LINDEMAN GREAT BARRIER REEF RESORT PROJECT

ENVIRONMENTAL IMPACT STATEMENT

APPENDIX T - WASTE MANAGEMENT

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 Accordingly, remaining references to, and images of, a safe harbour on various figures and maps in the EIS are no longer current.*

Waste Management Technical Report

Lindeman Island Great Barrier Reef Resort

HRP15078

Prepared for
White Horse Australia Lindeman Pty Ltd

09 December 2016

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Shaping the Future

Document Information

Prepared for	White Horse Australia Lindeman Pty Ltd
Project Name	Lindeman Island Great Barrier Reef Resort
File Reference	\\aubnecfs05\env$\HRP15078 Lindeman Is\wp\Waste Management\Waste Management Technical Report_V2 TH.docx.dotm.docx
Job Reference	HRP15078
Date	09 December 2016

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Document Control

Version	Date	Description of Revision	Author Initials	Author Signature	Reviewer Initials	Reviewed Signature
1	26 /02/16	For client review and comment	LM			
2	9/12/16	For approval	LM			

Executive Summary

This technical report has been developed to assess and plan the waste management arrangements for the proposed Lindeman Island Resort to ensure that all activities are managed in a way that protects environmental values.

A strategy for managing wastes generated during all phases of the proposed Lindeman Island Resort Redevelopment Plan has been developed in accordance with the waste management principles specified in the *Waste Reduction and Recycling Act 2011, Waste Reduction and Recycling Regulation 2011* and the *Queensland Waste Avoidance and Resource Productivity Strategy (2014-2024).*. These strategies focus on avoiding waste generation during construction and operation wherever possible, through implementation of procurement policies, planning and scheduling, training and awareness, and specific work practices.

During the demolition and construction phases it is anticipated that concrete, bricks, pavers, glass and timber are expected to be the dominant sources of waste. Key components of the waste stream generated during operation of the resort will comprise paper, food, garden waste (grass and vegetation trimming) and packaging (plastics, glass, cans all recyclable), consistent with domestic and commercial waste sources.

For the purposes of developing a waste management strategy for the Lindeman Island Resort, estimates of the anticipated volume of waste generated have been made with reference to waste data from the former Lindeman Island Resort and a review of available literature, including the waste projections for the Great Keppel Island resort due to aspects of project similarity.

To service the operation of the resort, a waste transfer station will be established within the resort's maintenance and services precinct as indicated in the Master Plan layout prepared by DBI Design, 2016. Wheelie bins will be collected from around the Island by the resort operator using a utility/tractor trailer before being emptied into bulk bins within the maintenance and services precinct. It is anticipated this will occur at least weekly during normal operation, increasing to a minimum of twice weekly during peak periods. Separate wheelie bins and bulk bins will be provided for collection of general waste and recyclable materials. A small stationary compactor, bin press or similar will be installed to reduce the volume of waste requiring transfer to the mainland, reduce transport frequency and cost, and reduce pressure on the capacity of Council's landfill facilities. Composting facilities will also be provided at a suitable location on the island for processing of green waste into soil conditioner. The waste transfer station and associated areas for storage and handling of bulk waste materials, are to be located with appropriate setbacks to environmentally sensitive areas, tourist villas and staff accommodation. Appropriate containment and drainage systems are to be installed for waste storage and handling areas to prevent the release of contaminants to receiving environments.

A commercial waste contractor holding the appropriate licence under the *Environmental Protection Act 1994* will be engaged to collect bulk bins containing general waste and recyclable wastes from the Island, and to transport these materials to appropriately licensed disposal and recycling facilities on the mainland. It is anticipated that the majority of general and recyclable waste will be transported to Whitsunday Regional Council's landfill facilities, which provide facilities for recycling a range of materials as well as landfill for disposal. Waste collection vehicles will travel to and from the Island via the regular barge service at least weekly or more frequently as required during peak periods.

A number of environmentally relevant activities as defined in Schedule 2 of the *Environmental Protection Regulation 2008* have been identified as potentially being associated with the proposed waste management strategy, including Environmentally Relevant Activity (ERA) 63 – Sewerage treatment, possibly ERA 53 – Composting and soil conditioner manufacturing if the 200t threshold per annum is exceeded and ERA 62 – Waste transfer station operation and ERA 33 –Crushing, milling, grinding or screening. Approvals will be required under the *Environmental Protection Act 1994* to operate these ERAs on the Island if triggered.

A range of environmental controls and mitigation measures are proposed to minimise potential risks to the environment associated with waste management practices. These measures include regular monitoring and inspections, tracking of wastes, and regular audits of waste streams to identify opportunities for increased reuse and recycling, and improved waste management practices. Engineering and procedural controls, such as construction of bunded containment areas, covering bins and stockpiles likely to generate odour or litter, and aeration of composting materials have also been proposed to minimise the potential environmental impacts of waste management.

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1 Introduction

1.1 Background

White Horse Australia Lindeman Pty Ltd (White Horse Australia) propose to redevelop the existing resort at Lindeman Island into an integrated tourist resort spread over a development footprint of approximately 19 hectares with an additional 5.61 hectares comprising an associated safe harbour (refer to **Figure 1 – Site Location**).

Lindeman Island is located approximately 35 kilometres south-east from Shute Harbour on the mainland and some 13 kilometres from Hamilton Island (refer to **Figure 2 – Council Waste Management Facilities and Regional Context**). The island has a total area of approximately 637 hectares with the resort redevelopment proposed to occupy leases of approximately 138 hectares. The balance of Lindeman Island is declared National Park and included in Lot 429 NPW622. Lindeman Island is within the jurisdiction of Mackay Regional Council.

This report summarises the site conditions, aspects and impacts relevant to waste management. The scope of the report addresses the waste management Terms of Reference for the Lindeman Island EIS. The report also considers the likely significance of the aforementioned issues to the development.

This technical study consists of:

> A site visit to confirm locations of potential issues and infrastructure on the ground;
> A review relevant literature and any other environmentally relevant information; and
> A review of relevant mapping resources for the site.

The technical report did not require, nor have any asbestos quantification investigations been undertaken as part of this investigation.

1.2 Project Overview

The Masterplan prepared by DBI Design for the redevelopment of the Lindeman Island Resort (refer to **Appendix A – Lindeman Island Resort Masterplan**) proposes to create a low rise resort on Lindeman Island comprising:

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

It is envisaged that approximately 300 full-time equivalent (FTE) employees will be required once the resort is fully operational. Most operational staff will work standard shift hours and will be sourced from the Whitsunday Region. . It is proposed that the approximately 300 staff will be accommodated in the new village precinct to be provided on the Island with staff movements to the mainland to occur mainly by ferries.

The Lindeman Island Great Barrier Reef Resort will be constructed in stages, with Stage 1 involving construction of the Beach Resort, Spa, safe harbour and internal infrastructure (power, water, sewerage, roads). It is expected that Stage 1 construction will take approximately 18 months. Completion of the Lindeman Island Resort and subsequent stages are expected to take up to 3 years.

Construction workers will be ferried to the Island where possible and practical. It is envisaged that rooms at the old resort as well as other accommodation options on the Island will be utilised to provide accommodation on the Island for construction workers.

The expected number of staff and visitors, and average occupancy for the resort during operation has been used to estimate the average volume of waste generated during operation of the resort. This is addressed further in **section 5.1** of this report.

1.3 Development History

Since European settlement on Lindeman Island land uses have changed from a grazing property through to the resort that currently exists on the island.

In 1928, the first guests arrived and were accommodated in grass huts and cabins. In the 1940s a number of tracks were constructed to provide access to scenic views. In the 1950s the air-strip was extended to meet Department of Civil Aviation standards for smaller aircrafts with a new air-strip of 4000 feet constructed to accommodate larger planes. In 1959 new guest accommodation was built and a swimming pool was added along with the demolition of the last of the grass huts. In 1961 the whole island was surrendered and replaced by a perpetual lease of 152 acres covering the resort area and airstrip.

In 1970 a six-hole golf course was constructed west of the air-strip and running towards Piccaninny Point. To provide water for the golf course and for landscaping and general use at the resort, a dam was constructed on Boat Port Creek located on the western side of the island and north of Piccaninny Point.

P&O operated a small 48 room resort in the 1980s before being purchased by Adelstein Investments who increased the size of the resort by 104 rooms in 1988. Subsequently it was sold to Club Med in 1990 and the current 225 room resort was opened. The resort closed in 2012. All infrastructure has remained in place since its closure, with the facilities remaining comprising 225 rooms, restaurant/s, golf course, staff accommodation, administration buildings, a grassed airstrip, recreational facilities including swimming pools and tennis courts.

1.4 Technical Report Scope and Objectives

The purpose of this Technical Report is to detail the waste management requirements for the resort, including the development of a strategy to manage the handling, storage and disposal of waste materials generated during demolition, construction and operation of the resort, and to ensure waste generated by the Lindeman Island Resort does not have an adverse impacts on surrounding environments and communities.

Specifically, the waste management strategy for the Lindeman Island Resort aims to minimise the total volume of waste produced and the volume of waste disposed to landfill during construction and operation by:

> employing waste avoidance and reduction strategies throughout construction and operation to eliminate waste at the source;
> maximising the reuse and recycling of waste materials produced on site;
> ensuring the handling, storage and transportation of wastes during construction and operation does not adversely impact on the natural environment or communities on and off the Island;
> continually improving the processes for managing wastes generated by conducting regular waste audits to evaluate waste streams; and
> identifying practices and new ways to reduce, reuse or recycle wastes and to prevent environmental harm.

This Report has been prepared to address the *Terms of Reference for an EIS –Lindeman Great Barrier Reef Resort Project* issued by the Queensland Coordinator-General and dated August 2015. The Terms of Reference requires the following matters to be considered in the Environmental Impact Statement (EIS).

Table 1-1 Terms of Reference- Waste Management

Item	Clause
13.34.	*Describe and provide estimated quantities of all the expected significant waste streams from the proposed project activities during the construction and operational phases of the project.*
13.35.	*Define and describe the principles, objectives and practicable measures for protecting or enhancing environmental values from impacts by wastes. Take into account best practice waste management strategies and the Waste Reduction and Recycling Act 2011, Waste Reduction and Recycling Regulation 2011, the Queensland Waste Avoidance and Resource Productivity Strategy (2014-2024) and the Environmental Protection (Water) Policy 2009.*
13.36.	*Assess the proposed management measures against the preferred waste management hierarchy, namely: avoid waste generation; cleaner production; recycle; re-use; reprocess and reclaim; waste to energy; treatment; disposal. This includes the generation and storage of waste.*
13.37.	*Describe how nominated quantitative standards and indicators may be achieved for waste management, and how the achievement of the objectives would be monitored, audited and managed*
13.38.	*Provide details on natural resource-use efficiency (such as energy and water), integrated processing design and by-product re-use as shown in a material/energy flow analysis.*
13.39.	*Detail any known or potential sources of contaminated land, the location of the development in relation to contaminated land and necessary management measures. Describe how any proposed activity may result in land becoming contaminated and measures to prevent and manage any soil contamination*

2 Historical Waste Management Practices

2.1 During Resort Operation

From approximately 1992 until closure of the resort in 2012, JJ Richards was responsible for the collection of general waste from the Island, and transport of these wastes to the mainland for disposal at Council's landfill facilities. During this period, information provided by Mr Darren Stuart. Maintenance Manager for the former Club Med Resort and currently for White Horse Australia Pty Ltd, indicates that waste for the maximum of 700 guests and staff was compacted at the waste transfer facility operated in the industrial maintenance area and then removed from the Island on a weekly basis (refer **Figure 1**). Mr Stuart also indicated that some recycling was undertaken at the resort, with bottles and cans separated at the source and diverted to recycling facilities. Green waste was diverted and composted along with waste activated sludge from the sewage treatment plant.

Of the waste removed from the Island each week, one bin containing recyclable glass and one bin containing recyclable cans were transported to recycling facilities on the mainland. The remaining was general waste and were transported to Council's landfill for disposal. Based on an approximate weight of 0.131 t/m^3 for un-compacted general waste (pers comm Darren Stuart), this equated to approximately 11 tonnes of general waste, 0.39 tonnes of recyclable glass and 0.39 tonnes of recyclable cans being removed from Island weekly.

This volume of waste excludes green waste and wastewater treatment plant bio-solids, which it is understood were being deposited in the organic waste composting area (**Figure 1**).

2.2 Following Resort Closure

Post resort closure, waste is transported to the maintenance compound, where minor amounts recyclables are held, pending collection. General waste is similarly held in the maintenance compound, although collection is as required rather than weekly.

It is anticipated that previous waste management arrangements, with required upgrades, could be reinstated for the proposed Lindeman Island Resort.

3 Waste Management Regulatory Requirements

3.1 Legislative Requirements

3.1.1 Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act), which is administered by the Department of Environment and Heritage Protection (DEHP), was established with the purpose "*to protect' Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development).*"

The EP Act utilises a number of mechanisms to achieve its objectives. These include:

> creating a general environmental duty,
> licensing environmentally relevant activities (ERAs);
> issuing environmental protection policies; and
> integrates with waste management policies under the *Waste Reduction and Recycling Act 2011* and *Waste Reduction and Recycling Regulation 2011.*

3.1.1.1 General Environmental Duty

All persons involved in this project are subject to a general environmental duty of care under sections 319 and 320 of the EP Act. Section 319 of the Act, which conveys the general environmental duty, states that a person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm.

Furthermore, section 320 of the Act requires than if any person, while carrying out an activity, becomes aware that serious or material environmental harm is caused or threatened by any person's act or omission in carrying out the activity, they must as soon as reasonably practicable after becoming aware of the event, notify their employer or give written notice to the administering authority of the event, its nature and the circumstances in which it happened.

3.1.1.2 Environmentally Relevant Activities

Environmentally relevant activities are defined in schedule 2 of the *Environmental Protection Regulation 2008* (EPR 2008).

A number of waste-related environmentally relevant activities are defined in the EPR 2008.

3.1.2 Waste Reduction and Recycling Act and Waste Reduction and Recycling Regulation 2011

The *Waste Reduction and Recycling Act 2011* (WRR Act) and *Waste Reduction and Recycling Regulation 2011* provides the legislative framework for waste management in Queensland.

The key provisions of the *Waste Reduction and Recycling Regulation 2011* include:

> fees for applications under the WRR Act;
> management of used packaging materials; and
> details about who is required to plan and report about waste management.

The WRR Act also provides a number of important waste reforms, for example:

> strengthened litter laws and public reporting for littering from vehicles;
> improved reporting of waste and disposal;
> strengthened planning and reporting by state government;
> a legislative framework for product stewardship (voluntary and mandatory);
> strategic planning for waste reduction and recycling;
> beneficial use approval framework for general approvals to facilitate resource recovery;
> ability for the Minister to issue priority product statements through a transparent consultative process; and
> review the waste strategy within three-year cycles.

3.2 Policy Considerations

3.2.1 Queensland Waste Avoidance and Resource Productivity Strategy

In addition to current legislative requirements, consideration has been given to the *Queensland Waste Avoidance and Resource Productivity Strategy (2014–2024)* (Waste Strategy) (DEHP, 2014) in developing the waste management strategy for the Lindeman Island Resort. This Waste Strategy is a 10-year plan to achieve the state government's vision of a low-waste Queensland and has the following vision " *Queensland will become a national leader in avoiding unnecessary consumption and waste generation, adopting innovative resource recovery approaches, and managing all products and materials as valuable and finite resources" (p3)*.

To achieve this vision the Waste Strategy outlines five principles:

1. Protecting human health and the environment to secure our future prosperity;
2. Sharing responsibility for avoiding unnecessary consumption and improving resource management;
3. Recognising the economic, environmental and social costs of waste generation and disposal;
4. Recognising regional differences and opportunities; and
5. Full lifecycle management of resources.

The state targets for reducing waste specified in the Waste Strategy to 2024 include:

> reduce waste to landfill by 50%;
> reduce commercial and industrial waste by 55%; and
> reduce construction and demolition waste by 80%.

The waste management strategy for Lindeman Resort as outlined in this report is considered to be consistent with the objectives of Waste Strategy and will contribute to achievement of the specified targets by improving upon current waste management practices including through providing enhanced opportunities for reuse and recycling of wastes, which are currently all disposed to landfill and by closure of former landfill operations on the Island. In addition, the waste management strategy for Lindeman Island Resort is strongly aligned with the waste management hierarchy as described in the following section.

4 Waste Management Hierarchy

4.1 Introduction to the Waste Management Hierarchy

The waste management strategy proposed for the proposed resort seeks to protect the environmental values of the Island and is strongly aligned with the State government's waste management hierarchy as described in the following section (refer to **Plate 1**). The waste hierarchy is summarised as follows (in terms of most to least preferred):

1. avoidance including action to reduce the amount of waste generated by households, industry and all levels of government.
2. resource recovery including re-use, recycling, reprocessing and energy recovery, consistent with the most efficient use of the recovered resources.
3. disposal including management of all disposal options in the most environmentally responsible manner.

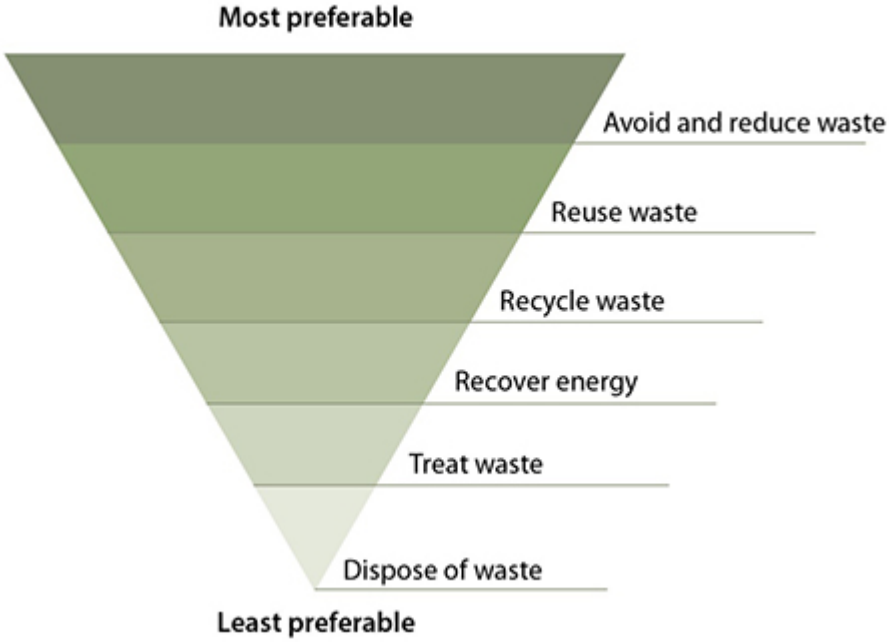

Plate 1 Waste Management Hierarchy (DEHP 2016)

4.2 Waste Avoidance

Waste avoidance relates to strategies that prevent the generation of waste or reduce the amount of waste generated. It is the preferred waste management strategy as it significantly reduces the environmental risks as well as the social and economic costs associated with storage, handling, transportation and disposal of wastes. The generation of waste can be avoided by undertaking the following.

> input substitution;
> increasing efficiency in the use of raw materials, energy, water or land;
> process redesign;
> product redesign;
> improved maintenance and operation of equipment; and
> closed-loop recycling – reclaiming, from a production process, a material that would otherwise be disposed of as a waste and using it as an input in the same production process.

Opportunities to implement waste avoidance practices as part of the Lindeman Island Resort are considered futher in sections 5 and 6 of this report.

4.3 Waste Reuse and Recycling

Waste reuse involves the reuse of waste without first processing or substantially changing the form of the material. Opportunities to implement waste reuse practices as part of the Lindeman Island Resort are considered in sections 5 and 6 of this report.

Waste recycling refers to the reprocessing of waste materials to produce new products. Opportunities to implement waste recycling practices as part of the Lindeman Island Resort are also considered in sections 5 and 6 of this report.

4.4 Energy Recovery

The practice of energy recovery involves recovering and using energy generated from waste.

Opportunities to implement energy recovery practices as part of the Lindeman Island Great Barrier Reef Resort are limited. Although technologies exist to recover energy from waste through incineration or gasification, these technologies have relatively high capital costs. Furthermore, such systems typically do not deal well with variable moisture content and composition of feedstock, which is an issue for Lindeman Island given the relatively small quantities of waste generated, would require the use of a broad range of feedstock material to make the system viable. Incineration also has the potential to release various pollutants to the air and is generally inconsistent with the 'clean' and 'green' image promoted by the Lindeman Island Resort.

Similarly, the establishment of an Island landfill for putrescible waste and extraction of methane gas for electricity generation is not considered appropriate due to the relatively high capital costs, small quantities of putrescible waste generated, environmentally sensitive nature of the Island, limited land availability and proximity of sensitive receivers.

Given the relatively small scale of the sewage treatment plant and highly variable loads associated with variable occupancy rates, energy recovery from methane generated by the sewage treatment process is also considered to be unfeasible at this time.

Small-scale production of biodiesel from green and organic waste for use in vehicles operated by the Lindeman resort may comprise an energy recovery option for future investigation once more accurate data relating to the composition and volumes of suitable organic source materials generated on the Island are known.

4.5 Waste Disposal

Waste disposal refers to the final deposit of waste when the material is of no further use and may involve disposal to landfill or thermal destruction (i.e. incineration). Disposal is considered the least preferred waste management option, but when required, it is important to select a method of disposal that causes the least harm to the environment.

The disposal or incineration of wastes on the Island is generally not considered a viable option for the Lindeman Island Resort due to the environmentally sensitive nature of the Island and surrounding areas. The operation of a landfill is not considered appropriate due to the environmental risks associated with contaminated leachate potentially entering groundwater and surface water, potential odour nuisance issues and relatively high costs associated with establishing and managing a landfill. Accordingly, no disposal or incineration of solid wastes will occur on the Island.

Some discharge of excess treated wastewater via ocean outfall may occur during periods of prolonged wet weather when demand for recycled water for irrigation is not sufficient to utilise all wastewater generated by the resort. In this case, wastewater will be treated prior to disposal to meet the quality standards specified by project approval conditions. Further details on proposed wastewater management, including reuse of recycled water for irrigation and toilet flushing, and discharge of excess treated wastewater via ocean outfall are contained in the Infrastructure Report prepared by Cardno, 2016.

All solid wastes that cannot be reused or recycled as described above, will be collected and stored in designated facilities on the Island, prior to transport and disposal on the mainland. It is proposed that solid

waste material intended for disposal on the mainland will undergo some minor treatment on Lindeman Island to reduce the volume of waste prior to transfer to the mainland. This will include compaction of general waste using a small stationary refuse compactor, bin press or similar installed within the maintenance and services precinct. Compacted waste will then be enclosed into container for transport to the mainland to minimise shipping costs and frequency.

White Horse Australia will engage the services of a commercial waste transporter licensed in accordance with the requirements of the EP Act to transport wastes to the mainland. It is anticipated that a waste collection vehicle will travel to Lindeman Island once or twice a week via the regular barge.

The waste collection vehicle will load wastes from bulk bins contained in the designated waste collection area before returning to the mainland via the barge service on the same day. It is envisaged that bulk recycling bins will be collected via a waste collection vehicle travelling to and from the mainland once a week or as required. Wastes will be disposed of at one of the following Whitsunday Regional Council managed landfill facilities licensed under the EP Act (**Figure 2**):

> Kelsey Creek Landfill; Proserpine;
> Mt Coolon Landfill, Bowen; and
> Cannonvale Waste Transfer Station.

Hazardous wastes from Lindeman Island will be transported directly to the Kelsey Creek Landfill and adjacent waste facilities in Proserpine. This facility is able to accept the following items:

> recyclable items – glass, cardboard, paper, plastic, aluminium cans;
> motor oils;
> tyres;
> batteries;
> drums;
> construction and demolition waste;
> general household waste; and
> green waste.

This facility is also able to accept a range of hazardous wastes subject to prior approval from Council and compliance with limitations specified in Council's environmental licence. In particular, the Whitsunday Regional Council website indicates that this facility can accept asbestos material that may be derived from demolition of the existing resort provided this material is packaged and sealed in accordance with the relevant Australian Standards.

5 Waste Management Plan – Construction Phase

5.1 Predicted Waste Generation

Wastes generated during the demolition and construction phases of the project will primarily be derived from:

> demolition of existing resort buildings and associated infrastructure (eg. roof sheeting and guttering, concrete, timber and steel framework, glass, cladding, pipework, bricks, tiles and pavers);
> ground preparation works (eg. cleared vegetation);
> delivery of materials to the Island (eg. packaging, pellets, storage containers);
> building and construction materials (eg. off cuts of timber, plastics, steel and concrete);
> building and construction processes (eg. sawdust and filings from timber and steel cutting and grinding, cement slurries and paint sludges (if producing painted concrete products) from concrete batching); and
> activities of construction workers, including general refuse (eg. food wrappings and scraps) and wastewater from site amenities.

A summary of wastes likely to be generated during the demolition and construction phase of the Lindeman Island Resort is provided in **Table 5-1** along with estimated volumes and proposed methods for managing each of these wastes.

In the calculation of both demolition and construction reference has been made to waste volumes estimates of a similar island resorts, including the proposed Great Keppel Island Resort, and average composition data for demolition and construction (commercial) in Queensland derived from *Construction and Demolition Waste: Waste Management and Resource Use Opportunities* published by the Queensland Environmental Protection Agency (now DEHP) in July 2002.

As such, the estimates provided for the Great Keppel Island Resort have been adopted as the basis for the estimated waste volumes in **Table 5-1**, while other waste streams not accounted within that development have been derived based on the proportions interpolated from the *Construction and Demolition Waste: Waste Management and Resource Use Opportunities* report except where indicated.

In summary, estimates of key waste streams generated by proposed demolition works within the resort area are:

> Concrete, bricks, tile and rubble – 2,580m^3;
> Timber – 40m^3;
> Plasterboard – 200m^3;
> Glass – 37m^3; and
> Scrap metal - 30m^3

In calculating the amount of construction materials which will comprise the construction waste stream 10% wastage is assumed. On this basis, it is estimated that 32,250m^3 of construction waste will be generated during the 30 month construction period. This value excludes the construction waste generated during construction of the safe harbour and navigation channel.

In terms of constructing the safe harbour and channel it is estimated that the required dredging would be approximately 43,000m^3 for the safe harbour and 39,000m^3 for the channel (Total 82,000m^3). A small cutter suction dredge (CSD) is proposed to undertake the required dredging. Material would be pumped by a pipeline into the bunded reclamation area on the Island (near existing football field) to dry out and this material would then be used to raise levels in various development locations on the Island. The reclamation area would have a number of settling basins to allow fines to settle out of suspension before the decant overflow is returned to the harbour basin. The dredging will include sand but also loose coral and rock material and this will be eroded and placed with the balance of dredged material.

Following completion of construction works, decommissioning of construction areas will occur progressively and this will also generate a range of wastes. These wastes will be managed in accordance with the waste management principles for similar types of wastes derived from demolition and construction and in accordance with the waste management hierarchy.

The following wastes are anticipated to be generated during decommissioning of construction areas:

> All components of concrete batching and crushing plants will be dismantled and returned to the mainland for reuse. Excess materials that cannot be beneficially used on the Island will also be transported to the mainland for use in other construction projects.
> Concrete and asphalt hardstand within lay down areas and construction compounds will be removed and reused in works on the Island or returned to the mainland for recycling or disposal.
> Buildings used for site offices and amenities etc, will be dismantled and / or relocated to the permanent maintenance and services precinct on the Island or to the mainland for reuse or recycling.
> Security fencing around lay down areas and construction compounds shall be dismantled and returned to the mainland for reuse or recycling;
> All excess hazardous materials shall be transferred to the permanent facilities maintenance compound on the Island for use in resort maintenance activities or otherwise removed from the Island for reuse or recycling; and
> Any soils contaminated during construction shall be remediated or removed from the Island for disposal at approved facilities on the mainland.

Table 5-1 Summary of Waste Generation and Management for Demolition and Construction Phase.

Waste Type	Approximate Quantity	Waste Storage	Waste Management Method	Frequency of Collection
Dredge material from safe harbour	The required dredging would be approximately 43,000m^3 for the safe harbour and 39,000m^3 for the channel (Total 82,000m^3)	Material would be pumped by a pipeline into the bunded reclamation area on the Island (near existing football field) to dry.	The material would be used to raise levels in various development locations on the Island.	Dredging rate would be approximately 120m^3 per hour which equates to 12 weeks based on a 12 hour day/7 days per week being dredged and allowing for a 20% contingency.
Fill and soil (not contaminated)	Cut and fill activities will be minimised and balanced such that no surplus fill or soil will require removal from the Island.	Dedicated stockpile sites will be established for each stage of construction. Sites will be located with appropriate setbacks to watercourses, overland flow paths and apartment/unit dwellings.	Topsoil stripped and stored for reuse in landscaping works. Cut material will be reused for filling during construction on the Island.	Not required.
Fill and soil (contaminated)	Refer to– Land Contamination section of the EIS.	Refer to Contaminated Site Investigation Report.	Refer to Contaminated Site Investigation Report.	Refer to Contaminated Site Investigation Report.
Cleared and grubbed vegetation	Total construction area = 180 to 300 hectares[1]	Dedicated green waste storage bay within construction compound.	Where practicable, felled timber of commercial quality will be salvaged and used in construction or transported to mainland sawmills for reuse. Other cleared vegetation will be mulched or chipped, and reused in landscape and rehabilitation works.	Weekly during construction.
Timber	Total for Demolition = 40m^3 Total for Construction = 4,764m^3	Dedicated storage bay within construction compound.	Timber salvaged from demolition of existing resort buildings or off cuts during construction will be reused in construction where possible. Other timber waste will be transported to the mainland for recycling where facilities exist, or disposal at Whitsunday Regional Council's Kelsey Waste Management Facility (landfill).	Weekly during construction.
Scrap metal	Total for Demolition = 30m^3 Total for Construction = 1,212m^3	Metal recycling skip bin in construction site compound.	Collected and transported to mainland for recycling.	Weekly during construction.

Waste Type	Approximate Quantity	Waste Storage	Waste Management Method	Frequency of Collection
Concrete, bricks, tile and rubble	Total for Demolition = 2,580m^3 Total for Construction = 11,301m^3	Dedicated storage baywithin the construction compound.	Concrete will be assessed for suitabilityand where practical, crushed on site (eg. using a mobile crushing plant) for use in road base or drainage on the Island. Concrete crushing activities will require approval under the EP Act for ERA 33 – Crushing, milling, grinding or screening. Other waste disposed to Whitsunday Regional Council's KelseyWaste Management Facility.	Weekly during construction.
Plasterboard	Total for Demolition = 200m^3 Total for Construction = 3,811m^3	Dedicated construction waste skip bin within the construction compound.	Collected and returned to supplier (where possible) (eg. Boral Plasterboard offers a potential for product take-back for recycling into new plasterboard products or soil conditioner (gypsum used to treat problems such as transient salinity and as a clay breaker) (Boral Limited, 2011)). Where reuse and recycling options not available, disposal to Whitsunday Regional Council's KelseyWaste Management Facility.	Weekly during construction.
Packaging wastes – cardboard / paper and plastics.	Total for Construction = 3,500m^3	Separate skip bins provided for cardboard / paper and plastics within the construction compound.	Transported to recycling facilities on the mainland, with some plastics disposed to Whitsunday Regional Council's KelseyWaste Management Facility.	Weekly during construction.
Glass	Total for Demolition = 37m^3 Total for Construction = 84m^3	Dedicated skip bin within the construction compound.	Transported to recycling facilities on the mainland.	Weekly during construction.
Food and other organic waste	Average of 140 kg/day	Dedicated general waste skip bins within the construction compound.	Putrescible organic waste will be transported for disposal at Whitsunday Regional Council's KelseyWaste Management Facility. Greenwaste will be disposed in the greenwaste composting area	Twice weekly during construction.

Waste Type	Approximate Quantity	Waste Storage	Waste Management Method	Frequency of Collection
Diesel and other fuels, oils, hydraulic fluids etc	Servicing = 1,050L/month	Bunded drum store within construction compound.	Collected, transported and recycled by a Fuel Recycling Contractor on mainland.	Monthly during construction.
Asbestos	As identified in asbestos register. Likely to be significant	Asbestos material to be appropriately bagged by a licensed asbestos removal contractor.	"Supervised special burial" at an appropriately licensed landfill site on the mainland.	As required.
Wastewater	200L/person/day for 300 person construction camp.	Processed via recommissioning of existing Sewage Treatment Plant until new plant is constructed and operational in initial phases of the redevelopment. Existing and proposed Sewage Treatment Plant s will require approval under the EP Act for ERA 63 – Sewage treatment.	Reuse in irrigation or discharge via existing ocean outfall in accordance with approval conditions. Biosolids to mainland landfill	Continuous.

5.2 Routine Procedures

5.2.1 Waste Minimisation

The following measures shall be implemented to minimise waste generation and reduce waste disposal during construction:

> Particular care shall be taken to avoid cross contamination from asbestos contaminants during demolition works. In particular soil and air quality monitoring shall be carried out to ensure that contamination during asbestos removal does not occur.
> Where practicable, construction shall include the use of modular components, purchase of materials cut to standard sizes or pre-fabricated materials to reduce the need for off-cuts.
> Selection of materials for building construction shall seek to maximise the use of renewable or recyclable components, subject to compliance with the relevant building standards specified in the Building Code of Australia and relevant Australian Standards.
> Purchasing policies shall be implemented to focus on selection of materials and resources with less packaging, including use of bulk purchasing, and potentially reusable or recyclable materials.
> Plastic waste will be kept to a minimum with alternatives to plastic being a selection criterion for suppliers delivering materials for construction. For example, metal strapping may be used instead of plastic wrapping or shrink wrap. Any plastic waste generated will be recycled, where possible.
> Contracts for builders and suppliers shall include an environmental performance component.
> Contractors and suppliers shall be required to pre-qualify for tendering based on environmental performance and consideration of potential environmental impact of supplying the materials or goods. Builders and suppliers shall also be required to identify the source of the material or goods, seek to provide alternatives, provide options for pre-fabrication, minimise packaging materials and access to “just in time” ordering.
> Construction project management shall ensure that works scheduling and organising trades.
> Material delivery and placement, construction compound layout and organisation can contribute to effective reuse and minimisation of wastes, including effectively tracking materials to ensure all available materials are utilised prior to ordering additional materials.
> Life cycle analysis shall be undertaken for building materials etc to ensure waste generation is minimised over the full life of the Lindeman Island Resort.
> Construction site disturbance shall be limited to minimise unnecessary excavation and removal of vegetation. It is anticipated that a neutral surplus of fill will result. If however there is surplus fill, it will be used for topsoil during landscaping. Landscaping for the Lindeman Resort Redevelopment.
> Plan will utilise mulch from the vegetation removed during site preparation for construction activities.
> Stripping and storage of topsoil shall be managed to maintain viability of this material for reuse in landscaping.
> Separate skip bins shall be provided within the construction compound to facilitate waste segregation and maximise economic reuse and recycling. A sufficient number and appropriate types of bins shall be provided and labelled to assist with correct use.
> Storage of fuel for refuelling of equipment during construction on the Island shall be kept to a minimum. Storage and handling of fuels shall comply with *AS1940 – 2004: The storage and handling of flammable and combustible liquids*. Where possible, a proportion of the fuel used in the construction vehicles, plant and equipment shall include renewable fuels and/or ethanol based fuel.
> Any construction waste that cannot be recycled or reused and requires disposal, will be transported to a Council operated landfill facility on the mainland. A waste acceptance agreement must be sought from the Manager of the landfill prior to dispatch of waste from the Island.
> All wastes transported off the Island, must be transported by a licensed waste transporter under the EP Act and shall be covered or otherwise secured to prevent litter generation.
> If wastes suitable for reuse cannot be reused on site, off site reuse options will be investigated.
> A number of waste asset databases exist for contractors to list wastes available for reuse so other contractors can use them. Where possible, arrangements shall be made for excess materials or packaging to be returned to the supplier.
> No waste materials shall be buried or burnt on the Island.

5.2.2 Waste Collection and Storage

Construction and demolition wastes will be collected and temporarily stored within the island construction compound, prior to being collected and transported to the mainland by a licensed waste contractor for recycling or disposal at approved facilities.

All construction and demolition waste materials shall be assessed for the ability to be reused or recycled to minimise the volume of waste requiring disposal. Separate waste bins shall be provided to enable efficient separation of waste materials, including designated waste storage bins for separation of:

> domestic waste generated by staff and contractors;
> recyclable wastes – paper and cardboard, timber, glass, metals and plastic (separate bins for each); and
> non-recyclable waste for disposal.

Waste storage bins shall be colour coded and/or labelled for separation of wastes into categories using the labelling system specified in Australian Standard *AS4123.7 – 2006 Mobile waste containers Part 7:Colours, markings and designation requirements*.

Smaller bins shall be provided in convenient and accessible locations relative to construction work areas and shall be emptied regularly into bulk storage bins provided within the construction compound. Large items of waste that do not fit into bins provided, shall be removed from the Island as soon as possible to ensure they do not accumulate.

Timber pallets and packaging material shall be stored within the construction compound and returned to the suppliers at the time of the next delivery.

All potentially hazardous wastes (eg. waste oils, batteries, fuels and chemical wastes etc) shall be stored in separate containers located within a bunded and roofed hardstand area. No hazardous substances shall be placed in general waste bins or recyclable bins.

Liquid wastes are not permitted to be disposed of to landfill and must therefore not be placed in waste storage bins. Waste materials such as paints, concrete, plaster etc shall be allowed to dry before being placed in the appropriate waste storage container. Although not anticipated to be generated in large quantities, any liquid wastes shall be transported by a licensed contractor to appropriate facilities on the mainland. No liquid wastes shall be disposed of into the sewerage treatment plant on the Island.

Waste storage containers and storage of bulk materials (eg. stripped topsoil and mulched vegetation), shall be:

> located at least 50 metres from any natural watercourse, including coastal waters;
> located outside of any overland flow paths;
> provided with appropriate erosion and sediment control measures;
> separated from existing villas/units or tourist accommodation to prevent odour and dust nuisance;
> stockpiles of topsoil shall be no greater than 2 metres high, shall be stored for no longer than 6 months to maintain viability, and covered if not intended to be used within 6 weeks; and
> Storage containers for potentially putrescible wastes (eg. food waste, other organics) or wastes with potential to generate windblown litter (eg. paper and plastics) shall be covered at all times.

5.2.3 Waste Transportation

The majority of wastes that cannot be reused or recycled on Lindeman Island will be transported on barges to the mainland. Wastes will be collected from the Island by a commercial waste contractor licensed to transport waste under the EP Act. Waste collection vehicles will travel to and from the Island by a barge, which will also be utilised to deliver construction materials to the Island.

Construction works shall be programmed to minimise barge movements by scheduling the removal of waste materials on barges returning to the mainland after completing delivery of construction materials.

All waste collection vehicles entering and leaving Lindeman Island must be clean and loads securely stowed, and covered where practicable.

Wastes will only to be transported to recycling or disposal facilities licensed for the particular waste stream(s) and will be accompanied by relevant waste tracking documentation.

5.2.4 Waste Disposal

The majority of construction wastes that cannot be reused or recycled on the Island will be transported to Whitsunday Regional Council's Waste Management Facilities (Landfill and Waste Transfer Station). The location of Council's existing waste management facilities is shown on **Figure 2.**

Wastes will be collected from the Island by a commercial waste contractor licensed to transport waste under the *Environmental Protection Act 1994*. Waste collection vehicles will travel to and from the Island by a barge, which will also be utilised to deliver construction materials to the Island.

Construction works shall be programmed to minimise barge movements by scheduling the removal of waste materials on barges returning to the mainland after completing delivery of construction materials.

All waste collection vehicles entering and leaving the Island must be clean and loads securely stowed, and covered where practicable.

Wastes will only to be transported to recycling or disposal facilities licensed for the particular waste stream(s).

All outgoing wastes from the Island will be transported by appropriately licensed waste transporters and will be accompanied by relevant waste tracking documentation.

5.3 Environmental Controls and Contamination

5.3.1 Litter Control

The following measures shall be implemented to minimise litter generation during construction:

> daily inspections of all waste storage areas shall be undertaken by the Principal Contractor or appointed representative, and shall include:
  - review bin capacity to determine if additional waste collection services are required and provide additional bins where necessary to prevent overflowing; and
  - general walkover of construction areas to identify evidence of litter and poor housekeeping practices and instruct clean-up of work areas if litter is observed;
> bulk items that cannot fit within waste collection containers shall be stored within the construction compound and removed as soon as possible;
> waste collection containers shall be removed regularly and no less than once a week during construction;
> waste receptacles provided for the storage of paper and plastics will be covered to prevent wind-blown litter; and
> all waste transported on and off the Island will be covered, where practicable.

5.3.2 Odour and Dust Control

The following measures shall be implemented to minimise odour and dust generation and prevent environmental nuisance as a result of waste storage and transportation activities:

> waste receptacles and storage bins for organic and food wastes will be covered;
> no bulk storage of food or other putrescible wastes shall occur within 50 metres of existing apartments/villas or tourist accommodation;
> waste, particularly putrescible waste, shall be removed from the site regularly and no less frequently than weekly;
> potentially contaminated stormwater captured in bunded areas used for waste storage will be assessed and disposed to appropriate facilities of as soon as practicable;
> All vehicles entering and leaving the Island must be clean and loads securely stowed, and covered where practicable; and
> Montioring during asbestos removal works.

5.3.3 Pest and Vermin Control

The following measures shall be implemented to prevent attracting pests, vermin and disease vectors to waste storage facilities:

> waste receptacles and storage bins for organic and food wastes will be covered;
> no biosolids or food waste will be composted on the island;
> no pooling or ponding will be allowed to occur around storage areas;
> where necessary, pest control shall be undertaken to control or prevent pest outbreaks; and
> all construction personnel, including contractors and sub-contractors, shall be provided with training in waste management procedures and good house-keeping practices as part of their site induction.

5.3.4 Stormwater Management

The following measures shall be implemented to prevent contamination of stormwater as a result of waste storage and transportation activities:

> all potentially hazardous wastes (eg. waste oils, batteries, fuels and chemical wastes etc) shall be stored in separate containers located within a bunded and roofed hardstand area;
> a spill response procedure shall be established and implemented, and appropriate clean up equipment / materials shall be provided where any construction activities or waste storage activities are undertaken to prevent the contamination of stormwater;
> any stormwater captured within bunded areas used for the storage and / handling of wastes or other hazardous materials shall be pump-out and disposed of at an appropriately licensed facility; and
> regular inspections shall be undertaken for stormwater drainage systems in areas used for the storage or handling of wastes and other hazardous materials to ensure all drains are free of litter and operating at optimum efficiency.

5.3.5 Construction Environmental Management Plan

A site-specific Construction Environmental Management Plan (CEMP) shall be developed prior to construction works commencing on site for both the terrestrial and marine based activities. Development of the waste management component of the CEMP shall be consistent with the waste minimisation and management principles contained in this document and should consider the following issues as a minimum:

> address waste reduction at source (e.g. orders to size, purchases in bulk);
> encourage trials into alternative sustainable packaging techniques (eg, metal strapping in preference to shrink wrap, paper packaging as opposed to plastic, and shredded paper as opposed to foam);
> use of reusable delivery and storage containers where possible;
> efficient ordering systems to ensure minimal wastage; and
> purchase of recycled products where viable and recycle, where possible.

5.4 Monitoring and reporting

5.4.1 Inspections

Daily inspections of construction areas shall be undertaken during construction works to identify waste management issues and results recorded in an appropriate site inspection register / checklist.

5.4.2 Records

5.4.2.1 General Waste Records

Contractors shall maintain records of all construction waste streams, including keeping records of all waste disposal (date, location, volume, type, etc) during their contract.

5.4.2.2 Trackable Wastes

Records of all "trackable wastes" as specified in Schedule 2E and Schedule 7 of the EPR 2008 that are generated during construction activities will be recorded and maintained in accordance with the requirements of the EPR 2008

During the construction phase, the Principal Contractor will be the 'generator' for reporting purposes.

5.4.3 Incidents and Complaints

All environmental incidents, including complaints relating to waste management which have the potential to cause environmental harm must be reported to DEHP in accordance with section 320 of the EP Act. Details of all complaints or environmental incidents relating to waste management shall be recorded in an appropriate environmental incident / complaint register.

All complaints or environmental incidents shall be investigated and corrective actions implemented to prevent recurrence. Corrective measures may include provision of additional waste containers or an increase in the frequency of waste collection. If a spillage or dispersal of waste causes contamination on the Island, the area affected by the spillage shall be immediately remediated and contamination reported to the relevant authorities.

5.5 Training and Awareness

All construction personnel, including contractors and sub-contractors, shall be provided with training in waste management issues as part of their site induction.

Training shall address the following:

> relevant policies and legal requirements;
> potential impacts of waste spillage and dispersal, particularly in relation to the environmental values of the area;
> procedures for storage and handling of waste materials, including correct separation and appropriate disposal of waste materials;
> procedures for responding to a complaint or incident involving waste; and
> roles and responsibilities of all parties.

6 Waste Management Plan- Operational Phase

This section relates specifically to management of wastes generated by the proposed Lindeman Island Resort during its operation.

6.1 Predicted Waste Generation

In order to determine the likely volume and composition of waste generated by the proposed Lindeman Island Resort, consideration has been given to recent studies conducted for the Great Keppel Island Resort which relied upon available literature including waste characterisation data for Queensland and the hospitality industry.

This estimate has been correlated with information provided by the previous resort manager as to the waste arising's from the operation of the now closed resort on the Island. The operator has confirmed that approximately 11 tonnes of general waste, 0.39 tonnes of recyclable glass and 0.39 tonnes of recyclable cans was being generated on a weekly basis.

Based on the review of the above literature and resort waste generation, it was determined that adoption of a waste generation rate of 2.2kg/person/day (excluding green waste) provides a conservative estimate of waste likely to be generated by the Lindeman Island Resort. Based on this information the key components of the waste stream generated during operation of the resort will comprise paper, food waste and packaging (plastics, glass, cans all recyclable) consistent with domestic and commercial waste sources. Recycling rates of greater than 70% should be achievable for the resorts. This target would include consideration of a biosolids generation rate of approximately 20kg of dry solids per equivalent person per year (EPA, 2002), it is estimated that the sewage treatment plant on the Island may produce up to 75 tonnes of biosolids per year.

Estimates of green waste and hazardous waste generation have been made based on reference to data from Queensland waste characterisation studies and compositional analysis as described in the Great Keppel Island Resort EIS.

A summary of wastes likely to be generated during operation of the Lindeman Island Resort, including estimated volumes and proposed methods for managing each of these wastes is provided in **Table 6-1**.

Table 6-1 Summary of Waste Generation and Management for Operation Phase

Waste Type	Approximate Quantity	Waste Storage	Waste Management Method	Frequency of Collection (During Normal Operation)
Domestic and general waste	0.4-2.1 tonnes per day	Individual general waste bins at each villa / room and wheelie bins at various commercial and tourist sites around the Island. Bulk bins within facilities maintenance compound.	To be collected and transported to Whitsunday Regional Council's Kelsey Waste Management Facility (landfill). by a licensed waste contractor.	Up to wice weekly
Organic and Food Waste	Food Waste = 0.6 – 1.5 tonnes per day Other Organics = 0.7 – 1.1 tonnes per day.	Food waste generated within villas / hotel rooms, and general tourist areas collected in general waste bins. Separate wheelie bins provided for collection of food waste at commercial food preparation.	Food waste (villas / hotel rooms / general tourist areas) - as per general waste. Food waste (commercial food preparation) sent to manland for landfill.	Twice weekly
Green Waste	0.8 tonnes per day	Mulched or chipped and stored in designated area within facilities maintenance compound. A proportion may also be included as feedstock for composting.	Reuse as mulch in landscaping areas on the Island.	As required for landscaping maintenance.
Metals	0.3-0.5 tonnes per day	Separate recycling bins at each villa / room and recycling wheelie bins at various commercial and tourist sites around the Island. Bulk bins within facilities maintenance compound.	To be collected and transported to the recycling facilities on the mainland.	Weekly
Plastics	0.3 – 0.5 tonnes per day	Separate recycling bins at each villa / room and recycling wheelie bins at various commercial and tourist sites around the Island. Bulk bins within facilities maintenance compound.	To be collected and transported to the recycling facilities on the mainland.	Weekly
Glass	0.3 – 0.6 tonnes per day	Separate recycling bins at each villa / room and recycling wheelie bins at various	To be collected and transported to the recycling facilities on the mainland.	Weekly

Waste Type	Approximate Quantity	Waste Storage	Waste Management Method	Frequency of Collection (During Normal Operation)
		commercial and tourist sites around the Island. Bulk bins within facilities maintenance compound.		
Paper and cardboard	1.0 to 2.5 tonnes per day	Separate recycling bins at each villa / room and recycling wheelie bins at various commercial and tourist sites around the Island. Bulk bins within facilities maintenance compound.	To be collected and transported to the recycling facilities on the mainland.	Weekly
Biosolids from sewage treatment process	0.16 tonnes per day	Storage in bunded hardstand drying areas within facilities maintenance compound.	To be stabilised and treated (eg. composted) and exported to mainland.	As required by Sewerage Treatment Plant operations.
Hazardous and other chemicals	0.01 tonnes per day	Storage in bunded hardstand areas within facilities maintenance compound.	Any spillage / leaks of chemicals or fuels to be contained within bunded area and pumped out for disposal at licensed facilities on the mainland. Waste oil to be transported for recycling on the mainland where facilities exist.	As required.
Electrical and electronic equipment (e-waste)	Not known	Dedicated e-waste bin at a central location on the Island.	Recycled off the Island by a licensed waste contractor.	As required.

6.2 Routine Procedures

6.2.1 Waste Minimisation

The following measures shall be implemented during operation of the Lindeman Island Resort is to minimise waste disposed to landfill:

> Purchasing policies shall be developed and implemented to give preference to:
  - Selection of materials and resources with less packaging, including encouraging bulk purchasing of materials;
  - Purchasing potentially reusable or recyclable materials where possible, and preferably materials derived from renewable sources and produced with a low embodied energy content;
  - Purchasing materials or resources that not only generate less waste, but generate less harmful wastes (eg. purchasing of biodegradable, low phosphorous cleaning products);

> Procurement shall be managed to ensure that only the minimum amount of materials required are purchased and delivered to the Island, including effectively tracking material ordering, delivery, placement and use of materials to ensure all available materials are utilised prior to ordering additional materials.

> Preference will be given to the use of electronic marketing and other information materials to reduce the amount of paper waste generated.

> Regular training shall be provided to staff to ensure they are aware of the environmental risks and costs associated with inappropriate waste management, and understand the opportunities to reduce waste generation through their specific tasks.

> Regular awareness programs shall be provided to visitors to educate them on correct recycling procedures and the impacts of inappropriate waste management on the environment, including impacts on native flora and fauna of the Great Barrier Reef.

> All plant and equipment shall be regularly maintained and operated efficiently to reduce excess generation of waste.

> Water efficient fixtures and fittings shall be installed throughout the resort to reduce the volume of wastewater generated.

> Sufficient solar panels shall be installed to generate electricity for the resort and ancillary activities, with excess energy stored for reuse on the Island.

> Adequate area shall be provided within the facilities maintenance compound to enable the separation and storage of different waste streams for efficient recycling and reuse.

> Where available, suppliers providing container return programs will be utilised.

> Easily identifiable and conveniently located collection bins for recycled materials will be provided throughout the resort, including use of colour-coding and labels to assist visitors and staff in utilising the correct bin. For example, each hotel room / villa shall be provided with separate bins for general waste and mixed recyclables. Separate wheelie bins for general waste and recyclable materials shall be provided in convenient locations throughout tourist and commercial areas of the resort. Information will be provided to visitors on correct recycling procedures to encourage separation of recyclables at the source.

> Food waste generated within hotel rooms / villas will be managed via the general waste stream due to the small quantities involved and the difficulties involved in separation at this source;

> Composting facilities will be established on the Island to process green wastes;

> Green waste from maintenance of the golf course and landscaped areas associated with the resort, including grass clippings, prunings, etc shall be collected and processed for reuse in landscaping. Processing may be limited to grinding or chipping of branches to produce mulch cover material, while green wastes containing leaves and grass clippings etc will be used as feedstock into composting activities.

> Biosolids from the sewage treatment plant on the Island will be stabilised and processed to reduce levels of pathogens, etc prior to being added to compost feedstock and compost will reused as soil conditioner on the golf course and other landscaped areas;

> Wastewater shall be treated at the on-site sewerage treatment plant to an appropriate standard that will enable use of recycled water for toilet flushing, and irrigation of the golf course and other landscaped areas on the Island.

> An annual waste audit shall be undertaken to audit progress towards waste reduction, recycling and reuse objectives, and to enable identification of new opportunities for improved waste management.

6.2.2 Waste Collection

6.2.2.1 General Waste and Recyclables

General waste and mixed recyclable bins from each unit/villa shall be collected and deposited into separate wheelie bins as part of standard room cleaning activities, with the wheelie bins stored within the cleaner's facilities. Separate wheelie bins for general waste and recyclable materials shall be provided in convenient locations throughout tourist and commercial areas of the resort, as well as at commercial premises around the resort.

Wheelie bins containing general waste and mixed recyclables shall be collected from around the resort by the resort operator at least twice a week or on an as needs basis to prevent overflowing. Wheelie bins shall be transferred to the bulk waste storage area within the facilities maintenance compound where the contents will be transferred to separate bulk skip bins for recyclable and non-recyclable wastes. This process is similar to that used by the former resort.

6.2.2.2 Hazardous Waste

Although likely to be generated only in small quantities through facilities maintenance activities, all hazardous wastes shall be collected separately and transferred to the facilities maintenance compound for storage in designated areas. Storage and handling of hazardous wastes, including batteries, waste oil, chemicals etc will be in accordance with AS1940:2004, including ensuring such wastes are contained within a roofed and bunded area able to contain the contents of stored materials in the event of a spill or leak. Appropriate spill kits should be kept in readily accessible locations in close proximity to areas used for the storage or handling of hazardous wastes, to enable the immediate clean-up of any spills or leaks.

Hazardous wastes shall be collected on an as needs basis.

6.2.2.3 E-Waste

A dedicated electronic or e-waste bin will be provided at a central location on the Island. E-waste shall be transported to recycling facilities on the mainland as required.

6.2.2.4 Food Waste

Separate bins will be provided at commercial food preparation areas for collection of food waste. These will be collected from around the resort by the resort operator at least twice per week during normal periods, increasing to every second day during peak periods or on an as needs basis to prevent overflowing and odour issues. Food waste generated within hotel rooms / villas will be managed via the general waste stream due to the small quantities involved and the difficulties involved in separation at this source.

6.2.2.5 Green Waste

Green waste collected during garden maintenance activities will be transferred to stockpiles / bulk containers located within the facilities maintenance compound where it will be stored until processed to produce materials for use in landscaping works. A proportion of green waste, including branches and other prunings, will be chipped and used for cover material, while remaining green waste will be used as feedstock for composting.

Stockpiles of green waste prior to and post-processing shall be located in designated storage areas that are well-separated from sensitive land uses, waterways and overland flow paths.

Stockpiles shall be mechanically aerated on a regular basis to reduce potential for spontaneous combustion.

6.2.2.6 Biosolids

Biosolids from sewage treatment processes can contain useful quantities of organic matter and nutrients (eg. nitrogen, phosphorous, potassium) that can be applied for beneficial reuse as a soil conditioner. Given that the sources of wastewater treated by the Lindeman Island sewerage treatment will largely be derived from tourist accommodation and commercial activities, with minimal industrial wastes, the level of heavy metal contaminants in biosolids will be relatively low making it suitable as a soil conditioner if stabilised and recovered. It is anticipated this would occur on the mainland.

Prior to transport, biosolids generated from treatment of sewage must be stabilised to destroy pathogenic organisms, minimise odour and reduce vector attracting potential. Biosolids generated from sewage processing will be stored within a designated drying area within the sewage treatment plant compound, which shall be well-separated from sensitive land uses. The drying area shall comprise a hardstand area provided

with appropriate containment and drainage systems to prevent the release of contaminants to surrounding soils, surface or groundwater.

Biosolids will be dried for sufficient time to achieve a moisture content suitable for disposal on the mainland. Accordingly an additional ERA should not be required for the temporary storage of biosolids prior to collection and transport to the mainland for recovery or disposal.

6.2.3 Waste Treatment

6.2.3.1 Composting

Green waste management facilities shall be located on a level area (<3%) located within the facilities management compound that is well-separated from sensitive land uses. Areas used for greenwaste composting and holding shall comprise a bunded area with adequate manoeuvring area for operation of loading / handling equipment. The facility shall require connection to water supply for feedstock mix and electricity supply (eg. for aeration equipment), and a stormwater containment and drainage system designed to prevent the release of contaminants to the environment. Greenwaste composting activities shall be managed to prevent odour generation through regular mechanical aeration and screening of feedstock.

Due to the potential for odour and vermin it is not proposed to develop a full scale organic composting facility such as windrows, and greenwaste from landscaping will be the only material treated in this area. The composting area will be within an impervious padded area, appropriately bunded and contained and the final specification shall be determined during the detailed design phase of the project. Greenwaste tonnages are unlikely to exceed the 200t threshold for ERA 53.

6.2.3.2 Compaction

It is proposed that solid waste material intended for disposal or recycling on the mainland will undergo some minor treatment on the Island to reduce the volume of waste material prior to transfer to the mainland. This will include compaction of waste using a small stationary refuse compactor, bin press or similar installed within the facilities maintenance compound. Compacted waste will then be enclosed into containers for transport to the mainland to minimise shipping costs and frequency.

A range of waste compactors are available on the market with a small stationary compactor or bin press system likely to be most efficient for the requirements of the Lindeman Island Resort. Consideration may also be given to the installation of balers / shredders to enable more efficient storage, handling and transportation of cardboard materials sent to the mainland for recycling.

6.2.4 Waste Transportation

The majority of operational wastes that cannot be reused or recycled on the Island will be transported to Whitsunday Regional Council's Waste Management Facilities (refer to **Figure 2**). This will include recyclable and non-recyclable general waste, and hazardous wastes.

The resort operator shall collect wheelie bins from around the Island and transport to the maintenance and services precinct using a utility or tractor / trailer, before emptying the contents into bulk bins.

Wastes will be collected from the Island by a commercial waste contractor licensed to transport waste under the EP Act. Waste collection vehicles will travel to and from the Island by barge and collect the bulk bins contained within the maintenance and services precinct.

The resort operator shall ensure there are no unnecessary obstructions to waste and recycling collection vehicles on the Island. The bulk waste skip bins shall be positioned so that the waste collection vehicles have unimpeded access. The collection shall be approximately once per week during normal trading, possibly increasing to twice a week during peak periods.

All waste collection vehicles arriving on and leaving the Island must be clean and loads securely stowed, and covered where practicable.

Wastes will only be transported to recycling or disposal facilities licensed for the particular waste stream(s).

6.2.5 Waste Disposal

No solid or liquid wastes shall be burned or buried on the Island.

No liquid wastes other than sewage and approved trade wastes (eg. from laundry and kitchen facilities) shall be discharged into the sewage treatment plant on the Island. Other liquid wastes, that may include for example waste / out of date chemical products or spillage of hazardous substances contained in bunded areas, shall be collected in appropriate storage containers prior to removal to the mainland for disposal at appropriately licensed facilities.

All waste that cannot be reused on the Island, will be transported to the mainland for recycling or disposal at Whitsunday Regional Council Waste Facilities. These facilities are able to accept recyclable and non-recyclable waste streams and also able to accept a range of hazardous wastes subject to prior approval from Council and compliance with limitations specified in Council's environmental licence.

6.3 Environmental Controls and Contamination

6.3.1 Litter Control

The following measures shall be implemented to minimise litter generation during operation of the Lindeman Island Resort:

> daily inspections of all waste storage areas shall be undertaken by the Resort Operator or appointed representative, and shall include:
  - review bin capacity to determine if additional waste collection services are required and provide additional bins where necessary to prevent overflowing;
  - general walkover of resort areas to identify evidence of litter and poor house-keeping practices and request clean-up activities if litter is observed;
> bulk items that cannot fit within waste collection containers shall be stored within the maintenance and services precinct and removed as soon as possible;
> waste collection containers shall be collected regularly to prevent overflowing;
> waste receptacles provided for the storage of paper and plastics will be covered to prevent wind-blown litter; and
> all waste transported on and off the Island will be covered, where practicable.

6.3.2 Odour and Dust Control

The following measures shall be implemented to minimise odour and dust generation and prevent environmental nuisance as a result of waste storage and transportation activities:

> waste receptacles and storage bins for organic and food wastes will be covered;
> no bulk storage of food or other putrescible wastes shall occur within 50 metres of sensitive land uses;
> no biosolids storage shall occur within 200 metres of sensitive land uses, and biosolids shall be appropriately stabilised to reduce pathogens and odour potential prior to reuse in landscaping;
> composting activities shall be managed to prevent odour generation through regular mechanical aeration and screening of feedstock, and / or use of composting systems incorporating odour containment / aeration systems. No foodwaste shall be composted on the island; and
> mulching and chipping of green wastes should not be undertaken during windy conditions or in close proximity to apartments/villas or tourist areas that may be impacted by dust and other particulates.

6.3.3 Pest and Vermin Control

The following measures shall be implemented to prevent attracting pests, vermin and disease vectors to waste storage facilities:

> waste receptacles and storage bins for organic and food wastes will be covered;
> no pooling or ponding will be allowed to occur around storage areas;
> where necessary, pest control shall be undertaken to control or prevent pest outbreaks; and
> all staff, including contractors, working on the Island shall be provided with training in waste management procedures and good house-keeping practices as part of their site induction.

6.3.4 Stormwater Management

The following measures shall be implemented to prevent contamination of stormwater as a result of waste storage and transportation activities:

> all potentially hazardous wastes (eg. waste oils, batteries, fuels and chemical wastes etc) shall be stored in separate containers located within a bunded and roofed hardstand area;
> a spill response procedure shall be established and implemented, and appropriate clean up equipment / materials shall be provided where any waste storage activities are undertaken to prevent the contamination of stormwater;
> any stormwater captured within bunded areas used for the storage and / handling of wastes or other hazardous materials shall be pumped out and disposed of at an appropriately licensed facility on the mainland; and
> regular inspections shall be undertaken for stormwater drainage systems in areas used for the storage or handling of wastes and other hazardous materials to ensure all drains are free of litter and operating at optimum efficiency.

6.4 Monitoring and Reporting.

6.4.1 Inspections

The Resort Operator shall undertake regular inspections of resort areas to identify waste management issues and results shall be recorded in an appropriate site inspection register / checklist. Inspections shall include as a minimum, the inspection requirements outlined in **section 6.3** above.

In addition, a waste audit shall be conducted when the Lindeman Island Resort is operational and also with the commencement of operation of each subsequent development stage. The purpose of the waste audit shall be to identify:

> types and volumes of wastes generated;
> further opportunities for waste avoidance, reuse and recycling;
> waste storage and segregation methods;
> waste treatment and disposal techniques;
> destination of waste materials; and
> regular waste audits will facilitate continual improvement of waste management practices implemented on the Island, which will contribute to improved environmental outcomes.

6.4.2 Records

6.4.2.1 General Wastes

The Resort Operator shall maintain records of all outgoing wastes, including at least the following details:

> waste type;
> volume / weight;
> date of removal;
> name and registration number of waste transporter; and
> destination of waste (eg. landfill, recycler etc).

6.4.2.2 Trackable Wastes

Records of all regulated/trackable wastes as specified in Schedule 2E and Schedule 7 of the EP Reg that are generated during operation of the resort will be recorded and maintained in accordance with the requirements of the EP Reg. During the operational phase of the project, the resort operator will be the ‘generator’ for reporting purposes.

6.4.3 Incidents and Complaints

All environmental incidents, including complaints relating to waste management which have the potential to cause environmental harm must be reported to DEHP in accordance with section 320 of the EP Act. Details of all complaints or environmental incidents relating to waste management shall be recorded in an appropriate environmental incident / complaint register.

All complaints or environmental incidents shall be investigated and corrective actions implemented to prevent recurrence. Corrective measures may include provision of additional waste containers or an increase in the frequency of waste collection. If a spillage or dispersal of waste causes contamination on the Island, the area affected by the spillage shall be immediately remediated and contamination reported to the relevant authorities.

6.5 Training and Awareness

All staff, including contractors and sub-contractors, working on the Island, shall be provided with training in waste management issues as part of their site induction. Training shall address the following:

> relevant policies and legal requirements;
> potential impacts of waste spillage and dispersal, particularly in relation to the environmental values of the area;
> procedures for storage and handling of waste materials, including correct separation and appropriate disposal of waste materials;
> procedures for responding to a complaint or incident involving waste; and
> roles and responsibilities of all parties.

In addition, the Resort Operator shall provide adequate information to staff and visitors on the opportunities and procedures for waste minimisation and recycling on the Island. This includes information relating to the correct use of recycling bins to ensure staff and visitors understand what materials can be deposited in each bin, and encouraging staff and visitors not to use plastic bags. The Resort Operator shall implement regular waste education and clean-up initiatives such as Clean-up Australia Day campaign.

7 Potential Impacts and Mitigation Measures

A summary of potential impacts associated with waste management practices during construction and operation of the Lindeman Island Great Barrier Reef Resort has been undertaken and is described in the following section, along with proposed mitigation measures to address each identified risk. A standard risk assessment has been used for the purpose of assessing waste management risks associated with the Lindeman Island Great Barrier Reef Resort. Lindeman Island is located within the Great Barrier Reef World Heritage Area and Marine Park and supports a range of native flora and fauna, while surrounding coral reefs are rich in marine life. Construction and operation of the resort has the potential to generate a range of wastes that could potentially impact on the environmental values of Lindeman Island and the surrounding marine environment, if not managed appropriately. Potential impacts range from pollution of waterways and harm to marine animals, to impacts on residents and visitors through litter and odour nuisance. A number of environmentally relevant activities as defined in Schedule 2 of the EP Reg have been identified as potentially being associated with the proposed waste management strategy, including ERA 63 – Sewage treatment, possibly ERA 62 – Waste transfer station operation and ERA 33 – Crushing, milling grinding or screening. Where the thresholds specified under the EP Reg are met, approvals will be required to operate these ERAs on the Island.

A summary of potential impacts and proposed mitigation measures associated with waste management for the Lindeman Island Great Barrier Reef Resort is provided in **Table 7-1**.

Table 7-1 Impact Mitigation Measures

Potential Impact	Risk (unmitigated)	Residual Risk	Mitigation Measures
Increased capacity pressure on Council's landfill facilities	Med	Low	> Limit waste generation during construction and operations by considering the waste management legislation requirements and hierarchy framework as further outlined in Section 3.1 and 3.2. > Implementation and continued use of strategies to maximise reuse and recycling of waste streams, including composting and processing of green waste and biosolids to reduce the volume of waste disposed to landfill. > Segregate recyclable from non-recyclable waste on Lindeman Island. Adequate area shall be provided to enable the separation and storage of different waste streams for efficient recycling and reuse. > Selection of materials and resources which give preference to: - less packaging and bulk purchasing of materials; - purchase of recycled products where viable; - potentially reusable, renewable or recyclable materials; and - materials or resources that generate less harmful wastes (eg. purchasing of biodegradable, low phosphorous cleaning products). > Provide regular training to staff to ensure they are aware of environmental risks and management strategies to reduce waste generation. > Provide visitor awareness programs to educate guests on environmental impacts to the Great Barrier Reef and Lindeman Island National Park. > Provide appropriate recycling procedures and signage. > Track material ordering, delivery, placement and use of materials to ensure all available materials are utilised prior to ordering additional materials. > Keep records of waste quantities removed from the Island to audit and assist in identifying further opportunities to reduce, reuse and recycle.
Leaching of contaminants to soils, surface water or groundwater during storage and handling on the Island,	High	Low	> Provide regular training to staff to ensure they are aware of environmental risks and management strategies to reduce waste generation and appropriate handling and storage of wastes.

Potential Impact	Risk (unmitigated)	Residual Risk	Mitigation Measures
including spills or loss of containment			> Provide spill response training and appropriate clean up equipment/materials to ensure staff are aware of appropriate procedures to limit contamination in the event of a spill. > Conduct regular inspection of bunded areas used for the storage/handling of hazardous materials. > Conduct regular inspections of stormwater drains to ensure all drains are free of litter and debris.
Leaching of contaminants or litter dispersal during transportation of waste from Lindeman Island	High	Low	> All waste shall be placed in appropriate containers and covered during transportation or otherwise secured to prevent loss of containment. > Transport of waste during unsuitable weather conditions (e.g. high winds) shall be avoided where feasible. > Waste shall be transported by a commercial waste transporter licensed in accordance with the requirements of the EP Act. > Leachate control to be available at composting area and biosolids management area.
Odour, bioaerosols, dust, bioaerosol and noise generation from waste handling and storage	High	Low	> Provide adequate ventilation in waste storage areas and ensure all waste is covered. > Potentially contaminated stormwater captured in bunded areas used for waste storage will be assessed and disposed to appropriate facilities of as soon as practicable. > All vehicles entering and leaving the Island must be cleaned and loads securely stowed, and covered where practicable. > Ensure no bulk storage of odourous waste within 50 metres of sensitive land uses. > Ensure no biosolid storage within 200 metres of sensitive land uses. > Potentially contaminated stormwater captured in bunded areas used for waste storage will be assessed and disposed to appropriate facilities of as soon as practicable. > Conduct bio aerosol monitoring of greenwaste composting area at frequency to be determined by a suitably qualified person.
Pest and vermin attraction	High	Low	> Ensure all waste is covered and maintain good housekeeping practices. > Staff are to report any signs of pest activity to the Resort Operator. > No pooling or ponding will be allowed to occur around storage areas. > Pest control shall be undertaken to control or prevent pest outbreaks (where required). Pest control activities shall not be conducted prior to rain events or near sensitive areas (near waterways or riparian areas).

Potential Impact	Risk (unmitigated)	Residual Risk	Mitigation Measures
			> All construction personnel, including contractors and sub-contractors, shall be provided with training in waste management procedures and good house-keeping practices as part of their site induction.
Stormwater Management	High	Low	> All potentially hazardous wastes (e.g. waste oils, batteries, fuels and chemical wastes etc.) shall be stored in separate containers located within a bunded area. > All bunded areas shall provide a roof to prevent stormwater inundation where dangerous or poisonous gas accumulation is not a risk. > Any stormwater captured within bunded areas used for the storage and / handling of wastes or other hazardous materials shall be pumped-out and disposed of at an appropriately licensed facility. > Rainwater tanks or similar should be utilised for stormwater catchment from roof runoff and reused for non-potable purposes where possible (e.g. irrigation, garden watering and toilet flushing).
Unsightly visual aesthetics	Med	Low	> Daily inspections of all waste storage areas shall be undertaken by the Resort Operator to identify potential litter problems, including: - Review bin capacity to determine if additional waste collection services are required and provide additional bins where necessary to prevent overflowing; - General walkover of resort areas to identify evidence of litter and poor house-keeping practices and instruct clean-up activities if litter is observed. > Bulk items that cannot fit within waste collection containers shall be stored within the maintenance and services precinct and removed as soon as possible. > Waste collection containers shall be collected regularly to prevent overflowing. > Waste collection containers provided for the storage of paper and plastics shall be covered to prevent wind-blown litter. > All waste transported on and off the Island shall be covered or otherwise secured to prevent litter dispersal.
Cross contamination of wastes, making wastes unsuitable for reuse and/or recycling, thus increasing	Med	Low	> Recyclable items shall be segregated from non-recyclable waste on the Island. > Adequate area shall be provided to enable the separation and storage of different waste streams for efficient recycling and reuse.

Potential Impact	Risk (unmitigated)	Residual Risk	Mitigation Measures
the quantity of waste being disposed of to landfill.			> Different waste streams shall be segregated in accordance with landfill acceptance criteria as further described in Section 3.2.5. > Waste storage bins shall be colour coded and/or labelled for separation of wastes into categories using the labelling system specified in *Australian Standard AS4123.7 – 2006 Mobile waste containers Part 7*. > During construction, timber pallets and packaging material shall be stored within the maintenance and services precinct and returned to the suppliers at the time of the next delivery. > No hazardous substances shall be placed in general waste bins or recyclable bins.

8 Conclusions

This report outlines a strategy for managing wastes generated during the demolition, construction and operational phases of the proposed Lindeman Island Resort development in accordance with the principles of the waste management hierarchy. This strategy focuses on avoiding waste generation during construction and operation wherever possible, through implementation of procurement policies, planning and scheduling, training and awareness, and specific work practices. The strategy involves:

> Reducing insofar as possible the volume of waste requiring disposal on the mainland, is an economic imperative for the Lindeman Island Resort while also achieving a range of environmental and social benefits;
> Reusing a range of wastes on the Island, including but not limited to, salvaging of demolition and construction wastes where possible, and composting of greenwastes for reuse as soil conditioner on the Island during operation.
> Waste collection and storage practices will also be implemented to enable effective and efficient collection of recyclables, which will be transported to recycling facilities on the mainland.
> Wastewater will be treated to a standard that will enable use of recycled water for irrigation of the golf course, landscaped areas and potentially for toilet flushing.
> These procedures will reduce the volume of waste requiring disposal during operation of the resort to approximately 8-25% of total waste generated.
> During operation of the Lindeman Island Resort, a waste transfer station will be established within the service infrastructure precinct on the Island. Wheelie bins will be collected from around the Island by the Resort Operator using a utility / tractor trailer before being emptied into bulk bins within the maintenance and services precinct. It is anticipated this will occur at least weekly during normal operation, increasing to twice weekly or more during peak periods.
> A small stationary compactor, bin press or similar will be installed to reduce the volume of waste requiring transfer to the mainland to reduce transport frequency and cost, and reduce pressure on the capacity of Whitsunday Regional Council's landfill facilities.
> The waste transfer station and associated areas for storage and handling of bulk waste materials will be located with appropriate setbacks to environmentally sensitive areas and land uses.
> Appropriate containment and drainage systems will be installed for waste storage and handling areas to prevent the release of contaminants to receiving environments.

A range of environmental controls and mitigation measures have been recommended to minimise potential risks to the environment associated with waste management practises for the Lindeman Island Resort.

These measures will include regular monitoring and inspections, tracking of wastes, and regular audits of waste streams to identify opportunities for increased reuse and recycling, and improved waste management practices. Engineering and procedural controls, such as construction of bunded containment areas, covering bins and stockpiles likely to generate odour or litter, aeration of composting materials, have also been recommended to minimise the potential environmental impacts of waste management.

Based on the implementation of the above proposed mitigation, potential impacts from unmanaged waste to the environment are considered unlikely during and following the proposed redevelopment works.

9 References

Department of Environment and Heritage Protection (DEHP) (2014) Waste—*Everyone's responsibility: Queensland Waste Avoidance and Resource Productivity Strategy (2014–2024).* Brisbane: Department of Environment and Heritage Protection, Queensland Government. viewed 29/02/16 http://www.ehp.qld.gov.au/waste/qld-waste-strategy.html

Department of State Development (2015). *Lindeman Great Barrier Reef Resort project – Terms of Reference for an environmental impact statement*. Department of State Development, Brisbane.

Lindeman Island

FIGURES

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1:6,000 Scale at A3

Metres

0 100 200 300 400

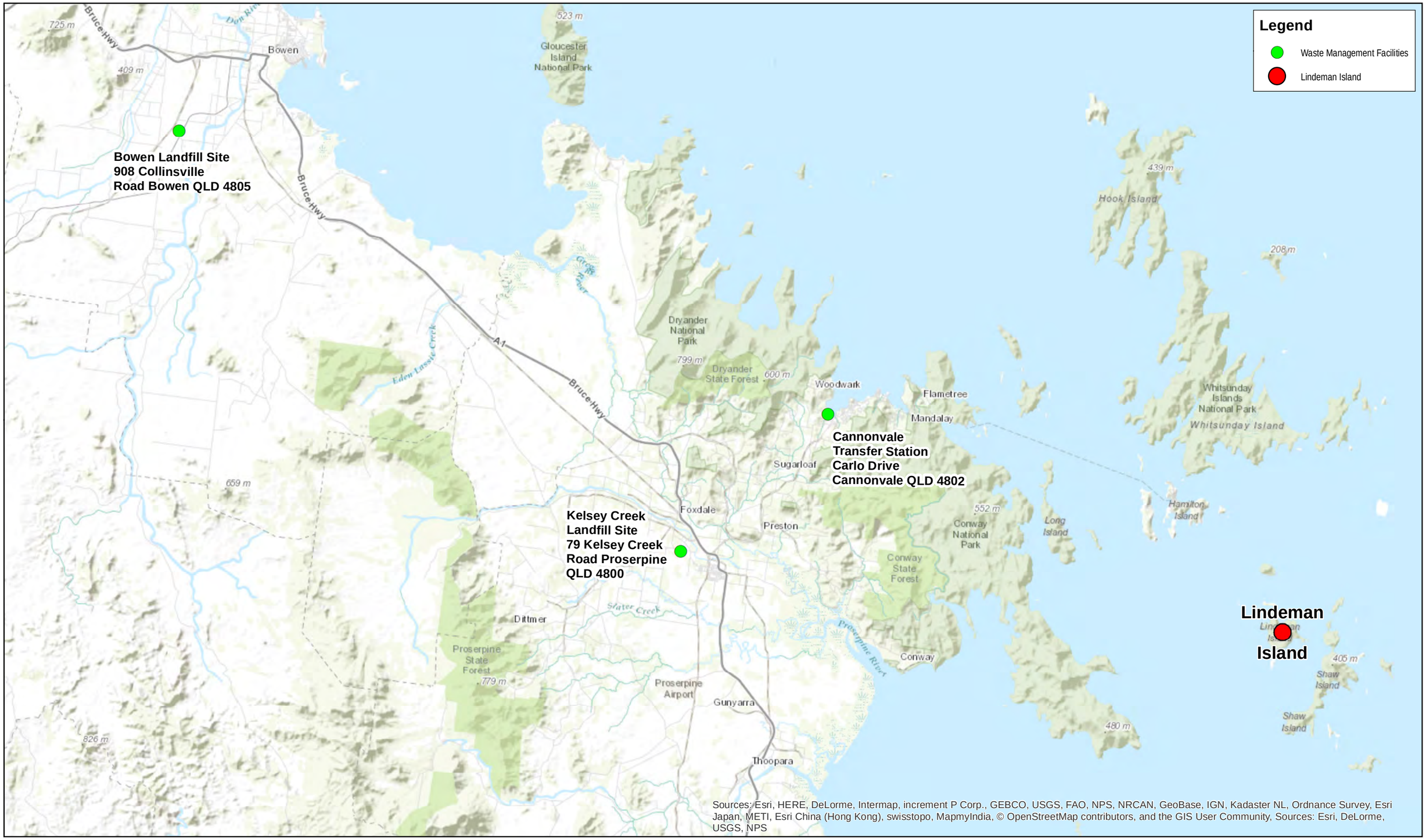
Lindeman Island Resort

SITE LOCATION AND LOCATION
OF EXISTING SITE WASTE FACILITIES
FIGURE 1

N W E S

Cardno

Map Produced by Cardno QLD Pty Ltd (4303)
Date: 2016-02-10
Coordinate System: GDA 1994 MGA Zone 55
Project: HRP15078-GS_003a
Map: HRP15078-GS-003aSiteWaste.mxd 01



1:300,000 Scale at A3

Kilometres

0 5 10 15

Lindeman Island Resort

COUNCIL WASTE MANAGEMENT FACILITIES AND REGIONAL CONTEXT
FIGURE 2

N W E S

Cardno

Map Produced by Cardno QLD Pty Ltd (4303)
Date: 2016-02-09
Coordinate System: GDA 1994 MGA Zone 55
Project: HRP15078-GS_003b
Map: HRP15078-GS-003bWasteFac.mxd 01

Lindeman Island

APPENDIX A
LINDEMAN ISLAND RESORT MASTERPLAN

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Note: A safe harbour is no longer proposed.

1. SAFE HARBOUR - INDICATIVE LAYOUT AND LOCATION
2. 5 STAR BEACHSIDE RESORT (136 SUITES)
3. VILLAGE - RETAIL, CONFERENCE AND BUSINESS CENTRE
4. VILLAGE - SPORT CENTRE
5. VILLAGE - STAFF ACCOMMODATION AND AIRPORT LOUNGE
6. MAINTENANCE AND SERVICES
7. HANGARS
8. RUNWAY
9. GOLF COURSE
10. 6 STAR SPA RESORT (59 VILLAS)
11. HEALTH RETREAT AND DAY SPA
12. TOURIST VILLA PRECINCT
13. 5 STAR ECO RESORT (41 VILLAS)
14. GLAMPING PRECINCT (30 TENTS)
15. ROCK BAR
16. POTENTIAL SOLAR PV PANEL AREAS
17. MAPPED VEGETATION COMMUNITIES

KEY PLAN

0 50 150 250 400

25 100 200 300 500