Waste Management Plan

Dampier Peninsula

December 2020

Acknowledgements

ASK Waste Management acknowledges the Traditional Owners of the land in which we work and live, and pays respects to Elders past, present, and emerging.

ASK also gratefully acknowledge the cooperation of the many stakeholders that provided information and assistance in the development of this report.

Disclaimer

Information in this document is current as of November 2020. While all professional care has been undertaken in preparing the document, ASK Waste Management accepts no liability for loss or damages incurred as a result of reliance placed on its content.

Any plans, designs or otherwise contained in this report are schematic and are provided for general guidance only. No reliance should be made by any user on this material for construction purposes. Advice must be sought from a suitably qualified engineer, prior to any construction, excavation or otherwise.

The mention of any company, product or process in this report does not constitute or imply endorsement by ASK Waste Management.

Document Control			
Version	Date	Description	Initials
0F	25 Nov 2020	Draft version for internal review	*AE*
1A	4 Dec 2020	Draft version for Shire review	*GP*
1B	20 March 2021	Draft version incorporating Shire review	*GP*

Report produced by:
ALISON EDMUNDS BSc

ASK Waste Management
PO BOX 401
Brunswick Heads
NSW. 2483
AUSTRALIA

0447 393363
admin@askwm.com
www.askwm.com

CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

The Dampier Peninsula offers a mix of iconic attractions and tourism experiences. With the recent sealing of the Cape Leveque Road, it is likely the Region will experience a rapid expansion in visitation rates, resident populations through local indigenous people returning to Country and the development of new commercial and tourism operations. Increasing population and tourism pressures will bring a new set of challenges for waste management in the Region.

In recognition of this, the Shire of Broome engaged ASK waste Management to prepare a Dampier Peninsula Waste Management Plan (DPWMP) to guide the direction and delivery of sustainable waste management services into the future. The central objectives of the DPWMP are focused on protection of human health and the environment, increasing resource recovery, meeting regulatory requirements, addressing concerns and preferences from stakeholders for future waste management within the region and maximising local economic development and employment opportunities.

Baseline Assessment

A baseline assessment of waste practices was undertaken to inform the project outcomes. Waste management on the Dampier Peninsula is basic. All communities, outstations and tourism operators manage their own waste and there is no coordination. Landfills are not generally sited appropriately, do not comply with minimum regulatory operational requirements and are likely to be impacting on the health of communities and the environment. There is minimal recovery of resources occurring. Litter within communities and along roadways is also a significant concern.

Stakeholder Consultation

To guide the actions of the DPWMP consultation was undertaken to establish the opinions of people who live and work on the Dampier Peninsula regarding current waste management issues and future preferences for waste management in the region. The overall conclusions that emerged from the consultation indicates:

- Concern at the way waste is currently managed on the Peninsula particularly around impacts on the health, the environment and visual amenity
- Local litter attitudes and practices is a priority issue to be addressed
- Concern about the increased utilisation of resources (both human resources and landfill capacity) in needing to manage increased volumes of waste disposed from tourists
- Tourist waste disposal points/litter collection infrastructure is believed to be inadequate and needs improvement to manage the increase of waste expected
- There was a general preference for waste to be taken off the Dampier Peninsula for disposal at a better practice waste management facility
- Community preferences for future waste management systems include the need to be community led, look after Country, and create training, education and employment opportunities within communities
- More opportunity to recycle waste streams in accessible and convenient locations is desired
- Future management options must also consider needs of smaller settlements and outstations
- More education on appropriate waste management for all stakeholders on the Peninsula is needed.

Action Plan

To meet the objectives of the DPWMP, waste and litter management practices need substantial improvement. A plan has been developed to guide stakeholders towards the delivery of sustainable waste management services for the region. The key action areas include:

- Undertake a **hydrogeological investigation** of existing community landfills to ascertain the impacts on groundwater and potable water sources.
- **Waste data collection** to facilitate effective planning of the waste system service needs and infrastructure requirements.
- **Remediation of illegal and legacy waste and litter issues.**

- Development of a **best practice waste management system** including coordinated collection services and disposal of waste at an appropriately sited, lined and managed landfill. The feasibility of establishing a network of waste and recovery centres (W&RC) to support the coordinated waste collection and disposal system should also be determined.
- The **closure and rehabilitation of community landfills** upon implementation of the new coordinated waste management system.
- Addressing stakeholder issues and concerns in relation to **management of waste and litter from tourists to the Region.**
- Development of processes for **better management and control of waste from construction and demolition projects** within communities.
- **Better Practice management systems** for small rural landfills that fall within and outside of the *Environmental Protection (Rural Landfill) Regulations 2002.*
- **Development of an emergency waste management plan or protocol** to ensure waste from emergencies and disasters that impact the region can be quickly and efficiently managed to protect residents on the Peninsula.
- **Development of a multi stakeholder waste and litter working group** to progress the actions of the DPWMP.
- Development of a **multi stakeholder Dampier Peninsula Litter Strategy.**

Integral to the success of any action will be the need for ongoing community and stakeholder engagement, acceptance, education and awareness and is as important as the provision of physical infrastructure and collection systems.

This DPWMP links government regulatory and policy requirements with the identified objectives for waste management service provision on the Dampier Peninsula to form an overarching strategic document to guide waste service delivery into the future.

2021 ADDENDUM TO REPORT

Since the DPWMP has been completed, Aboriginal communities have received $38.9 million dollars to upgrade water services from the State Government's WA Recovery Plan. Water Corp has also become the service provider for the communities of Ardyaloon, Djarindjin, Lombadina and Beagle Bay. The plans include relocating bores.

1 INTRODUCTION

The Shire of Broome (the Shire) engaged ASK Waste Management (ASK) to prepare a waste management plan for the Dampier Peninsula to guide the direction and delivery of sustainable waste management services into the future.

The Cape Leveque Road and its tributaries link Aboriginal communities, outstations, commercial operations and pastoral stations on the Dampier Peninsula with the highway to Broome and forms the main rural road network within the Shire of Broome. With the sealing of the Cape Leveque Road anticipated to be completed by December 2020, traffic movements are likely to increase by up to 40 per cent by 2030 (KPP Business Development, 2018).

With the increase in visitors, there will be more waste and litter generated within the Peninsula. A waste plan is required to address this issue and capitalise on the more efficient transport of waste materials that the sealed road may allow.

The Shire of Broome does not provide waste services on the Dampier Peninsula.

1.1 PURPOSE OF THE DPWMP

The purpose of the Dampier Peninsula Waste Management Plan (DPWMP or the Plan) is to provide a framework to deliver sustainable waste management services to the Dampier Peninsula.

1.2 OBJECTIVES

The objectives of the DPWMP have been developed based on consultation with the stakeholders, the objectives are to:

- Limit negative health and environmental impacts from waste and litter management
- Meet regulatory requirements
- Align with the objectives and targets of the Waste Authority, Waste Avoidance and Resource Recovery Strategy 2030
- Ensure appropriate, cost effective and sustainable waste management services for communities
- Maximise viable resource recovery
- Address concerns and preferences from stakeholders for future waste management within the region
- Ensure community driven solutions with continued consultation
- Maximise local economic development and employment opportunities.

1.3 DAMPIER PENINSULA

The Dampier Peninsula (the Peninsula) is located north of Broome in the Kimberley Region of Western Australia. It encompasses an area (excluding the islands) of approximately 1,100 km of coastline and 990,000 ha of land. Census records indicate 1,113 people reside on the Peninsula (ABS 2016). Aboriginal and/or Torres Strait Islander people make up 86.3% of the population. The Peninsula is home to Aboriginal people of six different language groups and around half of the Peninsula is covered by Aboriginal Native Title.

There are four main settlements on the Dampier Peninsula being the Aboriginal communities of Ardyaloon (formerly One Arm Point), Beagle Bay, Djarindjin and Lombadina, together with over 50 settlements of varying sizes and populations, **Figure 1.1** shows the northern portion of the Peninsula. These settlements are linked to Broome via the Cape Leveque Road which is 220km in length.

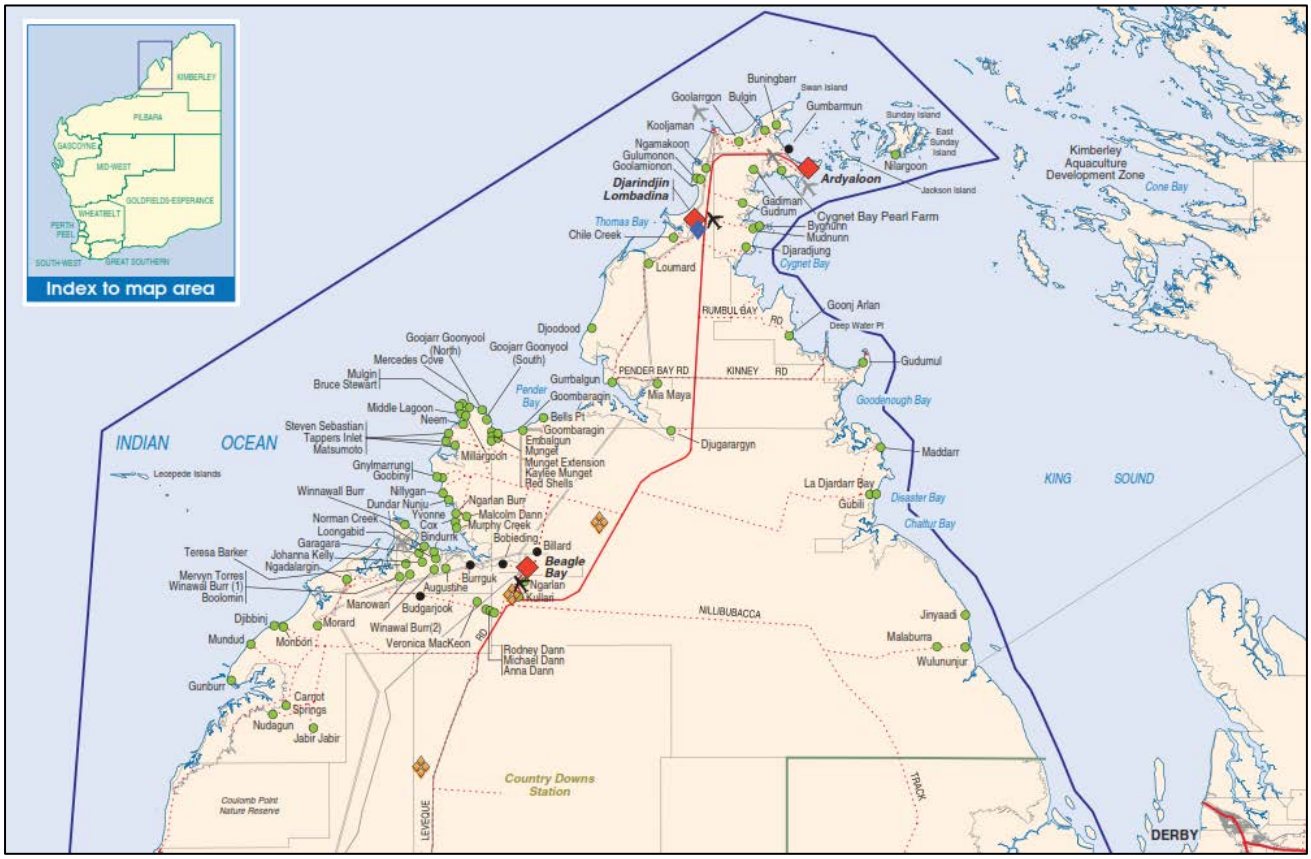
There are several different stakeholders on the Peninsula, including:

- Residents
- Native Title holders
- Freehold landowners
- Approximately 50 lease holders (under both the Land Administration Act 1997 and Aboriginal Affairs Planning Authority Act 1972)
- Community corporations with their associated retail outlets and other enterprises
- Aquaculture and agricultural businesses

- Resources services industry
- Tourism business (including resorts, camping grounds, small tour operators).

The Dampier Peninsula offers a mix of iconic attractions and tourism experiences. With increased accessibility to the region through the sealing of the main access road, the region is likely to experience a rapid expansion in visitation rates and expanding resident populations through local indigenous people returning to Country and the development of new commercial and tourism operations.

Figure 1.1 Map of the northern portion of the Dampier Peninsula (DPPS, 2015)



1.4 WASTE MANAGEMENT SERVICES – THE INCREASED RISKS

Typically, communities, settlements and outstations (including commercial operators) on the Dampier Peninsula are small in size, sparsely dispersed, away from major markets and central service economies (i.e. equipment servicing and repairs), which results to high unit costs for the provision of "conventional" waste management services that are used in urban waste collection, processing or disposal systems. Therefore, waste management practices in remote areas are often very basic, increasing the risk of potential health, environment, social and economic problems for those living, working and visiting the region.

A literature review of waste, and its relationship to health and wellbeing, in rural and remote Aboriginal communities was conducted in 2017 (Swinburne University). The review states that *'potential health issues are associated with every step of the handling, treatment and disposal of waste. Health impacts may occur following exposure to environmental hazards found in wastes. Waste is a complex mixture of different substances - only some of which are intrinsically hazardous to health'*.

Hazards in waste include:

- Biological – Microorganisms can cause a range of communicable diseases including gastroenteritis, respiratory illnesses, parasitic infections and skin infestations.
- Chemical – Heavy metals (lead, arsenic, chromium) from paints, solvents, batteries, e-waste, landfill leachate and gas emissions from the burning of waste (including ammonia, sulphur dioxide, nitric oxide, volatile organic compounds, polyaromatic hydrocarbons, dioxin, furans).

- Physical – Sharp objects that may cause trauma or particulate matter that may be harmful when inhaled including asbestos, clinical waste (needles) broken bottles, sharp objects. Flammable/explosive material (e.g. aerosol cans, tyres, methane) also pose physical hazards for those working in landfills.
- Indirect – Solid waste often provides an environment suitable for harbourage and proliferation of disease vectors such as mosquitoes, flies, vermin and cockroaches. These vectors may be capable of transmitting a range of diseases under suitable environmental conditions.

People may be exposed to these hazards via various routes including inhalation (e.g. dust, ash or smoke emitted from the landfill), ingestion (e.g. via water supplies contaminated with landfill leachate), direct contact (physical injury, chemical burns) and through vector transmission.

Waste can also have a significant impact on the environment through greenhouse gas emissions, pollution, biodiversity loss and resource depletion (Environmental Protection Authority, 2015).

The appropriate management of waste through access to better practice waste management systems, including recycling and disposal (landfill) facilities, is critical to protect public health and the environment from the negative impacts of waste.

2 DRIVERS AND INFLUENCERS

There are several government projects, policies and legislation that direct and influence the outcomes of this project.

2.1 DAMPIER PENINSULA ACCESS MANAGEMENT PLAN (2005)

The Dampier Peninsula Access Management Plan was prepared in 2005. The Management Plan was sponsored by Mamabulanjin Aboriginal Corporation overseen by the Department for Indigenous Affairs. The Management Plan addressed the implications of improvements to Cape Leveque Road to the people of the Peninsula.

The main recommendation from the Management Plan regarding the Peninsula was to *'prepare and implement a Waste Disposal and Management Strategy that would (among other things) minimise the number of landfill sites on the Dampier Peninsula'*.

2.2 DAMPIER PENINSULA PLANNING STRATEGY 2015

The Dampier Peninsula Planning Strategy 2015 (DPPS) was produced by the Western Australian Planning Commission and Department of Planning to reflect the long-term land use, infrastructure provision, access and development aspirations of Traditional Owners, Dampier Peninsula residents and other land holders.

The stated objective of the DPSS in relation to waste is '*To ensure that there are no unauthorised waste management sites on the Dampier Peninsula.*' The strategy to achieve this is listed as '*Improve waste management (collection and facilities) on the Dampier Peninsula through the integration of waste collection services and sharing of waste management infrastructure where practicable and cost effective.'*

The other actions relating to waste management have not been listed here, but include topics such as:

- The need for and location of waste disposal, material recovery, resource recovery and waste transfer infrastructure on the Dampier Peninsula
- Waste management facilities (landfill, a material and resource recovery facility and possible multiple transfer stations) needs to be further investigated through the local planning strategy process.
- Provide education and support to all waste generators on the Dampier Peninsula on approaches to progressing towards zero waste.
- Require new development located outside of the towns to transfer all waste that cannot be recycled or reused on site to a designated transfer station or landfill

2.3 ESSENTIAL AND MUNICIPAL SERVICES UPGRADE PROGRAM (EMSUP)

The Regional Resources Reform Unit (RRRU) is part of the Department of Communities and has been operating since 2015 after the withdrawal of Federal funding used by the State for delivery of essential services to remote Aboriginal communities.

Under the Essential and Municipal Services Upgrade Program (EMSUP), the State Government, through the RRRU, will progressively upgrade infrastructure in larger remote Aboriginal communities to standards comparable to other regional towns. This will enable the delivery of improved power, water and wastewater services, and municipal services such as road maintenance and waste collection. A future step may include handing the balance of the municipal services back to local government to manage.

The State Government recognises that the living conditions of families in remote Aboriginal communities must improve through mutual accountability between households, communities and government.

The first 10 remote Aboriginal communities to participate in the Essential and Municipal Services Upgrade Program include four communities located on the Dampier Peninsula: Ardyaloon, Beagle Bay, Djarindjin, and Lombadina.

The outcomes of the DPWMP will inform the future of waste management infrastructure within the region that may be progressed through the EMSUP program.

2.4 WASTE AVOIDANCE AND RESOURCE RECOVERY STRATEGY 2030

The Waste Avoidance and Resource Recovery (WARR) Strategy 2030 was released in 2019, with a key focus to generate less waste, recover more value and resources from waste, and to protect the environment by managing waste responsibility.

The Strategy defines a shared responsibility for improved waste management outcomes for Western Australia across all stakeholders including individuals, households, neighbourhoods, community groups, schools, small and big businesses, local governments, waste managers, the State Government and the media. The Strategy set targets for waste avoidance and resource recovery and requires all stakeholders to commit to adopting best practice waste management and engagement. The principles and approaches in this Strategy apply to waste management across WA, regardless of the type, form or source of waste.

2.5 WASTE AVOIDANCE AND RESOURCE RECOVERY (WARR) 2030 ACTION PLAN

The WARR 2030 Action Plan clarifies the specific actions, responsibilities and collaborations to achieve the objectives of the WARR strategy. Actions that are relevant to rural and remote communities which may have some impact over the life of the Plan include:

Action 1.11 **Managing waste in regional/remote communities**	In consultation with relevant State Government agencies, local government and communities, develop pragmatic guidelines for the design, maintenance and management of waste services and infrastructure in regional/remote communities, including Aboriginal communities.

2.6 ENVIRONMENTAL PROTECTION (RURAL LANDFILL) REGULATIONS 2002

Within Western Australia, small rural landfills are generally managed under the *Environmental Protection (Rural Landfill) Regulations 2002*. These regulations apply to landfills that receive more than 20 but less than 5000 tonnes per year. They cover the siting, operation and closure requirements for rural landfills. These regulations apply to the community landfills and potentially some of the larger tourism operators within the region.

Many small settlements on the Peninsula, with a population of less than 40 people, are likely to produce less than 20 tonnes of waste per annum in a typical year. However, when any works are completed to buildings or infrastructure, the 20 tonnes per year threshold is likely to be exceeded and trigger the need for the facility to be registered with DWER.

There is currently no legislation or better practice guidance on the operation for landfills that received less than 20 tonnes per year.

2.7 SHIRE OF BROOME REGIONAL RESOURCE RECOVERY PARK

The Shire of Broome is progressing with feasibility and monitoring activities to determine the preferred site for a new waste management facility. With the current landfill approaching the end of its operational life, it has become critical for the Shire to establish a new Regional Resource Recovery Park (RRRP) that includes a landfill with the capacity to service the community for at least another 70 years.

The Shire has identified two potential sites for the establishment of the RRRP, including a site off the Cape Leveque Road. The facility is proposed to incorporate best practice lined landfill cells and facilities for the recovery of resources. The facility is anticipated to be completed and operational by 2024. Waste from the Dampier Peninsula could potentially be transferred to this facility once it is operational.

2.8 CONTAINER DEPOSIT SCHEME 'CONTAINERS FOR CHANGE'

WA's container deposit scheme (CDS) 'Containers for Change' commenced in October 2020 and is run by not-for-profit WA Return Recycle Renew Ltd. The CDS allows consumers to take beverage containers to a refund point to receive a refund of 10 cents per container. For communities without kerbside recycling services it provides an opportunity to participate in recycling activities. There are two CDS refund points within the Shire of Broome; one within the town of Broome and another in the Djarindjin Aboriginal Community on the Dampier Peninsula.

3 EXISTING SERVICES AND INFRASTRUCTURE

The following section provides an overview of waste data for the Dampier Peninsula and outlines the waste management services provided.

3.1 POPULATION DATA

According to the ABS 2016, the total population of the Dampier Peninsula is 1,113 people. This does not include visitors, in particular long-term visitors living on the Dampier Peninsula during the dry season (April - November). The actual population at any one time is likely to be higher than that reflected in the ABS as there is significant variation in occupancy within communities depending on when family members and visitors come to stay with relatives and friends, often for extended periods of time.

3.2 WASTE QUANTITIES

Solid waste is generally categorised into three major streams:

- **Municipal Solid Waste (MSW)** – Waste derived from residential and public activities, collected by local governments (or their agents) from households, public places and public buildings. Municipal waste may include waste from small commercial premises or other similar activities where this is collected as part of the standard local government service. (DWER census glossary)
- **Commercial and Industrial Waste (C&I)** – Waste produced by institutions and businesses including schools, restaurants, offices, retail and wholesale, including manufacturing. (WARR 2030)
- **Construction and Demolitions Waste (C&D)** – Waste produced by demolition and building activities, including road and rail construction and maintenance and excavation of land associated with construction activities. (WARR 2030)

There is currently no waste data available regarding waste types and volumes generated within communities and settlements on the Dampier Peninsula. Landfill facilities within communities are unstaffed and there is no data collected on the quantities disposed.

To estimate the waste generation in the Peninsula, the WA average per capita non-metropolitan waste generation values (**Table 3.1**) and the population of the region (**Section 3.1**) has been used.

Table 3.1 Average waste generation rates for rural and regional WA – kg/capita (ASK, 2019)

MSW	C&I	C&D	Total
600kg	800kg	1,100kg	**2,500kg**

Based on this data, the estimated total quantity of waste generated per annum within the Dampier Peninsula is 3,000t as shown in **Table 3.2**. It is noted, however, this number is an approximation and does not take into account waste generated by any tourists and the impacts of population fluctuations within communities. It is likely the actual quantity of waste generated in the Peninsula will be between 3,000 – 4,500 tonnes per annum.

Table 3.2 Estimated tonnes of waste generated per annum on the Dampier Peninsula

	MSW	C&I	C&D	Total (rounded to nearest 1000)
Estimated tonnes of waste generated	670	890	1,220	**3,000**

3.3 WASTE GENERATION PROJECTIONS

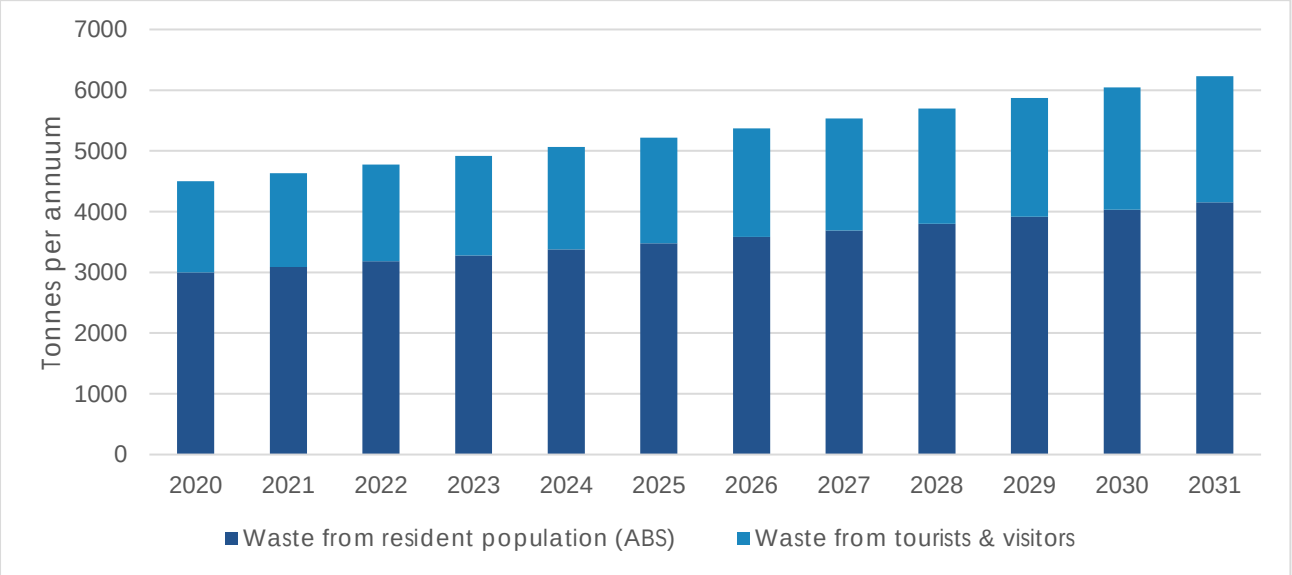
Once the Cape Leveque Road is sealed, access to Broome will be easier and it is possible more people will return to live on Country. In addition, there will be an increase in tourists and commercial business in the area. Therefore, the quantity of waste generated in the Peninsula will increase.

Waste generation projections have been made to 2031 based on the population growth data provided by the Dampier Peninsula Planning Strategy (DPPS) 2015. The DPPS projects growth in the Kimberley to be high in the context of the State and predicts an average annual population growth rate of approximately 3% between 2004 and 2031. The growth rate is expected to decline from about 2.93% per annum between 2007 and 2012 to less

than 2% in the decade ending 2031. The Dampier Peninsula's population is expected to reflect this forecast. This is reflected in **Figure 3.1** that shows the total annual waste generation projection to 2031.

The waste projections shown in **Figure 3.1** include the estimated quantity of waste produced by the resident population of the Peninsula and likely additional quantity of waste generated by tourists and the impacts of population fluctuations within communities. This shows that approximately 4,000 – 6,000 tonnes of waste being generated by 2031. This is an increase of approximately 75% in 11 years.

Figure 3.1 Estimated waste generation projection for the Dampier Peninsula, 2020 to 2031



3.4 WASTE INFRASTRUCTURE, OPERATIONS AND SERVICES

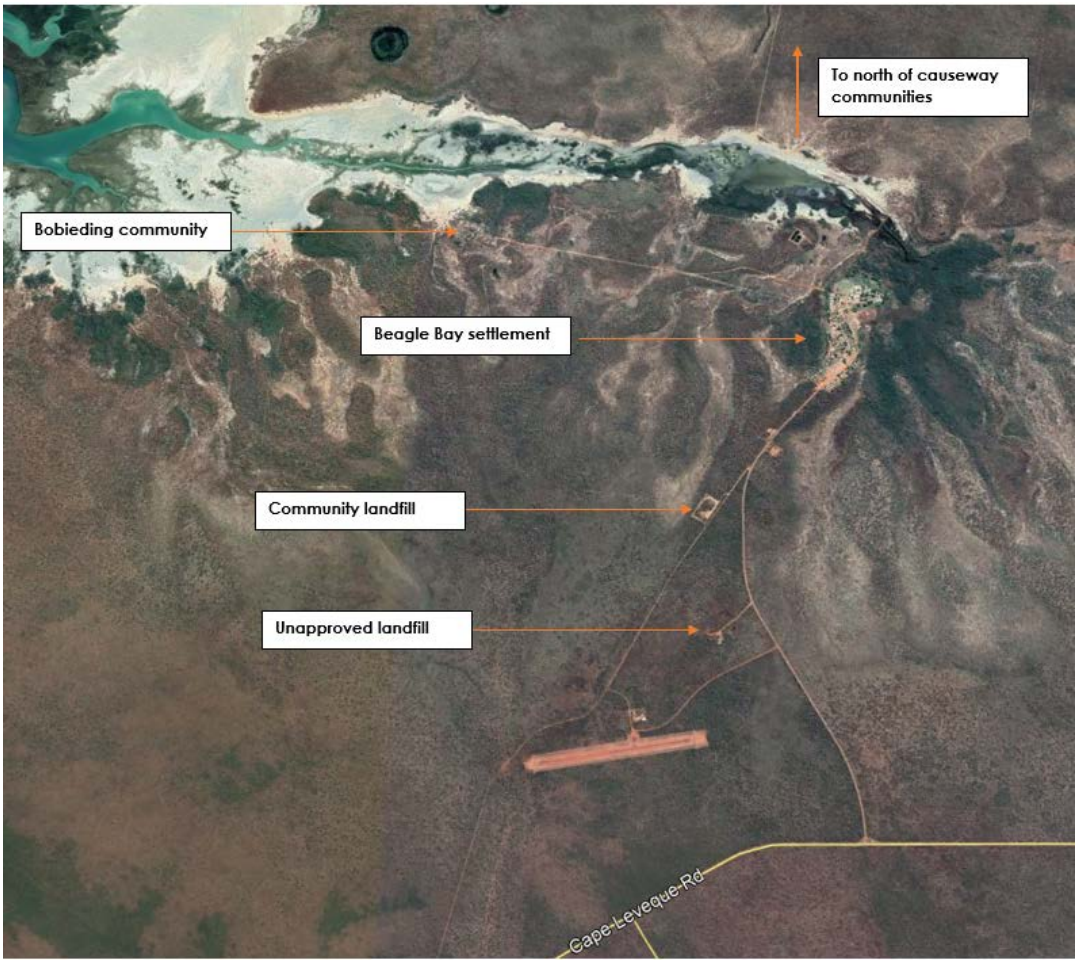
Basic waste management facilities exist on the Dampier Peninsula. All communities, outstations and tourism operators manage their own waste and there is no coordination. The following sections provide a summary of the Peninsula's waste management infrastructure, operations and services.

3.4.1 *Towns (Aboriginal Communities)*

The communities of Ardyaloon, Djarindjin, Lombadina and Beagle Bay are identified as towns within the Dampier Peninsula Planning Strategy. Towns are defined as large permanent settlements with a substantial population that provide a range of community, government and commercial services. These communities have access to essential and municipal services and infrastructure (power, potable water, sewerage disposal and treatment and solid waste collection and disposal). Towns support smaller near-by settlements, minor settlements and tourist activities on the Dampier Peninsula. Ardyaloon, Djarindjin, Lombadina and Beagle Bay and were visited as part of the project to gain a broader understanding of waste management services provided and are described in the following tables.

Table 3.3 Beagle Bay

General information	Beagle Bay is located 120km from Broome by road. The township is a formally established entity, and its main function is as a service centre for the Beagle Bay/Pender region. The Beagle Bay community comprises of the town settlement (Beagle Bay), settlements of Bobieding and Billard with a population of approximately 350 – 370 people. There are around 45 outstations with a population of around 60 - 70 people. Population fluctuates in the wet season when people from surrounding outstations come into the community.
Industry types	Store, school, office, clinic, workshops, training centre, women's centre, tourism (Beagle Bay Mission)
Waste service provision	• The Department of Communities (DOC) fund waste services to the community which are delivered through the Kimberley Regional Service Providers (KRSP). The services include kerbside rubbish collection, bulk waste collection, pushing up and digging of trenches, and litter collection within the main community. • Rubbish collection is undertaken twice weekly with two 240L MGBs per household. • Regular bulk waste collection is provided. • There are five KRSP staff employed at Beagle Bay. Waste is just one role. A lot of staff time is spent on litter collection.
Waste types	Domestic waste, packaging waste, paper and cardboard, beverage containers, construction and demolition waste, tyres, hazardous household waste, whitegoods, car bodies
Waste Infrastructure	The community has two landfills. One is the designated community landfill, the other is an illegal landfill used by the community and others (contractors, tourists) for waste disposal. The illegal landfill was originally a 'borrow pit' for roadworks near Beagle Bay.
Waste plant	• The community have access to a rear lift waste collection truck, a loader which they have for the majority of the year (used by KRSP for pushing up waste and digging trenches at other landfills in area) and a tipper truck for bulk waste collection. The equipment is supplied by the DOC through the Municipal Services Program. • They report no problems with servicing and repairs, either someone comes to repair the plant or it is taken to a workshop. *Waste plant used at Beagle Bay* 
Landfill siting	• Department of Water bore data indicates groundwater is within 1-5m of the surface • During flood events at Beagle Bay the entire community living area is surrounded by flood water, to the point that the current living area is referred to as an 'island'. This means that during the wet season flooding can occur that completely surrounds the living area and most community infrastructure. (DPLH, 2018) • The residential settlement is located within the 2000m minimum separation distance set for landfills within the Department of Planning, Lands and Heritage (DPLH), Aboriginal Settlements Guideline 3. The Beagle Bay Community Layout Plan (DPLH, 2018) states that this is a land use hazard with a medium level management priority due to the potential risk of contaminants leaching into the groundwater. The DPLH recommends a new landfill location should be identified in the future that is at least two kilometres away from the community living area and of less risk to the quality of drinking water.

	Image showing location of landfills in relation to Beagle Bay settlement 
Landfill operation	The community landfill is located on 1.3km south of the community with a short sand/gravel road leading to the site from the main sealed road into Beagle Bay. • The landfill is fenced and well maintained with minimal windblown waste or litter observed surrounding the site. • Car bodies separated and collected on occasions. • Some gas bottles, tyres separated where possible and stockpiled. • Uncontrolled access to the facility as it is not gated. • All waste is burnt (twice per week). • Waste covered only at end of trench life, which is approximately 14months per cell. • DOC contractors allegedly dumping asbestos at landfill, community is concerned about impacts. • No hazardous materials disposal options, with whatever placed in bin or trench burnt as required. This includes e-waste, batteries, tyres, asbestos waste, clinical waste, and used motor oil. • No training, operational planning and procedures, post closure plan or information kept on location of completed cells/trenches. • In general the operation of the landfill does not comply with the *Environmental Protection (Rural Landfill) Regulations.*

	Images of Beagle Bay community landfill 
Unapproved landfill	• The unapproved landfill is located further south of the community with a short sand/gravel road leading to the site from the main sealed road into Beagle Bay. • It is reportedly used by the community and others (contractors, tourists) for waste disposal. • The waste is burnt once a week and every couple of days waste is pushed back into pit. Tyres are pulled out of waste where practicable and stockpiled. • The landfill is not fenced, there is no firebreak and no signage. • The landfill does not comply with the *Environmental Protection (Rural Landfill) Regulations*. *Images of unapproved landfill* 
Landfill capacity	Capacity at the community landfill is said to be limited. There are no records of the location of old trenches.

Table 3.4 Djarindjin

General information	Djarindjin is located on the west coast of the northern Dampier Peninsula sub-region approximately 190km north of Broome, and 60km north of Beagle Bay. The township is approximately 2km due west of Cape Leveque Road. Djarindjin is part of a single urban area that incorporates Lombadina Aboriginal community and the Lombadina Mission. Djarindjin Aboriginal Corporation manages a 56,727ha Crown Lease. This area includes part of the Djarindjin/Lombadina township, including an airstrip, (existing and proposed) powerhouse, multi-function police station, proposed drinking water protection area and several independent outstations. Djarindjin has grown very rapidly over the past 30 years. It is expected that Djarindjin will continue to experience constant growth into the future. (DPLH, 2016) There are currently 57 houses within Djarindjin with an estimated population of approximately 400. (Nathan McIvor,per comms) The community is not open to tourists.
Industry types	• General store, café, roadhouse, airport, workshop, community resource centre, mechanic workshop, CDS return point. • Djarindjin will be opening a caravan park in December next year. The park will have 37 powered sites and 10-15 camping sites.
Waste service provision	Department of Communities (DOC) fund the community approx. $275,000 per annum to provide basic municipal services including rubbish collection, parks and gardens maintenance, road maintenance, installation and maintenance of firebreaks and waste facility management. Three full time employees and approx. five casual employees work in this space. • One 240L MGB is provided to each household. Additional MGBs are provided depending on numbers of residents in houses. Bins are repaired and maintained where possible (wheels, pins frames, lids). • Bins are collected twice weekly. • Bulk waste is collected kerbside every two months
Waste types	Domestic waste, packaging waste, paper and cardboard, beverage containers, construction and demolition waste, tyres, hazardous household waste, whitegoods, car bodies
Waste Infrastructure	• Solid waste disposal site • CDS return point under construction *CDS infrastructure at Djarindjin refund point outlet*  
Waste plant	The community has a hydraulic lift trailer connected to a 4WD. It is reportedly working well with low servicing and repair costs. They do five runs of a mostly full trailer to the landfill each collection. Bulk waste is collected using a dual cab 5 tonne 2wd tipper truck. A JCB Waste Master Backhow has also been purchased recently.

	Waste plant at Djarindjin    The community does not have access to appropriate equipment to manage the landfill operations and undertake planned remedial work. The community are in the process of purchasing a new wheeled loader or alike to manage operations at the landfill.
Landfill siting	The residential settlement is located within the 2000m minimum separation distance set for landfills within the DPLH, Aboriginal Settlements Guideline 3. The landfill buffer is also located within the drinking water source wellhead protection zone. The depth of groundwater is unknown, however given the close distance of the settlement location to the ocean, it is assumed to be shallow. Waterways and wetland areas are located approximately 1km east and south of the landfill. The Djarindjin Layout Plan 3 (DPLH) recognises the existing location of the landfill. The plan recommends that the landfill be closed because of the potential that it may contaminate all drinking and irrigation water supplies in Djarindjin and Lombadina. It is considered that a future landfill should be developed some distance further away from the town. The future landfill would best be a central facility used by Lombadina, Djarindjin, Djarindjin Junction and nearby outstations. Shire of Broome Local Planning Strategy also refers to the inappropriate siting of the Djarindjin landfill stating '*that current servicing problems within this centre include the proximity of the waste water treatment facility and the waste site to the ground water supply. Urgent attention should be given to relocating these facilities to ensure public health and safety is addressed*.' *Djarindjin Layout Plan 3 showing location of landfill in relation to settlements* 

	Aerial image of settlements in relation to Djarindjin landfill 
Landfill operation	• The community landfill is located approximately is 1km east of the community with a short sand road leading to the site from an unsealed road. • The landfill receives all waste from the community. Contractors working in the region also dump waste at the facility. Whilst the facility is fenced, it is not gated allowing unrestricted access. • During the site visit, the facility did not appear to be well maintained with numerous stockpiles of above ground waste and substantial windblown litter. This is understandable given the community do not have access to machinery to push up waste. • Waste from weekly collections is burnt once per week. • Legacy stockpiles are not burnt and will be pushed up, compacted where possible and covered to create a level surface once suitable plant is obtained. • There was indication of some separation of whitegoods and metals. • Generally waste oil and batteries collected kerbside is stockpiled at the mechanical workshop and taken to Broome as required. • Some tyres are recycled– used for levies and grading of roads. • Car bodies collected on infrequent occasions, challenge attracting contractors to the region • No hazardous materials disposal options, with whatever placed in bin or trench – burnt as required. This includes e-waste, batteries, tyres, asbestos waste, clinical waste, and used motor oil. • No training, operational planning and procedures, post closure plan or information kept on location of cells. *Images of landfill from visit*  *Images of landfill after remediation activities**  *Subsequent to the site visit, new plant was acquired and remedial works undertaken to bury legacy waste stockpiles as displayed in the above images.
Landfill capacity	Below ground landfill capacity appears to be limited. There is inadequate information available on the location of old trenches.

	The community CEO believes however if the site is managed right with appropriate equipment there should be capacity for the next five – ten years. It was advised there is a portion of land next to the site (Aboriginal Lands Trust land) that could be used for waste disposal for 30 years or more. This land however is inside the 2000m minimum separation distance set for landfills within the DPLH, Aboriginal Settlements Guideline 3. With appropriate plant it is intended to push up and cover all existing waste to create a level surface. Gravel will then be put down and above ground landfilling will commence. Locations will also be provided on site for separation and stockpiling of bigger material tyres, metals, whitegoods, etc. Some staff have previous experience in landfill management, hence confidence in new methods of working.

Table 3.5 Lombadina

General	Lombadina is part of a single urban area that incorporates Djarindjin Aboriginal community and the Lombadina Mission. Lombadina Aboriginal Corporation leases a 130ha lot that is held by the Aboriginal Lands Trust. This area includes part of the Djarindjin/Lombadina township, generally south of the church. Lombadina is an established community. The community is administered by Lombadina Aboriginal Corporation and it supports a range of businesses, particularly in tourism. There are currently 25 houses in Lombadina community with a population of approximately 50 people. Lombadina has existing tourist facilities to accommodate up to 41 visitors at a time. Lombadina is intending to expand tourism services to include campsites for caravans and campers to the region.
Industry types	Tourism, concrete and roadworks supplies, civil construction, bakery, craft shop, small shop
Waste service provision	• Department of Communities (DOC) fund the community to provide basic municipal services including rubbish collection and waste facility management. • Houses are provided with 240L MGBs. • Collection is undertaken three times a week (Mon, Wed, Fri) using a side lift compaction truck which the community purchased itself. • Bulk waste collection offered regularly. • No recycling options provided 
Waste infrastructure	The existing Lombadina landfill is approximately 500m south of the community living area.
Waste plant	The community have a side life compactor truck (not shown), a loader and backhoe to assist with landfill operations. Civil construction/road services is offered at cost to other communities. *Lombadina plant*   
Waste types	• General mixed domestic waste, packaging waste, paper & cardboard, beverage containers, construction and demolition waste, tyres, hazardous household waste, whitegoods, car bodies etc • Batteries are stacked and stockpiled at workshop • Tyres stacked and stockpiled at workshop • Waste oil collected from workshop operations 
Landfill siting	The Lombadina landfill is approximately 500m south of the community living area and within the 2000m minimum separation distance set for landfills within the DPLH, Aboriginal Settlements Guideline 3. The depth of groundwater is unknown, however given the close distance of the settlement location to the ocean, it is assumed to be shallow. The site is located within 30m of the Chile creek tidal inlet and wetlands. The Djarindjin landfill is located upstream of the Lombadina drinking water bore and is reported to be potentially contaminating the drinking water supply drawn from the existing Lombadina and Djarindjin bores. (DPLH, 2018) The Community Layout Plan recognises the existing location of the landfill. However, it is stated that a future landfill will be developed some distance further away from the town. The future landfill would best be a central facility used by Lombadina, Djarindjin and nearby outstations, tourist centres and other uses.

	Aerial image showing location of sensitive receptors in relation to Djarindjin and Lombadina landfills 
Landfill operation	• The existing Lombadina landfill is approximately 500m south of the community living area with a short sand/gravel road leading to the site from the main residential settlement. • The landfill was fenced and well maintained at the time of visit. A firebreak is installed around the boundary of the site. There was some wind-blown waste or litter observed surrounding the site. • A trench was used for kerbside waste and domestic waste disposal. The waste is burnt weekly or crows and dingoes get to waste and spread it through the country. Burnt material is then pushed up into the existing waste mass. • A second cell was used for disposal of unsalvageable construction and demolition waste and whitegoods/bulky waste from housing development within the community. The cell consisted of a large, excavated hole in which waste was dumped. No compaction was occurring. This was located outside of the fenced 'landfill' area. • Metals (mostly car bodies) separated where possible and collected on occasions • Whilst the facility is fenced it is not gated allowing unrestricted access. • Waste covered only at end of trench life. • No hazardous materials disposal options, with whatever placed in bin or trench – burnt as required. This includes e-waste, batteries, tyres, asbestos waste, clinical waste, and used motor oil. • No training, operational planning and procedures, post closure plan or information kept on location of cells. • There was also a significant amount of salvaged building materials stored separate to the site. The material is intended to be used by the community and contractors for construction of new houses. • Fridges and whitegoods to landfill (not degassed). • Some e-waste stockpiled, but community not sure where to take it.

	Aerial of Lombadina landfill (SLIP)  *Images of domestic waste trench and C&D disposal pit*  *Images of salvage building materials storage area* 
Landfill capacity	Landfill capacity is reported to be significant (10-15years) based on the small population and waste generation within Lombadina.

Table 3.6 Ardyaloon

General	Ardyaloon community is located at the northern end of the Cape Leveque road on the Dampier Peninsula approximately 202kms by road from Broome and 29kms from Djarindjin community. Ardyaloon was settled permanently in the early 1970's and has grown quickly to be one of the largest communities in the State. Ardyaloon is home to approximately 400 people and serves as a hub for many outstations that exist in the area. There are 92 houses within the settlement. 20,000 tourists visited the trochus hatchery last year.
Industry types	Community and public buildings (school, supermarket, office and community centre), mechanics workshop, aquaculture centre, health clinic,
Waste infrastructure	The Ardyaloon landfill is located 4.5km west from the community.
Waste Service provision	• KRSP providing rubbish collection and tip management services • Rubbish is collected twice weekly of one MGBs per household. • Bulk waste collection is undertaken as required. Residents place bulk waste next to bin and it is manually collected and placed in the truck.
Waste plant	• KRPS use to rear lift rubbish truck. The plant breaks down often and KRSP are responsible for resolving. • KRSP supply landfill plant for pushing up waste and digging trenches on periodic basis *Plant Ardyaloon* 
Waste types	• General mixed domestic waste, packaging waste, paper and cardboard, beverage containers, construction and demolition waste, tyres, hazardous household waste, whitegoods, car bodies etc • Batteries are stacked and stockpiled at the KRSP workshop if can be separated from general waste
Landfill siting	The landfill is located 4.5km from the community. The Community Layout Plan (DPLH, 2017) indicates that there are concerns that the rubbish site is contaminating the community water supply and there is a need for monitoring bores to be established to attempt to investigate whether there is any significant leaching is occurring. *Aerial showing location of Ardyaloon landfill in relation to the settlement* 

Landfill operation	• The landfill receives all waste from the community. Contractors working in the region also dump waste at the facility. Whilst the facility is fenced it is not gated allowing unrestricted access. • During the site visit, the facility appeared generally well maintained with numerous tip faces (trenches) provided for various waste streams (greenwaste, general waste, kerbside waste). There was minimal evidence of windblown litter. • Waste is burnt once per week and subsequently pushed up into the general waste mass within the trench. • There was a substantial pile of separated whitegoods, though the community is not sure what to do with them. Fridges are not degassed. Dumped cars from the community are stockpiled at the facility until metal collection available. • No hazardous materials disposal options, with whatever placed in bin or trench – burnt as required. This includes e-waste, batteries, tyres, asbestos waste and clinical waste, used motor oil. • No training, operational planning and procedures, post closure plan or information kept on location of cells. • There was a significant accumulation of legacy waste stockpiles outside the landfill facility. It is understood to contain a mix of commercial and construction and demolition waste. Asbestos is believed to be within the material. *Aerial image of Ardyaloon landfill (SLIP)*  *Images of Ardyaloon landfill*   

	   *Legacy waste stockpiles*  
Landfill capacity	Unknown

3.4.2 *Settlements*

Settlements are defined within the Dampier Peninsula Planning Strategy as consisting of approximately 50 - 150 people and rely on towns to access facilities and services. These communities generally source potable water from their own bore, operate their own generators, utilise septic tanks and have their own waste management facilities. Settlements may be associated with tourist related enterprise opportunities in the vicinity. Living areas such as Billard, Budgarjook, La Djardarr Bay and Millargoon are identified as settlements. Consultation was not undertaken with these communities, though it is assumed that waste management practices would reflect that undertaken in communities and outstations.

3.4.3 *Outstations and Minor settlements*

Minor settlements are generally communities that comprise a family or a family group living on a rural residential lot or lease area. Minor settlements are not necessarily permanently occupied, with residents relocating for periods of time for a variety of reasons. Population numbers vary but are usually less than 50 people. Minor settlements may operate tourism related ventures within their living or lease area. The communities are generally self-sufficient in terms of power, water and sewerage infrastructure and solid waste management. Minor settlements access government and commercial services at towns or regional centres such as Broome or Derby. There are more than 80 minor settlements on the Peninsula including places such as Carnot Springs, Pender Bay, Bindurrk, Mercedes Cove, Mudnunn and Malaburra. The outstations visited as part of this project to gain an understanding into existing waste practices were Pender Bay and Mercedes Cove.

3.4.3.1 Beagle Bay outstations (North of the causeway group)

General information	The north of the causeway outstation community (NCC)is located within the Beagle Bay/Pender Bay coastline. The outstations are essentially minor settlements providing indigenous tourism related ventures. Properties are approximately 30km from the Beagle Bay community landfill. Properties in this area include: • Goombaragin eco retreat • Embalgun (Smithys seaside) • Red shells • Whalesong(Munget) • Pender Bay escape • Mercedes Cove • Middle lagoon campground • Gnylmarung The NCC residents have previously expressed their dissatisfaction with current waste management methods. In the early 2000's residents formed an action group and obtained external funding from Centre of Appropriate Technology (Indigenous organisation) and Rio Tinto for the development of a waste management plan for the area. The draft 'North of the Causeway Community Waste Management Plan' was developed in 2006. The author of the document is unknown. It advocated for the introduction of regular waste collection, development of a waste disposal depot to store beverage containers, lead acid batteries, waste oil, car bodies and scrap metal, and development of waste disposal trenches within the depot. It was proposed that management of the service should be undertaken by an independent organisation, and that there must be adequate funding provided for establishment and operation of the service. It is not known as to the intended audience of the document nor as to why recommendations were not progressed further.
Industry types	Residential, tourism operators
Waste types	General domestic mixed waste, fish waste, cardboard, paper, bulky waste, beverage containers, whitegoods, car bodies, construction waste
Waste management practices	Residents are responsible for managing their own waste. • Most residents use 240L MGBS to store household waste • Trenches are excavated for waste disposal using KRSP or local machinery when available • Some residents own loaders • Domestic mixed waste is generally burnt to prevent scavengers and odours • Hazardous waste generally not separated as no facilities for appropriate disposal

	• Bulky waste, car bodies, tyres, construction and demolition waste etc separated from general waste to preserve trench life • Much of this separated material is stockpiled until suitable plant is available to bury them or remove off site to Broome or Beagle Bay landfill site • Waste is sometimes transported to Beagle Bay landfill by private vehicles • Some recyclables are taken to Broome waste disposal facility when visiting Broome • Some tourism providers have notices stating 'rubbish disposal not permitted' to reduce waste needing to be handled and disposed within the settlement *No rubbish disposal signage at Middle Lagoon*   *Waste trenches (Gnylmarung and Goombaragin)*   *Bulky waste storage/separation* 
Waste management challenges	• Windblown litter • Smoke emissions from burning impacting on health and amenity • Public health and environmental problems of disposing waste close to residential property • Lack of appropriate machinery to excavate disposal trenches, push up waste, cover waste and handle bulky and heavy material • Loss of amenity due to windblown litter, and stockpiled bulky material. • Lack of sealed road resulting in poor road conditions - road conditions subject to flooding and washaways during wet season • No assistance or guidance provided for managing waste more effectively and managing environmental impacts • Hazardous disposal options do not exist therefore gets put in trench and burnt or buried

3.4.4 *Commercial/tourism operators*

There are a number of commercial stakeholders on the Dampier Peninsula including aquaculture, agricultural and tourism businesses (i.e. resorts, camping grounds, small tour operators).

These stakeholders are generally self-sufficient in terms of power, water and sewerage infrastructure and solid waste management. Most have individual landfills that cater for the waste generated by their operations.
Stakeholders consulted include Cygnet Bay Pearls, Kooljaman Resort, Arrow Pearls, and Willie Creek Pearls. Stakeholders indicated that waste management was a key aspect of business operations and was undertaken independently. There are no waste disposal services provided that they can access.
In general, substantial effort was made to separate material streams to preserve landfill airspace, minimise environmental impacts and emissions where feasible and reduce waste generated within business operations. Activities included:

- Composting of small volumes of food waste and putrescible waste by some providers
- Separation of bulky waste, steel, car bodies and batteries which are stockpiled until a viable solution for disposal and/or recycling is found
- One operator had a recycling area for beer cans, wine bottles, beverage containers, which is stockpiled until a viable solution is found
- Building materials are generally salvaged and reused where possible
- Implementation of waste minimisation practices where possible including:
    - Mandatory use of reusable cups as opposed to disposable coffee cups
    - Advising visitors of the need to reduce plastic and packaging waste when packing for the trip
    - Increasing the use of more sustainable packaging and buying in bulk to reduce packaging waste
    - Minimising takeaway style packaging for hospitality operations

All operators regularly burn waste to some extent and there is limited sorting of the waste disposal bins. The project team was not able to visit landfills operated by commercial stakeholders.

3.4.5 *Roadside waste disposal options*

There are no waste disposal points at popular recreational spots. Public place bins are provided within some communities and at the Djarindjin roadhouse. There is a single rubbish disposal point on the Cape Leveque Road south of the Manari Road turnoff that is managed by the Shire of Broome. This will be removed once management of the road is vested in MRWA in July 2021. Waste that is brought onto the Peninsula is dealt with by the communities or tourism operators.

Figure 3.2 Rubbish disposal points south of Manari Road (Shire of Broome facility)

3.4.6 *Unapproved landfill (Mitre 11)*

During the site visit the project team was advised of the existence of an illegal landfill near Ardyaloon known locally as ‘Mitre 11’. It is alleged to be used by contractors and tradespeople on the Peninsula to dispose of waste from construction and demolition activity. It is believed to be about 10 years old and was originally constructed by the army to dispose of waste from the demolition of two houses at Ardyaloon. The site is understood to contain hazardous waste including asbestos.

Inspection of the site revealed a significant quantity of commercial and construction and demolition waste.

Figure 3.3 Images of waste disposed at an illegal landfill near Ardyaloon

3.5 ISSUES AND FINDINGS

As a result of the site visit, literature review and consultation, the following issues and findings were identified in relation to waste infrastructure, operations and services on the Dampier Peninsula.

3.5.1 *Waste data*

- The effective planning of strategies and design of infrastructure is limited by the lack of accurate and standardised waste data for the region.
- Waste quantities are expected to increase into the future.
- There are seasonal fluctuations in waste quantities generated due to tourist season.
- Waste that is brought onto the Peninsula is dealt with by communities or tourism operators.

3.5.2 *Landfill siting*

- There are more than 50 landfills reported to be operating within the region.
- Many of the landfills are incorrectly sited and may be impacted on community health, specifically:
    - In most cases environmental considerations and need for buffers have not been considered when locating the community landfills. Consideration around impacts of groundwater and surface water are further compounded by lack of geohydrological data including groundwater depth and direction on the Dampier Peninsula.
    - Three of the four community landfills are poorly sited, as they are located within the 2km exclusion boundary required for the landfill land use, to protect drinking water and public health, with this boundary extending into the community living areas. There are concerns for all communities that the landfill sites may be contaminating the community potable water supplies.
    - The Department of Water has strongly recommended that Djarindjin landfill be closed down because of the potential that it may contaminate all drinking and irrigation water supplies in Djarindjin and Lombadina (DPLH, 2016).
- There are no groundwater monitoring bores at the landfills to monitor depth and impacts on groundwater quality.
- Some community landfills were in close proximity to each other (i.e. Lombadina and Djarindjin were only 1.5 km apart).
- Landfills within communities are unlined and some do not comply with the siting requirements as required under the Environmental Protection (Rural Landfill) Regulations (Regulation 9) presenting an environmental and health risk from the operation of the landfill.
- There is no guidance available for siting of landfills in small settlements and outstations.

3.5.3 *Landfill operation*

- Landfills have uncontrolled access which means there is no waste acceptance procedure or records kept.
- There is a general lack of appropriate equipment for proper landfill management.
- There is a lack of process or system for the management of bulk waste and there are large stockpiles of metals, whitegoods and car bodies. These waste streams are removed from the waste stream to preserve landfill life and stockpiled for significant lengths of time until a solution for disposal is found.
- Burning of waste is the primary method of landfill management to reduce waste volumes, odours and vermin risks. This does not align with better practice and has the potential impact on health and the environment.
- There is no process to manage hazardous waste streams, with the majority of this waste burnt at the landfills (e.g. waste oil, batteries, e-waste, HHW, tyres, etc).
- No degassing of fridges occurring.
- There is limited resource recovery.
- There are no records regarding site operations (i.e. where the waste has been previously buried).
- There are no operational or post closure management plans for operation of sites, therefore no plans to work with for operations and closure.
- There appears to be a lack of skills collaboration and knowledge between facilities.
- There is no system coordination, with each stakeholder essentially 'doing its own thing'.

3.5.4 *Service provision*

- Kerbside and hardwaste service collection appears to be working effectively within communities.
- MGBs within communities appear to be well maintained.
- There are no services for waste or recycling provided for other stakeholders, with each responsible for their own waste management.
- Limited resource recovery occurring with most waste being disposed of to landfill, where it is subsequently burnt.
- Containers for Change initiative in Djarindjin

3.5.5 *Legacy waste issues*

- Illegal landfills at 'Mitre 11' near Ardyaloon and Beagle Bay are not approved and do not comply with *Environmental Protection (Rural Landfill) Regulations 2002.* They have the potential to impact in health and the environment.
- Legacy waste stockpiles outside Ardyaloon landfill need to be appropriately disposed of to limit potential health and environmental impacts. Asbestos is believed to be contained within the material.

4 COMMUNITY CONSULTATION

Consultation was undertaken to establish the opinions of people who live and work on the Peninsula regarding current waste management issues and future preferences for waste management in the region.

General information sought from stakeholders included:

- Feedback about the existing waste management practices
- Feedback about the impacts from increased tourism numbers and corresponding waste quantities
- Stakeholder preferences for the future waste management within region
- Views and importance on waste recovery and recycling
- Waste education requirements

Consultation with stakeholders via telephone was conducted from 7-11 September 2020. Onsite community visits were undertaken between 12-16 October 2020. Meetings were held with Community CEO's or Community council representatives.

A list of stakeholders consulted is contained in the **Appendix.**

Stakeholder feedback is discussed under the key themes to follow. For ease of reference, feedback has been grouped by community, outstations, tourism/commercial operator, government and non-government stakeholder. However, the first section summarises the key themes of the stakeholder consultation findings.

4.1 CONSULTATION FINDINGS

The findings of the stakeholder consultation includes a number of key themes.

4.1.1 *Concerns around current waste management practices*

- All stakeholders expressed concern at the way waste is currently managed on the Peninsula particularly around impacts on the health, the environment and visual amenity.
- Communities felt a lack of control over decisions around the structure and format of government delivered services in the region (including waste services). Empowerment and self-determination are an important vision for the central communities of Djarindjin and also Lombadina.
- There is a lack of guidance material available for better waste management practices for small settlements.
- There is an inability to recycle material given there are no services close by to receive material or any local markets for reuse.
- Stakeholders face difficulty in managing visitor expectations for recycling and waste disposal options

4.1.2 *Impacts of more waste and litter being generated within the region due to increase in tourists*

- Addressing local litter attitudes and practices is a priority.
- There is concern about the increased utilisation of resources (both human resources and landfill capacity) in needing to manage increased volumes of waste disposed.
- The current tourist waste disposal points/litter collection infrastructure is believed to be inadequate and needs improvement to manage the increase of waste expected. The was a desire amongst stakeholders for more roadside bins and/ or litter and waste dump points at key tourist spots and service centres where waste can be collected and taken off the Peninsula for disposal without accommodation providers needed to 'foot the bill'.
- The installation of caravan dump points needs to be considered as part of the planning for the region.
- Increasing number of dead animals on road (cows, camels, birds, wallabies etc) due to increased visitation that will need to be managed appropriately.

4.1.3 *Future waste management preferences*

- To improve health and environmental outcomes for the region there was a general preference for waste to be taken off the Dampier Peninsula for disposal at a better practice facility.
- Community preferences were aligned around ensuring that for any future option the following outcomes are attained:
    - Must be community led,

    - Needs to create training, education and employment opportunities within communities
    - Must look after country and the people that live on it (environmental protection)
    - Increases the recovery of resources and potential income streams for the communities
- More opportunity to recycle waste streams in accessible and convenient locations.
- Future options to also consider needs of smaller settlements and outstations.

4.1.4 *Importance of waste recovery and recycling*

- Waste recovery and recycling needs to be understood in context of basic hierarchy of needs.
- It is important but very challenging given the site isolation and lack of rules and standards.
- Litter management and education widely recognised as an important issue that needs to be addressed by all stakeholders.

4.1.5 *Education*

- There was unanimity amongst stakeholders regarding the need for more education on appropriate waste management for all stakeholders on the Peninsula. This includes:
    - Addressing littering and illegal dumping within communities
    - Need for better practice guidance to assist with the management and disposal of waste for small settlements including environmental emissions and management, operational efficiency and ways to minimise waste to landfill
    - Visitor education on how, why and where to dispose of waste appropriately on the Dampier Peninsula including messaging around waste minimisation and avoidance practices to reduce waste generated and needing to be handled.

4.2 CONCERNS AROUND CURRENT WASTE MANAGEMENT PRACTICES

'We live and work in a pristine environment and to keep it that way for future generations we need to walk the walk and weave better waste practices into our everyday practices'

All stakeholders expressed concern at the way waste is managed on the Peninsula particularly around impacts on the health, the environment and visual amenity.

4.2.1 *Communities*

Communities were concerned about the lack of options for managing their waste appropriately to ensure impacts on health and the environment can be managed. This included concerns around:

- Lack of access to appropriate equipment.
- Lack of options for managing bulk waste and large accumulation of metals, whitegoods and car bodies. These waste streams are generally removed from the waste stream to preserve landfill life and stockpiled for significant lengths of time until a solution for disposal is found.
- Whilst burning of waste was not a general preference, there is no other option due to lack of machinery to push up and cover waste daily, lack of available cover material, and the potential for spread of litter and disease if left uncovered.
- Little control over decisions around the structure and format of government delivered services in the region (including waste services). Numerous communities and outstations stated that they don't want government making decisions on their behalf. Some community representatives stated the need to remove money from government for delivery of municipal services and give back to community. Empowerment and self-determination was stated as important visions for the central communities of Djarindjin and also Lombadina.
- No management of hazardous waste streams where everything goes to landfill where it is burnt (including waste oil, batteries, e-waste, HHW, tyres, etc).
- Some government building contractors in the region dumping waste at community landfills where landfill space is precious or at illegal landfills (Mitre 11).
- The lack of options for fresh food supplies and lack of basic household amenities (fridges) means that a lot of packaging waste and beverage containers are generated.

4.2.2 *Government*

Government stakeholders were generally concerned with the inappropriate siting of community landfills and that many were close to where the communities water sources are drawn out of the ground, hence the potential to contaminate ground water. Concern was also raised for the safety of communities from the routine practice of burning of waste at landfills including risks around:

- HAZMAT (hazard material) fires (from explosives, compressed gases, flammable liquids and gases, poisons, corrosive substances, radioactive materials and infectious materials) can cause plumes of toxic smoke, affecting at risk residents in the adjoining communities.
- Fire from community refuse sites can escape into adjoining scrubland and possibly impacting community.
- The mixing of rubbish (all in same hole) creating the potential for unknown explosions/fires should they find an ignition source.

Government stakeholders also raised concerns regarding the absence of minimum environmental standards for landfill operations of small rural and remote communities and that this should be progressed and consistently applied across the state.

4.2.3 *Outstations*

Outstation settlements within the Beagle Bay area expressed concern that they need to manage their own waste with little assistance or guidance provided. Currently some of those consulted do not get any services from the Department of Communities (through KRSP) and feel 'left out' of any arrangements to ensure minimum standards of waste management can be maintained in these settlements.

Other general concerns about waste management methods reflected those of the bigger communities. It was also raised that many within the area don't have trailers or utes, and as such bulky material accumulates in yards or on properties. Road access to the community waste site in Beagle Bay is a significant issue in the wet and the poor condition of the road further impedes on their ability to remove waste from their property.

Septic waste disposal was also raised as a concern, with advice provided about the septage ponds for Beagle Bay being situated on tidal area which is usually completely flooded in wet season. The septage ponds are reported to fill up with water and overflow into the tidal streams which is used by locals for fishing.

4.2.4 *Tourism Operators*

Tourism operators expressed concern around:

- Environmental impacts of landfills.
- Lack of guidance available to guide the implementation of better waste management practices.
- The need to burn waste.
- Inability to recycle material given there are no services close by to receive material or any local markets for reuse and recycling.
- Managing the visitor expectations for recycling options and lack of awareness of how waste is managed within the region.
- One operator summarised their position as being in a position of conflict, trying to the best they can to preserve the pristine environment however with no options for better waste management methods and the high costs associated with better practice -' *it costs a lot to be green, however we do the best we can with what we have*'.
- The amount of waste generated on the Peninsula given the lack of access to fresh supplies. Tourists stock up before they come and leave the packaging waste and beverage containers behind with accommodation providers as they have nowhere to dispose of it.
- Some felt irritated by the lack of access to better waste services given the high amounts of rates paid annually to the Shire of Broome. Collecting and transporting waste and managing the landfill is an additional duty for staff and comes at additional cost to the business.
- Keeping wildfires out of the landfill is extremely difficult.

Most stakeholders raised the amount of roadside litter on the Cape Leveque Road being an issue that needs to be addressed, and the need for more roadside bins to be put in place as part of the road sealing to prevent this from occurring.

4.3 CONCERNS AROUND INCREASES IN TOURISM AND THE CORRESPONDING WASTE AND LITTER IMPACTS

Many stakeholders on the Peninsula were supportive of the road and the benefits year round access will bring as well as the potential business development opportunities.

4.3.1 *Communities and outstations*

Communities and outstations reflected similar views that whilst waste and litter may increase, local litter attitudes and practices were of greater concern with many stating there is a significant need for litter awareness and education in communities around proper disposal of waste and care in country. *'If they don't care for country, how do you expect tourists to do the right thing.'* Proper nappy disposal was a particular issue of concern noted by most communities.

General concerns around tourism waste varied from community to community based on whether services were offered to tourists. These concerns include:

- Increased utilisation of resources (both human resources and landfill capacity) in needing to manage increased volumes of waste.
- The lack of dump points on the Peninsula for disposal of toilet waste from caravans.
- Lack of feedback to communities from working groups as to how waste at roadside rests and recreational spots is intending to be managed as part of the road upgrade.
- Managing impacts of illegal camping by tourists and the flow on effects on country particularly fire and litter.

Outstations consulted within Beagle Bay were generally positive about the impacts the road sealing will bring to the communities. The main concerns reflected the views of the larger communities regarding litter issues within the communities being a greater priority for action than litter from tourists. Additional concerns were raised regarding the increase in resources needed to collect and manage tourism waste and the impacts on the trench life of their small landfills for those outstations providing accommodation options.

4.3.2 *Tourism Operators*

Tourism operators were generally optimistic regarding the road sealing the positive implications that should have on business operations. Many were, however, concerned about the significant influx of day visitors and the lack of public bin services to deal with this waste. One larger operator stated they do not have the capacity or infrastructure to handle the rubbish coming with these people in addition to their own generated from within the resort. In addition to day visitors, waste from extended visits was also raised as problematic. Tourists leave waste for operators to deal with, which is stated to be less than ideal given the method in which this waste is disposed (i.e. burnt).

Non-government stakeholders identified concerns around the following key topics:

- Current tourist waste disposal points/litter collection infrastructure is not appropriate and needs improvement to manage the increase of waste expected. The need for more roadside bins/ litter waste dump points and key tourist spots where waste can be collected and taken off the Peninsula without the accommodation providers needed to 'foot the bill'.
- Dumping of black water will occur illegally and that the installation of dump points hasn't been considered as part of the resealing of the road.
- Dumping of tyres is already believed to be a significant issue and will increase as the road opens given more cars and caravans will be on the road. They are littered everywhere - if they do make it back to a landfill they are generally burnt. There must be options for proper collection and disposal of tyres.
- Increasing number of dead animals on road (cows, camels, birds, wallabies etc) due to increased visitation. There needs to be a procedure/mechanism for animals to be dragged off road so to reduce road safety implications.

4.4 PREFERENCES FOR FUTURE WASTE MANAGEMENT WITHIN THE REGION

Stakeholders were asked about their preferences for future waste management within the region.

4.4.1 *Communities*

The communities were aligned in their preferences around ensuring that for any future option/s the following outcomes are attained:

- Must be community led.
- Needs to create training, education and employment opportunities within communities.
- Must look after country and the people that live on it (environmental protection).
- Increases the recovery of resources and potential income streams for the communities.

Community provided suggestions for future waste management options included a central better practice landfill being run by all four communities, development of a number of transfer stations/recycling depots which are serviced by a network of trucks picking up and taking waste and recyclables back to Broome, or a combination of both being a network of transfers stations and new best practice landfill on the Dampier Peninsula.

4.4.2 *Outstations*

The outstations at Beagle Bay preferences reflected the larger communities and included the need to ensure any option is accessible and convenient for outstations taking into consideration many don't have access to utes, trailers or plant to move large bulky waste and car bodies from their sites. They reiterated that given their unique situation with a significant number of tourism operators, outstations and settlements being situated in tight cluster that their needs are considered as part of any future option.

4.4.3 *Tourism Operators*

Tourism and commercial operators suggested they would like to see improvement in the way waste is handled given the negative impacts it has on the environment and amenity in the region ('*the environment is fundamental to supporting the many aspects of business we are involved in and therefore keeping it in pristine condition is critical to the continued and ongoing success of the region.*') with some operators stating that waste should not be disposed of on the Dampier Peninsula.

Concerns were expressed that whilst an improvement is required someone will have to pay for it and that current communities and operators should not be lumbered with that burden. One operator stated that the Shire should be responsible for provision of new services given the rates paid annually. Preferences for future waste management included:

- Periodic collection options for recycling.
- Options for disposal of hazardous waste including oils and batteries needs.
- Collection points for waste on the main road to ensure waste and litter can be appropriately disposed
- Options for cardboard recycling.
- A central location that operators can go and dump their rubbish and it is collected and run back to Broome at least twice a week by the Shire.
- More opportunity to recycle waste streams in accessible and convenient locations.

4.4.4 *Government*

Government stakeholder preferences reflected the following requirements:

- Any future scenario is community led as much as possible and has the potential for income generation and increased employment opportunities.
- The need for the development and consistent implementation of minimum environmental standards for rural and remote communities and settlements landfills.
- The closure of existing community landfills and for all refuse to be transported to the main landfill in Broome to be properly disposed.
- The development of a central landfill and transfer/drop-off hubs within communities and along main routes that can be serviced regularly. Recycling can also be pulled out at required intervals and brought back to Broome.
- Responsibility for capital and ongoing operation costs needs to be addressed.
- Future service scenarios need to be addressed collaboratively and collectively by all stakeholders, not a piece meal approach.

Non-government stakeholder preferences were around better health and environmental outcomes for communities with most stating the waste should be transferred off the Peninsula.

4.5 IMPORTANCE OF WASTE RECOVERY AND RECYCLING

Communities felt that whilst good waste management practice is integral to the protection of public health and the environment, waste recovery and recycling was not as important. This needs to be understood in context of basic hierarchy of needs which was summarised in a statement provided by the Djarindjin community '*when you don't have a fridge or a mattress, recycling is not high up the list'*.

Tourism operators stated that whilst it is important, it is very challenging given the site isolation and lack of rules and minimum standards.

Litter management and education was widely recognised as a critical issue that needs to be addressed by all stakeholders.

4.6 EDUCATION

There was consensus amongst stakeholders regarding the need for more education of businesses, communities and visitors to the region regarding better management of waste and litter.

'Yes absolutely. There is a mentality up here of dump it or burn it.'

'Yes - all sectors need educating. Particularly providing culturally appropriate messaging about litter and caring for country. Our property is very large and we have a creek on our property which is accessed by local people. The litter left behind is very concerning. We have provided bins but they just get set alight. Elders try very hard to educate the youth and are very proactive about caring for country.'

Communities and outstations consulted believed waste education needs to be undertaken as a priority to address littering issues within communities. It was stated that there is a need to educate communities that the inappropriate disposal of waste and litter is dangerous to health and dangerous to country. It was also noted that appropriate behaviours need to be displayed and role modelled and inappropriate littering behaviours need to be 'called out' as well as a need to stimulate more community involvement and responsibility in regard to litter.

Many stakeholders felt that visitors need to be informed of the lack of waste services in the region and of the need to take rubbish with them when they leave to reduce the impacts of disposal of this waste on the 'pristine' environment. Additionally, visitors need education as to how to reduce and avoid waste generation as part of planning for and holidaying on the Peninsula. Adequate signage is also needed as to the location of waste drop off locations and/or requirements upon entering the region.

A common theme from outstations and commercial and tourism providers was the need for better practice guidance to assist with the management and disposal of waste generated within their operations. This includes environmental emissions and management, operational efficiency, and ways to minimise waste to landfill.

5 CONCLUSIONS

Based on the assessment of existing services and infrastructure, stakeholder consultation and project objectives, a number of key conclusions can be drawn.

Waste management on the Dampier Peninsula is basic. All communities, outstations and tourism operators manage their own waste and there is no coordination. Many landfills are not sited appropriately, do not comply with minimum regulatory operational requirements and are likely to be impacting on the health of communities and the environment.

There is minimal recovery of resources occurring. Litter within communities and along roadways is also a significant concern. Increasing tourists to the area will only amplify the impacts and issues around inadequate waste management. To meet the objectives of the DPWMP, waste and litter management practices need substantial improvement

Key conclusions are provided to follow.

5.1 WASTE DATA

- There is currently no data available about waste types or quantities generated on the Dampier Peninsula.
- The lack of waste data means it is difficult to manage and plan for current and future waste services.

5.2 LEGACY WASTE

- Illegal landfills at 'Mitre 11' near Ardyaloon and Beagle Bay are not approved and do not comply with *Environmental Protection (Rural Landfill) Regulations 2002.*
- The impact on health and the environment from the illegal landfills is unknown.
- There are legacy waste stockpiles outside Ardyaloon landfill. Asbestos is understood to be contained within the material. The legacy waste stockpiles present serious health and environmental risks.

5.3 LANDFILL SITING

- Many of the community landfills are incorrectly sited within the minimum required buffer distances to protect community health. Given the landfills are unlined there is a significant risk that the landfill sites are contaminating potable water supplies.
- Numerous previous government reports indicate the need for further investigation to ascertain groundwater impacts from landfills and/or require the relocation of existing landfills.
- None of the landfills have groundwater monitoring bores. Therefore the impact of the waste on groundwater and potable water supplies is unknown and unquantified.

5.4 LANDFILL OPERATIONS

- Given the lack of guidance, operational constraints and isolated location, the landfills visited were generally well operated. However, they do not meet the minimum legislative requirements, the waste is regularly burnt including hazardous materials which can impact on health and the environment.
- There is little or no guidance available, or training for the landfill operators.
- There is a lack of process or system for the management of bulk waste streams, recyclable material or hazardous waste streams.
- Public health and environmental impacts of the landfills is unknown.

5.5 LITTER MANAGEMENT

- There is a litter problem on the Peninsula and there is concern that this will get worse with the road sealing.
- Litter issues affect many of the Dampier Peninsula stakeholders.
- Addressing local litter attitudes and practices and legacy litter issues (roadside litter on the Cape Leveque Road) was deemed a priority by many stakeholders.

5.6 FUTURE WASTE MANAGEMENT PREFERENCES

- All stakeholders expressed concern at the way waste is currently managed on the Peninsula particularly around impacts on the health, the environment and visual amenity.
- To improve health and environmental outcomes for the region there was a general preference for waste to be taken off the Dampier Peninsula for disposal at a better practice facility.
- The cost implications of constructing and operating a lined landfill on the Dampier Peninsula is prohibitive given the low volumes of waste generated. Therefore, if the waste is to be disposed of in line with best practice, it will need to be transferred from the Peninsula to a lined landfill.
- Community preferences for future waste management systems include the need to be community led, look after Country, and create training, education, employment and income opportunities within communities.
- More opportunity to recycle waste streams in accessible and convenient locations is desired.
- Future options must consider the needs of smaller settlements and outstations.
- Concerns were expressed that whilst an improvement is required, the high unit cost of waste management operations in remote areas mean that it may be prohibitive for commercial operators to meet best practice standards.

5.7 TOURISM WASTE AND LITTER

- Many stakeholders on the Peninsula were supportive of the sealing of the Cape Leveque Road and the benefits year-round access will bring as well as the potential business development opportunities.
- Increasing tourism due to the sealed road will increase the responsibilities and costs for tourism providers and commercial operators to manage the waste.
- Current public place waste and litter disposal is inadequate to meet the needs and expectations of visitors.

5.8 CONSTRUCTION AND DEMOLITION WASTE

- The significant amount of construction waste illegally dumped in the region indicates that a significant quantity of construction and commercial waste is not being managed in line with the regulatory requirements.

5.9 BETTER PRACTICE MANAGEMENT OF SMALL RURAL LANDFILLS

- Many stakeholders indicated the need for better practice guidance for landfill management. Guidance would minimise the impacts to the environment and to improve the efficiency of operations.
- The Dampier Peninsula landfills that that are within the scope of the Environmental Protection (Rural Landfill) Regulations, are in breach of many conditions within the regulations.

5.10 STAKEHOLDER COLLABORATION

- Responsibility for the management of waste and litter in the region is spread across many stakeholders and dependent on land ownership/vesting.
- There is little collaboration between the numerous stakeholders relating to waste management on the Peninsula.

6 ACTION PLAN

There is a great opportunity to improve waste management on the Dampier Peninsula. The action plan below provides a framework to guide the stakeholders towards the delivery of sustainable waste management services for the region.

6.1 GROUNDWATER IMPACT INVESTIGATION

Action	**Undertake a hydrogeological investigation of existing community landfills to ascertain the impacts on groundwater and potable water sources**
Priority	**Urgent**
Rationale	Given the landfill operational practices, uncontrolled nature of disposal, illegal fires and poor siting there is a high risk that groundwater, including potable water sources has been impacted by the landfills. These risks to public health and the environment are yet to be monitored, quantified and appropriate action taken.
Implementation	• Determine suitable locations for the installation of groundwater monitoring bores at each community landfill. • Install groundwater monitoring bores. • Undertake a hydrological assessment to confirm groundwater depth, direction and quality (including microbiological and chemical) and the risk to potable water supplies. • Take appropriate action based on the results of the assessment and impacts on groundwater and potable water sources • Develop an ongoing monitoring program to monitor groundwater quality beneath landfills.

6.2 REMEDIATION OF ILLEGAL AND LEGACY WASTE AND LITTER ISSUES

Action	**Closure of illegal landfills and address legacy waste and litter issues**
Priority	**High**
Rationale	Illegally disposed waste impacts is deemed an offence under the Environmental Protection Act and Litter Act. In addition, it increases the risk of impacts on public health and the environment, harms wildlife, impacts on visual amenity and can undermine the spirit and pride of a community. 'Waste attracts waste' and the longer these issues remain visible, the quantity of illegal waste will increase, along with the health risks, environmental impacts and cost of remediation. The illegal landfills near Ardyaloon (Mitre 11) and Beagle Bay, legacy waste stockpiles outside of Ardyaloon and litter and roadside waste (including abandoned cars) along the Cape Leveque road needs to be addressed.
Implementation	• Assess each site to estimate the quantity and types of wastes to be disposed of or recovered. Given the mix of waste disposed at these sites may contain asbestos and other hazardous material, further advice should be sought as to the most appropriate method to dispose of this waste. • Organise the removal and disposal or recovery of waste and litter from these locations. • Rehabilitate these areas and restrict access to illegal landfill sites to prevent further dumping of materials. • Education must be provided to the Beagle Bay community to make them aware of the impacts of illegal dumping, the changes being introduced and to encourage the use of the approved community landfill. • Waste from construction activities needs to be removed from Dampier Peninsula. This can be addressed through action **6.10** below.

6.3 WASTE DATA COLLECTION

Action	**Undertake a waste data collection project for waste generated on the Dampier Peninsula**
Priority	**High**

Rationale	For effective planning and monitoring of waste management in the Peninsula, reliable waste data is required. There is no waste type or quantity data collected at communities and settlements on the Dampier Peninsula.
Implementation	Landfill facilities are unstaffed. Until facilities are staffed and data can be collected at a gatehouse alternative methods are required to provide more accurate data for economic and operational assessments. This could include: • Bin audits to determine the composition of the waste and bin weights • Recording bins lifted (collected) per week over a given period along with numbers and description of types of bulk waste collected • Weighing collection trucks/vehicles using mobile weigh cells. This data, when combined with the number of bin lifts in each weighed load will provide a more accurate value for the waste produced per household.

6.4 DEVELOP A COORDINATED WASTE COLLECTION AND DISPOSAL SYSTEM

Action	**Develop and introduce a coordinated waste collection and disposal system**
Priority	**High**
Rationale	To minimise health and environmental impacts from waste and litter and to align with the objectives of the DPWMP, there is an opportunity to introduce improved waste management for the Peninsula. This system should include coordinated collection services and disposal of waste at an appropriately sited, lined and managed landfill. The cost of constructing and operating a lined landfill on the Dampier Peninsula is prohibitive due to the low quantity of waste generated. As such waste must be transferred from the Peninsula, most likely for disposal at the Shire of Broome's proposed lined landfill.
Implementation	• Maintaining ongoing community engagement throughout the development of a new system. • Define the waste streams and quantities to be managed through the system (i.e. kerbside waste, hard waste, greenwaste, etc), • Define servicing locations. Services may just apply to towns (communities) or may include servicing of some smaller settlements, outstations, and commercial/tourism operations. Locations are likely to be guided by settlement population and road access. • Develop an efficient waste collection and transport system that will enable waste to be collected and transported to the Broome facility. Transport costs are a significant portion of the operational cost for collection services. Collection vehicle types and infrastructure options (e.g. bins sizes, compaction equipment) are largely reliant on the volume and type of waste to be collected. • Define service costs (capital and operational), funding responsibility and management responsibilities • Evaluate service delivery options that will help in maximising local economic development and employment opportunities • Develop a culturally appropriate community education program to support the system requirements.

6.5 FEASIBILITY STUDY FOR WASTE AND RECOVERY CENTRES

Action	**Undertake a feasibility study for the establishment of waste and recovery centres**
Priority	**High**
Rationale	Kerbside domestic waste may be transferred from the Peninsula in the future (**Section 6.5**). However bulk waste, hazardous waste (i.e. e-waste, waste oil, batteries, tyres) and recoverable material streams would still require facilities where these materials can be dropped-off, consolidated and stored prior to transport for disposal or reprocessing. The feasibility of establishing a network of waste and recovery centres (W&RC) to support the coordinated waste collection and disposal system should be determined. A standard design for the waste and recovery centres can be developed, which will make it easier for operations and customers to be familiar with the layout, and costs associated with servicing the centres can be minimised through shared contracts and/or plant costs.

	The W&RC will allow users to drop off materials in dedicated areas/containers with appropriate signage including: • Facilities to collect materials delivered to the site for recovery (e.g. waste oil, batteries, bins for recyclable material, scrap metal, packaged recyclables, tyres) • Stockpiling of material to be processed either on site or collected and processed at the Broome landfill including (scrap metals, greenwaste, construction and demolition material) • Recyclables such as cardboard, plastics, aluminium cans etc. • Reuse area for reusable material and goods Decisions on which materials to segregate for recycling should be made based on as analysis of markets, transport costs, savings in disposal costs and environmental benefits.
Implementation	The feasibility assessment of establishing waste and recovery centres on the DP will include the following: • Define the waste streams to be managed through the centres. • Define locations for establishment of the centres. Locations are likely to be guided by catchment population and road access. • Develop a standard design for the W&RC that reflect local factors such as power availability, waste quantities, available plant and repair / servicing facilities. • Define a transport system and servicing configuration that will enable waste to be collected and transported off the Peninsula as efficiently as possible. • Define service costs (capital and operational), funding responsibility and management responsibilities • Evaluating service delivery options that will help in maximising local economic development and employment opportunities • Define costs, resources and actions to maintain ongoing community engagement, acceptance, education and awareness of changes.

6.6 CLOSE AND REHABILITATE COMMUNITY LANDFILLS

Action	**To close and rehabilitate community landfills**
Priority	**Medium**
Rationale	The implementation of a new waste management system that transfers waste from the Peninsula will result in the closure and rehabilitation of community landfills, which must be completed in line with legislative requirements.
Implementation	• Develop a Post Closure Management Plan (PCMP) to guide closure and capping requirements for community landfills based on the Environmental Protection (Rural Landfill) Regulations 2002 (even if the landfills are not closed, the production of a PCMP is a requirement of the regulations). • Submit the PCMP to the Minster of Environment for approval in line with requirements of the regulations. • Implement the PCMP for each facility including post closure monitoring requirements. • Restrict access to facilities to ensure illegal waste dumping does not occur

6.7 DEVELOP A MULTI STAKEHOLDER WASTE AND LITTER WORKING GROUP

Action	**Develop a multi stakeholder waste and litter working group to implement outcomes of the DPWMP**
Priority	**High**
Rationale	Waste and littering impacts on and affects many of the Dampier Peninsula stakeholders. Responsibility for the management of waste and litter in the region is spread across many different stakeholders dependent on land ownership/vesting. Each stakeholder has a share of responsibility for managing waste and litter in the region. Without coordination, stakeholders are not usually familiar with each other's scope of work, statutes, cultures, issues and attitudes, even though they serve common customer groups. These challenges all contribute to inadequate service efficiency and effectiveness which in turn increases the impacts from waste and litter upon the region.

	Developing a multi stakeholder working group to improve waste management and amenity on the Dampier Peninsula will contribute to holistic health and environmental outcomes for the region.
Implementation	The tasks required to progress this action include: • Identify a lead agency to manage the group • Identify relevant stakeholders with a strong interest in and ability to influence the goals of the group and their current scope of responsibility. • Set up charter of operation of the working group including as a minimum: vision, objectives, expected outcomes, by whose authority they are working, ground rules for participation, financial contributions (if required), reporting requirements. • Formalise group. • Commence meetings, identify issues for resolution and formulate actions to progress required outcomes. • Annually review and monitor progress and outcomes achieved by group to ensure effective use of group resources.

6.8 DEVELOP A DAMPIER PENINSULA LITTER STRATEGY

Action	**Develop and implement a multi stakeholder litter strategy for the Dampier Peninsula**
Priority	**Medium**
Rationale	Given litter impacts on many stakeholders within the region a collaborative approach is required to drive any substantial change and achieve successful outcomes. The strategy will require several different approaches and should include: • Identification of problem areas, issues and concerns. • Identification of stakeholder responsibilities for management of litter • Assessment of infrastructure required to facilitate proper disposal of materials. • Development of education, awareness and behaviour change initiatives to prevent the creation of litter and to achieve long-term positive behavioural change. • Identification of enforcement strategies to change behaviour and reinforce the commitment to a community with less littering and illegal dumping (i.e. reinstatement of community by-laws). • Incentives to encourage people to maintain litter-free environments. • Opportunities for stakeholder collaboration and partnerships to build consistent and effective approaches. • Identification of training and development opportunities for stakeholders to increase their level of expertise regarding effective management of litter and illegal dumping. • Broad stakeholder support and promotion of the Djarindjin CDS refund point should also help to reduce the amount of beverage containers littered throughout the region.
Implementation	In line with **Section 6.6**, the multi stakeholder working group will progress development of a litter strategy to address issues and practices on the region. Steps for development include: • Obtain/identify suitable resourcing to develop the strategy • Develop the strategy • Implement the strategy providing relevant resourcing where required. • Monitor the implementation of the strategy through the Dampier Peninsula Waste and Litter working group • Provide for annual reporting of outcomes • Regularly review of the strategy. The Keep Australia Beautiful Council Western Australia (KABC) provides Community Litter Grants for projects and initiatives which aim to change littering behaviour.

6.9 IMPROVE MANAGEMENT OF TOURISM WASTE

Action	**Implement improved practices for management of tourist waste**
Priority	**High**
Rationale	Increased tourist numbers in the region will increase responsibilities and costs upon tourism providers and commercial operators in managing this waste. There are very few options for tourists to dispose of waste appropriately.

Implementation	• Review options and adopt a preferred approach to manage waste from public places, roadside rests, recreational and tourist locations. • Improve education and engagement with visitors to the region around waste minimisation, avoidance (i.e. reducing plastics and packaging waste) and recycling options and locations when planning for and preparing to visit will help to reduce waste generated and needing to be handled on the Dampier Peninsula. • Increase promotion of the Djarindjin and Broome CDS refund points to encourage visitors to reduce beverage containers littered and disposed on the Peninsula • Investigate options for development of agreements with communities to manage litter and waste on main access roads (including removal of dead animals), roadside rest areas, recreation and tourism locations for financial return.

6.10 DEVELOP BUILDING CONTRACTOR GUIDELINES

Action	**Develop a set of operating guidelines in relation to the disposal of waste products, construction waste and demolition debris from construction and demolition projects within communities on the Dampier Peninsula.**
Priority	**High**
Rationale	The significant amount of construction waste disposed illegally in the region indicates that waste from construction and commercial operations is not being handled satisfactorily.
Implementation	To control and minimise ongoing waste generation from on-site construction within communities, a set of operating guidelines must be prepared in relation to the disposal of waste products, construction waste and demolition debris on the Dampier Peninsula. These guidelines must be documented in all government construction contracts for all works within communities and government related facilities. The construction contracts must indicate that all waste must be removed from Dampier Peninsula. Weighbridge receipts from the Broome waste management facility should be supplied to as part of invoicing requirements to ensure this practice is adhered to, together with on-site audits towards the end of construction projects that completed by the organisation managing the contract.

6.11 REGULATION OF LANDFILLS UNDER THE ENVIRONMENTAL PROTECTION (RURAL LANDFILL) REGULATIONS 2002

Action	**Ensure landfills that fall within the scope of the *Environmental Protection (Rural Landfill) Regulations 2002* are appropriately managed.**
Priority	**Medium**
Rationale	The *Environmental Protection (Rural Landfill) Regulations* 2002 apply to premises which handle more than 20 but less than 5,000 tonnes of waste per year for burial. These regulations provide a series of measures and actions that must be met.
Implementation	Ensure landfills that fall within the scope of the Environmental Protection (Rural Landfill) Regulations are appropriately managed to mitigate emissions on health and the environment and met the minimum regulatory requirements by DWER.

6.12 DEVELOP BETTER PRACTICE GUIDANCE FOR MANAGEMENT OF WASTE FROM SMALL SETTLEMENTS

Action	**Development of better practice guidance for small settlements in relation to the management of waste.**
Priority	**Low**
Rationale	There are many small settlements and outstations and commercial operators on the Dampier Peninsula (and throughout Western Australia) which due to their size and remote location will likely not have their waste collected. Many of these settlements will produce less than 20 tonnes of waste per annum fall and as such fall outside the scope of *Environmental Protection (Rural Landfill) Regulations.* There is a lack of better practice guidance for these smaller facilities. Many of these stakeholders stated the need for advice and guidance to operate their landfills and minimise negative impacts on the environment and to achieve better efficiencies in how

	they manage waste generated. This includes guidance on options to avoid, minimise, recover and reuse waste materials.
Implementation	• Confirm that DWER is responsible for the development of guidance material • Develop guidance material • Distribute guidance material • Provide ongoing support and guidance as required

6.13 EMERGENCY WASTE MANAGEMENT PLANNING

Action	**Develop an Emergency Waste Management Plan or protocol for the communities of the Dampier Peninsula**
Priority	**Low**
Rationale	The implementation of a new waste management system is likely to result in the closure of most community landfills on the Peninsula. Therefore the ability to dispose of waste locally from an emergency or natural disaster will be significantly reduced. The Peninsula is regularly impacted by cyclones and natural disaster impacts can generate significant quantities of waste. Emergency waste issues can have significant environmental and public health impacts, place an additional financial strain on those tasked with recovery, and can impede community recovery. Before communities can rebuild after emergencies, waste generated from these incidents must first be safely removed and disposed. Following a disaster or emergency, there is little time for assessment and planning. The lack of planning can lead to costly and slow recovery and increase health and safety risks.
Implementation	As part of emergency and recovery planning for the communities of the region, an emergency waste management sub-plan should be developed, including consideration of the type and risk of likely emergencies, estimates of types and amounts of waste, funding responsibilities and resources, identifying locally and regionally available plant, equipment, disposal, recycling and storage capacity.

7 REFERENCES

ABS 2016 Census. (n.d.).

ASK Waste Management (2019). ***Kimberley Regional Waste Management Plan.*** Prepared for the Shires of Broome, Derby/West Kimberley, Halls Creek and Wyndham East Kimberley.

ATEA Consulting (2020). ***Interim Report Dampier Peninsula Visitor Pass Options Development.***

Centre for Appropriate Technology (2006). ***Draft North of the Causeway Waste Management Project and Waste Management Plan***.

Department of Planning, Lands and Heritage (2012). ***Aboriginal Settlements Guideline 3: Layout Plan Exclusion Boundaries.***

Department of Planning, Lands and Heritage. ***Ardyaloon Layout Plan 2. Background Report. Amendment 11 (2017)***. Available online at: https://www.dplh.wa.gov.au/getmedia/782cab1c-b3bd-46e1-ba82-e11c51c15a5e/LOP_Ardyaloon_LP2_Amendment_11_Report

Department of Planning, Lands and Heritage***. Beagle Bay Layout Plan 1. Background Report. Amendment 9 (2018)***. Available online at: https://www.dplh.wa.gov.au/getmedia/618310ca-b42e-41c6-8b62-377b5049188c/LOP_Beagle_Bay_LP1_Amendment_9_Report

Department of Planning, Lands and Heritage***. Djarindjin Layout Plan 3. Background Report. Amendment 9 (2016).*** Available online at: https://www.dplh.wa.gov.au/getmedia/03efe8c8-55c7-47ae-9af3-c0bddc0f8b00/Djarindjin-LP3-Amendment-9-Report

Department of Planning, Lands and Heritage. ***Lombadina Layout Plan 3. Background Report. Version 11 (2020)***. Available online at: https://www.dplh.wa.gov.au/getmedia/f08629a0-cc3d-4b83-beb8-ef8c54fc753f/Lombadina-LP3-Draft-Version-11-Report

Government of Western Australia. Regional Services Reform Unit. ***Resilient Families; Strong Communities. Essential and Municipal Services Upgrade Program***. Available online at https://regionalservicesreform.wa.gov.au/p/essential-and-municipal-services-upgrade-program

KPP Business Development. (2017). ***Dampier Peninsula Visitation & Tourism Infrastructure Assessment.***

Shire of Broome (2014) ***Local Planning Strategy***

Swinburne University (2017). ***Waste Aid – A gap to close.***

WA Waste Authority (2018). ***Waste Strategy2030***. Available online at http://www.wasteauthority.wa.gov.au/

WA Waste Authority (2018). ***Waste Avoidance and Resource Recovery (WARR) 2030 Action Plan***. Available online at http://www.wasteauthority.wa.gov.au/

Western Australian Planning Commission (2015). ***Dampier Peninsula Planning Strategy.***

8 APPENDIX

Stakeholder consultation list

Stakeholder	Contact	Consultation method
Beagle Bay Community	Mary O'Reeri	Visit
Lombadina Community	Darrell and Caroline Sibasado	Visit
Djarindjin Community	Nathan McIvor	Visit
Ardyaloon Community	Col Woodman	Visit
Kooljaman Resort	Maree Milne	Phone and visit
Cygnet Bay Pearls	Duncan Smith	Phone
Embalgun (Smithy Seaside Adventures)	William Smith	Phone
Gumbarnun (Gumbanan Wilderness Retreat)	Jarrade	Phone
Goombaragin (Goombaragin Eco Retreat)	Kathleen and John Cox	Phone and visit
Gnylmarung	Alphonse Cox	Phone and visit
Banana Wells (Banana Wells Getaway)	Carrie Wright	Phone
Arrow Pearls	Steve Arrow	Phone
Mercedes Cove	David Channing	Phone
Willie Creek Pearls	Paul Birch	Phone
Department of Communities	Jacinta Thompson	Phone
Department of Water and Environmental Regulation	Damian Thomas	Phone
Department of Fire and Emergency Services	Vance Lee	Phone
Shire of Broome (Environmental Health & Rangers)	Stuart Martin	Phone
Main Roads Western Australia	Carmen Murdock	Phone
Roadwise (WALGA)	Greg Hayes	Phone
Kimberley Regional Service providers	Rob Immes	Phone
Cleanaway	Russell Clauston	Phone
Broome Visitor Centre	Mel Virgo	Phone

Some outstation settlements were closed due to COVID 19 implications and were unable to be contacted. These included:

Middle Lagoon
Munget (Whale Song)
Bindurrk Hideaway
Country Downs Station
Mudnann (Contact was in Broome for Funeral on planned meeting date)