assessment Regulation 2000 (NSW) (EP&A Regulation) and a number of Environmental Planning Instruments (EPI) which include State Environmental Planning Policies (SEPP) and Local Environment Plans (LEP).

Part 4 of the EP&A Act establishes a framework for assessing development that requires consent under an EPI. It allows development to be classified as 'development that does not need consent', 'development that needs consent', or 'prohibited development'. The term 'development' is defined under section 1.5 of the EP&A Act.

The project is considered to fall within the definition of 'development' as it involves categories of development, including 'the use of land' and the 'carrying out of a work'. The project is considered 'development that needs consent' and is classified as State significant development (refer to **Section 5.2.3**).

Section 5.5 of the EP&A Act requires the determining authority to take into account to the fullest extent possible, all matters affecting or likely to affect the environment. The environmental impact of the works would need to be assessed in an environmental impact statement taking into consideration the factors listed under clause 228 of the EP&A Regulation. These environmental matters would need to be assessed in order to satisfy the necessary environmental assessment requirements under the EP&A Act.

5.2.2 State Environmental Planning Policy (Infrastructure) 2007 (ISEPP)

Under the ISEPP, the project would be defined as development for the purpose of an 'airport', which includes a place used for the landing, taking off, parking, maintenance or repair of aircraft (including associated buildings, installations, facilities and movement areas and any heliport that is part of the airport).

Part 3, Clause 22 (1) of ISEPP states that "*development for the purpose of an airport may be carried out by or on behalf of a public authority without consent on land in any of the following land use zones or in a land use zone that is equivalent to any of these zones:*

- | | |
|-----------------------------------|--------------------------------------|
| a) <i>RU1 Primary Production,</i> | e) <i>SP2 Infrastructure,</i> |
| b) <i>RU2 Rural Landscape,</i> | f) <i>W2 Recreational Waterways,</i> |
| c) <i>IN4 Working Waterfront,</i> | g) <i>W3 Working Waterways."</i> |
| d) <i>SP1 Special Activities,</i> | |

Under the Lord Howe Island LEP, the land in the area of the proposed runway extension is zoned:

- Zone 5 Special Uses
- Zone 7 Environment Protection
- Zone 9 Marine Park

As only Zone 5 Special Uses may be equivalent to the land use zones listed in Clause 21(2) of ISEPP, proposed future runway extension works for an airport cannot be carried out by a public authority without consent under the ISEPP.

5.2.3 State Environmental Planning Policy (State and Regional Development) 2011

State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP) identifies development that is State Significant Development (SSD), State Significant Infrastructure (SSI) and critical SSI based on the magnitude of the development and the likelihood of significant impacts resulting from the development.

Section 4.12(8) of the EP&A Act states that a "*development application for State significant development or designated development is to be accompanied by an environmental impact statement*

(EIS) prepared by or on behalf of the applicant in the form prescribed by the regulations". Schedule 2 of the EP&A Regulation sets out the requirements of an EIS and requires that the content of an EIS is "subject to the environmental assessment requirements that relate to the EIS".

Clause 8(1) outlines the criteria for a development to be considered SSD as:

- a. the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and
- b. the development is specified in Schedule 1 or 2.

Given that development for the purposes of air transport facilities has a capital investment value of more than \$30 million is included in Schedule 1, and as outlined in section 5.2.2 the project is not permissible without development consent, the project is therefore considered SSD under clause 8(1) of the SRD SEPP.

The project requires approval from the NSW Minister for Planning under Section 5.14 of the EP&A Act, as it is SSD. A SSD scoping report would need to be prepared to support an application to DP&E for the project under section 5.15 of the EP&A Act. This PEA would help inform the scoping report. The DP&E would then issue Secretary Environmental Assessment Requirements (SEARs), which identify assessment requirements for the project. LHIB would then prepare the EIS and submit it to the DP&E for approval by the NSW Minister for Planning. The EIS would be placed on public exhibition by the Secretary of DP&E. LHIB would prepare a submissions report (and Preferred Infrastructure Report (PIR), if required) if submissions are received during the public exhibition period. If changes are proposed to the project then LHIB would also prepare a PIR to assess the environmental impacts associated with the project changes. This would be followed by assessment and determination by the NSW Minister for Planning, who would decide whether or not to approve the project and the conditions to be attached to the determination (if approved). This process may take in the order of 12-18 months depending on the complexity of the project and the number of submissions received during the public exhibition period.

5.3 Local legislation and regulations

5.3.1 Lord Howe Island Act 1953

Under the *Lord Howe Island Act 1953*, the LHIB is charged with the responsibility of administering the affairs of the Island. This Act is supported by the Lord Howe Island Regulation 2014.

Relevant to the proposed runway extension works, Part 3, section 12 of this Act states that the Board has the power and authority to "do all things necessary from time to time for the promotion and preservation of public health, safety and convenience upon the Island".

Part 3A, section 15A indicates that any reference to the consent authority within parts of the EP&A Act 1979, applies to the Island as reference to the LHIB wherein "the Island is taken to be a region within the meaning of that Act" and "the Board is taken to be the council of an area situated in that region".

5.3.2 Lord Howe Island Local Environmental Plan 2010

Environmental planning on Lord Howe Island is controlled by the *Lord Howe Island Local Environmental Plan 2010* (LEP 2010). This document overrides almost all SEPPs, except the Infrastructure SEPP, as stated under Clause 8(1) of the ISEPP. The proposed airport extension works would not be considered exempt development as defined under Part 1 Clause 9 as it does not constitute any of the activities listed in Schedule 1 Exempt development of LEP 2010. Examples of exempt development include an advertisement or sign, antenna, driveway, water tank, etc¹.

The proposed works would be located on land zoned Zone 5 Special Uses, Zone 7 Environment Protection and Zone 9 Marine Park under the LEP 2010 (refer to **Appendix A** for the land zoning map).

The objectives of Zone 5 are to:

¹ List of exempt development under the Lord Howe Island LEP 2010 can be found here: <https://www.legislation.nsw.gov.au/#/view/EPI/2010/88/sch1>

- a) to provide utility services that are essential to the community's needs in a manner that is in sympathy with the World Heritage values of the natural environment of the Island,
- b) to maintain efficient services (such as education, health and transport services and the administration of the Island) and associated infrastructure.

Clause 15, subclause 3(l) of Part 2 states "*demolition and development for the purposes of [public utility undertakings] may be carried out on land within Zone 5 Special Uses only with the consent of the consent authority.*"

Public utility undertakings means in this report any air transport undertaking, or uses associated with this undertaking, carried on by, or on behalf of, the Board or any government agency acting under any Commonwealth or State Act.

The objectives of Zone 7 are to:

- a) to protect areas that may be vulnerable to erosion or that are a habitat, or corridor, for animals that are native to the Island or significant native vegetation,
- b) to protect the scenic amenity of land in the zone,
- c) to restore lost or disturbed natural resources, particularly if this may enhance the World Heritage values of the natural environment of the Island,
- d) to provide utility services that are essential to the community's needs in a manner that is in sympathy with the World Heritage values of the natural environment of the Island.

Clause 17, subclause 3(c) of Part 2 states "*demolition and development for the purposes of [public utility undertakings] may be carried out on land within Zone 7 Environment Protection only with the consent of the consent authority.*"

The objectives of Zone 9 are to:

- a) to protect marine ecosystems, habitats and species within Lord Howe Island Marine Park,
- b) to protect the scenic amenity of the Marine Park,
- c) to permit appropriate uses, such as fishing and tourism, that are consistent with any zoning plan for the Marine Park made under Division 1A of Part 3 of the *Marine Parks Act 1997*.

Clause 19, subclause 2(h) of Part 2 states "*demolition and development for the purposes of public utility undertakings may be carried out on land within Zone 9 Marine Park only with the consent of the consent authority.*"

Clause 35 of the LEP 2010 states that "*development on the foreshore area is prohibited... [but] may be carried out with consent if, in the consent authority's opinion:*

- a) *the proposed development is in the public interest and does not significantly reduce public access to the foreshore, and*
- b) *the bulk and scale of the proposed development will not detract from the visual amenity of the foreshore area, and*
- c) *the proposed development addresses any need to restore lost or disturbed plants that are native to the Island, particularly if restoring those plants may enhance visual amenity, and*
- d) *there is a demonstrated Island community-based, or marine-based, business need for it, and*
- e) *the proposed development will not be adversely affected by, or adversely affect, coastal processes, and*
- f) *in the case of proposed development involving the erection of a structure—the purpose of that structure could not practicably be fulfilled by an existing structure, and*
- g) *in the case of development proposed to be carried out on land that is also within Zone 9 Marine Park—the proposed development is not inconsistent with any advice about the development that is provided to the consent authority by the Marine Estate Management Authority.*"

The Marine Estate Management Authority advises the NSW Government on the management of the NSW marine estate, and the consent authority for the proposed development would need to consider advice provided by the Authority.

5.3.3 Lord Howe Island Biodiversity Management Plan (DECC, 2007)

This plan constitutes a formal National and NSW Recovery Plan for endangered and vulnerable species under the EPBC Act. The management plan assists with prioritisation of actions and provides management measures relevant to the LHIG's overall biodiversity, particularly for the rare and significant species and communities of the LHIG. For example, the management plan identifies management priorities for species such as *Elymus multiflorus* subsp. *kingianus*, which is in the immediate vicinity of the project. Clearing, trampling and grazing of this grass should be avoided where possible.

Some of the objectives of the plan include to reduce human impacts and to encourage the conservation and protection of significant species, populations and ecological communities.

5.3.4 Lord Howe Island Development Control Plan 2005

The Lord Howe Island Development Control Plan 2005 provides guidelines, design principles and objectives for certain types of development on Lord Howe Island. The plan is predominantly for building structures however, it provides relevant objectives, principles and guidelines for every proposed development to protect the community's interest and to protect the environmental integrity of the island. However a large part of these objectives, principles and guidelines apply to new buildings or dwellings, subdivisions or alterations to existing buildings.

Some relevant objectives and principles include:

- every proposed development should strive to achieve quality design outcomes, including to provide information on appropriate construction methods and materials and efficient use of resources; and
- assess how the landscaping of the proposed development could blend with or improve the surrounding environment.

5.4 Other NSW legislation and regulations

5.4.1 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act), administered by OEHL, is the primary legislation for the care, control and management of all National Parks, historic sites, nature reserves and Aboriginal areas in NSW.

Part 3A, section 15B of the *Lord Howe Island Act 1953 No 39* states that "*Part 5 of the National Parks and Wildlife Act 1974 applies to and in respect of land dedicated under [the Lord Howe Island Permanent Park Reserve]*".

As project works are not proposed to encroach onto the Permanent Park Reserve (located around 250 metres south of the project) the NPW Act does not apply.

5.4.2 Marine Estate Management Act 2014

Clause 55 (1) of the *Marine Estate Management Act 2014 No 72* states that "*before determining a development application under Part 4 of the Environmental Planning and Assessment Act 1979 for the carrying out of development within a marine park or an aquatic reserve, a consent authority must:*

(a) take into consideration:

- (i) if there are management rules for the marine park or aquatic reserve (refer to Part 4 of the *Marine Estate Management (Management Rules) Regulation 1999*), the purposes of the zone within which the area concerned is situated as specified in those management rules, and
- (ii) the permissible uses of the area concerned under the regulations or the management rules, and

(iii) if a management plan for the marine park or aquatic reserve has been made, the objectives of the marine park or aquatic reserve, and

(iv) any relevant marine park or aquatic reserve notifications, and;

(b) if the consent authority intends to grant consent to the carrying out of the development, obtain the concurrence of the relevant Ministers to the granting of the consent.”

Consultation would be required with the Marine Estate Management Authority, and a marine park permit may be required. The proposed development must be consistent with any advice about the development that is provided to LHIB by the Marine Estate Management Authority.

The proposed runway extension falls partially within the Lagoon sanctuary zone and habitat protection zone as defined under Part 4 of the *Marine Estate Management (Management Rules) Regulation 1999*. Refer to **Figure 5-1**.

The objects of the sanctuary zone are:

(a) to provide the highest level of protection for biological diversity, habitat, ecological processes, natural features and cultural features (both Aboriginal and non-Aboriginal) in the zone, and

(b) where consistent with paragraph (a), to provide opportunities for the following activities in the zone:

(i) recreational, educational and other activities that do not involve harming any animal or plant or causing any damage to or interference with natural or cultural features or any habitat,

(ii) scientific research.

The objects of the habitat protection zone are:

(a) to provide a high level of protection for biological diversity, habitat, ecological processes, natural features and cultural features (both Aboriginal and non-Aboriginal) in the zone, and

(b) where consistent with paragraph (a), to provide opportunities for recreational and commercial activities (including fishing), scientific research, educational activities and other activities, so long as they are ecologically sustainable and do not have a significant impact on any fish populations or on any other animals, plants or habitats.

However, Clause 1.41 of *Management Rules* states that provision of this Regulation (other than clause 1.11², 1.13³, 1.16⁴, 1.17⁵, 1.19⁶, 1.20⁷, 1.22⁸ or 1.23⁹) does not require the consent of the relevant Ministers to the carrying out of any activity if planning approval has been given with respect to that activity in accordance with section 55 of the Act. If the project is to progress, the EIS stage would assess the project against the considerations outlined in section 55 of the Act.

² Protection of animals, plants and habitat in sanctuary zone

³ Dredging and beach replenishment activities not permitted in sanctuary zone

⁴ Protection of animals, plants and habitat in habitat protection zone

⁵ Limited fishing activities in habitat protection zone

⁶ Protection of animals, plants and habitat in general use zone

⁷ Limited fishing activities in general use zone

⁸ Protection of animals, plants and habitat in special purpose zone

⁹ Limited fishing activities

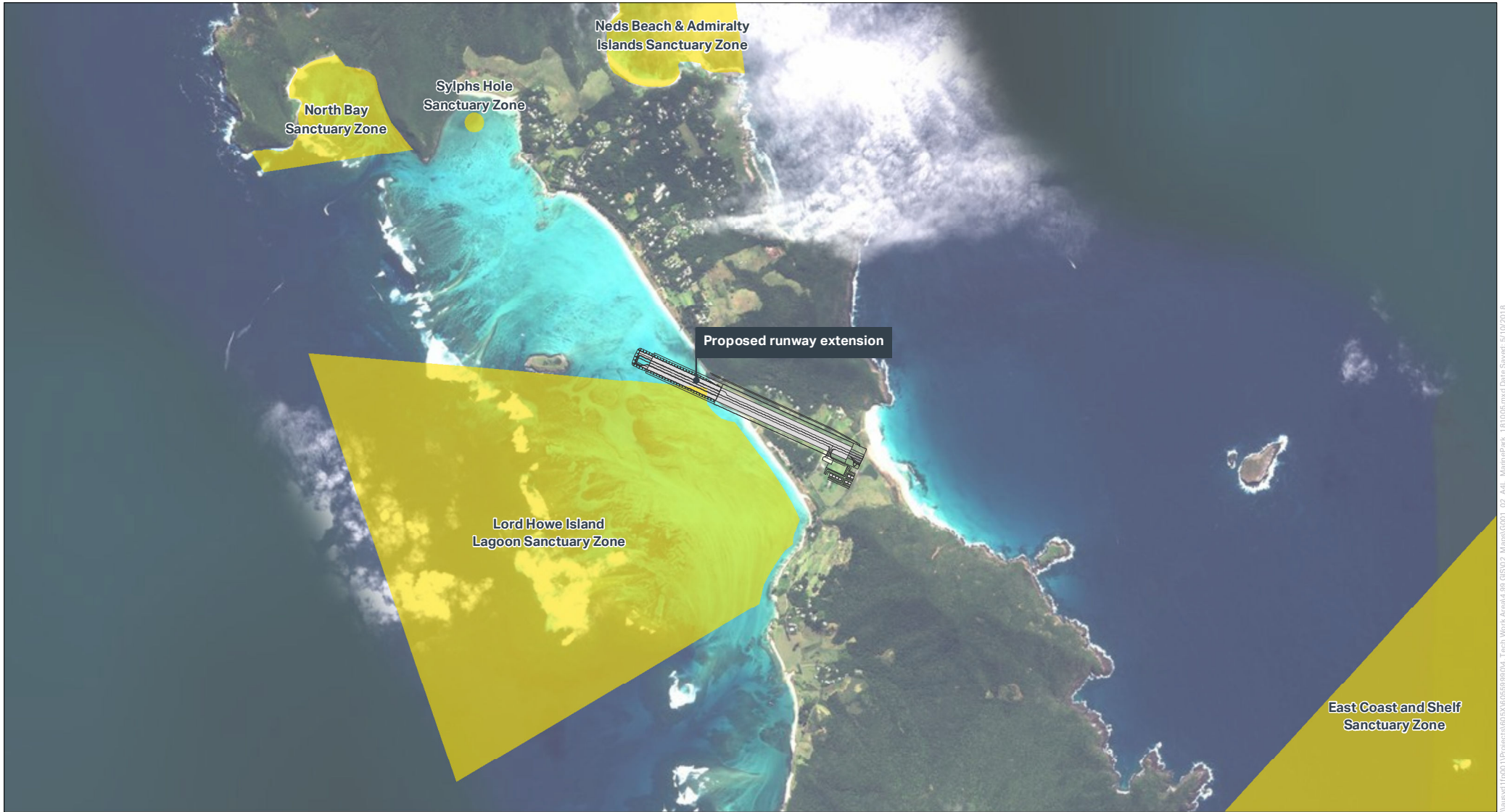


FIGURE 5-1 MARINE SANCTUARY ZONE

Legend

Sanctuary Zone



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5.4.3 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) aims to maintain a healthy, productive and resilient environment for the greatest well-being of the community now and into the future, consistent with the principles of ecologically sustainable development. Section 7.3(1) of the BC Act outlines criteria that are to be taken into account when determining whether a proposed development is likely to significantly affect threatened species or ecological communities, or their habitats.

Should a development be deemed to have a significant effect on threatened species or ecological communities, or their habitats, a biodiversity development assessment report is required to determine the full extent of the impacts and associated offsets that would be required.

An ecological assessment for the purpose of assessing the proposed works against the relevant criteria under section 7.3(1) of the BC Act would be required to determine if a significant effect on threatened species or ecological communities, or their habitats is likely.

5.4.4 Biosecurity Act 2015

The Biosecurity Act was enacted to provide for the identification, classification and control of Priority Weeds with the purpose of determining if a biosecurity risk is likely to occur, i.e.:

- the introduction, presence, spread or increase of a pest into or within the State or any part of the State; and
- a pest plant has the potential to; harm or reduce biodiversity or out-compete other organisms for resources, including food, water, nutrients, habitat and sunlight.

Given the remoteness of Lord Howe Island, biosecurity would be a prominent risk to the ecological health of the Island.

5.4.5 Heritage Act 1977

The NSW *Heritage Act 1977* was enacted to conserve the environmental heritage of NSW. Under section 32, places, buildings, works, relics, movable objects or precincts of heritage significance are protected by means of either Interim Heritage Orders (IHO) or by listing on the NSW State Heritage Register (SHR).

Lord Howe Island Group is listed on the NSW State Heritage Register (SHR ID 00970) for its significant cultural heritage associations in the history of NSW. The State Heritage listing also recognizes that it is inscribed on the World Heritage List for its unique landforms and biota, its diverse and largely intact ecosystems, natural beauty, and habitats for threatened species.

Proposals to alter, damage, move or destroy places, buildings, works, relics; movable objects or precincts protected by an IHO or listed on the SHR require an approval under section 60. The 'relic's provision' requires that no archaeological relics be disturbed or destroyed without prior consent from the Heritage Council of NSW. Therefore, no ground disturbance works may proceed in areas identified as having archaeological potential without first obtaining an excavation permit pursuant to section 60 of the Heritage Act 1977 or an archaeological exemption.

Refer to **Section 7.2** for an overview of the World Heritage values on the Island.

5.4.6 Roads Act 1993

Section 138 of the *Roads Act 1993* (Roads Act), requires applicants to obtain approval from the relevant roads authority for the erection of a structure, the carrying out of work on or over a public road, or the digging up or disturbing the surface of a road.

The LHIB is the road authority for the construction, maintenance, repair and draining of all public roads on the Island (refer to section 12(1) (a) of the *Lord Howe Island Act 1953* and section 263 of the Roads Act).

5.4.7 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (PoEO Act) is the key piece of environment protection legislation administered by the NSW Environment Protection Authority (EPA). The object of the PoEO Act is to achieve protection, restoration and enhancing of the quality of the NSW environment.

Section 120 of the PoEO Act states that “*a person who pollutes any waters is guilty of an offence*”. However, Section 121 (1) of the PoEO Act states that “*the regulations may, for the purposes of this Part, regulate the carrying out of an activity that pollutes waters*”.

The PoEO Act provides for the issue of an Environment Protection Licence (EPL) for scheduled activities pursuant to Section 48 of the PoEO Act, in relation to pollution and waste disposal caused by development or operation of developments. Activities requiring an EPL are listed in Schedule 1 of the Act.

The proposed works (either design option) is not defined as a Scheduled Activity under the PoEO Act and therefore an EPL is not required.

5.4.8 Contaminated Land Management Act 1997

The primary objective of the *Contaminated Land Management Act 1997* (CLM Act) is to establish a process for investigating and remediating land where contamination presents a significant risk of harm to human health or another aspect of the environment. Where land is identified as potentially contaminated, consultation with the NSW EPA should be undertaken.

Further assessment to identify whether land is contaminated would be required. A PFAS investigation carried out by AECOM in early 2018 found that PFAS materials were above the limit of reporting at some sites across the airport (refer to **Section 7.4**).

5.5 Local Strategies

5.5.1 Lord Howe Island Weed Management Strategy 2016 – 2025

The management of noxious weeds is mandatory and prescribed under the *NSW Noxious Weeds Act 1993*. The Lord Howe Island Weed Management Strategy provides a framework to prevent the introduction of new weed incursions, detect and contain newly emerging weed risks and to continue to address weed risks at the island scale. The implementation of this strategy will benefit the island ecosystems but also the local community and economy by protecting the integrity of the island's nature-based tourism assets and World Heritage values.

One of the goals of this strategy is to prevent the establishment of new invasive weeds. Equipment and materials imported for construction of the project should be inspected for weeds prior to being transported to the island.

5.5.2 Strategic Plan for the Lord Howe Island Group World Heritage Property 2010

The strategic plan provides a ten-year framework for “*consistent and coordinated management of the LHIG World Heritage Property by the Lord Howe Island Board and the various NSW and Commonwealth government agencies with responsibilities in the area*”. The plan is to “*ensure that day-to-day management of the Property complies with Australia’s obligations under the World Heritage Convention to protect, conserve, rehabilitate, present and transmit World Heritage values*”.

5.5.3 Lord Howe Island Biosecurity Strategy 2016

The Biosecurity Strategy provides guidelines to ensure the biodiversity and natural values of Lord Howe Island, including the economies those values support, and the health and safety of the community are protected from biosecurity risks. These risks come from pests and diseases entering, emerging, establishing or spreading.

The Strategy identifies recommendations to protect the economy and health and safety of the environment and community on the island. It is recommended that construction contractors be made aware of the Biosecurity risks and the Strategy prior to import of materials and equipment for construction.

6.0 Consultation

6.1 Community engagement for the feasibility study

In order to undertake a preliminary environmental impact assessment for the project, clear and effective consultation with key stakeholders and the community is required. AECOM has been undertaking community consultation as part of the project, with the following objectives:

- inform the community, tourists and key stakeholders about the feasibility study through timely, understandable and accessible communication channels;
- early and regular engagement so that the community is informed and involved in decision-making, where relevant, in the project;
- promote the feasibility study's purpose and necessity;
- understand the community, tourist and stakeholder's values and opinions of the project;
- identify objections to the proposed extended runway and potential impacts to the community; and
- help the community, tourists and stakeholders understand that a runway extension is not a certain conclusion and that the feasibility study will help decide this.

The communication channels for consultation involve:

- updated project webpage;
- updated Frequently Asked Questions;
- article in The Signal;
- community update;
- article in LHIB bulletin;
- project phone number and email address for community;
- information sessions x 2;
- online feedback form;
- community consultation report (to be published on project webpage); and
- letters to key stakeholders.

6.2 Target audiences

Listed below are the target audiences for the feasibility study:

- local community;
- visitors;
- tourism industry; and
- aviation industry.

Further measures to reduce adverse effects on the community and promote the positive impacts of the runway extension project would be identified in the EIS if the project further progresses.

6.3 Community issues

On October 3 2018, three community consultation sessions were held to obtain community issues and feedback regarding environmental impacts for the proposed extended runway. The general concerns the community raised were in regards to the following issues:

- impacts to World Heritage values;
- impacts on the coastal processes;
- climate change, particularly sea level rise;
- biodiversity and biosecurity;
- traffic and transport during construction, particularly access along Lagoon Road adjacent to the airstrip;
- marine access in the Lagoon during construction and operation;

- amenity impacts to receivers and residents nearby such as noise and vibration and visual impacts; and
- socio and economic impacts, particularly the impacts from additional tourists on the existing management systems on the island (waste, water, etc.), impacts on the existing 'lifestyle' perceived by residents and compensation for leaseholders for the loss of land associated with the realignment of Lagoon Road.

There were other concerns raised regarding the project cost, alternatives to the proposed runway extension and design enquiries.

The community was informed that the PEA has been undertaken as part of a feasibility assessment of the proposed future extension of the LHI Airport runway. The purpose of the PEA is to provide an overview of potential impacts of the two design options developed for the proposed runway extension.

The concerns raised by the community and stakeholders and responses to the issues raised during the consultation process will be captured in the Community Consultation Report. If the project does proceed further, these concerns would also be addressed in the EIS that would be prepared for the project.

7.0 Existing environment

7.1 World Heritage listing

The LHIG was included as a World Heritage Area on the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage List in 1982, for being “*an outstanding example of oceanic islands of volcanic origin containing a unique biota of plants and animals, as well as the world’s most southerly true coral reef*”.

An extensive barrier coral reef protects the Lagoon and sandy beach on the western side of the island and fringing coral reefs could be found adjacent offshore of the beaches on the eastern side. The Lagoon sanctuary zone supports a significant amount of marine biodiversity, including various species of coral, seagrass, and algae, some of which are endemic to the Lord Howe Island Marine Park. Within the Lagoon, coral areas have dominant coverage in the western portion located seaward of Blackburn Island, while the landward (eastern) portion of the Lagoon is generally comprised of sandy substrate. The reef is unique given the large proportion of calcareous (coralline) algae occurring with coral. This mixture of algae and coral occurs because LHIG is affected by both warm and cold currents. The LHIG meets criteria (vii) and (x) identified by UNESCO on the World Heritage List, as outlined in **Table 7-1**.

Table 7-1 UNESCO World Heritage criteria

Criteria		Justification
vii	To contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance	<ul style="list-style-type: none"> • example of an island system formed from submarine volcanic activity and demonstrates a nearly complete phase in the destruction of a large shield volcano; • example of a significant topographic change within a particular area (topographic relief) with exceptional diversity of scenic landscapes within a small area; • has the most southerly coral reef in the world as it demonstrates a rare example of a zone transition between algal and coral reefs; • many species are only found on this island group where there are unique assemblages of temperate and tropical forms cohabit; and • the islands support extensive colonies of nesting seabirds, where it provides the only breeding locality for the Providence Petrel and has the largest breeding concentrations of the Red-tailed Tropicbird.
x	To contain the most important and significant natural habitats for <i>in situ</i> conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation	<ul style="list-style-type: none"> • example of the development of a characteristic insular biota that has adapted to the island environment through speciation; • significant number of endemic species or subspecies of plants and animals have evolved in a very limited area; • example of independent evolutionary processes due to the diversity of landscapes and biota and the high number of threatened and endemic species; • Lord Howe Island supports a number of endangered endemic species or subspecies of plants and animals, such as Lord Howe Woodhen and Lord Howe Island Phasmid, the largest stick insect in the world, still exists on Balls Pyramid; and • example of an oceanic island group with a diverse range of ecosystems and species that have been subject to human influences for a relatively limited period.

7.2 Heritage

The LHIG is also listed on the following NSW State heritage registers:

- NSW Office of Environment and Heritage (OEH) State Heritage Register (SHR 00970): The LHIG was inscribed on the World Heritage List for its unique landforms and biota, its diverse and largely intact ecosystems, natural beauty, and habitats for threatened species. It also has significant cultural heritage associations in the history of NSW. The earliest European discovery of Lord Howe appears to have been in 1788 by the British colonial vessel HMS Supply. There is no recognised evidence of prior Polynesian or Melanesian discovery or settlement. A small permanent settlement was established in the 19th century, subsisting on trade with passing ships. With numerous fluctuations over the years, the settlement slowly expanded and consolidated, developing a distinctive social structure and culture with the passage of time. The island is an interesting example of restricted island settlement, although the World Heritage nomination was not made on cultural grounds (OEH, 2018);
- NSW State agency heritage register under section 170 of the *NSW State Heritage Act 1977*; and
- National Heritage list, in recognition of its National heritage significance.

Individual local heritage items on Lord Howe Island are managed by the *Lord Howe Island Local Environment Plan 2010* which includes the “Kentia” (formerly house of A. Christian) on Lagoon Road, Portion 111. This site is located to the west of the existing airport terminal and apron area.

In relation to Island heritage, there is no known association with the original inhabitants of the landmass from which the Australian mainland was derived, given that Lord Howe Island has had no geological relationship with Australia. Furthermore, there has been no evidence to date to suggest that Lord Howe Island had an early settlement by peoples of the Pacific region, including Polynesians, Melanesians or from other eastern coastal tribes. A survey was undertaken in 1996 by archaeologists from the University of Wollongong which found no evidence in analysis of pollens and deposits to indicate human colonisation prior to the time of the European discovery in 1788.

Under the *Lord Howe Island Act 1953*, a “Lord Howe Islander” is a person who has either resided on the Island continuously for the previous 10 years or resided on the Island immediately before 1 January 1982 and held, or have been closely related to someone who held, a permissive occupancy before 22 April 1954.

Given the above, there has been no previous and limited potential for there to be archaeological items present on the Island that predated European discovery in 1788.

7.3 Geology and hydrology

The existing runway occupies a sedimentary plain that developed by sand accumulating in a sheltered area between rocky outcrops. To the west of the existing runway is a coral reef Lagoon system, which is characterised by a reef platform (weak variable strength limestone) with sand accumulating in deeper areas. To the east of the existing runway is the eastern coastline of Lord Howe Island and the Pacific Ocean beyond.

Within the Lagoon, coral areas have dominant coverage in the western portion (seaward of Blackburn Island), while the landward (eastern) portion of the Lagoon is generally comprised of sandy substrate. The proposed runway extension area is expected to comprise loose coarse sands above bedrock, consisting of calcarenite over volcanic rocks (mostly basalt).

As mentioned in **Section 3.5.5**, the only existing form of stormwater treatment at Lord Howe Island is at the southern end of the runway which drains through a water course containing mangroves prior to discharging.

According to the NSW Office of Environment and Heritage using the bore construction data layer, there are no existing groundwater bores constructed on the island. However, there are multiple water bores on the island for domestic use by local residents for irrigation, domestic supply and other uses. Additionally, there are a series of groundwater monitoring wells along the southern shoreline used by the LHIB for groundwater monitoring. Review of the monitoring well log for ACMW5 indicates sand

from surface to 4.8 metres below ground surface (m bgs), underlain by coarse sand with increasing shell/coral fragments to depth of completion at 7.3 m bgs.

The PFAS investigation completed by AECOM in April 2018 included monitoring from existing groundwater monitoring wells and private bores. The standing water level (SWL) was monitored in each of the bores (refer to **Table 7-2** and **Figure 7-1**).

Table 7-2 SWL of groundwater (meters below ground surface)

Sample ID	Location	Depth to water (m bgl)
ACMW5	Near the Aquatic Club, end of Middle Beach Road, towards the Lagoon	2.00
BORE001	Western end of the existing runway	3.50
BORE003	Situated halfway on Lagoon Road	2.00
BORE005	Near the Bureau of Meteorology	2.45
BORE006	South west of the Bureau of Meteorology	2.10
CCMW1	Southern coastline of Lovers Bay	3.52
PPMW3	Situated on Lagoon Road between the Bowling Club and Pinetrees Lodge	2.10
WMFMW10	Waste Management Facility	4.80

A Preliminary PFAS Assessment (AECOM 2018b) indicated that there may be up to two different groundwater bearing zones attributed to the geology on the Site. It is the opinion of AECOM that a shallow aquifer may exist in the alluvial geology, with a separate deeper aquifer likely present in the underlying basalt.

7.4 Contamination

A search of the NSW Office of Environment and Heritage Acid Sulfate Soil Risk Map has shown that there is no risk of Acid Sulfate Soils on the Island, however due to the geomorphology of Lord Howe Island; the Island is susceptible to developing potential acid sulfate soils if development occurs in low lying areas.

A Preliminary PFAS Assessment (AECOM 2018b) was completed for the LHIB in April 2018. Soil and sediment samples were analysed for PFAS and concentrations found were detected above the LOR (Limit of Reporting) in the Preliminary PFAS Assessment study area. The study area consisted of the following sites:

- Site A: LHI Airport and surrounds comprising the following:
 - LHI Airport
 - Bureau of Meteorology (BoM) Lord Howe Island Aero Station
 - Waste Management Facility
 - Pond
 - Various private properties
- Site B: Lord Howe Island Board Depot
- Site C: LHI Lagoon

A PFAS investigation carried out by AECOM in early 2018 found that PFAS materials were detected in soil, sediment and groundwater at the following locations:

- western end of the existing runway (BORE001, SED002, HA004 and HA005);
- adjacent to the existing aircraft apron (HA006);
- proposed aircraft apron (HA007 and HA008); and

- eastern end of the existing runway (SED005).

The concentrations in soil were less than the adopted human health assessment criteria however were greater than the National Environmental Management Plan (NEMP) interim ecological assessment criteria. This means the levels of PFAS present at the island may present a risk to the environment, but not to human health.



FIGURE 7-1 LOCATION OF SOILS AND SEDIMENT SAMPLES ANALYSED FOR PFAS

Legend

- Groundwater sample location
- Hand auger location
- Sediment sample location
- Surface water sample location
- Surface water flow direction



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Source:

7.5 Biodiversity

LHI is the only major breeding locality for the Providence Petrel (*Pterodroma solandri*) and contains one of the world's largest breeding concentrations of Red-tailed Tropicbird (*Phaethon rubricauda*). LHIG supports a number of endangered endemic species or subspecies of plants and animals, for example the Lord Howe Woodhen (*Gallirallus sylvestris*), which at time of World Heritage listing was considered one of the world's rarest birds.

Endangered and critically endangered species listed under the EPBC protected matters search tool previously recorded within 1 kilometre of the proposed extension area are shown in **Table 7-3**. Species highlighted below have been identified to have a higher risk of being impacted by the extension works given their status and likelihood of occurrence. A full list of species including those identified as 'vulnerable', such as the Lord Howe Island Skink, Currawong and Black Rock Cod is provided in **Appendix B**.

The vegetation located on either side of the existing paved runway is dominated by kikuyu grass. Beyond this grass is significant native vegetation (refer to **Appendix C, Plate 4**). Kentia palms are also located to the north of Lagoon Road, north of the airfield.

Being the most southerly coral reef in the world, Lord Howe Island comprises a unique zone of transition between algal and coral reefs. The Lagoon sanctuary zone supports a significant amount of marine biodiversity, including various species of coral, seagrass, and algae, some of which are endemic to the Lord Howe Island Marine Park. Within the Lagoon, coral areas have dominant coverage in the western portion located seaward of Blackburn Island, while the landward (eastern) portion of the Lagoon is generally comprised of sandy substrate. The Lagoon contains suitable potential foraging and breeding habitat for marine species such as the Loggerhead Turtle and Leatherback Turtle. Common habitat types in the Lagoon include brain coral, branching coral, soft coral, microalgae, sponge, rubble, sand and seagrass (NSW Marine Parks Authority, 2002).

A thorough marine investigation would be undertaken if the project were to progress further in order to identify specific marine species in the Lagoon where the proposed runway extension would be constructed.

The Lagoon supports a significant amount of marine biodiversity, including various species of coral, seagrass, and algae, some of which are endemic to the Lord Howe Island Marine Park. A thorough marine investigation would be undertaken if the project were to progress further in order to identify specific marine species in the Lagoon where the proposed runway extension would be constructed.

Table 7-3 EPBC Endangered and Critically Endangered Listed Species

Species	Status	Likelihood of occurrence	Habitat
Red Knot (<i>Calidris canutus</i>)	Endangered	Known to occur	Coastal areas in sandy estuaries with tidal mudflats. They breed in North America, Russia, Greenland and Spitsbergen.
Curlew Sandpiper (<i>Calidris ferruginea</i>)	Critically Endangered	Known to occur	Intertidal mudflats of estuaries, Lagoons, mangroves, as well as beaches, rocky shores and around lakes, dams and floodwaters. Its breeding habitat is the lowland tundra of Siberia.
Northern Royal Albatross (<i>Diomedea sanfordi</i>)	Endangered	Foraging/feeding likely to occur	The breeding range is restricted to the Chatham Islands. The majority of the population spends their non-breeding period off both coasts of southern South America.

Species	Status	Likelihood of occurrence	Habitat
Lord Howe Woodhen (<i>Gallirallus sylvestris</i>)	Endangered	Breeding likely to occur	Found only on Lord Howe Island. Breeding season is between spring and early summer. Highly territorial with a territory of around 3 hectares.
Northern Siberian Bar-tailed Godwit (<i>Limosa lapponica menzbieri</i>)	Critically Endangered	May occur	Breed in northeast Asia and Siberia, spending its winters in coastal areas of Australia and New Zealand.
Southern Giant-Petrel (<i>Macronectes giganteus</i>)	Endangered	May occur	Breeds on numerous islands throughout the southern oceans. The range is quite large and ranges from Antarctica to the subtropics of Chile, Africa, and Australia.
Eastern Curlew (<i>Numenius madagascariensis</i>)	Critically Endangered	Known to occur	Intertidal mudflats and sandflats, often with beds of seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and Lagoons. Breeds in Russia and north-eastern China.
Herald Petrel (<i>Pterodroma heraldica</i>)	Critically Endangered	May occur	Highly pelagic, rarely approaching land except at colonies. Nests on tropical and subtropical islands, atolls, cays and rocky islets
Gould's Petrel (<i>Pterodroma leucoptera leucoptera</i>)	Endangered	May occur	Nesting predominantly occurs in natural rock crevices among the rock scree and also in hollow fallen palm trunks, under mats of fallen palm fronds and in cavities among the buttresses of fig trees. They breed colonially and the nests are clumped and often less than 1 m apart. Breeding takes place over a six week period commencing in early November.
Chatham Albatross (<i>Thalassarche eremita</i>)	Endangered	May occur	The species nests on level or gently sloping ledges, summits, slopes and caves of rocky islets and stacks.
Southern Right Whale (<i>Eubalaena australis</i>)	Endangered	May occur	Most feeding areas are thought to be in deeper offshore waters. Breeding habitat for the southern right whale is generally near-shore, shallow water depths and being in close proximity to other individuals whilst in calving grounds in Australian waters.
Magnificent Helicarionid Land Snail (<i>Gudeoconcha sophiae magnifica</i>)	Critically Endangered	May occur	Confined only to Mount Gower and Mount Lidgbird on Lord Howe Island.
Masters' Charopid Land Snail (<i>Mystivagor mastersi</i>)	Critically Endangered	Likely to occur	Located on the summit of Mount Lidgbird, Mt Gower, Blinky Beach and Boat Harbour. The species is now suspected to be restricted to the rugged areas at the southern end of the island

Species	Status	Likelihood of occurrence	Habitat
Lord Howe Flax Snail (<i>Placostylus bivaricosus</i>)	Endangered	Known to occur	Abundant under cover in shady, damp situations and on scrubby calcarenite (chalky) hillsides, was sparingly represented at higher altitudes and appeared to avoid open areas.
<i>Calystegia affinis</i> (a twining plant)	Critically Endangered	May occur	Occurs mainly in open higher areas along ridge tops. On Lord Howe Island, the species occurs in lowland areas in the north of the island, and high in the southern mountains. Both habitats are on basalt-derived soils.
Phillip Island Wheat Grass (<i>Elymus multiflorus subsp. Kingianus</i>)	Critically Endangered	Likely to occur	Occurs between exposed basalt-derived cliffs and upslope littoral rainforest.
Rock Shield Fern (<i>Polystichum moorei</i>)	Endangered	Likely to occur	Entire population occurs within the southern part of Lord Howe Island; however the species ranges across two disjunct habitats, namely calcarenite boulders on the coastal fringe and ledges on the southern mountains.
Loggerhead Turtle (<i>Caretta caretta</i>)	Endangered	May occur	Occur in coral reefs, bays and estuaries in tropical and warm temperate waters. Loggerhead turtles nest from late October and finish nesting in late February.
Leatherback Turtle (<i>Dermochelys coriacea</i>)	Endangered	Likely to occur	Occur in tropical and temperate waters. Most leatherback turtles living in Australian waters migrate to breed in neighbouring countries, particularly in Indonesia, Papua New Guinea and the Solomon Islands.

The NSW BioNet is the repository for biodiversity data products managed by the OEH. This data includes species sightings of plants, mammals, birds, reptiles, amphibians, some fungi, invertebrates and fish. A search of the NSW OEH BioNet species sightings records identifies previous records of a number of threatened species located in the vicinity of the proposed runway extension area. **Figure 7-2** shows species that have been previously recorded and entered into the database.

7.5.1 Biosecurity risks

Due to the remoteness of Lord Howe Island, biosecurity is a prominent risk to the ecological health of the Island. A Biosecurity Strategy (AECOM 2016) for the LHIB was developed to provide a gap analysis of the 2003 Quarantine Strategy by identifying the environmental and economic values of the Island, identifying stakeholders and most importantly identifying a range of pathways that exist for the spread of biosecurity since 2003. Table 7 of the Biosecurity Strategy lists an extensive list of potential biosecurity pathways and they are summarised as follows:

- By sea:
 - sea freight Island Trader;
 - project specific vessels such as barges;
 - yachts and other vessels;
 - military vessels; and
 - natural pathways: ocean currents, weather events, animal migration/dispersion.
- By land:
 - regular passenger flights;
 - Mac Air Freight Plane (from Port Macquarie);
 - light aircraft;
 - military aircraft; and
 - natural pathways: animal migration/dispersion, climate change events.
- On land dispersal
 - movement of people and vehicles; and
 - natural dispersal: pests and weeds existing on the island.

The AECOM 2016 report provides recommendations for the Lord Howe Island Board and its residents to implement on the island. These recommendations include increasing awareness for residents and suppliers both before and after import and increasing inspections at the LHI wharf and airport.

7.6 Flooding

As oceans warm, they expand and sea level rises. Global mean sea levels have risen around 20 centimetres since the late 19th century and are expected to continue to rise under future climate change (CSIRO, 2016). It is expected that mean sea level will rise 0.4 metres above 1990 levels by 2050 and 0.9 metres by 2100. Climate change projections are currently reported for a range of possible future emissions scenarios, referred to as Representative Concentration Pathways (RCPs). Global emissions are currently tracking along the RCP8.5 pathway, which arises from little effort to reduce emissions and represents a failure to prevent warming by 2100. Over the next 15 years, in the absence of global action on curbing emissions, this trajectory is unlikely to change significantly, suggesting that the most extreme emissions scenario is more likely to occur through to 2030.

All coastal structures have been designed for a 50 year design life, with a design horizon of 2070. To account for climate change a sea level rise of 0.4m has been adopted for the 50 year design life (2070); this is applied to the ambient water levels.

However in 2014, a Lord Howe Island Coastline Hazard Definition and Coastal Management Study undertaken (Haskoning Australia Pty Ltd, 2014) identified that areas below the 3 metre AHD elevation are expected to be at risk of inundation, and areas between 3 metre and 4 metre AHD elevation may become subject to inundation over the long term under sea level rise. The airport was recognised as the most extensive area to be subject to coastal inundation with elevations around 4 metre AHD, refer to **Figure 7-3**.

Storm surge is a raised mass of water, generally several metres higher than normal tide levels, which results from strong onshore winds and reduced atmospheric pressure. An individual storm surge is

measured relative to the tide level at the time. The combination of storm surge and normal (astronomical) tide is known as a “storm tide”.

The worst impacts occur when the storm surge arrives on top of a high tide. When this happens, the storm tide can reach areas that might otherwise have been safe.

Storm surge is often associated with cyclones and can cause flooding and damage through raised tides and waves. The height of storm surge is influenced by many factors, including the intensity and speed of an associated cyclone, the angle at which the cyclone crosses the coast and the topography of the affected area. Cyclonic tidal surges are associated with the passage of intense tropical cyclones on particularly critical paths, combined with a high state of the astronomical tide. Surge levels significantly above the predicted levels are possible.

Coastal areas surrounding Lord Howe Island are exposed to periodic flooding and inundation hazards when the sea level rises above normal heights during tropical cyclones or storm activity. This information is suitable to inform the concept design of the runway extension, but it is recommended that 2 dimensional or 3 dimensional computational modelling of the water dynamics within the Lagoon is carried out at subsequent design stages of the project. The runway extension has been designed to account for both sea level rise and storm surge. The recommended additional modelling would verify the assumptions regarding sea level and storm surge.



Figure 7-3 3m, 4m and 5m AHD contours along the Lagoon shoreline (Haskoning Australia, 2014)

8.0 Environmental risk identification

An environmental risk analysis was carried out for the two runway extension design options to identify the environmental issues which require assessment in **Section 9.0**.

8.1 Methodology

To determine the risk for each potential environmental issue, the likelihood of an environmental aspect occurring is assessed using the categories provided in **Table 8-1**.

Table 8-1 Likelihood categories

Likelihood	Description
Certain	Expected to happen routinely during the project life.
Possible	Could easily happen and has occurred on a previous similar project.
Unlikely	Possible, but not anticipated.

The consequence of the impact if it was to occur was assessed using the categories provided in **Table 8-2**.

Table 8-2 Consequence categories

Consequence	Description
Minor	Minor effects on biological, social, economic or physical environment, both built and natural. Minor short to medium term damage to small area of limited significance, easily rectified.
Moderate	Moderate effects on biological, social, economic or physical environment, both built and natural. Moderate short to medium term widespread impacts. More difficult to rectify.
Major	Serious effects on biological, social, economic or environment, both built and natural. Relatively widespread medium to long term impacts. Rectification difficult or impossible

Based on the assessment of the likelihood and consequence of a given impact occurring, a risk rating was derived from the risk matrix presented in **Table 8-3**.

Table 8-3 Risk Rating Matrix

Risk rating				
Likelihood	Nil	Minor	Moderate	Major
Certain	-	Medium	High	High
Possible	-	Low	Medium	High
Unlikely	-	Low	Low	Medium

8.2 Preliminary environmental risk assessment

Table 8-4 and **Table 8-5** provide a preliminary environmental risk ranking wherein environmental issues with a 'nil' or 'low' risk rating have not been taken forward for further assessment in this report. Environmental risks that were identified as Low or Nil risk are highlighted in green and have not been taken forward for further assessment in this report. This preliminary risk assessment assumes no mitigation or management measures. If mitigation and management measures are applied the level of risk would likely be reduced in most instances.

Table 8-4 Environmental risk identification during construction

Environmental impact	Option 1 Land reclamation			Option 2 Deck on pile		
	Likelihood	Potential Consequence	Risk rating	Likelihood	Potential Consequence	Risk rating
Local Island heritage	Unlikely	High	Moderate	Unlikely	High	Moderate
World heritage during construction	Certain	Major	High	Certain	Moderate	High
Surface water (quality and hydrology)	Certain	Major	High	Certain	Moderate	High
Coastal processes	Certain	Major	High	Likely	Minor	Medium
Contamination	Possible	Moderate	Medium	Possible	Moderate	Medium
Groundwater and geology during construction	Unlikely	Low	Low	Unlikely	Low	Low
Climate change and flooding	Certain	Major	High	Certain	Major	High
Aviation safety during construction	Unlikely	Major	Medium	Unlikely	Major	Medium
Construction traffic, transport and access (includes marine access)	Possible	Moderate	Medium	Possible	Moderate	Medium
Biodiversity and Biosecurity	Certain	Major	High	Certain	Moderate	High
Air quality	Possible	Moderate	Medium	Possible	Minor	Medium
Construction Noise and vibration	Certain	Major	High	Certain	Major	High
Landscape and visual amenity	Certain	Major	High	Certain	Moderate	High
Resource use and waste management during construction	Certain	Major	High	Possible	Moderate	Medium

Environmental impact	Option 1 Land reclamation			Option 2 Deck on pile		
	Likelihood	Potential Consequence	Risk rating	Likelihood	Potential Consequence	Risk rating
Socio-economic during construction	Certain	Moderate	High	Certain	Moderate	High
Cumulative impacts¹⁰ during construction¹¹	Unlikely	Moderate	Low	Unlikely	Moderate	Low

Table 8-5 Environmental risk identification during operation

Environmental impact	Option 1 Land reclamation			Option 2 Deck on pile		
	Likelihood	Potential Consequence	Risk rating	Likelihood	Potential Consequence	Risk rating
Local Island heritage	Unlikely	High	Moderate	Unlikely	High	Moderate
World heritage	Certain	Major	High	Certain	Moderate	High
Surface water (quality and hydrology)	Certain	Major	High	Certain	Moderate	High
Coastal processes	Certain	Major	High	Likely	Minor	Medium
Contamination	Possible	Moderate	Medium	Possible	Moderate	Medium
Groundwater and geology during operation	Unlikely	Low	Low	Unlikely	Low	Low
Climate change and flooding	Certain	Major	High	Certain	Major	High
Change in aviation safety during operation	Unlikely	Low	Low	Unlikely	Low	Low

¹⁰ Cumulative impacts are determined by an assessment of developments that are proposed, have been approved (but not yet under construction) and/or those that would be constructed or operating in the vicinity of and/or at the same time as the planning, construction or operation of the project.

¹¹ & ¹⁴ There are currently no major projects on the Island that is expected to be constructed.

Environmental impact	Option 1 Land reclamation			Option 2 Deck on pile		
	Likelihood	Potential Consequence	Risk rating	Likelihood	Potential Consequence	Risk rating
Operational traffic, transport and access (includes marine access)	Unlikely	Moderate	Low	Unlikely	Moderate	Low
Biodiversity and biosecurity	Certain	Major	High	Certain	Moderate	High
Air quality	Possible	Moderate	Medium	Possible	Minor	Medium
Change in operational noise and vibration	Possible	Minor	Low	Possible	Minor	Low
Landscape and visual amenity	Certain	Major	High	Certain	Moderate	High
Resource use and waste management during operation	Unlikely	Minor	Low	Unlikely	Minor	Low
Socio-economic	Possible	Moderate	Medium	Possible	Moderate	Medium
Cumulative impacts during operation¹⁴	Nil	Nil	Nil	Nil	Nil	Nil

9.0 Preliminary environmental impact assessment

This section provides a description of the potential environmental impacts associated with the two design options of the proposed runway extension at Lord Howe Island Airport. Impacts have been grouped into construction related impacts and operational related impacts, with sub-groupings in relation to the land component, the water component or general impacts of works for both design options. Potential issues identified as being of 'high' or 'medium' risk in **Section 8.0** are discussed in this section, while issues identified as having 'nil' or 'low' risk have not been considered further in this report.

9.1 Potential construction impacts

9.1.1 World Heritage and Local heritage

As discussed in **Section 7.1** and **Section 7.2**, the LHIG is identified as having heritage significance at a World Heritage, Commonwealth and State level, as it provides natural, scientific and cultural values to the local community of the island, to the people of New South Wales and globally. Lord Howe Island also has local heritage items in the vicinity of the proposed runway extension works. Given this, World Heritage is one of the key issues for consideration during construction.

The potential impacts to World heritage as a result of construction activities for the two design options are discussed in **Table 9-1**.

Table 9-1 Potential construction impacts on World heritage

Construction activities	Potential impact
Land based component (design Option 1 and Option 2)	
Construction of extended turning and apron area, and taxiway.	Construction of the extended turning area, apron area and taxiway would be within the existing airfield and cleared area.
Realignment of Lagoon Road to the north of the airfield.	Kentia palm trees (and potentially other types of vegetation) may be cut down for the new road alignment and fence line. Some existing grass either side of the taxiway, turning and apron area (not know to contain any threatened species) would be impacted by the works. In addition, as the LHIG is a World, Commonwealth and State Heritage listed area, all construction activities have the potential to affect its heritage significance by causing damage to the environment by introducing pests and weed species, affecting water and air quality and interacting with existing contamination within the airport site.
Water based component (design Option 1 and Option 2)	
Construction activities required for construction of the runway extension.	As the LHIG is a World, Commonwealth and State Heritage listed area, all construction activities have the potential to affect its heritage significance by changing the amenity of the area, the land use and causing damage to the environment by affecting biodiversity through direct and indirect impacts, introducing pests and weed species, affecting water and air quality and introducing work activities with the potential to contaminate the existing environment. The works have the potential to detrimentally impact water quality in surrounding waters as a result of introduced fill, disturbance of sediments, erosion and surface water run-off during construction, therefore impacting on the heritage values of the Island. This is particularly the case for design Option 1.

Future consultation with the relevant stakeholders and additional heritage impact assessment would need to be undertaken as part of an Environmental Impact Statement (EIS) that would be required to accompany any future project application for a proposed runway extension.

9.1.2 Surface water (quality and hydrology)

Table 9-2 outlines the potential impacts on surface water from construction activities, these relate to water quality and hydrology.

Table 9-2 Potential construction impacts on surface water

Construction activities	Potential impact
Land based component (design Option 1 and Option 2)	
<p>The following land based activities may produce dust and have the potential to increase sediment or contaminant laden erosion to surface waters:</p> <ul style="list-style-type: none"> • general site access to the land either side of the existing airstrip, causing disturbance of vegetated areas; • stripping of grassed areas for extension either side of the runway may cause disturbance of soils which may result in erosion and sediment runoff • excavation and mobilization of known PFAS containing material either side of the runway, due to past firefighting activities; • asphaltting activities from construction of the runway pavement and associated airfield pavements and access roads; • refuelling of construction vehicles and machinery, including hammer piling rigs, loaders and excavators; • adhoc concrete work required to tie in stormwater pits; and • stockpiling of sub base materials. 	<p>An increase in dust and erosion of exposed or stockpiled soil can enter the water from wind and rain respectively, increasing sediment load and reducing light and oxygen available to aquatic flora and fauna.</p> <p>Potential to change the chemical content on land and water resulting in contamination. Asphaltting, concreting and refuelling chemicals can change the pH, salinity and oxygen significantly. A change in land and water conditions has the potential to be detrimental to land and aquatic flora and fauna.</p>
Water based component for Option 1 (Land reclamation)	
<p>Disturbance of the Lagoon bed due to pushing the rock armour structure and wave trip structure into the Lagoon to build up the runway base and trip structure, causing mobilised sediment into the water column.</p> <p>Concrete fill surrounding the rock armour may produce dust and have the potential to increase sediment or contaminant laden erosion to surface waters.</p>	<p>Mobilised sediment would increase the turbidity in the water reducing the light and oxygen available to aquatic flora and fauna.</p> <p>Concreting has the potential to change the chemical content of water (pH, salinity and oxygen). A change in water conditions is detrimental to aquatic flora and fauna.</p>
Water based component for Option 2 (Deck on piles)	
<p>Disturbance to the Lagoon bed due to driven or vibratory piling of the steel tubes into the Lagoon bed (at approximately RL-1.0m AHD), causing sediment to be mobilized into the water column.</p> <p>In-situ concrete stitching used to join the pre-cast concrete.</p>	<p>Similar to Option 1, the mobilised sediment will increase the turbidity in the water reducing the light and oxygen available to aquatic flora and fauna. The disturbance and mobilization of sediments will be considerably less than in Option 1, however.</p>

In order to further assess the extent of potential impacts on surface water, background surface water quality monitoring should be undertaken within the surface water drains and Lagoon. Ideally the data captured would be collected over a sufficient duration to capture any seasonal changes in conditions.

9.1.3 Coastal processes

Table 9-3 outlines the potential impacts on coastal processes. The Lagoon is more protected from wave action than the eastern and southern sides of the Island as it is shallower water and is partially protected by the coral and algal reef habitat on the edge of the Lagoon.

With regard to Option 2 (Deck on piles), a 570 metre piled runway extension is not expected to have significant impacts on coastal processes, although if storm wave crests reached the slab edge, then some attenuation of wave action would be expected at the shoreline, although not to the same magnitude as Option 1.

Table 9-3 Potential construction impacts on coastal processes

Construction activities	Potential impact
Option 1 (Land reclamation)	
Pushing out of large rock armour material from the shoreline, which would progressively change the topography of the Lagoon coast line in this location.	The construction of both structures would cause progressive wave refraction, changing the wave energy and velocity in the Lagoon and at the shoreline. This would reduce the tidal inundation area along the area of the shoreline immediately adjacent to the rock armour structure.
Development of wave trip structure 50 metres off shore from the rock armour structure would progressively alter the incoming wave action to the Lagoon.	
Option 2 (Deck on piles)	
The deck on pile option would comprise precast concrete deck panels supported on precast reinforced concrete beams and steel pile footings. No wave trip structure is required for the deck on pile option.	The construction of the piled runway extension would be expected to have reduced impacts by comparison to Option 1 on coastal processes given that this option would maximise the scope for prefabrication and minimise on-site construction time.

The impact of the proposed runway extension on coastal processes would require further investigation and assessment in the EIS.

9.1.4 Contamination

Table 9-4 discusses the potential impacts of contamination during construction.

Table 9-4 Potential contamination construction impacts

Construction activities	Potential impact
Land based component (design Option 1 and Option 2)	
Use of plant and machinery during existing airfield pavement works. Activities include stripping of vegetation, placing aggregate, compaction of sub base and asphaltting of airfield pavements. Use of machinery can result in contamination from oil leaks, refuelling operations and chemical storage required for maintenance.	Chemical and fuel content on land can be leached into the soil and taken up by vegetation either side of the runway, potentially leading to die back. Potential migration of PFAS contamination over land and into water.

Construction activities	Potential impact
Excavation of previously contaminated materials i.e. PFAS containing material may result in further contamination in the form of dust and storm water runoff.	
Water based component (design Option 1 and Option 2)	
<p>Option 1 (Land reclamation) Similarly to the land based component, the use of plant and machinery to push out the rock armour will present some risk to the surface water from the same activities mainly through refuelling, hydraulic oil spills and maintenance predominantly through untreated stormwater discharges and potentially where crane and booms are used over water, PFAS contamination is not expected to be a risk because excavation of existing material will not be required.</p> <p>Option 2 (Deck on piles) Construction activities to build Option 2 are likely to include working over water for majority of the works. The risk from hydraulic oil and diesel from refuelling of equipment is high.</p>	Chemicals have the potential to be absorbed and ingested by aquatic flora and fauna. An increase of untreated chemicals and fuels in drainage runoff may cause degradation in aquatic flora and fauna over time. Chemicals can change surrounding water properties such as pH, salt content, oxygen and temperature causing changes to ecosystem functions.

It is recommended that further soil testing is completed prior to any potential future construction for a runway extension, so as to understand the extent of potential contamination likely to be encountered. Additional PFAS investigations for the purposes of further assessing the nature and extent of identified PFAS impacts would be undertaken.

9.1.5 Climate change and flooding

Lord Howe Island Airport is considered critical infrastructure and needs to remain operational during emergencies in order to allow emergency services access to the island. Any proposed future runway extension and associated structures (deck on piles or land reclamation, for example) must remain functional after a major event, therefore in accordance with AS4997-2005 the airport is designated as a function category 3 (high property value or high risk to people).

Potential climate change and flooding impacts during construction for the two design options are discussed in **Table 9-5**.

Table 9-5 Potential impacts of climate change and flooding during construction

Construction activities	Potential impact
Land based component (design Option 1 and Option 2)	
Storm surge, periodic flooding and inundation hazards when the sea level rises above normal heights during tropical cyclones or storm activity during the construction of the land based components of the project.	<p>There is the potential for flooding and land inundation in the areas surrounding the airport. The airport was recognised as the most extensive area to be subject to coastal inundation with elevations around 4 metre AHD (Haskoning Australia, 2014). Major impacts from flooding and land inundation would include:</p> <ul style="list-style-type: none"> • bank erosion and scouring of the landscape surrounding the airport runway; • erosion of construction stockpiles containing site materials; • damage to airport assets, in particular the existing airport runway, apron and administration buildings;

Construction activities	Potential impact
	<ul style="list-style-type: none"> • damage to construction machinery, equipment, plant laydown areas, site compounds etc.; • loss of vegetation, flora and fauna habitat in surrounding areas of the airport runway; and • safety risk to construction personnel,
Water based component (design Option 1 and Option 2)	
Storm surge, periodic flooding and inundation hazards when the sea level rises above normal heights during tropical cyclones or storm activity during the construction of the runway extension.	<p>A storm surge may damage infrastructure, release contaminants and is a risk to personnel working on the construction of the runway extension.</p> <p>These impacts would have a flow on effect and have the potential to impact on aquatic flora and fauna. Crushing of aquatic flora will result in habitat loss for aquatic fauna.</p> <p>Displacement of Lagoon sediments would increase the turbidity on the water and potentially temporarily displace nutrient availability to aquatic flora and fauna.</p>

9.1.6 Aviation safety

Construction of the runway extension is based on no aircraft operations occurring for four consecutive days, as described in **Section 3.2**. This is typically managed through the use of Method of Work Plans (MOWP) which sets out the work required on the airfield and indicates restrictions to aircraft operations and a Notice to Airmen (NOTAM) which alerts pilots of potential hazards along a flight route or at a location that could affect the safety of the flight. Typically these documents contain protocol for the restoration of the airfield to operational considerations to accommodate emergency aircraft.

Should construction work be required outside of the four consecutive days of airport shutdown, stakeholder consultation with Air Services, CASA, the incumbent aircraft operator and the community would be required to ensure aviation safety is maintained.

In addition to the information above, future stages of development for the runway extension would need to consider potential aviation safety hazards and implement additional appropriate mitigation measures during construction if required.

9.1.7 Traffic, transport and access

The road network on the Island is managed by the LHIB. Background traffic volumes are expected to be low due to the limited number of vehicles on the Island. The roads are mostly used by light vehicles, cyclists and pedestrians. Access to the airport is via Lagoon Road, a sealed road in good condition.

The runway extension works may not have an increase in traffic on the local road network during construction for the transport of construction materials as plant and materials may be stored on barges moored outside the reef and delivered straight to the existing western end of the runway, as per the 2015 runway overlay project. No road upgrades would be expected to be required as a result of construction and movement of equipment; however an appraisal of the suitability of the wharf to the north of the airport to accommodate suitably sized barges and vessels during construction would be required if it were to be used.

Potential impacts to traffic, transport and access due to construction activities for the two design options are discussed in **Table 9-6**.

Table 9-6 Potential construction impacts on traffic, transport and access

Construction activities	Potential impact
Land based component (design Option 1 and Option 2)	
General site access and vehicle movement, together with loading and unloading of materials. Construction traffic would use Lagoon Road.	Increase in traffic on the surrounding road network during construction somewhat affecting road safety for local road users. Traffic and transport of construction materials would result in a risk of collision with the wildlife on the island.
Water based component (design Option 1 and Option 2)	
Construction activities required for both piling and reclamation of land for the extended runway component would increase marine traffic due to the importation of construction materials (most notably for Option 1 (Land reclamation)).	Increase of marine traffic for the transportation of construction materials would negatively impact on the marine life and environment (e.g. due to propeller disturbance or boats running aground) in terms of vegetation area, fauna and flora habitat values and habitat connectivity within the Lagoon. An increase in marine traffic may also impact on the movement of other vessels and Lagoon users.

Further assessment of the traffic and transport impacts of the proposed runway extension would be undertaken as part of the EIS.

9.1.8 Biodiversity and biosecurity

Biodiversity threatened flora

Vegetation surveys north and south of the runway (beyond the cleared and grassed areas) have not been completed as part of this PEA. The likelihood of having threatened ecological communities in the vicinity of the proposed runway extension area is high due to the habitat that the Island provides for threatened migratory and endemic species, including four threatened species in the immediate vicinity:

- *Elymus multiflorus* subsp. *kingianus* Phillip Island Wheat Grass
- *Calystegia affinis*
- *Geniostoma huttonii*
- *Polystichum moorei* Rock Shield Fern

A study completed by the LHIB in 2016 noted that two communities are threatened, one of them being the *Lagunaria* Swamp Forest, more widespread on the low-lying flats of the Island. This community may be relevant to the proposed works due to the low lying location of the Airport and runway.

Biodiversity threatened fauna

According to the protected matters search, 16 fauna species have been found likely to be distributed on the Island and a search on the NSW Bionet Atlas has identified eight species previously visually observed within the vicinity of the proposed runway extension area. **Table 9-7** lists the eight threatened fauna sighted within 3 kilometres of the proposed runway extension area. Other endangered species listed under the EPBC protected matters search tool that would be potentially impacted are also identified under **Section 7.5**. All species listed under the EPBC protected matters search tool previously recorded within 1 kilometre of the proposed extension area is discussed in **Section 7.5**.

Table 9-7 Threatened fauna previously recorded within 3 kilometres of proposed runway extension area

Scientific name	Common name	Commonwealth status	State status	No. of sightings
Birds				
<i>Calidris canutus</i>	Red Knot	Endangered		1
<i>Gygis alba</i>	White Tern		Vulnerable	2
<i>Limosa lapponica menzbieri</i>	Northern Siberian Bar-tailed Godwit	Critically Endangered		2
<i>Phaethon rubricauda</i>	Red-tailed Tropicbird		Vulnerable	1
<i>Pterodroma nigripennis</i>	Black Winged Petrel		Vulnerable	1
<i>Onychoprion fuscata</i>	Sooty Tern		Vulnerable	3
Invertebrates (including fish)				
<i>Placostylus bivaricosus</i>	Lord Howe Island Placostylus	Critically Endangered	Endangered	1
Reptiles				
<i>Chelonia mydas</i>	Green Turtle	Vulnerable	Vulnerable	9

Biosecurity risk

Potential impacts to biodiversity and biosecurity due to construction activities for the two design options are discussed in **Table 9-8**.

Table 9-8 Potential biodiversity and biosecurity impacts during construction

Construction activities	Potential impact
Land based component (design Option 1 and Option 2)	
<p>Removal of vegetation either side of the existing airfield pavement works may result in a loss of vegetative habitat.</p> <p>Tracking of plant and storage of equipment in containers may result in soil remnants being carried over from the mainland.</p>	<p>Vegetation removal or trimming may result in habitat loss for migratory and endemic species and loss of threatened vegetation. Vegetation beyond the grassed areas on either side of the runway has the potential to be covered in dust from excavation works; this would limit the sunlight and oxygen available to plants along the extent of the runway. Furthermore, construction works may potentially inhibit bird movement around the runway area, therefore potentially affecting bird propagation dependent vegetation of localised species either side of the runway</p> <p>Kentia palm trees and potentially other types of vegetation located adjacent to Lagoon Road may be trimmed or removed during the realignment of Lagoon Road and the fence.</p> <p>Deposition of soil remnants from the mainland has the potential to introduce pest and disease to the Island.</p>
Movement of construction vehicles and equipment.	Vehicle strike of fauna may result in injury or mortality of species (including threatened species).

Construction activities	Potential impact
Water based component for Option 1 (Land reclamation)	
Pushing out of aggregate and rock armour material to build the platform may result in crushing aquatic flora and immobile fauna. Rock armour placement would displace Lagoon sediments.	Crushing of aquatic flora would result in habitat loss for aquatic fauna and crushing aquatic fauna. Displacement of Lagoon sediments would increase the turbidity in the water and potentially temporarily displace nutrient availability to aquatic flora and fauna.
Movement of the barge and other construction equipment within the water column.	Vehicle strike of fauna may result in injury or mortality of species such as fish (including threatened species).
Water based component for Option 2 (Deck on piles)	
Hammer or vibratory piling causing significant vibrations in the water column.	Vibration can potentially stun aquatic fauna and also cause disorientation, particularly for fauna which rely on sonar and echolocation to orientate themselves within their habitat. For example the project may result in vibration above exposure limits for some species and result in permanent hearing damage and impact navigational mechanisms. Vibration impacts may also damage surrounding coral habitat in the Lagoon.
General impacts	
Both design options and the land based component of the potential works may require night works causing associated light spill.	Light spill can be significantly detrimental to flora and fauna on land and in water. Artificial lighting can potentially disorientate fauna, affect breeding cycles and affect plant reproduction.
Importation of construction equipment and materials	Potential to introduce biosecurity risks (e.g. invasive and exotic species) to the island if they are present on the construction equipment and materials imported for the project.

In order to further assess the extent of potential impacts on biodiversity, additional monitoring and field surveys should be undertaken within the Lagoon and in the vicinity of the study area to inform the EIS.

9.1.9 Air quality

Constructions works have potential to generate vehicle and plant emissions and dust, particularly during the drier months.

The potential impacts on air quality as a result of construction activities for the two design options are discussed in **Table 9-9**.

Table 9-9 Potential construction impacts on air quality

Construction activities	Potential impact
Land based component (design Option 1 and Option 2)	
General site access and vehicle movement, together with loading and unloading of materials may cause dust, loose soil and gravel fines to be dissipated from their origin into the surrounding environment either side of the airport runway.	Dust would potentially create air pollution to nearby residents around the airport and those located on the northern side of the runway. Dust could also be a safety concern for the air traffic control and drivers of vehicles along Lagoon Road as well as recreational users of the Lagoon.
The use of diesel fuelled plant and machinery	Dust also has the potential to smother localised

Construction activities	Potential impact
would cause exhaust fumes to be emitted into the ambient air.	vegetation along either side of the runway which may potentially affect sunlight and nutrient absorption. Diesel fumes emitted in the ambient air can reduce air quality for residents of the island and local fauna surrounding the runway area.
Water based component (design Option 1 and Option 2)	
The use of diesel fuelled plant and machinery would cause exhaust fumes to be emitted into the ambient air.	Diesel fumes emitted in the ambient air can reduce air quality for residents of the island and local fauna surrounding the runway area particularly sea birds.
Water based component for Option 1 (Land reclamation)	
Pushing out of aggregate and rock armour has the potential to emit gravel fines into the ambient air.	Gravel fines may potentially pollute the surface water and potentially be ingested by aquatic fauna. Gravel fines may settle on aquatic vegetation reducing sunlight and nutrient absorption.

Background monitoring should be completed for any future EIS for the potential works and prior to construction, to gain an understanding of the mean ambient levels against the NEPM for Carbon monoxide (CO), Nitrogen Dioxide, particulate matter (PM₁₀ and PM_{2.5}).

9.1.10 Noise and vibration

The potential impacts of noise and vibration as a result of construction activities for the two design options are discussed in **Table 9-10**.

Table 9-10 Potential noise and vibration construction impacts

Construction activities	Potential impact
Land component (design Option 1 and Option 2)	
General site access and vehicle movement, together with loading and unloading of materials	Noise impacts during construction are likely to range in severity, from minor to potentially significant, depending on the nature of background or ambient noise in any given location, work hours or the duration of the works in that location and the nature and extent of the work being undertaken. Given the low density residential nature of the island, it is considered likely that the community would be impacted by the noise generated by construction activities, particularly if night works are undertaken. The majority of construction works would be undertaken during standard construction hours with occasional night works required for specific construction activities but these would generally be of limited duration. Quantitative noise assessment, noise modelling and/or noise logging would be required to be undertaken as part of any future EIS for the works. Community consultation and assessment of potential noise and vibration impacts should also be conducted as part of any future environmental assessment.
Water based component (design Option 1 and Option 2)	
Construction activities required for	Impacts arising from vibration during construction are most

Construction activities	Potential impact
both piling and reclamation of land	<p>likely to be associated with piling or reclamation of land for the water based component where unmanaged vibration has the potential to cause damage to coral substrate, structures and/or roads, and the potential to contribute to a disturbance in human comfort. There is also potential for vibration from proposed works to impact upon sensitive marine life found within the Lagoon and wildlife near the construction area.</p> <p>Quantitative noise assessment, noise modelling or noise logging should be undertaken as part of any future EIS for the works.</p> <p>Community consultation and assessment of potential noise and vibration impacts should be conducted.</p>
Water based component for Option 2 (Deck on piles)	
<p>Construction activities required for piling. Potentially a hammer piling rig.</p> <p>If there was a problem, an option would be to vibrate the piles in depending on the hardness of the corals. Another alternative would be roto-piling, where the steel piles are fitted with a toothed bit and are rotated in the (special) piling rig to core their way into the corals.</p>	<p>Impacts arising from vibration during construction for this option includes:</p> <ul style="list-style-type: none"> • if the piles are drilled in (roto-piling),; • if the piles are vibrated in, the deck on piles option will mean localised vibration in the founding corals; and • if the piles are driven using a standard piling hammer, the deck on piles option will mean more noise and more vibration than Option 1. <p>Impacts arising from vibration during construction have the potential to cause damage to coral substrate, structures and/or roads, and the potential to contribute to a disturbance in human comfort. There is also potential for vibration from proposed works to impact upon sensitive marine life found within the Lagoon and wildlife near the construction area. As such, future design options would need to specify the piling method accordingly in order to reduce noise and vibration impacts.</p> <p>Quantitative noise assessment (noise modelling) based on background noise logging measurements should be undertaken as part of any future EIS for the works.</p> <p>Community consultation and assessment of potential noise and vibration impacts should be conducted.</p>

9.1.11 Landscape and visual amenity

Construction activities would be temporary and would change throughout the different stages of construction. Views toward construction activities would be partially restricted by the undulating topography of the surrounding area.

Potential impacts to landscape and visual amenity due to construction activities are discussed in **Table 9-11**.

Table 9-11 Potential construction impacts on landscape and visual amenity

Construction activities	Potential impact
Land based component (design Option 1 and Option 2)	
<p>Onshore storage activities, general site access and vehicle movement, together with loading and unloading of materials would cause visual amenity impacts on the surrounding receivers.</p> <p>Temporary elements likely to be introduced into the visual environment during the construction period include:</p> <ul style="list-style-type: none"> • fencing and hoarding; • road barriers, signage and VMS systems; • earthworks and stockpiles of material; • erosion and sediment control devices; • lighting for night time works; • construction equipment/plant; and • site office and amenities. 	<p>The works may result in visual intrusion into adjacent residents around the airport. Visual intrusion impacts occur when a project allows a new intrusive view from a public area into an otherwise private area of a residential property.</p> <p>The presence of a temporary construction compound and lighting required for night-time works would be visible from adjacent residents around the airport.</p>
Water based component (design Option 1 and Option 2)	
<p>Limited onshore area is available for construction storage, and plant and materials may be required to be stored on barges moored outside the reef for periods of time.</p> <p>Temporary elements likely to be introduced into the visual environment during the construction period include:</p> <ul style="list-style-type: none"> • construction equipment/plant such as cranes, drill rigs, trucks, used for the construction of the runway extension,; • fencing and hoarding; • erosion and sediment control devices; and • lighting for night time works. 	<p>Plant and materials stored on barges moored outside the reef would be visible from the mainland, though may only form background views from onshore receivers.</p> <p>Construction materials and equipment would be offloaded using a smaller crane barge, which would transfer the materials and equipment to the island wharf or south-west extent of the runway. Construction materials would be delivered to a storage area adjacent to the airfield. This will be visible to residents around the airport and has the potential to cause visual intrusion impacts. Additionally, construction works within the Lagoon would also contribute to visual impacts. As such, the project may result in visual intrusion into residents and sensitive receivers located to north of the runway extension at Windy Point.</p> <p>The presence of a temporary construction compound and lighting required for night-time works would be visible from all residents around the airport and receptors at Windy Point.</p>

9.1.12 Resource use and waste management

The proposed runway extension works would not use any materials derived from the Island and all construction materials would be imported. The Island has no landfill capability and as such all non-compostable waste produced during construction would be taken off the Island. All waste which is not able to be composted or used on the Island would be shipped to a Waste Management Facility on the mainland for recycling, reuse or land fill disposal. The potential impacts on resource use and waste management as a result of construction activities for the two design options are discussed in **Table 9-12**.

Table 9-12 Potential construction impacts on resource use and waste management

Construction activities	Potential impact
General impacts (design Option 1 and Option 2)	
Waste produced from construction activities	<p>Waste generated during the construction phase is anticipated to include:</p> <ul style="list-style-type: none"> • excess spoil material from piling and/or infilling activities; • materials associated with demolition of existing infrastructure; • waste fuels, oils and grease generated during plant and vehicle maintenance; • effluent generated at site amenities during construction; • packaging materials from items delivered to the site, such as pallets, crates, cartons, plastics and wrapping materials; • domestic waste, including paper, aluminium cans, glass, plastics, packaging and other material generated by site construction personnel; and • contaminated soils that may be exposed during construction, and if exposed, may require off-site disposal. <p>The potential for waste generation could potentially contaminate and consequently cause impact on biodiversity and the general environment of the Island if managed incorrectly. Waste material would require to be transported appropriately and effectively managed upon final disposal.</p>

9.1.13 Social and economic

The construction of the runway extension and associated works has the potential to have a socio-economic impact on community amenity and the visitor economy.

Social amenity impacts from the construction of the runway extension have been discussed in **Sections 9.1.7, 9.1.9, 9.1.10 and 9.1.11.**

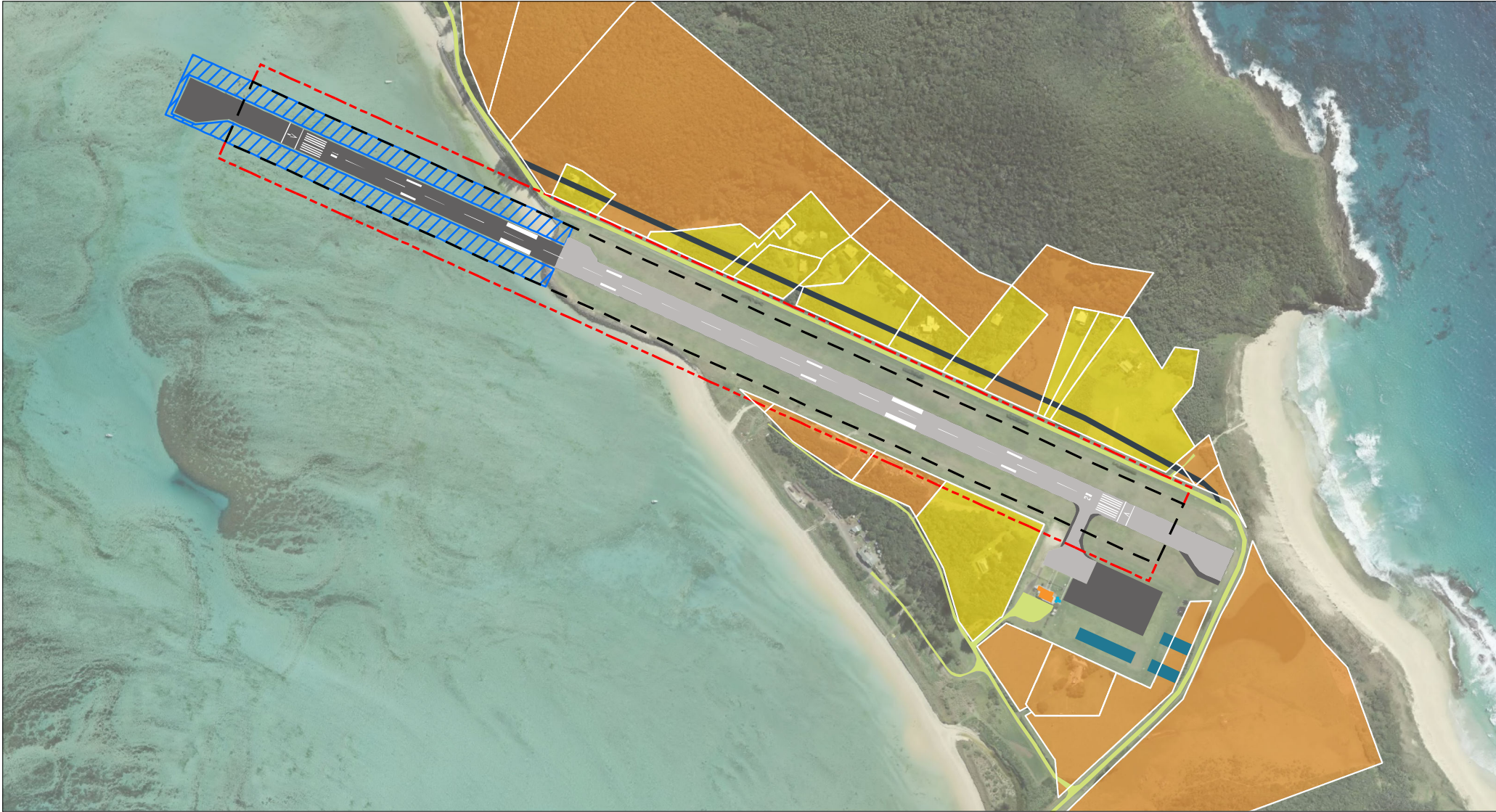
As discussed in **Section 3.0**, it is assumed that there would be very limited local availability of construction plant or materials and as such these must be brought in by air or by sea. There would also be limited personnel available locally. During construction, there would be a demand for local services including accommodation and health services due to the influx of construction workers onto the island during this period, and the presence of the project workforce could also be beneficial to the local economy due to the need for goods and services. Local construction jobs may also be an opportunity and socio-economic benefit for the local community.

The existing Lagoon Road adjacent to the airport would need to be moved north, which would impact some properties located along Lagoon Road. The proposed alignment of Lagoon Road adjacent to the airfield is subject to change at subsequent design stages once accurate topographic survey is available. **Figure 9-1** shows the special and perpetual leases which would be impacted and partially acquired for the new alignment of Lagoon Road. Residents of these properties would likely experience health and psychological wellbeing impacts, such as stress, due to the partial acquisition of their property. There may also be a reduction in amenity due to the removal or trimming of the vegetation located along Lagoon Road within or adjacent to these properties (refer to **Figure 9-1**).

Impacts associated with property acquisition may be reduced and/or managed through an effective process of consultation and compensation that is designed to be equitable to property owners. Further investigation of the property acquisition process would be required.

During construction the marine traffic within the Lagoon area may be impacted by the movement of the barge and other vessels delivering/handling construction plant and materials. Commercial and private boats currently utilise the passage between the existing runway end and Blackburn/Rabbit Island as a preferred thoroughfare between north (boat shed ramp and sheds) and the south (e.g. snorkeling locations).. This thoroughfare would likely be unavailable during construction and an alternative route would need to be used.

A detailed social and economic impact assessment at subsequent stages of the project is recommended to better identify the magnitude and severity of social and economic impacts associated with construction of the project.



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FIGURE 9-1 POTENTIAL PROPERTY ACQUISITION FOR LAND BASED COMPONENT OF EXTENDED RUNWAY



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- Legend**
- Perpetual lease
 - Special lease
 - New aircraft pavement
 - Deck on piles or reclaimed land
 - Aircraft stand
 - Existing island road
 - Extent of flyover area
 - Extent of runway strip
 - Terminal building

9.2 Potential operational impacts

9.2.1 World heritage

Table 9-14 discusses the potential impacts to World heritage from operational activities relating to the runway extension.

Table 9-13 Potential operational impacts to World heritage

Potential operational impacts
Water based component (design Option 1 and Option 2)
Scenic values on Lord Howe Island are contributing factors to the heritage listing. The extension of the runway structure into the Lagoon would have a permanent visual impact on the landscape which in turn affects the world heritage and National Heritage values of the Island.

A visual impact assessment including photomontages of the before and after impacts from key viewing locations on land and water would be undertaken as part of the EIS.

9.2.2 Surface water (quality and hydrology)

Table 9-14 discusses the potential impacts to surface water from operational activities relating to the runway extension.

Table 9-14 Potential operational impacts to surface water

Potential operational impacts
Land based component (design Option 1 and Option 2)
<ul style="list-style-type: none"> • Diesel and oil spills on runway washed into stormwater drains from rainfall causing pollution of surface water.
Water based component (design Option 1 and Option 2)
<ul style="list-style-type: none"> • Diesel and oil spills on runway washed into Lagoon from rainfall causing pollution of the Lagoon.

Further assessment would be undertaken as part of the EIS including best practice surface water management measures.

9.2.3 Coastal processes

Table 9-15 discusses the potential impacts on coastal processes from both design options. It is unlikely that impacts would occur from the land based component of either option.

Table 9-15 Potential operational impacts on coastal processes

Potential operational impacts
Water based component for Option 1 (Land reclamation)
<ul style="list-style-type: none"> • The potential extended runway would act as a complete barrier to longshore sand transport along the Lagoon shoreline; • the SE corner of the potential extended runway would become a sand trap, and an accumulation zone for floating and suspended matter; • alteration of the coastal processes, including wave action, sediment movement or accretion, or water circulation patterns in the Lagoon; • potential to permanently alter tidal patterns and water flows in the Lagoon; • potential wave scouring on the seaward side at the base of the wave trip structure and deposition of sediments further away from the base of the wave trip structure; • operation of the wave trip structure 50 metres off shore from the rock armour structure has the potential to change the incoming wave action to the Lagoon, for example through wave refraction changing wave energy and velocity. This would reduce the tidal inundation area along the existing coastal line either side of the base of the rock armour structure. As the wave would be refracted,

Potential operational impacts

water would arc around the structure and potentially scour the Lagoon bed at the base of where the coastline meets the armour structure. Adversely, at the top of the arc that the water would travel around the structure, sediment would be deposited, changing the coastline;

- in the case of longshore drift, further north of the runway along the coastline would be impacted by increased deposition; and
- indirect impacts to biological diversity or species composition in the Lagoon in particular to seagrasses, coral reefs and marine species as a result of sediment deposition changes.

Water based component for Option 2 (Deck on piles)

A 570 metre piled runway extension would be expected to have reduced impacts by comparison to Option 1 on coastal processes, although if storm wave crests reached the slab soffit, then some attenuation of wave action would be expected at the shoreline, although not to the same magnitude as Option 1. Furthermore, due to the low level of the existing runway, the inshore section of the deck structure will be subject to wave action during extreme events. These will reduce as the deck rises seawards.

Notwithstanding the above, some specific coastal processes impacts may occur for Option 2 including:

- sediment deposition is expected on the leeward side of the piles, which may build up over time to create small peaks and troughs on the Lagoon bed;
- wave energy will be slowed by the piles dropping sediment and therefore sediment could potentially build up over time underneath the runway extension footprint; and
- scouring at the base of the piles may occur on the seaward side causing small troughs around piles which can potentially dissipate wave energy. Further investigations would be undertaken to assess wave energy and coastal processes at the EIS stage.

9.2.4 Contamination

Potential contamination impacts caused by operational activities have been considered within the surface water (**Section 9.2.1**) and biodiversity sections (**Section 9.2.7**) of this report.

9.2.5 Climate change and flooding

In regards to the likely impacts of climate change during the operational phase of the proposed runway extension, the following flood modelling and related design needs to be considered in detailed design and to inform the EIS:

- increased intensity of rainfall events (using an approach in accordance with relevant guidelines (e.g. Practical Responses to Climate Change, Engineers Australia);
- sea level rise of between 45 to 82 centimetres by 2090 (as projected for the NSW coastline under Representative Concentration Pathway 8.5), coupled with extreme sea level events, with increases in storm surge and the extent of inundation across the island; and
- increased tailwater levels or sensitivity testing undertaken for various projected rises in mean sea levels.

Table 9-16 discusses the impacts of climate change and flooding during operational activities. If the project is to progress further, the EIS stage would assess the existing levels of the airport and runway in regards to climate change and flooding levels.

Table 9-16 Potential operational impacts on climate change and flooding

Potential operational impacts
Land based component (design Option 1 and Option 2)
<p>If design does not consider climate change and rising sea levels, particularly the impact of extreme sea level events and increases in storm surge, then flooding and land inundation is likely to occur resulting in the following impacts:</p> <ul style="list-style-type: none"> • bank erosion and scouring of the landscape surrounding the airport runway; • damage to airport assets, in particular the airport runway, apron and administration buildings; • loss of vegetation, flora and fauna habitat in surrounding areas of the airport runway; and • safety risk to airport personnel.
Water based component for (design Option 1 and Option 2)
<p>If design does not consider climate change and rising sea levels, in particular storm surge, periodic flooding and inundation hazards when the sea level rises above normal heights during tropical cyclones or storm activity, then flooding and land inundation is likely to occur resulting in the following impacts:</p> <ul style="list-style-type: none"> • damage or complete failure of the rock armour structure and wave trip structure; • a release of contaminants from the runway into the ocean environment and subsequent damage to aquatic flora and fauna; and • risk to personnel working on the airport runway or maintenance work extended runway structure.

9.2.6 Traffic, transport and access

If the runway extension was found to be a feasible option, it would increase the potential number of passengers per flight to the Island which would increase the need for transport to and from the airport. The island has an existing visitor capacity of 400 visitors and a proposed runway extension would not increase this limit. It is not likely that the increase in passenger capacity and tourist transport would have a significant impact on the traffic and transport on the island, nor significantly change the traffic numbers along the Lagoon Road adjacent to the airfield; as such traffic impacts during operation are expected to be low.

9.2.7 Biodiversity and biosecurity

Table 9-17 discusses the potential impacts on biodiversity and biosecurity from operational activities.

Table 9-17 Potential operational impacts on biodiversity and biosecurity

Potential operational impacts
Land based component (design Option 1 and Option 2)
<ul style="list-style-type: none"> • An increase in aircraft noise levels due to an increase in plane size may potentially impact on the roosting and foraging activities of birds in the adjacent areas of the airstrip; and • the realignment of the existing Lagoon Road adjacent to the airfield may isolate populations of ground dwelling fauna as these species would need to travel further distances to find similar habitats.
Water based component for Option 1 (Land reclamation)
<ul style="list-style-type: none"> • Rock armour may potentially provide habitat for species otherwise not known to occur in the local area, this may have a flow on effects to the existing food chain. However, this could also provide habitat for some species that are known to occur; • impacts on long-term coastal processes, sedimentation and longshore drift, resulting in impacts on the existing flora and habitat composition on or close to the shore, and within the shallow waters close to shore; and • scouring of rock armour may dissipate detrimental minerals into the water column to be ingested by aquatic flora and fauna; and

Potential operational impacts

Water based component for Option 2 (Deck on piles)

- The bridge deck will create shadow to the water and Lagoon bed underneath, which may impact the life cycle of flora and/or fauna;
- peaks and troughs created by the wave energy under the deck may allow vegetation to establish as seeds, sediment and minerals will be captured in the troughs and protected by the peaks; and
- the piles may allow aquatic vegetation to establish at the base providing habitat for marine fauna.

Water based component (design Option 1 and Option 2)

- Oil/fuel spills from aircraft and vehicles may run into the Lagoon during high rainfall events and not be captured by the stormwater drainage.

Further assessment and field surveys would be required to inform the EIS stage.

9.2.8 Air quality

Table 9-18 discusses the potential impacts on air quality from operational activities.

Table 9-18 Potential operational impacts on air quality

Potential operational impacts

Land based component (design Option 1 and Option 2)

- Emissions emitted in the ambient air from larger planes can impact on air quality for residents, particularly the residents around the airport, receptors at Windy Point, and local fauna surrounding the runway area.

Water based component (design Option 1 and Option 2)

- Emissions emitted in the ambient air from larger planes have the potential to impact on air quality for residents of the Island and local fauna surrounding the runway area, particularly sea birds.

9.2.9 Landscape and visual amenity

Table 9-19 discusses the potential impacts on landscape and visual amenity from operational activities. It is noted that without doing an on ground visual impact assessment, the visual landscape impacts to receptors can't be determined. A visual impact assessment including photomontages of the before and after impacts from key viewing locations on land and water would be undertaken as part of the EIS.

Table 9-19 Potential operational impacts on landscape and visual amenity

Potential operational impacts

Land based component (design Option 1 and Option 2)

As the runway for the airport is already in existence the proposed works for the land component of the project is unlikely to pose significant visual impacts on the landscape during airport operation.

Through realigning Lagoon Road adjacent to the airfield, there would be more areas cleared to the north of the runway which would slightly change the visual landscape.

The Kentia palm trees located adjacent to Lagoon Road may be trimmed or removed during the realignment of Lagoon Road and the fence, resulting in a reduction in amenity along the road for passers-by/onlookers and residents.

Larger aircraft would be landing and taking off from the airport and may have some impact on visual amenity in the adjacent area. Larger aircraft have the potential to cause visual intrusion impacts for the residents around the airport and receptors at Windy Point, however this impact would be temporary in nature.

Potential operational impacts

Water based component (design Option 1 and Option 2)

The extension of the runway structure would have a permanent visual impact on the landscape. The project is likely to result in a visual intrusion for residents and sensitive receivers located around the airport. Other receivers that would be impacted by the proposed runway includes Pinetrees boat shed, the aquatic club, the Lagoon foreshore, users of the Lagoon, Blackburn Island, viewing platforms on Transit and Intermediate Hill, Mt Gower, Signal Point.

The landing and taking off a larger aircraft would have some impact on visual amenity in the adjacent area. Larger aircraft have the potential to cause visual intrusion impacts for the nearby residents around the airport and Windy Point to the north, however, this impact would be temporary in nature.

9.2.10 Social and economic

If the runway extension was found to be a feasible option, it could expand services and tourism opportunities in the future, up to the existing visitor capacity of 400 visitors. The larger planes may result in an increase in the number of tourists visiting the island at the one time, which may result in expanded services, tourism services, etc.

Once in operation, the runway extension is likely to have a negligible impact on the surrounding environment and associated amenity, with only minor increases in operational noise level associated with larger plane arrivals and departures. As such, negative socio-economic impacts associated with the operation of the project are anticipated to be minor and generally consistent with existing airport. No additional permanent workforce is anticipated to be required for the operation of the project.

The project may result in positive low or moderate social and economic impacts. A number of businesses may be able to operate all-year (as opposed to being closed in winter, which they are currently) as more customers are likely to visit if flight prices are lowered due to the use of more commercially viable aircraft.

However an increase in visitor traffic and the expansion of tourism services may also negatively impact residents on the Island. An increase in visitor traffic may affect the existing 'lifestyle' perceived by residents, and impact their psychological wellbeing. This was an issue raised by the community during consultation undertaken in October 2018.

During operation, marine traffic movements would be impacted by the runway extension in the Lagoon. Commercial and private boats currently utilise the passage between the existing runway end and Blackburn/Rabbit Island as a preferred thoroughfare between the north (boat shed ramp and sheds) and the south (e.g. snorkeling locations). This thoroughfare would likely be unavailable once the runway extension has been built and an alternative route would need be used. A detailed community consultation and socio-economic assessment would need to be undertaken as part of any future environmental assessment to verify these preliminary conclusions.

10.0 Significance of potential impacts

Based on the preliminary (desktop) environmental assessment undertaken in **Section 9.0**, an initial comparison of the significance of potential impacts for the runway extension with respect to each design option during construction and operation are provided in **Table 10-1** and **Table 10-2**. Where there is a difference between the significance of an environmental aspect between Option 1 and Option 2, the more significant potential impact has been highlighted.

Table 10-1 Summary of significance of potential impacts per design option during construction

Environmental aspect	Significance of potential impacts during construction	
	Option 1 (Land reclamation)	Option 2 (Deck on piles)
World heritage	High	High
Surface water (quality and hydrology)	High	Medium
Coastal processes	High	Low
Contamination	High	High
Climate change and flooding	High	High
Aviation safety	Low	Low
Traffic, transport and access	High	Medium
Biodiversity and biosecurity	High	High
Air quality	High	Medium
Noise and vibration	High	High
Landscape and visual amenity	High	High
Resource use and waste management	Medium	Medium
Social and economic	Low	Low

Table 10-2 Summary of significance of potential impacts per design option during operation

Environmental aspect	Significance of potential impacts during operation	
	Option 1 (Land reclamation)	Option 2 (Deck on piles)
Surface water (quality and hydrology)	High	High
Coastal processes	High	Low
Contamination	High	High
Climate change and flooding	High	High
Traffic, transport and access	Medium	Medium
Biodiversity and biosecurity	High	Medium
Air quality	Medium	Medium
Landscape and visual amenity	High	High
Social and economic	Low	Low

Should the project proceed, further investigations would be required to support preparation of an EIS. The EIS would assess the potential impacts of the project in more detail and would detail mitigation and management measures to reduce impacts to acceptable levels.

11.0 Planning approval pathways and associated risks

The Lord Howe Island Board is a statutory authority responsible to the NSW Minister for the Environment. The Board is charged with the care, control and management of the Island and the affairs and trade of the Island. A review of the relevant NSW and Commonwealth legislation, planning instruments (Local Environmental Plans and Development Control Plans) and strategic policy documents to determine the planning approval pathways and potential approval risks for both of the design options for the proposed runway extension has been undertaken and is presented in **Table 11-1**. The following planning pathways are for either design option, unless stated otherwise.

Table 11-1 Planning pathways required to obtain necessary approvals

Legislation	Planning requirements	Risks
Commonwealth		
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	<p>The EPBC Act requires Commonwealth approval be obtained for certain actions, and establishes an assessment and approvals system for actions that have or are likely to have, a significant impact on MNES.</p> <p>Before taking an action that could have a significant impact on a matter protected by the EPBC Act, the proposed action must be referred to the Minister. The purpose of a referral is to determine whether the proposed action will need formal assessment and approval under the EPBC Act. The referral will be the principal basis for the Minister's decision as to whether approval is necessary and, if so, the type of assessment that will be taken.</p> <p>The required assessment would then be undertaken under the bilateral process for assessment as described in Section 5.1.1.</p> <p>MNES relevant to the proposed works include the presence of threatened and migratory species listed under the EPBC Act and the location of the proposal within a World Heritage Area. These issues need to be considered as part of a detailed environmental impact assessment in order to assess the significance of potential impacts (either direct or indirect) of the works and identify recommended safeguards and mitigation measures.</p>	<p>Refusal if the Minister considers the project to have significant impacts on social, environmental and economic matters, particularly the impacts on the value of the heritage listing.</p> <p>Past example of refusal for a major development on Lord Howe Island was for the wind turbines. The proposed development was refused as the Federal Government (Federal Environment Minister) considered the development would create an intrusive visual impact on the island and affect the World Heritage value. The Minister for the Environment and Energy stated that the proposal "<i>would have clearly unacceptable impacts on a matter protected by a provision of Part 3 of the EPBC Act, and that Division 1A of Part 7 of the EPBC Act should apply to the referral of the proposed action.</i>"</p>
State		
<i>Environmental Planning and Assessment Act 1979</i> (including aims and objectives of relevant environmental planning instruments, zoning and permissible uses, development controls, etc.)	<p>Under the SRD SEPP, the project is a development that meets the definitions of 'air transport facilities' and also exceeds \$30 million capital investment value and therefore would be classified as State Significant Development (SSD) under this SEPP.</p> <ol style="list-style-type: none"> 1. A development application for a SSD proposal requires that: the proponent seek Secretary's Environmental Assessment Requirements (SEARs) for the project prior to lodging the development application; and 	<p>Refusal if the determining authority considers the project to have significant impacts on social, environmental and economic matters, particularly the impacts on the community and the value of the heritage listing.</p> <p>Risk of project refusal on the grounds of community objections and concerns.</p> <p>Refusal if the project does not meet</p>

Legislation	Planning requirements	Risks
	<p>2. the application be accompanied by an EIS.</p> <p>Figure 11-1 provides a detailed process of approval with consideration of state and commonwealth processes.</p> <p>Lord Howe Island Airport is subject of the Lord Howe Island Local Environmental Plan 2010 (LHI LEP).</p> <p>Clause 10(2) of the LHI LEP provides that potential future runway extension works would require development consent from the Board as works would involve:</p> <p style="padding-left: 40px;">(2)(a) the construction of a new building or a new work, such as an airport, wharf or way, that is related to a public utility undertaking</p> <p>In addition to this, as discussed in section 4.3.2, development on the foreshore area and also within Zone 9 Marine Park may be carried out with consent if the consent authority finds that the proposed development is not inconsistent with any advice about the development that is provided to the consent authority by the Marine Estate Management Authority (MEMA).</p> <p>As the carrying out of works requires development consent, the determining authority is required under Part 4 of the EP&A Act to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity. Clause 228 of the EP&A Regulation sets out the factors that must be taken into account when determining the impact of an activity on the environment.</p> <p>If the project is to progress further, the EIS would consider and assess the relevant issues raised in the LEP and DCP.</p> <p>Lord Howe Island Airport is subject of the <i>Marine Estate Management Act 2014</i>. Refer to section 55 (1) of this Act.</p> <p>In general before determining a development application under Part 4 of the EP&A Act for the carrying out of development within a marine park or an aquatic reserve, a consent authority must:</p> <p>(a) take into consideration:</p> <ul style="list-style-type: none"> i. if there are management rules for the marine park or aquatic reserve, the purposes of the zone within which the area concerned is situated as specified in those management rules, and ii. the permissible uses of the area concerned under the regulations or the management rules, and iii. if a management plan for the marine park 	<p>the considerations set out under Clause 228 of the EP&A Regulation, and/or the objectives or zone purposes of the marine park or aquatic reserve.</p> <p>As above.</p> <p>As above.</p> <p>The risks associated with obtaining a permit from MEMA is if the project is not inconsistent with any advice about the development that is provided to the consent authority by the Marine Estate Management Authority. As such, it is recommended to consult with MEMA if the project progresses further.</p>

Legislation	Planning requirements	Risks
	<p>or aquatic reserve has been made, the objectives of the marine park or aquatic reserve, and</p> <p>iv. any relevant marine park or aquatic reserve notifications.</p> <p>The proposal may require a permit from MEMA.</p> <p>Lord Howe Island Airport is subject of the <i>Biodiversity Conservation Act 2016</i>.</p> <p>Under Part 7, section 7.8(3) of the BC Act, should a development be deemed to have a significant effect on threatened species or ecological communities, or their habitats, the environmental impact statement under Part 5 of the EP&A Act is to include or be accompanied by:</p> <ol style="list-style-type: none"> 1. a species impact statement, or 2. if the proponent so elects—a biodiversity development assessment report. <p>Lord Howe Island Airport is subject of the <i>Fisheries Management Act 1994</i>.</p> <p>Design option 1 includes the use of fill material and other excavated material stockpiled on the Island, wherein the modification of 'water land' means that the proposal therefore fits the definition of reclamation work under the BC Act. In accordance with section 200(1) of the BC Act, a local government authority must not carry out reclamation work except under the authority of a permit issued by the Minister.</p>	<p>As above.</p> <p>As above.</p>
Lord Howe Island Regulation 2014	The LHI Regulation prohibits the importation of soil or rock, removal or destruction of substances forming part of the Island, or removal or destruction of vegetation except in accordance with the approval of the Board.	Risk of refusal if the determining authority considers the importation of soil or rock or the removal or destruction of vegetation or parts of the Island to have significant impacts on environmental matters, particularly the impacts on the value of the heritage listing.
<i>Lord Howe Island Local Environmental Plan 2010</i>	<p>Clause 35 of the LEP 2010 states that “development on the foreshore area is prohibited... [but] may be carried out with consent if, in the consent authority’s opinion:</p> <ol style="list-style-type: none"> i. the proposed development is in the public interest and does not significantly reduce public access to the foreshore, and ii. the bulk and scale of the proposed development will not detract from the visual amenity of the foreshore area, and iii. the proposed development addresses any need to restore lost or disturbed plants that are native to the Island, particularly if restoring those plants may enhance visual amenity, and 	Risk of refusal if the determining authority considers that the project would not align with these requirements. The project would have to be consistent with any advice about the development that is provided to LHIB by MEMA.

Legislation	Planning requirements	Risks
	<p><i>iv. there is a demonstrated Island community-based, or marine-based, business need for it, and</i></p> <p><i>v. the proposed development will not be adversely affected by, or adversely affect, coastal processes, and</i></p> <p><i>vi. in the case of proposed development involving the erection of a structure—the purpose of that structure could not practicably be fulfilled by an existing structure, and</i></p> <p><i>in the case of development proposed to be carried out on land that is also within Zone 9 Marine Park—the proposed development is not inconsistent with any advice about the development that is provided to the consent authority by the Marine Estate Management Authority.”</i></p>	

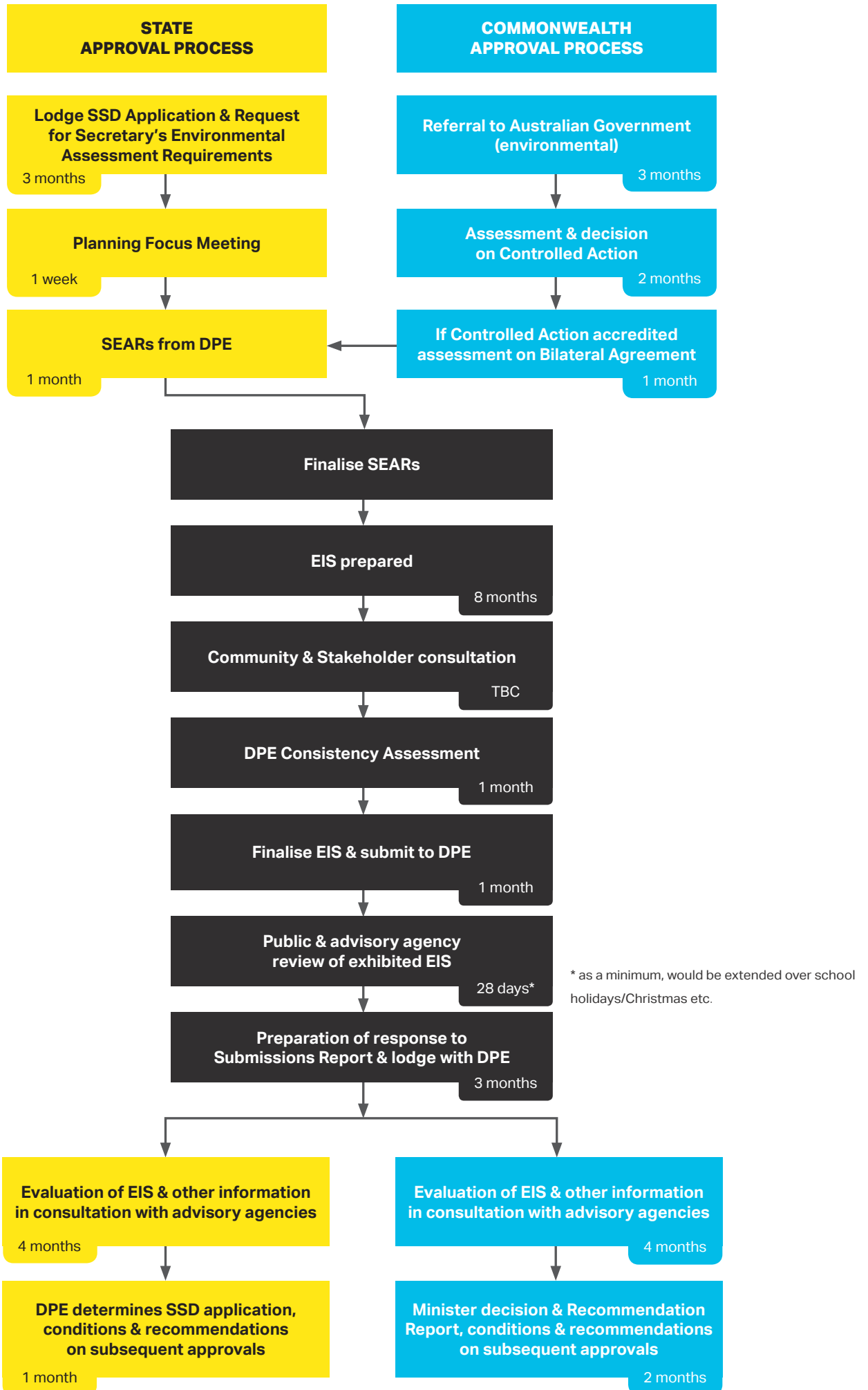


FIGURE 11-1 PROCESS OF APPROVAL WITH CONSIDERATION OF STATE AND COMMONWEALTH APPROVAL PROCESSES

12.0 Conclusion and recommendations

This preliminary environmental assessment has been undertaken based on a desktop review of the potential impacts of a runway extension at the Lord Howe Island Airport. The options analysis for the runway extension includes two design options of either a land reclamation design or a deck on pile structural design. The proposed runway extension would protrude into parts of the Lord Howe Island Lagoon Sanctuary Zone. The desktop assessment carried out has determined characteristics, potential environmental risks and approval risks associated with the environmental aspects of the marine and land based components of proposed works. This is discussed in **Section 9.0**.

A number of environmental issues associated with the potential construction and operation of a runway extension which were identified to have a medium to high risk were assessed. The assessment found that a runway extension has the potential to impact on the LHIG World, Commonwealth and State Heritage listings. Construction activities have the potential to affect the Island's heritage significance by either changing the visual amenity of the area, the land use, causing damage to biodiversity, to the environment by introducing pests and weed species, by affecting water and air quality and/or introducing to or spreading contamination on the Island.

The assessment of significance for the potential impacts identified that Option 2 for deck on piles would have an overall lower level impact to the environment during compared to Option 1 for land reclamation. The primary difference between the two options is the difference in the significance of coastal processes, surface water, traffic and transport and air quality impacts.

During operation, the assessment of significance identified that Option 2 for deck on piles would have an overall lower level impact to the environment compared to Option 1 for land reclamation. This is demonstrated during the assessment for coastal processes and biodiversity and biosecurity. During operation, the land reclamation option would act as a complete barrier and become an accumulation zone for sand and floating and suspended matter. The land reclamation option would also impact on the wave patterns and sand volumes within the Lagoon.

This PEA was limited to a desktop assessment and as such if the project is to progress, the environmental issues identified would need to be assessed in detail through additional, detailed and fieldwork based technical assessments. Based on the preliminary findings in **Section 9.0**, it is recommended that a more in-depth investigation to ascertain the accurate location, distribution and extent of potential constraints and impacts is undertaken. Further assessment should at a minimum include the following:

- further consideration of the potential impact to World heritage;
- further soil testing to understand the extent of existing land-based contamination and additional PFAS investigations for the purposes of further assessing the nature and extent of identified PFAS impacts;
- the extent of impacts on surface water, based on background surface water quality monitoring, including further assessment as part of the EIS with considerations to best practice surface water management measures;
- further assessment as part of the EIS regarding the traffic and transport impacts of the proposed runway extension, including field surveys;
- background monitoring of the mean ambient levels against National Environmental Protection Measures (NEPM);
- a quantitative noise assessment, noise modelling and/or noise logging;
- likelihood and extent of impacts to specific threatened ecological communities and threatened species;
- a field-based landscape and visual impact assessment of proposed changes including photomontages of the before and after impacts from key viewing locations on land and water would be undertaken; and

- detailed community consultation and socio-economic assessment as part of any future environmental assessment.

If it is decided that the runway extension would progress further, the next steps would be to begin with a formal planning application for the development. A legislative framework was established for the potential works, and informed a relevant approvals pathway for a potential future runway extension project, as outlined in **Section 11.0**.

A State significant development scoping report would need to be prepared to support an application to DP&E for the project under section 5.15 of the EP&A Act. The scoping report would present potential environmental impacts that have been identified for the project. The DP&E would then issue Secretary Environmental Assessment Requirements (SEARs), which identify assessment requirements for the EIS. This PEA could be used to inform the scoping report.

LHIB would then prepare the EIS. The EIS would need to present outcomes of any alternatives such as the 'do-nothing' approach and options studies undertaken for the project, including justification of why the project was chosen as the preferred option. Preparation of the EIS would also involve undertaking detailed technical assessments and field surveys, for example the detailed studies recommended in this report.

The EIS would then be submitted to the DP&E for approval by the NSW Minister for Planning and Commonwealth Environment Minister (refer to **Section 11.0**) for further details. **Figure 11-1** provides the approval process that would need to be undertaken if the proposed runway extension were to progress further.

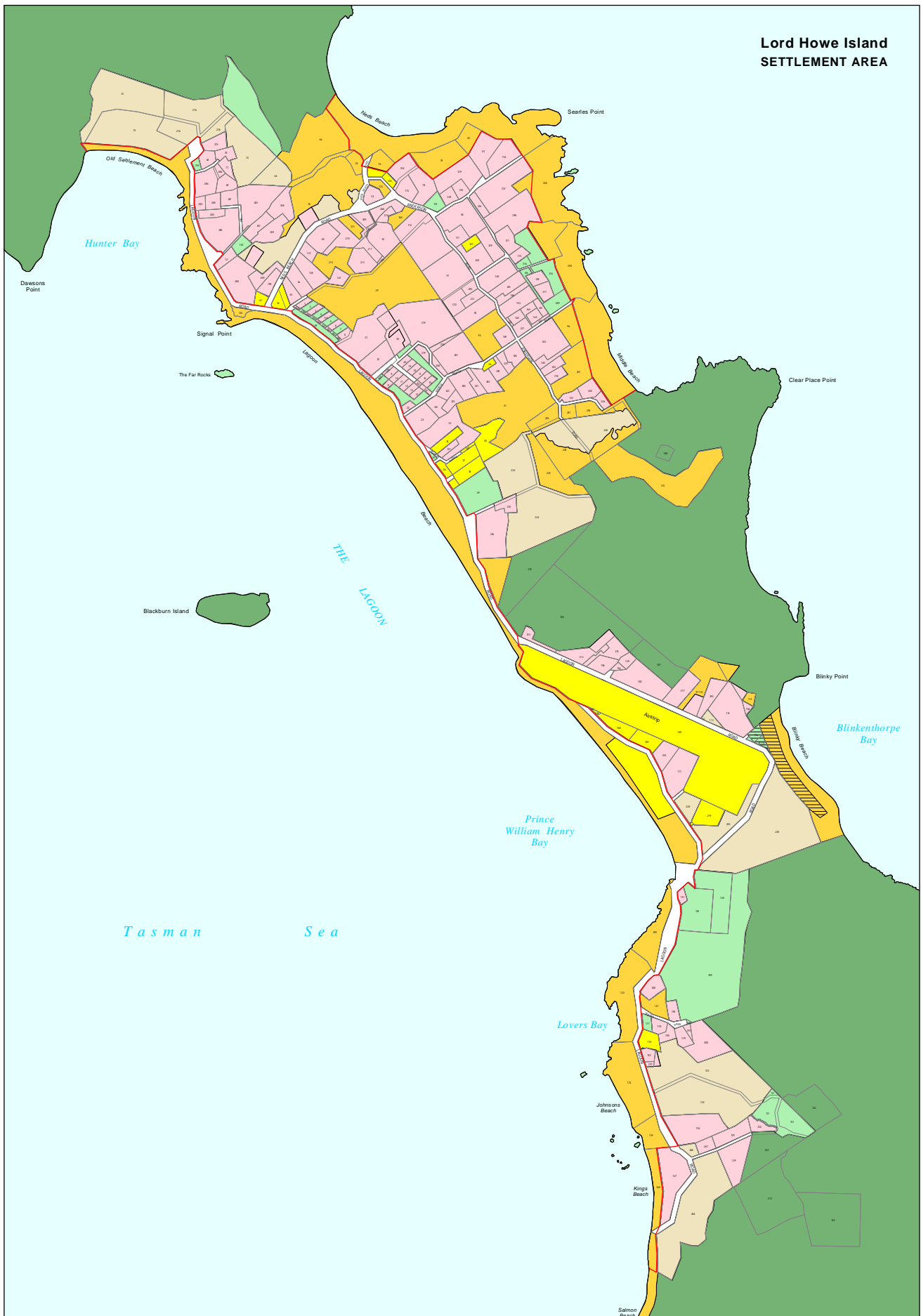
In summary, such a project would require multiple approvals at the State and Commonwealth levels, the certainty of which is not assured due to the potential approvals risks associated with the preliminary construction and operational environmental impacts identified. As such, a more detailed assessment would be undertaken for the legislative requirements and approval processes in the later stages if the project does progress.

13.0 References

- AECOM 2016, *Lord Howe Island Biosecurity Strategy 2016*, viewed 16 August 2018, <<https://www.lhib.nsw.gov.au/sites/lordhowe/files/public/images/documents/lhib/Publications/Plans/Lord%20Howe%20Island%20Biosecurity%20Strategy%202016.pdf>>
- AECOM 2018a, *Detailed Assessment of Extended Runway Requirements and Suitable Aircraft*, April 2018.
- AECOM 2018b, *Preliminary PFAS Assessment Lord Howe Island*, issued April 2018.
- AECOM 2018c, *Lord Howe Island Concept Design Report*, issued 26 August 2018.
- CoastAdapt 2018, *Climate change and sea-level rise in the Australian region*, National Climate Change Adaptation Research Facility, viewed 4 September 2018, <<https://coastadapt.com.au/climate-change-and-sea-level-rise-australian-region>>
- Commonwealth of Australia 2013, *Matters of National Environmental Significance - Significant Impact Guidelines 1.1*, viewed 28 August 2018, <http://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf>
- CSIRO and Bureau of Meteorology (BOM) 2016, *State of the Climate 2016*, viewed 4 September 2018, <<https://www.csiro.au/en/Showcase/state-of-the-climate>>
- CSIRO and Bureau of Meteorology (BOM) 2015, *Climate Change in Australia Information for Australia's Natural Resource Management Regions: Technical Report*. Chapter Eight Projections (and Recent Trends): Marine and Coasts, CSIRO and Bureau of Meteorology, Australia, viewed 4 September 2018, <<http://www.climatechangeinaustralia.gov.au/en/publications-library/technical-report/>>
- Department of Environment and Climate Change (DECC) 2007, *Lord Howe Island Biodiversity Management Plan*, viewed 5 September 2018, <<https://www.environment.gov.au/system/files/resources/e30dcdd3-e6d5-43e2-bc33-7fdb6dd9061e/files/lord-howe-island.pdf>>
- DECC 2009, *Five Year Review of the Lord Howe Island Act – A discussion paper*, viewed 4 September 2018, <<http://www.environment.nsw.gov.au/resources/legislation/09398lhiareview.pdf>>
- DECC, *New Lord Howe Commonwealth Marine Reserve*, viewed 4 September 2018, <<http://www.environment.gov.au/topics/marine/marine-reserves/temperate-east/lord-howe>>
- Haskoning Australia Pty Ltd 2014, *Lord Howe Island Coastline Hazard Definition and Coastal Management Study*, viewed 4 September 2018, <<https://www.lhib.nsw.gov.au/sites/lordhowe/files/public/news/8A0085prh-Lord%20Howe%20Coastal%20Study-v5-all.pdf>>
- Intergovernmental Panel on Climate Change (IPCC) 2014, *Coastal Systems and Low-Lying Areas*; Chapter 5 of *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects, Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Authors Wong, P.P., I.J. Losada, J.-P. Gattuso, J. Hinkel, A. Khattabi, K.L. McInnes, Y. Saito, and A. Sallenger. [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 361-409, viewed 4 September 2018, <http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap5_FINAL.pdf>
- Lord Howe Island Board 2010, *Strategic Plan for Lord Howe Island Group World Heritage Property*, viewed 5 September 2018, <<https://www.ecotourism.org.au/assets/Resources-Hub-Ecotourism-Plans/Lord-Howe-Island-Strategic-Management-Plan.pdf>>
- Lord Howe Island Board 2016, *Lord Howe Island Weed Management Strategy 2016 – 2025*, viewed 3 September 2018, <http://www.lhib.nsw.gov.au/sites/lordhowe/files/public/images/documents/lhib/Publications/Plans/LHI%20Weed%20Mgmt%20Strategy%202016_2025.pdf>
- NSW Marine Parks Authority 2002, *Draft zoning plans for the Lord Howe Island Marine Park*, NSW Marine Parks Authority, Lord Howe Island
- UNESCO, *Lord Howe Island Group*, viewed 30 August 2018, <<https://whc.unesco.org/en/list/186>>

Appendix A – Land use zoning map (Lord Howe Island LEP 2010)

Lord Howe Island SETTLEMENT AREA

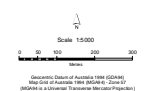


- Legend**
- Zones**
- Zone No. 1 - Rural
 - Zone No. 2 - Settlement
 - Zone No. 5 - Special Uses
 - Zone No. 6 - Recreation
 - Zone No. 7 - Environment Protection
 - Zone No. 8 - Permanent Park Preserve
 - Zone No. 9 - Marine Park
- General**
- Land Referred to in Clause 37
 - Foreshore Building Line

NSW Planning & Environment
Environmental Planning and Assessment Act 1979

**Lord Howe Island
Local Environmental Plan 2010**

Sheet 2 of 3 Sheets



Sheet Index

Notations:

This map shows Lord Howe Island Regional Environmental Plan 2010.

Map produced by Department of Planning and Environment 12 May 2014.

Data supplied by Land and Property Information (LPI), Office of Environment and Heritage and Planning and Infrastructure.

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Map identification number: E880_DD04_L27N_002_005_20140512

Appendix B – EPBC Protected Matters Search Tool Search Results



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 18/10/18 09:48:01

[Summary](#)

[Details](#)

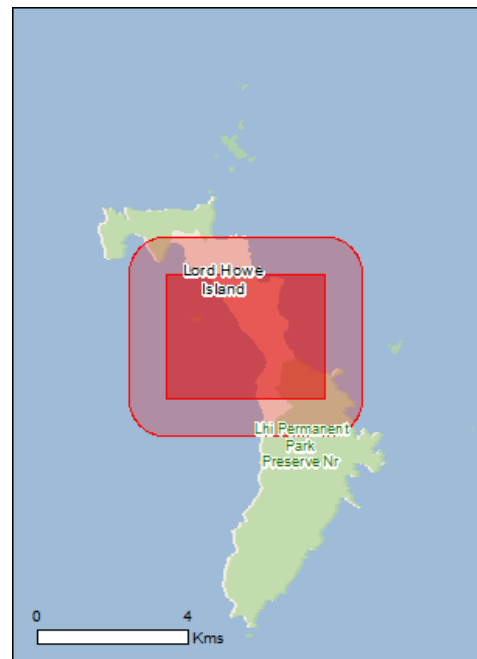
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are
©Commonwealth of Australia
(Geoscience Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	48
Listed Migratory Species:	42

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	43
Whales and Other Cetaceans:	29
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	13
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

World Heritage Properties		[Resource Information]
Name	State	Status
Lord Howe Island Group	NSW	Declared property

National Heritage Properties		[Resource Information]
Name	State	Status
Natural		
Lord Howe Island Group	NSW	Listed place

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Hypotaenidia sylvestris Lord Howe Woodhen [87732]	Endangered	Breeding likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Pterodroma heraldica Herald Petrel [66973]	Critically Endangered	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Strepera graculina crissalis Lord Howe Island Currawong, Pied Currawong (Lord Howe Island) [25994]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta steady White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fish		
Epinephelus daemeli Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Other		
Gudeoconcha sophiae magnifica Magnificent Helicarionid Land Snail [82864]	Critically Endangered	Species or species habitat may occur within area
Mystivagor mastersi Masters' Charopid Land Snail [81247]	Critically Endangered	Species or species habitat known to occur within area
Placostylus bivaricosus Lord Howe Flax Snail, Lord Howe Placostylus [66769]	Endangered	Species or species habitat known to occur within area
Pseudocharopa ledgbirdi Mount Lidgbird Charopid Land Snail [85279]	Critically Endangered	Species or species habitat may occur within area
Pseudocharopa whiteleggei Whitelegge's Land Snail [81249]	Critically Endangered	Species or species habitat may occur within area
Plants		
Calystegia affinis [48909]	Critically Endangered	Species or species habitat known to occur within area
Elymus multiflorus subsp. kingianus Phillip Island Wheat Grass [82413]	Critically Endangered	Species or species habitat known to occur within area
Geniostoma huttonii [56368]	Endangered	Species or species habitat known to occur within area
Polystichum moorei Rock Shield Fern [40755]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
Christinus guentheri Lord Howe Island Gecko, Lord Howe Island Southern Gecko [59250]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Oligosoma lichenigera Lord Howe Island Skink [82034]	Vulnerable	Species or species habitat known to occur within area

Sharks

Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat likely to occur within area
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Listed Migratory Species

[[Resource Information](#)]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Breeding known to occur within area
Ardenna carneipes Flesh-footed Shearwater, Flesh-footed Shearwater [82404]		Breeding known to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat likely to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Name	Threatened	Type of Presence
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Breeding known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Procelsterna cerulea Grey Noddy, Grey Ternlet [64378]		Breeding known to occur within area
Pterodroma nigripennis Black-winged Petrel [1038]		Breeding known to occur within area
Pterodroma solandri Providence Petrel [1040]		Breeding known to occur within area
Puffinus assimilis Little Shearwater [59363]		Breeding known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Breeding known to occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Fish

Cosmocampus howensis Lord Howe Pipefish [66208]		Species or species habitat may occur within area
Halicampus boothae Booth's Pipefish [66218]		Species or species habitat may occur within area
Hippocampus kelloggi Kellogg's Seahorse, Great Seahorse [66723]		Species or species habitat may occur within area
Solegnathus dunckeri Duncker's Pipehorse [66271]		Species or species habitat may occur within area

Reptiles

Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat may occur within area

Whales and other Cetaceans

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within

[Resource Information]

Name	Status	Type of Presence area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat may occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area

Name	Status	Type of Presence
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Lord Howe Island	NSW

Invasive Species	[Resource Information]
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.	

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
<i>Sturnus vulgaris</i> Common Starling [389]		Species or species habitat likely to occur within area
<i>Turdus merula</i> Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
<i>Turdus philomelos</i> Song Thrush [597]		Species or species habitat likely to occur within area
Mammals		
<i>Mus musculus</i> House Mouse [120]		Species or species habitat likely to occur within area
<i>Rattus rattus</i> Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Plants		
<i>Anredera cordifolia</i> Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
<i>Asparagus asparagoides</i> Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> Bitou Bush [16332]		Species or species habitat likely to occur within area
<i>Lantana camara</i> Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
<i>Lycium ferocissimum</i> African Boxtorn, Boxtorn [19235]		Species or species habitat likely to occur within area
<i>Salvinia molesta</i> Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.52559 159.05323,-31.52559 159.09091,-31.55105 159.09091,-31.55105 159.05323,-31.52559 159.05323

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

Appendix C – Site Photos



Plate 1: DHC8-200 aircraft parked in existing apron area, looking north-east from outside existing terminal building



Plate 2: DHC8-200 aircraft travelling along existing taxiway, looking north-east from outside existing terminal building



Plate 3 – Looking north-east from outside the existing terminal building. DHC8-200 aircraft in distance travelling along existing runway



Plate 4 – Looking south-west from the northern side of the runway. The existing airfield and existing security fence can be seen. Significant native vegetation beyond the kikuyu grass on the other side of the airfield can be seen in the distance.



Plate 5 – Looking south-west from Windy Point towards the Airport. The end of the existing runway can be seen on the rock/reclaimed land structure.

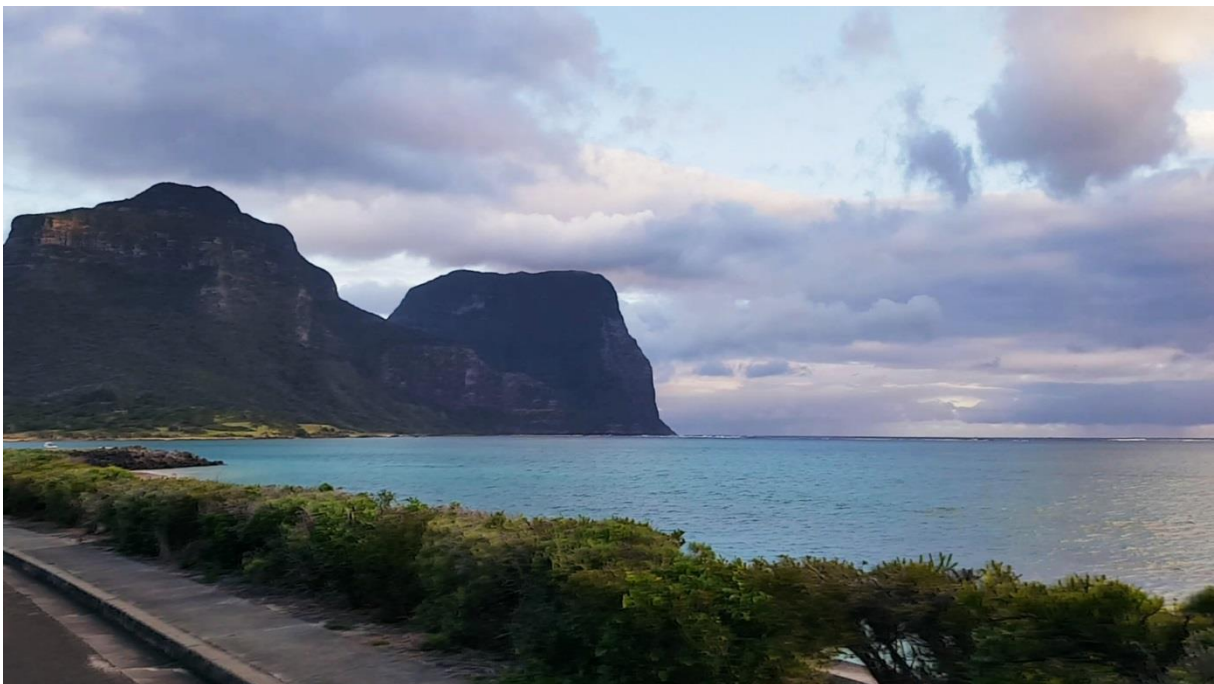


Plate 6 – Looking south-west from Windy Point towards the Airport and Lagoon. This section of the Lagoon is where the proposed runway would extend into starting from the end of the existing runway (rock/reclaimed land structure on the left).



Plate 7 – Looking north-west from Lagoon Road adjacent to the airstrip towards the Lagoon. If the proposed runway extension were to progress further, this portion of the road would need a new realignment in order to avoid vehicles and the fence line impinging the ‘fly-over area plane’ and OLS restrictions.



Plate 8 – Lord Howe Island terminal located adjacent to the apron.

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