Ngaanyatjarra Lands Waste Management Plan

Shire of Ngaanyatjarraku

March 2021

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 Shire of Ngaanyatjarraku staff that provided information and assistance in the development of this report.

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The Ngaanyatjarra Lands Waste Management Plan (WMP) has been prepared by the Shire of Ngaanyatjarraku (the Shire) and ASK Waste Management (ASK) to guide the direction and delivery of sustainable waste management services in the Ngaanyatjarra Lands into the future.

The Shire is located within the traditional lands of the Ngaanyatjarra people of the Central Desert of Western Australia.

First Nation peoples represent 86% of the population (approx. 1,606 total), where less than 10% of households speak English at home with the most common languages being Ngaanyatjarra (60.7%) and Pitjantjatjara (11.7%).

The Ngaanyatjarra Lands cover approximately 160,000 square kilometres and are home to a diverse range of desert flora and fauna living amongst the region's distinctive red sands, water holes, rocky escarpments, and ranges.

The Shire is in a unique position as they do not have rateable properties, making them reliant on grant funding for approximately 90% of annual revenue.

Also unique to the Shire is that waste management services to its remote aboriginal communities are not funded by the Remote Essential and Municipal Services (REMS) Program which provides funding to other remote aboriginal communities in the state.

Current Issues

Due to inconsistent and insufficient funding, none of the ten communities in the Shire will have waste management services in 2021/22.

In a recent visit, ASK consultant Samuel Green observed the following:

- Burning of waste a common practice, including plastics, batteries, tyres, e-waste, motor oil, etc.
- Poor siting and operation of waste sites presenting environmental health risks to the local residents.
- Exposed asbestos, much of it at risk of being further fragmented.
- Approximately 2,500 abandoned vehicles requiring removal.
- Wind-blown waste and/or dumping grounds in areas as wide as 150 hectares, often within 3kms of residential housing.

These issues present severe human health risks.

Warburton waste sites


Asbestos water pipes and abandoned vehicles


Tipped burnt waste bin

Community Voices

Residents of the Ngaanyatjarra Lands expressed:

- Communities want regular waste collection services.
- Solutions must provide local employment opportunities.
- Conventional plastic 'wheelie' bins would be preferred to steel drums as they would be easier to move and collect and would discourage the practice of burning household waste.

EXECUTIVE SUMMARY

- New bins could be painted by children to create sense of ownership and minimise damage to and burning of bins.
- Waste education is important and necessary, particularly regarding health hazards of waste.
- Waste from construction and demolition activities is significant and problematic.
- Plant is not available and/or serviced regularly to provide effective services.
- Removal of scrap vehicles from communities would be supported if in close consultation with the community to ensure that only unwanted fully salvaged vehicles are removed.

Recommendations

ASK recommends that stakeholders on the Ngaanyatjarra lands urgently progress the following actions:

- Develop and implement a weekly domestic waste collection service.
- Provide assistance to smaller communities self-managing waste collection services.
- Develop and implement a multi stakeholder waste education and community engagement strategy.
- Plan and implement a program to provide dedicated waste plant to communities on a scheduled basis.
- Contaminated site investigations and remediation of landfills, legacy waste sites, and scrap vehicle storage areas

Securing long-term funding is essential in delivering all the recommendations.

Cost estimates

Implementation of actions detailed in the WMP are estimated to require approximately $13.1M of capital investment over a four year period and annual costs (includes amortised capital costs and annual operational costs) ranging from $1.5M to $3.6M per annum.

The cost estimates assume that all regulatory and legislative requirements will be met in the delivery of the waste services. This is likely to result in higher service delivery costs than can be achieved through the REMS Program which does not require compliance with state legislation.

Project Outcomes

Implementation of the WMP will deliver the following outcomes:

- Significantly reduced environmental health risks to the Ngaanyatjarra people.
- Creation of 13 FTE positions by 2024/25.
- New economic opportunities in the region associated with infrastructure development and service delivery.
- Improved community amenity.
- Compliance with the *Environmental Protection (Rural Landfill) Regulations 2002*, *Environmental Protection Regulations 1987*, and *Environmental Protection Act 1986*.

1 INTRODUCTION

The Shire of Ngaanyatjarraku (the Shire) engaged ASK Waste Management (ASK) to prepare a waste management plan for the Ngaanyatjarra Lands, to guide the direction and delivery of sustainable waste management services into the future.

The Shire is a unique local government in that it does not have rateable properties as its boundaries are contained within the traditional lands of the Ngaanyatjarra people of the Central Desert of Western Australia. The 99-year leases held by the Ngaanyatjarra Land Council on behalf of the traditional owners also form the boundaries of the Shire of Ngaanyatjarraku.

Waste management services on the Ngaanyatjarra Lands have historically proven difficult to deliver and sustain due to the high cost of service delivery, harsh environmental conditions, extreme remoteness, and lack of long-term funding mechanisms.

1.1 PURPOSE OF THE NGAANYATJARRA LANDS WASTE MANAGEMENT PLAN

The purpose of the Ngaanyatjarra Lands Waste Management Plan (NLWMP or the Plan) is to provide a framework to deliver sustainable waste management services to the region.

1.2 OBJECTIVES

The objectives of the NLWMP are to:

- Provide financially sustainable waste services to the Ngaanyatjarra communities.
- Protect the Ngaanyatjarra people from health impacts caused by waste.
- Protect the Ngaanyatjarra lands from environmental impacts caused by waste disposal.
- Improve community amenity.
- Increase local employment and economic opportunities.
- Meet regulatory requirements.

1.3 THE SHIRE OF NGAANYATJARRAKU

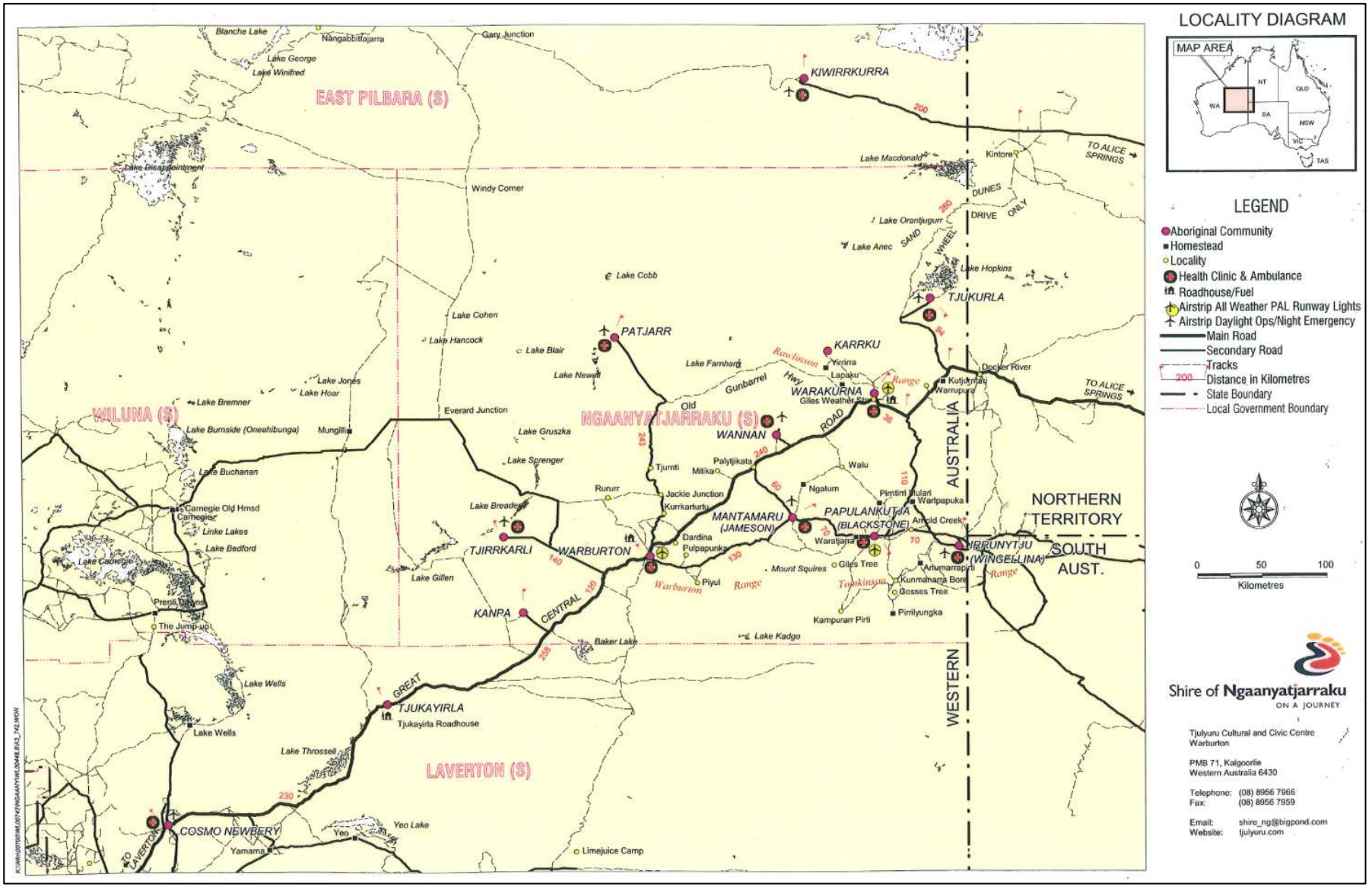
The Shire is in the Goldfields-Esperance region approximately 1,542 kilometres east-northeast of Perth. It is bound by the Shire of Laverton to the south, the Shire of Wiluna to the west, and the Shire of East Pilbara to the north. The eastern boundary is shared with the Northern Territory and South Australia. Although the Shire is geographically large, covering more than 160,000 square kilometres, it is a small organisation with only twelve full-time equivalent employees.

The Shire is located on lands belonging to the Ngaanyatjarra people who have inhabited the region living semi-nomadic lifestyles for thousands of years. The largest community in the Shire is Warburton, other communities include Mantamaru (Jameson), Papulankutja (Blackstone), Irrunytju (Wingellina), Tjukurla, Warakurna, Wanarn, Patjarr, Tjirrkali and Kanpa.

In the 2016 Census, the Shire had 573 households and an estimated population of 1,606 people, of which 86% were of Aboriginal ancestry. Less than 10% of households spoke English at home with the most common languages being Ngaanyatjarra (60.7%) and Pitjantjatjara (11.7%).

The Ngaanyatjarra Lands are also home to a diverse range of desert flora and fauna living amongst the region's distinctive red sands, water holes, rocky escarpments, and ranges.

Figure 1.1 - Location of Ngaanyatjarra communities



1.4 CHALLENGES FACED

Successful delivery of basic waste collection and disposal services in the Shire must overcome a range of challenges unique to the region.

1.4.1 *Remoteness, transport distances and road conditions*

Warburton is positioned 1,542kms north-east of Perth on the Great Central Road halfway between Laverton and Yulara (near Uluru). The closest regional centres to Warburton are Kalgoorlie (WA) and Alice Springs (NT). Road travel to Kalgoorlie is approximately 900 kilometres, and Alice Springs 1000 kilometres; travel time to both are about equal at approximately 11 hours depending on road conditions.

These transport distances and the fact that almost 800 kilometres of the Great Central Road remain unsealed, result in difficulties and high costs to access goods and services, for example:

- Trucks and vehicles must either be transported to Kalgoorlie for major servicing and repairs, or a mobile mechanic must travel to Warburton at significant expense.
- Transport and freight costs for goods delivered to the Ngaanyatjarra communities are extremely high.
- Travel costs for staff, contractors and consultants are prohibitive as there are no scheduled commercial passenger flights to Warburton. The closest airport with scheduled flights is Laverton located 550km southeast.

In addition to the great travel distances from Perth and regional centres to Warburton, significant travel times and distances are experienced reaching the other communities within the Shire from Warburton (see **Table 1.1** below). This creates challenges in delivering services, goods, and communications within the Shire itself.

Furthermore, transportation issues are exacerbated by the fact that more than 99% of the Shire's road network is unsealed. The unsealed roads result in substantially shortened vehicle life and increased repairs and servicing frequency. This is evidenced by the thousands of scrap vehicles found on the roadsides and in communities within the Shire.

Table 1.1 – Travel distance and times from Warburton

Community	Distance (kilometres)	Approximate travel time (hours)
Mantamaru (Jameson)	169	2.5
Papulankutja (Blackstone)	239	3.5
Irrunytju (Wingellina)	312	5
Kanpa	127	2
Patjarr	225	4
Tjirrkarli	135	2.5
Wanarn	163	2
Warakurna	233	3
Tjukurla	394	5

1.4.2 *Extreme environmental conditions*

The region is subject to extreme environmental conditions characterised by high temperatures, low humidity, high solar exposure, and minimal rainfall. These conditions make outdoor daylight work challenging and put workers at risk of dehydration and heat exhaustion. Plant and equipment are also impacted by the high temperatures, dusty conditions, and abrasive sands (overheating, abrasion to moving parts, dust ingress to filters and seals, etc.).

During rare periods of seasonal rainfall, flooding can occur, and roads can become impassable for trucks, adding to the transportation and logistical challenges detailed above.

Figure 1.2 - Example of flooding caused by seasonal rainfall (ASK site visit 2020)

1.4.3 *Employment and staff turnover*

Recruiting and retaining qualified staff is a challenge faced by all organisations operating on the Ngaanyatjarra Lands as:

- Potential staff from outside the region are often hesitant to live and work in such a remote area with extreme weather conditions and an absence of many services and facilities that are commonly available in other parts of Australia.
- Many positions are in direct competition with state government entities (e.g. Dept. of Education who fly workers in/out) and mining industry positions that can offer more attractive salaries and employment conditions.
- Cultural obligations often result in local Ngaanyatjarra staff being unavailable for work. Jobkeeper and Jobseeker government supplements have exacerbated this issue by weakening the incentive to work.

1.4.4 *Funding*

The Shire has the lowest rate base of any local government in Western Australia due to there being no rateable properties (all properties are on Crown Land). In the last four years, revenue from rates averaged 3.6% (from mining tenements which fluctuate from year to year), leaving the Shire nearly wholly reliant on grant funding (88.9%) to provide services to its communities (**Table 1.2**).

Reliance on grant funding is troublesome in that it does not provide a stable revenue stream such as that provided through rates to conventional local government authorities. Grant funding is subject to significant annual variations; between 2016-17 and 2019-20 grant funding declined from $6.89M to $5.60M (**Table 1.2**).

Table 1.2 - Shire revenue sources (Source: www.mycouncil.wa.gov.au)

Revenue source	2016-17		2017-18		2018-19		2019-20		4 Year Average
Grants	6,886,960	92%	6,371,628	90%	5,459,889	88%	5,604,524	86%	88.9%
Rates	217,278	3%	239,238	3%	256,220	4%	260,272	4%	3.6%
Fees and charges	344,718	5%	325,368	5%	368,094	6%	488,860	8%	5.7%
Other Revenue	77,688	1%	115,656	2%	129,714	2%	160,130	2%	1.8%
Total	7,526,644	100%	7,051,890	100%	6,213,917	100%	6,513,786	100%	100.0%

This funding instability creates substantial challenges in planning and implementing long term projects such as domestic waste collection services and waste facility management. The lack of a sustainable long term funding mechanism resulted in the Shire being forced to cancel waste collection services to all communities outside of Warburton as it lacked the financial resources necessary to undertake the services. Collection services continued being provided to Warburton during 2019/20 as the Warburton Community agreed to pay a 20% subsidy towards the service, however, the Shire has now been advised that the community is unable to pay the invoice for the year due to a lack of funding. As such, the Shire will have to discontinue waste collection services to Warburton, effective 1 July 2021.

1.5 SITE VISITS

ASK's senior consultant Samuel Green visited the Ngaanyatjarra Lands between the 18th and 27th of November 2020. With the accompaniment of the Shire's Environmental Health Officer and Works Supervisor, Samuel visited the communities of Warburton, Mantamaru (Jameson), Papulankutja (Blackstone), Irrunytju (Wingellina), Tjukurla, Warakurna, Wanarn, Patjarr, Tjirrkali and Kanpa. Travel to all communities was undertaken by road to gain an understanding of the logistical issues facing a future waste collection service. The core objectives of the community visits were to:

- Develop an understanding of the conditions and issues experienced at each community.
- Consult with community representatives and stakeholders on waste management issues.
- Photographically document landfill sites, and legacy dumping areas that may require rehabilitation works.
- Document waste site details including location, cell construction, relative waste composition, and environmental considerations.
- Document human and environmental health hazards resulting from improper waste management.
- Determine the location of scrap vehicle areas and legacy waste sites.
- Determine and document current waste collection and disposal processes.
- Confirm the locations of groundwater supply bores that could potentially be impacted by landfill leachate.
- Document any plant, equipment, facilities, and organisations in the community that may be capable of assisting future waste services delivery.
- Document any problematic waste types.
- Take notes on vehicle access conditions.

2 EXISTING SERVICES AND INFRASTRUCTURE

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

2.1 POPULATION DATA

According to the ABS 2016 Census, the Shire has an estimated population of 1,606 people.

Due to the semi-nomadic lifestyle of the Ngaanyatjarra people and cultural obligations which require travel, community populations can vary significantly throughout the year, and from year to year. **Table 2.1** below contains estimates of the population range for each of the Shire's communities.

Table 2.1 - Estimated community population ranges

Community	Estimated population range	
Warburton (Milyirrtjarra)	550	600
Warakurna	220	270
Papulankutja (Blackstone)	120	180
Irrunytju (Wingellina)	140	170
Mantamaru (Jameson)	100	120
Wanarn	90	140
Tjukurla	40	60
Tjirrkarli	1	25
Kanpa	1	10
Patjarr	1	25

2.2 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 tail 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 on the Ngaanyatjarra Lands. Landfill facilities within communities are unstaffed and there is no data collected on the quantities disposed.

To estimate the waste generation in the Shire, the WA average per capita non-metropolitan waste generation values (**Table 2.2**) and the population of the region (**Section 2.1**) has been used.

Table 2.2 - 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 Ngaanyatjarra Lands is 4,000t as shown in **Table 2.3**. It is noted, however, this number is an approximation and does not take into account the impacts of population fluctuations within communities. It is likely the actual quantity of waste generated in the Shire will be between 3,000 – 4,500 tonnes per annum.

Table 2.3 - Estimated tonnes of waste generated per annum

MSW	C&I	C&D	Total (rounded to nearest 1000)
960	1,280	1,770	**4,000**

2.3 WASTE INFRASTRUCTURE, OPERATIONS AND SERVICES

Basic waste management facilities exist at each of the communities within the Shire. All communities manage their own waste to varying degrees and there is limited coordination between communities.

The Shire is not responsible for the operation or management of any waste management facilities. None of the landfills are registered or licenced like commercial and local government operated facilities in WA. They are remote Aboriginal community landfills similar to those operated in the Kimberley and Pilbara under the Remote Essential and Municipal Services (REMS) Program. The major difference from other remote Aboriginal community landfills in WA is that those within the Shire are not provided funding by the REMS Program.

The following sections provide a summary of the existing waste management infrastructure, operations, and services within the Shire.

2.3.1 *Warburton*

General information	Warburton Ranges Mirlirrtjarra Community is in the Ngaanyatjarra Lands, Gibson Desert, Western Australia. It is located 1,000kms south west of Alice Springs and 900kms north east of Kalgoorlie on the Great Central Road (Outback Way). The community functions as the main service centre within the Ngaanyatjarra Lands and is home to the Shire offices. The population of Warburton is approximately 580 and is estimated that about 1,500 tonnes of waste is generated annually.
Industry types	Roadhouse, caravan park, accommodation, community store, school, Shire office, clinic, workshop, training centre, women's centre, art gallery, swimming pool, police station.
Waste service provision	• Two waste collection vehicles that are intended to collect domestic waste from the community on a weekly basis. • Domestic waste is collected and sometimes burnt in steel drums that will not be destroyed by the fire. • The bins have steel lids to limit dogs accessing waste. • At the time ASK visited the community, the waste collection service was not functioning due to plant breakdowns and staff shortages. • Maintenance of the landfill (cell excavation, waste compaction and covering) is undertaken on an ad-hoc basis by the Ngaanyatjarra Council, the Shire does not have plant capable of undertaking these works.
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 an active landfill cell, a legacy landfilling area, and a scrap vehicle storage area located to the south of the community.

Waste plant	• The Shire has a small side loading rubbish compactor truck, and an Isuzu truck with bin lifting mechanism.
	• Both vehicles have specialised bin lifting assemblies that enable the steel drums to be lifted, rather than conventional Mobile Garbage Bins (MGBs).
	• The rubbish compactor truck was inoperable at the time ASK visited as it is awaiting servicing and repairs.
	• The Isuzu collection truck is operational, but its design is reported to provide inefficient waste collection due to:
	  o the forward location of the lifter resulting in uneven filling of the tray; and
	  o the low mounting point of the lifting mechanism preventing the tray from being filled to its full capacity.
	Waste plant used at Warburton (left, small compactor with modified lifting attachment for 44 gallon drum. Middle and right, nipper truck with different attachment for 44 gallon drum)
	   

Landfill siting	• The landfill is located approximately 2.7km southeast of the community and nearest residential premises. • Department of Water bore data from bores in the vicinity of the landfill indicates groundwater is at least 9m from the surface. • It is anticipated that groundwater flow from the landfill would be in a southwest direction towards the creek line, if this is correct, landfill leachate impacts on the community's drinking water extraction bores are unlikely. The closest extraction bore is located approximately 2.4km north of the landfill. • Limestone hardpan makes excavation of cells below 1.5m problematic.

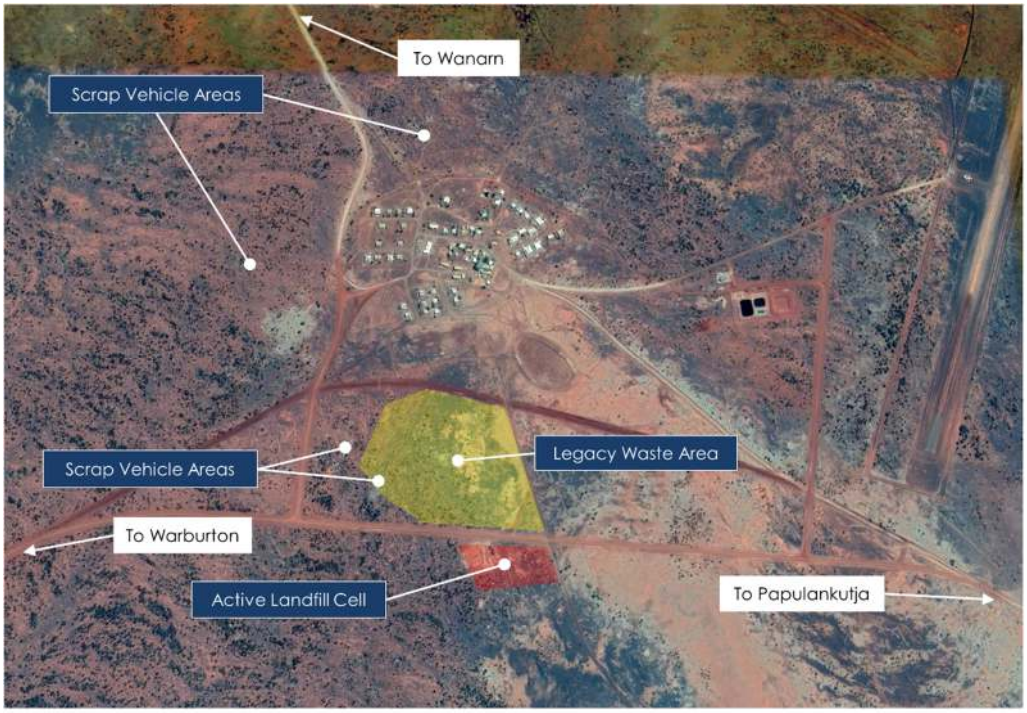
	Image showing location of waste sites in relation to Warburton 
Landfill operation	• The landfill is unstaffed, unfenced and poorly maintained with large amounts of windblown waste being emitted from the tipping area and landfill face into surrounding native vegetation. • Scrap metal and demolition waste appear to be a major component of the waste stream. • There is not heavy tracked machinery available in Warburton to effectively compact waste (especially scrap metal and C&D waste). • Waste is compacted and covered with soil less than twice per year. • There is no instructional signage at the site to encourage separation of materials or ensure site users know how to appropriately utilise the facilities. • Locally available plant is insufficient for excavating through the limestone hardpan to depths of more than 1.5m. • A gravel pit adjacent to the current cell may be suitable for further excavation to provide cover soil and be used as the next landfill cell. • There are no litter screens or fencing to catch windblown litter from the cell. • Uncontrolled access to the facility as it is not gated. • The waste cell is regularly burnt. • Separate pits are excavated for the disposal of asbestos and animal carcasses when required. • As there are limited resource recovery options available, it is likely that e-waste, batteries, tyres, and used motor oil are regularly disposed to landfill and burnt. • No induction training or information for contractors and businesses generating waste.

	• 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 Warburton community landfill*    
Landfill capacity	Significant capacity remains at the site, especially if cells are excavated to deeper depths, and an above ground landform continues to be developed.
Legacy waste area	• A large area (~150 hectares) between the community and the active landfill contains legacy waste cells and illegal dumping areas. The area requires a large cleanup to remove dumped waste and litter. • Asbestos material was identified on the surface at one location in this area, and additional asbestos contaminated locations would likely be found with a more comprehensive investigation of the site. • Some of the legacy landfill cells have not been adequately capped with waste materials protruding through the surface and presenting physical injury hazards. *Images of legacy waste area (top right, asbestos material)*    

Scrap vehicle area	• A large area (~150 hectares) between the community and the active landfill contains legacy waste cells and illegal dumping areas. The area requires a large cleanup to remove dumped waste and litter. • Asbestos material was identified on the surface at one location in this area, and additional asbestos contaminated locations would likely be found with a more comprehensive investigation of the site. • Some of the legacy landfill cells have not been adequately capped with waste materials protruding through the surface and presenting physical injury hazards. *Images of Warburton scrap vehicle area*  

2.3.2 *Mantamaru (Jameson)*

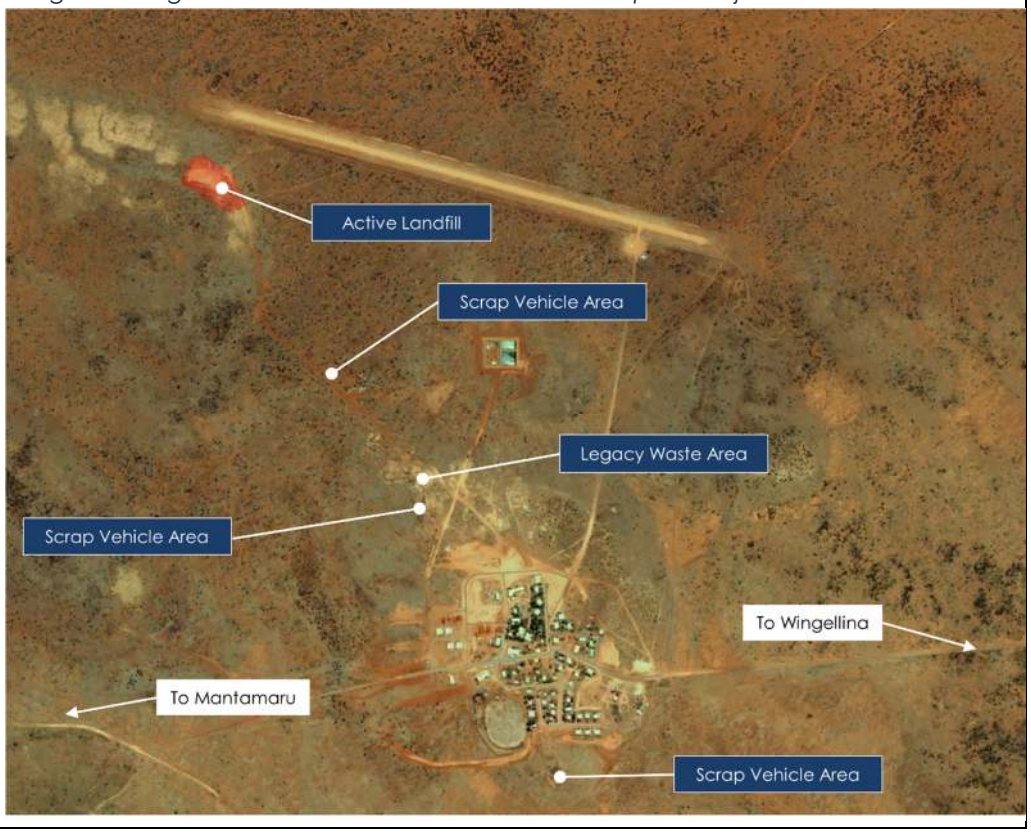
General information	Mantamaru or Jameson is located at the base of the Jameson Range in the Central Ranges region 125kms east of Warburton. Mantamaru and Parnamaru (the original name of the community when it first became incorporated) both translate in Ngaanyatjarra and Pitjantjatjara respectively as black (maru) ground (manta or parna) which describes the ground cover of small black stones found around the Jameson Range. The community was established in the vicinity of a mining camp run by Southwestern Mining. Homelands funding was later provided for a store, a generator, a new bore and a vehicle to transport supplies from Warburton. The community became incorporated in 1976 and a member of the Ngaanyatjarra Council in 1981. Miners have recently returned looking for nickel, with a large deposit of sulphide nickel having been identified 30km south of the community. In an effort to minimise wear and maintenance requirements for Papulankutja Road, a policy has been implemented to have heavy vehicles only access Mantamaru via the Great Central Road. This increases the travel distance from Warburton to 170km. The population of Mantamaru is believed to range from 100 to 120 and it is projected that about 250 to 300 tonnes of waste is generated annually.
Industry types	Community store, school, works depot, women's centre, clinic, earth moving business.
Waste service provision	• The community has no waste collection service provided. • Domestic waste is burnt in steel drums in front of homes. • Maintenance of the landfill (cell excavation, waste compaction and covering) occurs infrequently as suitable plant for these works are not located in the community. • Although the Shire is not responsible for landfill maintenance, it occasionally requests its road construction and maintenance contractor to undertake covering and excavation works when in the area.
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 an active landfill cell, a legacy landfilling area, and a scrap vehicle storage area located to the south of the community. There are also scrap vehicle storage areas located to the west and north of the community.
Waste plant	The Shire gifted the local community a side loading tipper truck when the Shire was no longer able to provide a collection service.

Landfill siting	*Image showing location of waste sites in relation to Mantamaru*  • The active landfill cell is located approximately 680m south of the community and nearest residential premises. This is within the 2000m minimum separation distance set for landfills within the DPLH, Aboriginal Settlements Guideline. • The active landfill cell is located less than 10 metres from the realigned Papulankutja Road. There are significant traffic safety hazards associated with the current location. • Department of Water bore data from two bores in within 2km of the landfill indicates groundwater is at least 20m from the surface. • The community's drinking water extraction bores are located more than 5km northeast of the landfill. • It is anticipated that groundwater flow from the landfill would be in an easterly direction towards the lower ground between the landfill and the airstrip.
Landfill operation	• The landfill is unstaffed, unfenced and poorly maintained with large amounts of windblown litter being emitted from the tipping area and landfill face. • Scrap metal and demolition waste appear to be a major component of the waste stream. • There is not heavy tracked machinery available to effectively compact waste (especially scrap metal and C&D waste). • Waste is compacted and covered with soil less than twice per year. • There is no instructional signage at the site to encourage separation of materials or ensure site users know how to appropriately utilise the facilities. • The waste cell is regularly burnt. • As there are limited resource recovery options available, it is likely that e-waste, batteries, tyres, and used motor oil are regularly disposed to landfill and burnt. • No induction training or information for contractors and businesses generating waste. • 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 active landfill cell 
Landfill capacity	Whilst there may be the physical capacity to continue landfilling at the current location for several years, the health, safety and environmental risks posed by the current location mean that relocation to an alternative suitable site should be an immediate priority.
Legacy waste area	• An area between the community and the active landfill contains legacy waste cells and illegal dumping areas. • Extensive quantities of asbestos water piping were observed to have been dumped throughout this area, and the adjacent vehicle storage areas. • It is apparent that the asbestos piping is being further fragmented and damaged by vehicle movements through the area.

	Images of legacy waste area containing asbestos pipes 
Scrap vehicle area	• There are at least four scrap vehicle storage areas located around the community that are used for storing broken down vehicles for parts. • These areas contain approximately 300 vehicles (cumulative) • The areas also contain litter and dumped waste, and some are contaminated with oil, ash from burnt vehicles, melted batteries and asbestos piping. *Images of Mantamaru scrap vehicle areas* 

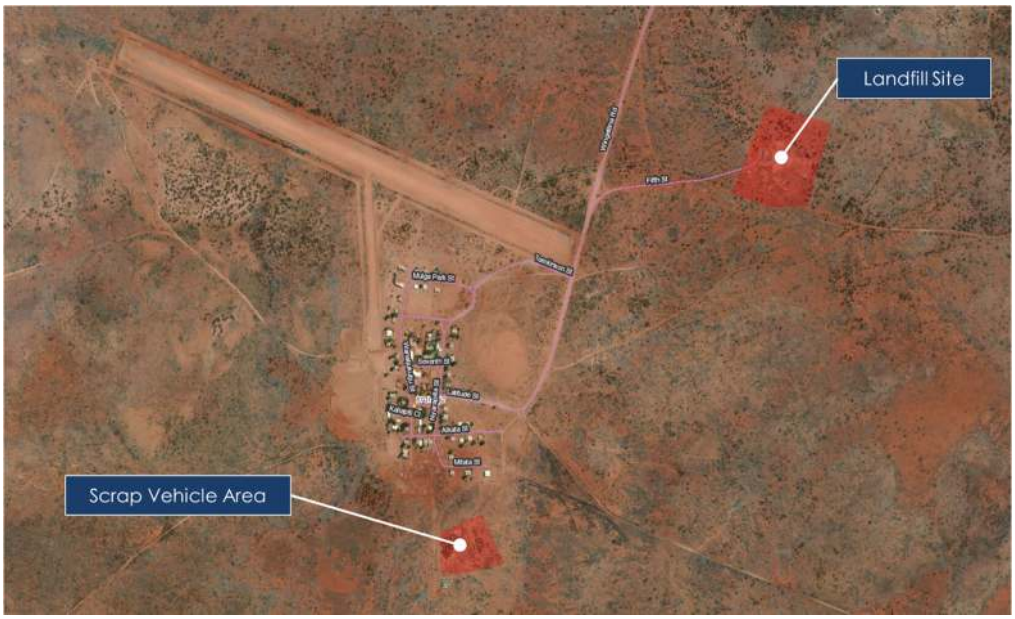
2.3.3 *Papulankutja (Blackstone)*

General information	Papulankutja or Blackstone is located north of the Blackstone Ranges, halfway between Mantamaru and Irrunytju. Its residents are both Ngaanyatjarra and Pitjantjatjara. The area around Blackstone contains some of the most significant sacred sites in the region. The community became incorporated in 1976 and a member of the Ngaanyatjarra Council in 1981. The community's population is believed to range from 120 to 180 and it is projected that about 300 to 450 tonnes of waste is generated annually.
Industry types	Community store, school, works depot, women's centre, clinic, community services, indoor pool, camel mustering.
Waste service provision	• The community has no waste collection service provided. • Domestic waste is burnt in steel drums in front of homes. • Maintenance of the landfill (cell excavation, waste compaction and covering) occurs infrequently as suitable plant for these works are not located in the community. • Although the Shire is not responsible for landfill maintenance, it occasionally requests its road construction and maintenance contractor to undertake covering and excavation works when in the area.
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 an active landfill cell, a legacy landfilling area, and three scrap vehicle storage areas.
Waste plant	The Shire gifted the local community a side loading tipper truck when the Shire was no longer able to provide a collection service.
Landfill siting	*Image showing location of waste sites in relation to Papulankutja* 

	• The active landfill cell is located approximately 1,600m northwest of the community and the nearest residential premises. This is within the 2000m minimum separation distance set for landfills within the DPLH, Aboriginal Settlements Guideline. • The active landfill cell is located about 250m south of the community airstrip. • Department of Water data for Bore 120319014 (located 2km from the landfill) indicates groundwater is at least 18m from the surface. • There are no drinking water extraction bores located within 2km of the landfill. • Local groundwater flow is expected to be in a northerly direction away from the Blackstone Ranges. This would carry any landfill contaminants away from the community's groundwater extraction bores.
Landfill operation	• The landfill was relocated to the current location in 2018. It is positioned in an old gravel pit that has been excavated to a depth of about 2 metres. • The cell has a plentiful capacity and soil availability for cover and future capping. • Material separation is encouraged by signs indicating designated disposal areas for batteries, tyres, scrap metal, and domestic waste. • As resource recovery options are currently limited, it is likely that separated batteries and tyres will still end up being landfilled or burnt. • Although the landfill is unstaffed and unfenced, windblown litter does not appear to be major problem and the site is relatively clean. • Scrap metal and demolition waste appear to be a major component of the waste stream. • There is not heavy tracked machinery available to effectively compact waste (especially scrap metal and C&D waste). • Waste is compacted and covered with soil less than twice per year. • The waste cell is regularly burnt. • No induction training or information for contractors and businesses generating waste. • 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 active landfill area* 
Landfill capacity	It is estimated that the current landfill cell has the capacity for more than 25 years of waste disposal.
Legacy waste area	• An area between the community and the active landfill contains legacy waste cells and illegal dumping areas.

	• Some historic cells have not been levelled and fully capped (metals protruding through surface), combined with the lack of signage, contractors and the community continue to dump waste in this area which results in windblown litter blowing back into the community. *Images of legacy waste area*    
Scrap vehicle area	• There are three scrap vehicle storage areas located around the community that are used for storing broken down vehicles for parts. • These areas contain approximately 250 vehicles (cumulative) • The areas also contain litter and dumped waste, and some are contaminated with oil, ash from burnt vehicles and melted batteries. *Images of scrap vehicle areas*    

2.3.4 *Irrunytju (Wingellina)*

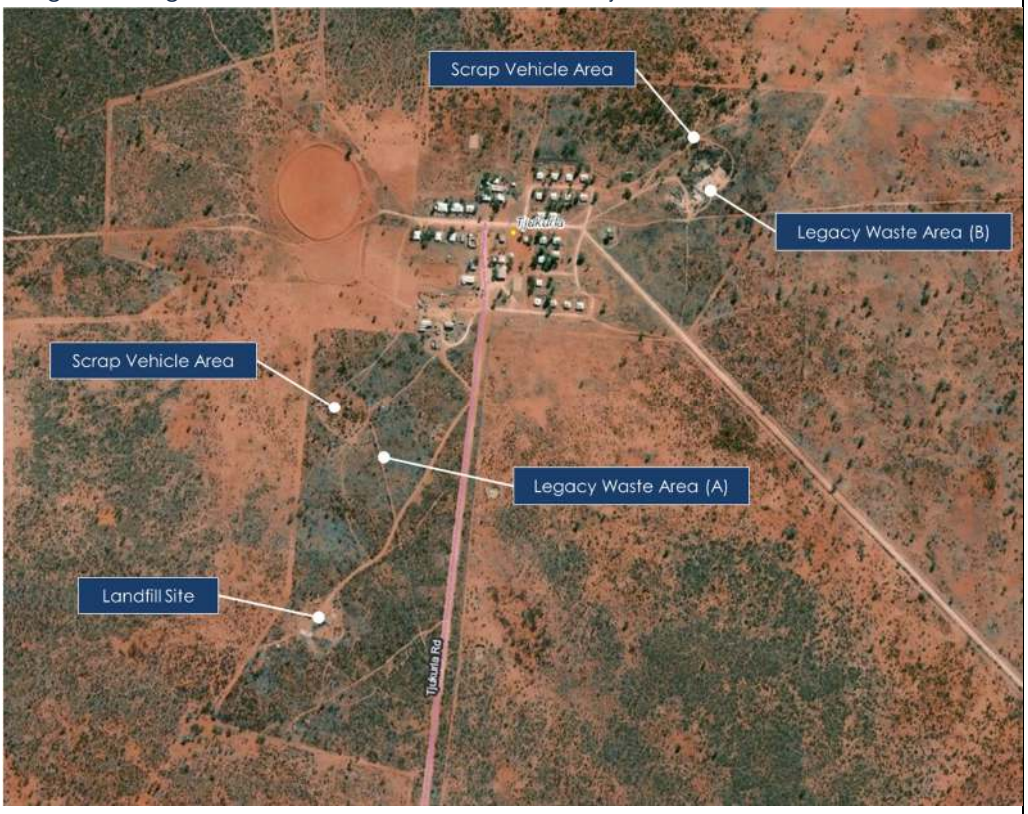
General information	Irrunytju (Wingellina) is located close to the WA and SA border in the vicinity of the Wingellina Hills. Irrunytju is the name of a site in the hills to the south of the community. The majority of residents are Pitjantjatjara speakers. The development of a community in this area was initiated in response to mining activities in the area during the late 1950s. Nickel exploration and chyrsoprase mining attracted several large companies including International Nickel and many illegal prospectors. Once the miners left, a permanent community was established that built upon the existing infrastructure of the abandoned mining camps. The community became incorporated in 1976 and a member of the Ngaanyatjarra Council in 1981. Mining activities have now returned to the region and a large deposit of nickel oxide has been shown to be more extensive and deeper than originally thought. It remains to be seen whether it will be an economically viable deposit given the remoteness of this region. The population of Irrunytju is believed to range from 140 to 170 and it is projected that about 350 to 430 tonnes of waste is generated annually.
Industry types	Community store, broadcasting studio, school, works depot, women's centre, clinic, aged care facility, art, potential tourism opportunities.
Waste service provision	• The community does not have a regular domestic waste collection service provided. • Domestic waste is often burnt in steel drums in front of homes. • Maintenance of the landfill (cell excavation, waste compaction and covering) occurs infrequently as suitable plant for these works are not located in the community. • Although the Shire is not responsible for landfill maintenance, it occasionally requests its road construction and maintenance contractor to undertake covering and excavation works when in the area.
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 a landfill facility located to the northwest of the community, and a scrap vehicle storage area located to the south of the community.
Waste plant	The Shire gifted the local community a side loading tipper truck when the Shire was no longer able to provide a collection service.
Landfill siting	*Image showing location of waste sites in Irrunytju* 

	• The landfill is located approximately 1,100m northeast of the community and nearest residential premises. This is within the 2000m minimum separation distance set for landfills within the DPLH, Aboriginal Settlements Guideline. • Department of Water data for two bores within 1km of the landfill indicates groundwater is more than 10m from the surface. • The closest groundwater extraction bore is located approximately 850m to the northwest of the landfill. There is a risk that landfill leachate could impact groundwater quality in proximity to this extraction point.
Landfill operation	• The landfill is unstaffed and unfenced but is relatively clean. • Scrap metal and demolition waste appear to be a major component of the waste stream. It is anticipated that significant demolition and building works will result from a decision being made on the future of the mine which will cause a large spike in waste generation. • There is not heavy tracked machinery available to effectively compact waste (especially scrap metal and C&D waste). • There is no instructional signage at the site to encourage separation of materials or ensure site users know how to appropriately utilise the facilities. • The waste cell is regularly burnt. • As there are limited resource recovery options available, it is likely that e-waste, batteries, tyres, and used motor oil are regularly disposed to landfill and burnt even though some efforts have been made to separate batteries and tyres. • Lithology (no massive limestone) at the landfill suggests that much deeper cells can be excavated if appropriate plant is made available. • Historic waste cells appear to be better capped than at other sites in the Shire. • No induction training or information for contractors and businesses generating waste. • 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 active landfill cell* 

Landfill capacity	Landfilling has been undertaking in the same area since the 1990's. If the site is expanded to the west and north and heavy equipment is used to excavate deep cells (~5m), the landfill should have capacity for more than 15 years of life.
Scrap vehicle area	• The scrap vehicle area starts about 150m south of the community and contains an estimated 250 vehicles. • The area's proximity to the community and residential buildings presents environmental health risks as it is being used by wild dogs to breed and contains physical and toxic hazards to the community (ash from burnt vehicles, melted lead acid batteries, hydrocarbon spills etc.). *Images of Irrunytju scrap vehicle area*    

2.3.5 *Tjukurla*

General information	Tjukurla is located in the sandhill country on the edge of Lake Hopkins, halfway between Warakurna (WA) and Kintore in the NT. In the early 80's a bore was put down near the present Tjukurla Community as part of the outstation movement from Docker River community. Tjukurla was permanently occupied by 1986 and became incorporated and a member of the Ngaanyatjarra Council the following year. The population of Tjukurla is understood to range from 40 to 60 and it is projected that about 100 to 150 tonnes of waste is generated annually. Access to the community can be difficult for trucks due to poor road conditions at different times of the year (soft sand, mud and flooding).
Industry types	Community store, art, school, works depot, women's centre, clinic.
Waste service provision	• The community is provided a regular waste collection service with a small cage trailer. This service is operated by the Ngaanyatjarra Council. • Domestic waste is collected in steel drums and the drums are manually emptied into the trailer. • Maintenance of the landfill (cell excavation, waste compaction and covering) occurs infrequently as suitable plant for these works are not located in the community.
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 an active landfill site, two legacy landfilling areas, and two scrap vehicle storage areas.
Waste plant	There is a small cage trailer used to collect domestic waste from the community. It does not have mechanical bin lift assist and is rusting out, likely requiring replacement soon. *Images of Tjukurla waste collection trailer* 
Landfill siting	*Image showing location of waste sites in relation to Tjukurla*  • The active landfill cell is located approximately 700m south of the community and nearest residential premises. This is within the 2000m minimum separation distance set for landfills within the DPLH, Aboriginal Settlements Guideline. • Groundwater depth in the vicinity of the landfill could not be determined. • There are no drinking water extraction bores located within 500m of the landfill.

Landfill operation	• The landfill is unstaffed, unfenced, and poorly maintained with windblown waste litter being emitted from the tipping area. • Scrap metal and demolition waste appear to be a major component of the waste stream. • There is no heavy tracked machinery available to effectively compact waste (especially scrap metal and C&D waste). • Waste is compacted and covered with soil less than twice per year. • There is no instructional signage at the site to encourage separation of materials or ensure site users know how to appropriately utilise the facilities. • The waste cell is regularly burnt. • As there are limited resource recovery options available, it is likely that e-waste, batteries, tyres, and used motor oil are regularly disposed to landfill and burnt. • No induction training or information for contractors and businesses generating waste. • 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 active landfill site* 
Landfill capacity	The active landfill cell has a deep pit (approximately 3m) which suggests this area could have the capacity for decades of landfilling if effectively managed. Recommended that a groundwater risk assessment and site suitability assessment be undertaken prior to investing further in the current location to ensure that environmental and human health risks are acceptable.
Legacy waste areas	• Legacy Waste Area (A) is the old landfill site which was located closer to the community. It appears to have been relatively well capped. • Legacy Waste Area (B) contains significant quantities of waste dumped on the surface, and waste that has been placed in excavations but remains exposed. This area requires levelling, compaction and capping to make it safe and to facilitate rehabilitation. • A decommissioned asbestos transportable building is located between Legacy Waste Area (B) and the community. The building appears to be getting damaged by children and asbestos fragments are spreading across the area. This building should be safely disassembled and disposed of as an immediate priority.

	Images of legacy waste area (B)    
Scrap vehicle area	• There are two scrap vehicle storage areas located around the community that are used for storing scrap vehicles for parts. • These areas contain approximately 150 vehicles (cumulative) • The areas also contain litter and dumped waste, and some are contaminated with oil, ash from burnt vehicles, melted batteries and asbestos piping. *Images of Tjukurla scrap vehicle areas*    

2.3.6 *Warakurna*

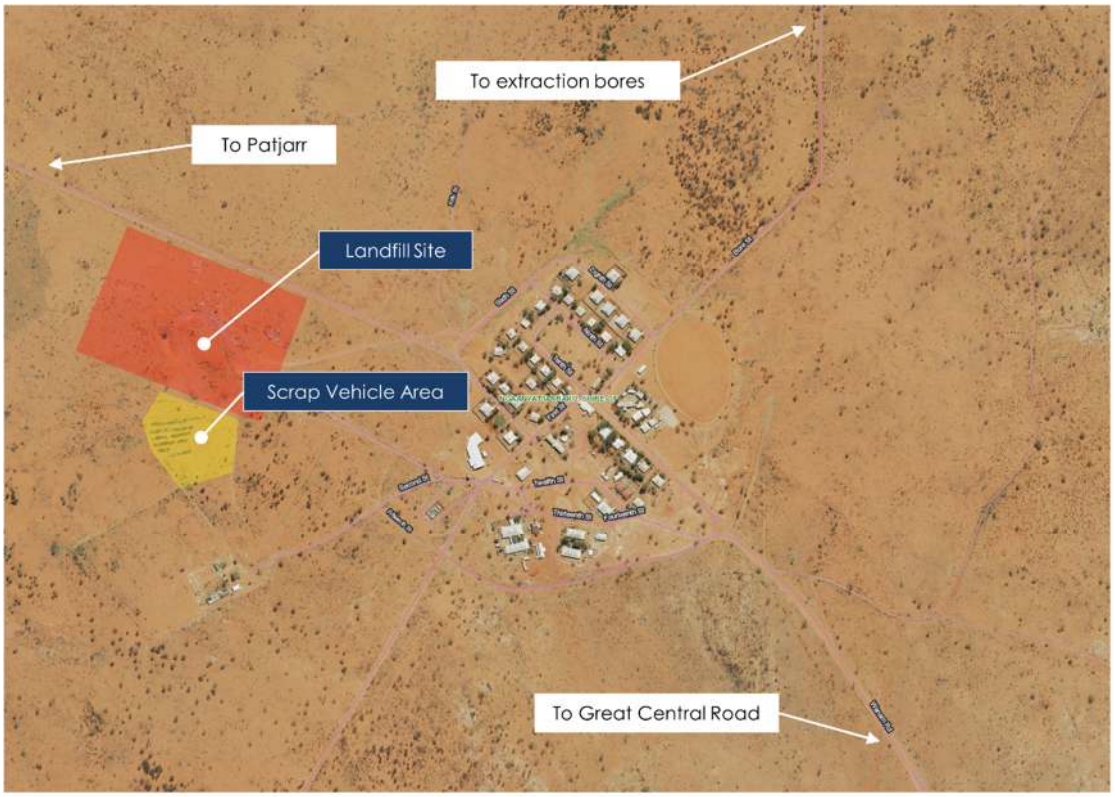
General information	Warakurna is located at the western extent of the Rawlinson Ranges. The residents are mostly Ngaatjatjarra speakers. Many of the local people experienced their first contact with non-Aboriginals in the late 1930's with the establishment of the Warburton Mission, for other residents their first contact was with the Native Patrol Officers working for the Weapons Research Establishment in Woomera in the late 1950's. The Giles Weather Station was established in 1956 and by the 1960's a new government settlement was established at Docker River 100km north-east of the Giles Weather Station. In the early 1970's a range of drivers such as the availability of government funding for homelands, easier road access, and over-crowding at the Docker River settlement and Warburton Mission, combined to make the location of Giles Weather Station chosen for a new community. The Warakurna community became incorporated in 1976 and a member of the Ngaanyatjarra Council in 1981. The population of Warakurna is believed to range from 220 to 270 and it is projected that about 550 to 680 tonnes of waste is generated annually.
Industry types	Community store, school, art, works depot, women's centre, clinic, police station, aged care, Giles Weather Station, road house, earth moving and machinery hire business.
Waste service provision	• The Ngaanyatjarra Council provide domestic waste collection service to the community. • Domestic waste is collected from steel drums in front of homes using a trailer with mechanically assisted bin lifting. • The collection service is hampered by equipment breakdowns and staff availability, resulting in waste having to be occasionally burnt in bins at the front of homes. • Maintenance of the landfill (cell excavation, waste compaction and covering) occurs infrequently as suitable plant for these works are not located in the community.
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 an active landfill cell and a scrap vehicle storage area located to the north of the community. There is also a scrap vehicle storage area to the south of the community.
Waste plant	• The Shire gifted the local community a side loading tipper truck when the Shire was no longer able to provide a collection service in Warakurna. This vehicle is now inoperable with a destroyed motor. • The community recently purchased a hydraulic side loading trailer (BGR Waste Engineering, South Australia) with hydraulic tipper and gate to replace the truck. The trailer required repairs to hydraulics, wiring, brakes and wheels at the time ASK visited. *Images of Warakurna waste collection vehicles*  

Landfill siting	*Image showing location of waste sites in relation to Warakurna*  • The active landfill cell is located approximately 650m northwest of the community and nearest residential premises. This is within the 2000m minimum separation distance set for landfills within the DPLH Aboriginal Settlements Guideline. • The landfill is located within 150m of a creek that runs towards the Rawlinson Ranges to the north. • Department of Water bore data shows standing water levels ranging from 2m to 20m below ground level for bores in the Warakurna area (the closest bore with water level data being 1km from landfill). • The community's drinking water extraction bores are located approximately 3km north of the landfill at the base of the Rawlinson Ranges. • It is anticipated that groundwater flow from the landfill would be in a northerly direction towards the communities bore field.
Landfill operation	• The landfill is unstaffed, unfenced and poorly maintained with large amounts of windblown waste being emitted from the tipping area and landfill face into surrounding native vegetation. • The active cell has been excavated to a depth of approximately 1m and is surrounded by 3m high bunds. • The cell may be subject to waterlogging during periods of heavy rainfall. • Scrap metal and demolition waste appear to be a major component of the waste stream. • There is no heavy tracked machinery available to effectively compact waste (especially scrap metal and C&D waste). • Waste is compacted and covered with soil less than twice per year. • There is no instructional signage at the site to encourage separation of materials or ensure site users know how to appropriately utilise the facilities. • The waste cell is regularly burnt. • As there are limited resource recovery options available, it is likely that e-waste, batteries, tyres, and used motor oil are regularly disposed to landfill and burnt.

	• No induction training or information for contractors and businesses generating waste. • 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 active landfill cell*      
Landfill capacity	The current landfill cell is estimated to have a remaining capacity of 2,700 cubic metres, which should provide capacity for 2-5 years' worth of landfilling.
Scrap vehicle area	• There are two scrap vehicle storage areas located around the community that are used for storing broken down vehicles for parts. • These areas contain approximately 400 vehicles (cumulative) • The areas also contain litter and dumped waste, and some are contaminated with oil, ash from burnt vehicles, melted batteries and asbestos piping. *Images of Warakurna scrap vehicle areas*  

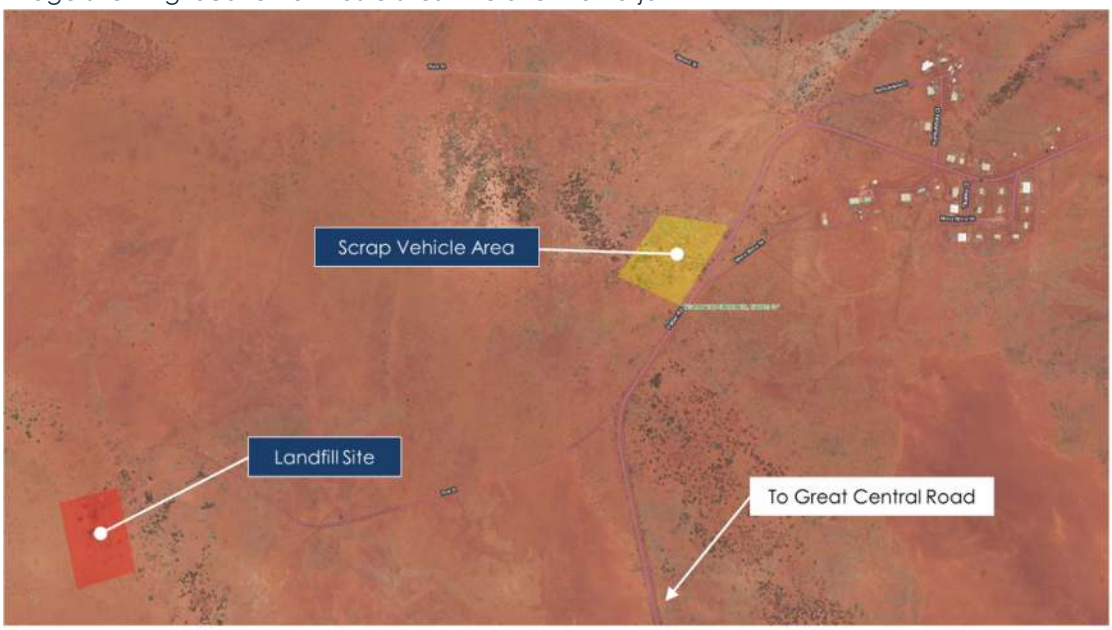
2.3.7 *Wanarn*

General information	The community of Wanarn is located 100km north of Warburton, halfway to Warakurna. It was established in the late eighties and residents came from Docker River, Warburton and Warakurna. The community was incorporated and became a member of the Ngaanyatjarra Council in 1989. The population of Wanarn is believed to range from 90 to 140 and it is projected that about 230 to 350 tonnes of waste is generated annually.
Industry types	Community store, school, aged care and respite facility, works depot and depot, clinic.
Waste service provision	• The Ngaanyatjarra Council provide a regular domestic waste collection service. • Domestic waste is collected in steel drums in front of homes by a side loading tipper truck. • Maintenance of the landfill (cell excavation, waste compaction and covering) occurs infrequently as suitable plant for these works are not located in the community.
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 a landfill site and a scrap vehicle storage area located to the west of the community.
Waste plant	The Shire gifted the local community a small side loading tipper truck (no compactor) to collect domestic waste from the Wanarn community. *Image of Wanarn waste collection truck* 

Landfill siting	*Image showing location of waste sites in relation to Wanarn*  • The active landfill cell is located approximately 500m west of the community and nearest residential premises. This is within the 2000m minimum separation distance set for landfills within the DPLH, Aboriginal Settlements Guideline. • Department of Water data for a bore 1.4km north of the landfill shows a standing water level of 26.75m below ground level. • The community's drinking water extraction bores are located more than 10km north of the landfill.
Landfill operation	• The landfill is unstaffed, unfenced and poorly maintained with large amounts of windblown waste being emitted from the tipping area and landfill cell. • There are significant quantities of dumped waste and litter in areas surrounding the active cell. • The active cell is approximately 25m long, 10m wide and 2m deep with 1m high bunds. • Scrap metal appears to be a major component of the waste stream. • There is not heavy tracked machinery available to effectively compact waste (especially scrap metal and C&D waste). • Waste is compacted and covered with soil less than twice per year. • There is no instructional signage at the site to encourage separation of materials or ensure site users know how to appropriately utilise the facilities. • The waste cell is regularly burnt. • As there are limited resource recovery options available, it is likely that e-waste, batteries, tyres, and used motor oil are regularly disposed to landfill and burnt. • No induction training or information for contractors and businesses generating waste. • 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 Wanarn landfill site      
Landfill capacity	The capacity of the existing cell is limited but should be sufficient for the burial of all waste in the surrounding areas if compacted by a dozer. Recommended that an alternate site situated further from the community should be identified and developed to minimise windblown litter and waste burning impacts on the community.
Scrap vehicle area	• The Wanarn scrap vehicle area is located adjacent to the landfill. • It appears to be comparatively well managed with vehicles arranged in rows and stacked. • There are approximately 200 vehicles stored in the area. *Images of Wanarn scrap vehicle area*    

2.3.8 *Patjarr*

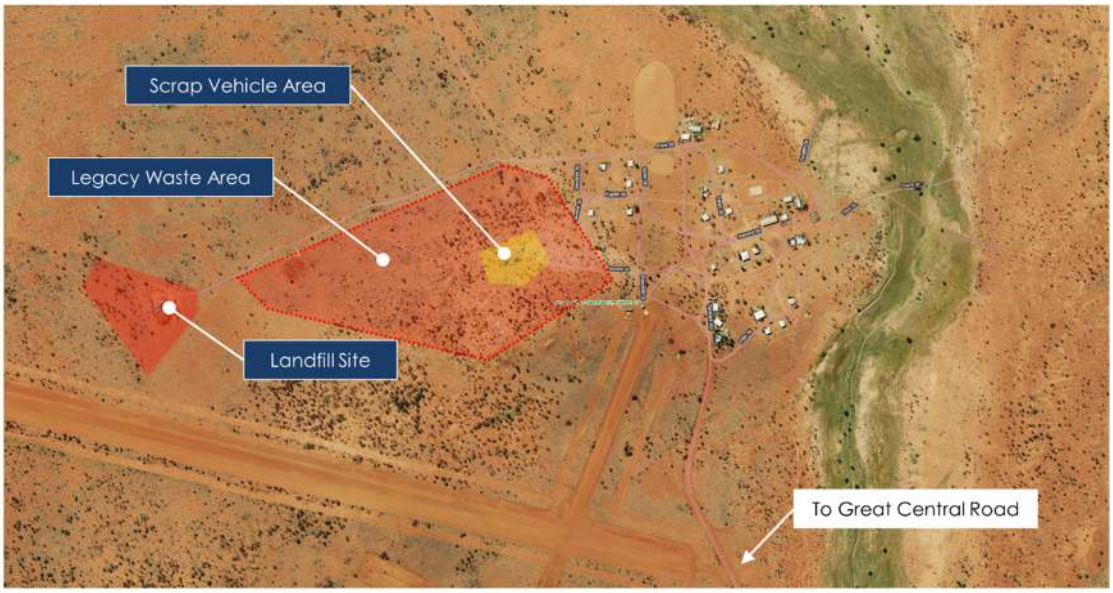
General information	Patjarr is a small community that was established in 1992 as an outstation of Warburton. It is located about 170km north northwest of Warburton in the Gibson Desert Nature Reserve. The Pintupi people who now live at Patjarr were one of the last groups of Aboriginal people in Australia to be contacted by non-Aboriginals. Native Patrol Officers were bringing Pintupi people into Warburton Mission from this area as late as the early 70s. By the early 1980's, Pintupi people began migrating from Warburton back to their homelands. In 1993 the Ngaanyatjarra Council lodged a submission to have an excision for a permanent living area in the Gibson Desert Nature Reserve on behalf of the Pintupi. By 1993 a large group of people were living at the outstation without a mechanised water supply, no fabricated buildings and no electricity or store goods. The Patjarr community now has houses, a permanent water supply, store and clinic facilities. In 1995 Patjarr Community became an incorporated community and member of the Ngaanyatjarra Land Council. The population of Patjarr is usually less than 25 and is estimated to generate less than 60 tonnes of waste annually.
Industry types	Community store, works depot, women's centre.
Waste service provision	• The community has no waste collection service provided. • Domestic waste is either self-hauled to the landfill or burnt in steel drums in front of homes. • Maintenance of the landfill (cell excavation, waste compaction and covering) occurs infrequently as suitable plant for these works are not located in the community.
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 an active landfill cell and a scrap vehicle storage area located to the southwest of the community.
Waste plant	There is no plant in the community dedicated for waste collection and handling.
Landfill siting	*Image showing location of waste sites in relation to Patjarr*  • The active landfill cell is located approximately 1.8km southwest of the community and nearest residential premises. This is just within the 2000m minimum separation distance set for landfills within the DPLH, Aboriginal Settlements Guideline. • Department of Water data for a bore 1.5km northeast of the landfill records the standing water level as 43m below ground level. • The closest drinking water extraction bore is located approximately 1km northeast of the landfill.

Landfill operation	• The landfill is fenced and reasonably well maintained with only small amounts of windblown litter. • There is not heavy tracked machinery available to effectively compact and cover waste. • Waste is covered with soil using a tractor that is based in the community. • The lack of heavy plant to compact and cover waste is resulting in unstable surfaces and a risk of collapse in areas containing buried waste. • As there are limited resource recovery options available, it is likely that e-waste, batteries, tyres, and used motor oil are regularly disposed to landfill and burnt. • No training, operational planning and procedures, post closure plan or information kept on location of completed cells/trenches. *Images of landfill site*      
Landfill capacity	The current landfill site should be able to sustain landfilling for decades (based on current population), including burial of scrap vehicles.
Scrap vehicle area	• A scrap vehicle area is maintained just to the southwest of the community. • Once vehicles have all salvageable parts removed and are no longer valuable to the community, they are transported to the landfill site and stacked. • As the quantity of scrap vehicles is estimated to be only 20, it will not be viable to have these vehicles recycled. • Recommended that the vehicles stockpiled at the landfill be buried when suitable plant is available in the community.

	Image of Patjarr scrap vehicles 

2.3.9 *Tjirrkarli*

General information	Tjirrkarli is located 110km north west of Warburton between Lake Breaden and Lake Gillen. The community takes its name from a site nearby which is associated with a Dreaming story concerning native yams (tjirrkarli). The community was established in the 1980s in the vicinity of a bore put down by Shell Oil. The company was searching for oil and constructed an extensive network of seismic lines, some of which are now used as main access roads to the community or as hunting tracks. The community became incorporated and a member of the Ngaanyatjarra Council in 1987. The population of Tjirrkarli is usually less than 25 and it is estimated that less than 60 tonnes of waste is generated annually.
Industry types	Community store, works depot, women's centre.
Waste service provision	• The community has no waste collection service provided. • Maintenance of the landfill (cell excavation, waste compaction and covering) occurs infrequently as suitable plant for these works are not located in the community.
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 an active landfill site, a legacy landfilling area, and a scrap vehicle storage area located to the west of the community.
Waste plant	There is no plant in the community dedicated for waste collection and handling.

Landfill siting	*Image showing location of waste sites in relation to Tjirrkarli*  • The active landfill cell is located approximately 1000m west of the community and nearest residential premises. This is within the 2000m minimum separation distance set for landfills within the DPLH, Aboriginal Settlements Guideline. • Department of Water bore data from two bores located immediately east of the community indicate groundwater depths around 14m below ground level. • The community's drinking water extraction bores are located more than 5km northeast of the landfill. • It is anticipated that groundwater flow from the landfill would be in a northerly direction towards the creek line that runs around the community.
Landfill operation	• The landfill is unstaffed, unfenced but does not have excessive windblown litter in surrounding areas. • Scrap metal and demolition waste appear to be a major component of the waste stream. • There is not heavy tracked machinery available to effectively compact waste (especially scrap metal and C&D waste). • Waste is compacted and covered with soil very infrequently. • The waste cell is regularly burnt. • As there are limited resource recovery options available, it is likely that e-waste, batteries, tyres, and used motor oil are regularly disposed to landfill and burnt. • No induction training or information for contractors and businesses generating waste. • No training, operational planning and procedures, post closure plan or information kept on location of completed cells/trenches.

	Images of Tjirrkarli landfill site 
Landfill capacity	The existing waste trench is nearing capacity and it is likely that a new cell will soon require excavation.
Legacy waste area	• A large area between the community and the active landfill contains legacy waste cells, dumped waste, scrap metal, building materials and litter. • Material appearing to be asbestos fragments was identified throughout this area.

	Images of legacy waste area      
Scrap vehicle area	• A scrap vehicle area is located west of the community for salvaging vehicle parts. • The areas contain approximately 90 vehicles. • The area also contains litter and dumped waste requiring a clean-up. *Images of Tjirrkarli scrap vehicle area*    

2.3.10 *Kanpa*

General information	Kanpa is a very small community with few permanent residents located about 100km southwest of Warburton. The community acts as an outreach site for vulnerable young people who are involved in the justice system. It supports young people who require accommodation, diversion, and support away from urban centres. In 2006 the community became incorporated as Pira-Kata Community Aboriginal Corporation and became an official member community of Ngaanyatjarra Council. It is estimated that less than 20 tonnes of waste is generated at Kanpa annually.
Waste service provision	• The community has no waste collection service provided so waste is either burnt in steel drums or self-hauled to the landfill. • Maintenance of the landfill (cell excavation, waste compaction and covering) occurs infrequently as suitable plant for these works are not located in the community.
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 an active landfill cell and a scrap vehicle storage area.
Waste plant	There is no plant in the community dedicated for waste collection and handling.
Landfill siting	*Image showing location of waste sites in relation to Kanpa*  • The active landfill cell is located approximately 600m northeast of the community and nearest residential premises. This is within the 2000m minimum separation distance set for landfills within the DPLH, Aboriginal Settlements Guideline. • The community's drinking water extraction bores are located about 750m southwest of the landfill.
Landfill operation	• Small landfill site that is unstaffed and unfenced but well maintained with minimal windblown litter. • Would benefit from more regular compaction and cover application to active cell. • No training, operational planning and procedures, post closure plan or information kept on location of completed cells/trenches.

	Images of Kanpa landfill site    
Landfill capacity	The existing waste cells should be sufficient for at least a decade of landfilling if waste can be occasionally compacted with heavy machinery. A second landfill cell is already available for future landfilling once the active one is completed.
Scrap vehicle area	• Scrap vehicle area is located approximately 1.2km south of the community. • Well maintained compared to other communities. • Approximately 70 vehicles and other scrap metal • Community caretaker indicated that they do not want vehicles removed as they wish to sell them to scrap metal recycler. • Asbestos panels identified at scrap vehicle area amongst other building material. *Images of Mantamaru scrap vehicle areas*    

3 FINDINGS AND CONCLUSIONS

Based on the assessment of existing services and infrastructure, several key findings and conclusions can be drawn:

- Waste management services on the Ngaanyatjarra Lands are inadequate and are likely contributing to significant environmental and human health impacts.
- No community has a well-functioning domestic waste collection system, and as a result, residents are often forced to burn household waste in steel drums at the front of their homes.
- All communities manage their own waste and there is limited coordination.
- Many landfills are not sited appropriately, do not comply with minimum regulatory operational requirements and are very likely to be impacting on the health of communities and the environment.
- There is minimal recovery of resources occurring, and hazardous wastes such as vehicle oil and batteries are routinely disposed of to landfill.
- Many communities are surrounded by sprawling areas of old waste cells that have not been adequately capped and are contaminated with illegally dumped waste, litter, and in some instances, asbestos containing materials. These areas present serious environmental and human health risks.

Key findings and conclusions are discussed in detail below.

3.1 CONSULTATION FINDINGS

Findings from consultation with stakeholders undertaken during the site visits include:

- Solutions to waste problems should provide local employment opportunities.
- Communities want regular waste collection services but lack the resources to do so.
- Waste collection vehicles are in poor condition due to a lack of financial resources and a lack of access to mechanical maintenance and repair services.
- Conventional plastic MGBs would be preferred to steel drums as they would be easier to move and collect.
- Potential solution to minimise the burning of plastic MGBs could involve painting of bins by children to create sense of ownership.
- Waste education regarding the hazards of waste is not provided in local schools; waste related activities at schools is limited to litter pickups.
- A lack of awareness of the presence of asbestos in communities, and its potential impacts on human health.
- Waste from construction and demolition activities in communities is significant and problematic.
- There is no information providing guidance on the disposal of waste for community members, external contractors, departments and organisations.
- Plant is not available to effectively compact and cover waste.
- Attempts to recycle certain waste materials such as batteries are unsuccessful due to a lack of coordinated transport logistics.
- The Container Deposit Scheme service provided by the Warburton Roadhouse is well utilised by the community but was administratively challenging to establish.

- Burning/arson of scrap vehicles is unwelcome as it prevents the salvaging of useful parts to repair other vehicles.
- Removal of scrap vehicles from communities would be supported, but that it should be done in close consultation with the community to ensure that only unwanted fully salvaged vehicles are removed.

3.2 WASTE COLLECTION

- Waste collection services are infrequent and irregular (if provided at all), this results in residents not knowing if or when collection will occur, leading to the burning of household waste, litter and dumping.
- Warburton, Warakurna, Wanarn and Tjukurla are currently the only communities that have a hint of a domestic waste collection service.
- Collection vehicles at all communities require repair or replacement.
- Vehicle repairs are costly and take a long time due to a lack of mechanics in the Shire.
- The use of steel drums for domestic bins is problematic compared to conventional plastic Mobile Garbage Bins (MGBs), specifically:
    - Bins are not sealed with lids which contributes to odour and the breeding of flies.
    - Difficult to move as they do not have wheels.
    - Comparatively inefficient bin lifting process.
    - Bin lifting equipment must be custom built.
    - Steel bins facilitate burning of waste at households (community health risk).
    - Occupational health and safety hazards associated with:
        - Back injuries from moving and lifting (especially when full).
        - Inhalation and exposure to ash from burnt waste when emptying bins.
        - Steel bins can be hot and dangerous to handle during hot weather conditions or if waste has been recently burnt.
        - Risk of embers or smouldering waste from burnt bins causing a fire in the collection vehicle.
- Bulk household waste collections (for furniture, whitegoods etc) are not occurring on regular scheduled basis, often resulting in these items being dumped in areas surrounding the communities.

3.3 LANDFILL SITING

- Except for Warburton, all the community landfills are incorrectly sited within the minimum required 2000m buffer distance to protect community health as specified by the DPLH Aboriginal Settlements Guideline.
- The Mantamaru landfill urgently requires relocation as the active cell is located on the verge of Papulankutja Road and presents significant traffic safety hazards.
- All landfills are unlined and there is a risk that they are contaminating potable water supplies.
- As none of the landfills have groundwater monitoring bores, the impact of the waste on groundwater and potable water supplies is unknown and unquantified.

3.4 LANDFILL OPERATIONS

- The *Environmental Protection Regulations 1987* require that all landfills receiving between 20 and 5,000 tonnes per annum be registered as Category 89 putrescible landfills. Nearly all community landfills are estimated to be receiving more than 20 tonnes of waste per annum (Kanpa, Tjirrkali and Patjarr may be under this threshold). As such, the landfills are likely in breach of the *Environmental Protection Act 1986*.
- None of the community landfills are being operated in accordance with the *Environmental Protection (Rural Landfill) Regulations 2002* that apply to Category 89 facilities (which the landfills should be registered as).
- Waste is regularly burnt at all landfills, including hazardous materials which can impact on health and the environment.
- Due to a lack of heavy tracked plant, waste is rarely compacted and covered. This results in inefficient utilisation of space, and the emission of odour and litter from the landfill cells.
- Except for Patjarr, none of the landfills are fenced to control access and catch windblown litter.
- None of the landfills are staffed, instructional signage is limited, and there is uncontrolled access to the sites. These factors combine to result in inappropriate use of the sites by members of the community and contractors.
- There is no guidance and information available on how to use and operate the landfills for staff, members of the community, businesses and contractors.
- There are no documented operational management procedures for the sites.
- Post Closure Management Plan's (PCMPs) have not been developed to guide closure and capping requirements for community landfills as required by the *Environmental Protection (Rural Landfill) Regulations 2002*.

3.5 LEGACY WASTE SITES

- Many communities have areas that were previously used for waste disposal purposes.
- Whilst attempts have been made to cover the waste with soil, the closure, capping and rehabilitation of these older waste cells is often inadequate due to the following issues:
    - Lack of access to heavy tracked plant prevented the sufficient compaction of waste necessary to avert the formation of large subsurface voids. In some instances, this has resulted in unstable surfaces that are at risk of collapse.
    - Many of the legacy waste areas have not been appropriately levelled and recontoured, which has resulted in steep slopes and mounds that are subject to accelerated wind and water erosion. It has also resulted in landforms that are not in keeping with the surrounding landscape and are visually unappealing.
    - Insufficient compaction and capping application causing waste to remain exposed or protruding through the soil capping.
- Legacy waste sites often continue to be used as dumping grounds.
- Material thought to contain asbestos was found at three legacy waste sites.
- These areas pose a range of risks to human health that include:
    - Possible human exposure to toxic and dangerous materials.

- Physical hazards from sharp and protruding objects such as broken glass and scrap metal.
- Potentially unstable ground at risk of collapse due to poorly compacted waste buried beneath.

3.6 CONSTRUCTION AND DEMOLITION WASTE

- Site inspections found that construction and demolition (C&D) waste disposed of by contractors consumes significantly more airspace than household waste generated in communities.
- Contractors are creating large quantities of waste and are not paying for its disposal, therefore passing the cost onto the communities in terms of future liabilities.
- Communities lack the heavy plant required to handle bulky C&D waste and ensure it is appropriately compacted and buried.
- Scrap metal is particularly problematic as burying it without compaction by tracked machines results in poor utilisation of landfill space and can cause large voids to form in the waste mass that pose a risk of collapse in the future.

Figure 3.1 – High proportion of C&D waste at Warakurna (L) and Warburton (R) landfills

3.7 ASBESTOS

Asbestos materials, and materials possibly containing asbestos, were identified at or near waste sites in Warburton, Warakurna, Mantamaru, Tjukurla, Tjirrkarli and Kanpa. In all instances it was apparent that these materials were at risk of being further fragmented and asbestos particles becoming airborne by vehicle movements, fire, or children playing. Whilst much of the asbestos identified may have been in-situ for decades, it poses an immediate and severe risk to human health.

Figure 3.2 – Asbestos fragments at old Warburton landfill

Figure 3.3 – Asbestos water pipes at Mantamaru

3.8 WASTE OIL, VEHICLE BATTERIES AND TYRES

- Many residents service and repair their own vehicles which results in significant quantities of waste oil, vehicle batteries and tyres being generated.
- These materials are hazardous and should not be burnt or disposed of to landfill.
- There are no facilities in the communities for people to safely dispose of these materials and have them removed from the region for recycling.

3.9 SCRAP VEHICLES

- Except for Patjarr, all communities have large stockpiles of scrap vehicles that warrant removal for recycling. It is estimated that there are approximately 2,500 scrap vehicles located across the Ngaanyatjarra communities. Hundreds of additional scrap vehicles are also located on the roadside throughout the Shire.
- Scrap vehicle storage areas create a range of issues that include:
    - Soil contamination from hydrocarbons and other vehicle fluids.
    - Soil and air contamination from burning vehicles.
    - Feral cats and wild dogs living and breeding in the storage areas.
    - Physical and toxicological health hazards to people accessing the storage areas.
    - Storage areas are generally poorly maintained which is conducive to the dumping of other waste types.
- It was noted that many scrap vehicles still have number plates attached. This is most likely resulting in fines being applied to the owners and causing an unnecessary financial drain on individuals and their communities.

3.10 LITTER AND DUMPING

Most of the Ngaanyatjarra communities have large amounts of litter within yards, streets, public places, areas of vegetation surrounding the communities, landfills, and scrap vehicle storage areas. This litter and dumped waste are driven by the following factors:

- Infrequent waste collection services resulting in bins overflowing.
- Landfills have large quantities of uncovered waste and wide tipping faces resulting in litter being blown into surrounding areas and the community.
- Sizeable legacy waste and scrap vehicle storage areas encourages dumping of waste outside of the active landfill cell ('if it's already a mess, there's no point trying to keep it clean' mentality).
- Lack of scheduled bulky waste collection services.

3.11 WASTE EDUCATION AND COMMUNITY AWARENESS

Community awareness of waste issues is critical for ensuring that waste is safely managed in communities, especially where waste sites are unsupervised, and communities largely self-manage their waste collection and disposal. Unfortunately, there are no formal waste education and community awareness campaigns or programs currently being delivered, and essentially no information is provided to communities and contractors on how waste should be managed.

This lack of community awareness and waste education is almost certainly contributing to the following issues:

- Burning of household waste

- Littering and waste dumping
- Landfilling of waste oil and vehicle batteries
- Burning of scrap vehicles
- Exposure to waste materials containing asbestos

3.12 WASTE DATA

- There is no data available on waste quantities generated, collected, and disposed of within the Ngaanyatjarra Lands.
- The lack of data creates difficulties in planning, implementing and operating waste collection services and infrastructure as a reliance must be placed on estimates and projections that may not prove accurate.

4 ACTION PLAN

The action plan below provides a framework to guide the stakeholders towards the delivery of sustainable waste management services for the Ngaanyatjarra Lands and address the issues and challenges addressed above.

4.1 WASTE COLLECTION

The following actions have been developed to facilitate the reintroduction of regular scheduled domestic waste collection services to the Ngaanyatjarra communities.

4.1.1 *Domestic Waste Collection Service*

Action	**Develop and implement a weekly domestic waste collection service**
Priority	**Urgent**
Rationale	Waste collection services for Warburton, Mantamaru, Papulankutja, Irrunytju, Warakurna, and Wanarn are not being provided on a regular basis (or at all) and are resulting in waste burning, litter, and dumping. A coordinated and regular scheduled collection service would alleviate these issues and result in domestic putrescible waste being removed from the smaller communities for disposal at Warburton and Warakurna where it can be better managed.
Implementation	• Obtain funding • Purchase two rear loading compactor trucks (12m^3 min capacity) • Establish a waste services depot with secure parking, storage and washdown bay in Warburton • Employ drivers • Establish a local labour pool • Purchase 240L mobile garbage bins (MGBs) to replace steel drums • Purchase and install locking bin stands at each household • Remove steel drums and instal 240L MGBs at each household • Commence weekly collection of MGBs at Warburton, Mantamaru, Papulankutja, Irrunytju, Warakurna, and Wanarn • Dispose of collected waste at Warburton and Warakurna only (unless truck cannot complete run due to overcapacity)
Responsibilities	• REMS contract or Shire of Ngaanyatjarraku if funded
Cost Estimates	Refer to **Section 5** below.

4.1.2 *Domestic Waste Collection Assistance to Small Communities*

Action	**Provide assistance to smaller communities self-managing waste collection services**
Priority	**Urgent**
Rationale	Although it is not economically justifiable to include the communities of Tjukurla, Patjarr, Tjirkarli and Kanpa on the weekly waste collection run (**Section 4.1**) due to the distances involved and small number of residents, assistance should be provided to ensure waste is safely removed from households.
Implementation	• Develop an assistance program in consultation with local community board (for example, provision of MGBs and bin stands, trailers for waste collection and annual payments to contribute towards waste collection costs) • Obtain funding necessary to implement the assistance program • Implement the assistance program
Responsibilities	• REMS contract or Shire of Ngaanyatjarraku if funded
Cost Estimates	Refer to **Section 5** below.

4.1.3 *Waste Education and Community Engagement Strategy*

Action	**Develop and implement a multi stakeholder waste education and community engagement strategy**
Priority	**Urgent**
Rationale	All members of a community contribute to waste generation, and all members of a community have a role to play in ensuring that waste is managed in a way that protects the amenity, and environmental and human health of their community. Strong community engagement, and the provision of effective waste education and awareness programs are essential for achieving the objectives of this plan. Development and implementation of the Waste Education Strategy should be considered an urgent priority as it will support the reintroduction of domestic waste collection services to the communities. The Waste Education and Community Engagement Strategy should focus on the following issues: • Waste hazards to human health • Waste hazards to the environment • The social, environmental, and economic benefits of waste minimisation and recycling • Provision of information on how to use waste services and facilities. Development of the Waste Education and Community Engagement Strategy should be undertaken in close consultation with key stakeholder groups in each community to ensure that effective measures are developed for communicating and engaging with all members of the community. Programs included in the strategy should consider local cultural understandings of the links between environment and human health and wellbeing and be culturally and linguistically appropriate to the community.
Implementation	• Undertake community consultation regarding waste management issues and services to determine the community's perceived issues, identify gaps in waste education and awareness, and obtain feedback on current performance. • Produce a comprehensive five-year Waste Education and Engagement Strategy based on results from the community consultation. The Strategy will outline appropriate campaigns, programs, and measures to address gaps identified in community education and awareness of waste management issues. • Obtain funding for implementation of the strategy. • Implement the strategy.

Responsibilities	• REMS contract or Shire of Ngaanyatjarraku if funded (development and implementation of strategy)
	• Key stakeholders and partners for strategy consultation and implementation:
	  o Ngaanyatjarra Council
	  o Local Community Boards
	  o Department of Education
	  o Department of Communities

Cost estimates	Refer to **Section 5** below.

4.2 LANDFILL MANAGEMENT

The following actions have been developed to improve the management of landfills within the Shire with the specific objectives of:

- Establishing appropriately sited, designed, and operated landfills at Warakurna and Warburton that can be used to receive waste generated at other communities within the Shire.
- Providing access to dedicated waste handling plant to enable effective compaction and cover of waste.
- Managing all landfills in accordance with relevant legislation and regulations by investing in infrastructure, plant, and operational management.
- Minimising environmental and human health risks from landfill operations.

4.2.1 *Warburton and Warakurna Landfill Improvement Program*

Action	**Implement an improvement program to ensure the Warburton and Warakurna landfills are correctly sited and operated in accordance with the Environmental Protection Act 1986.**
Priority	**High**
Rationale	These landfills serve the Shire's two largest communities and with the implementation of a coordinated domestic waste collection service (**Action 4.1.1**) they will also be receiving waste from the communities of Mantamaru, Papulankutja, Irrunytju and Wanarn. With the increased waste quantities they will be receiving, it is critical that they are sited and managed so that environmental receptors and human health is protected, and relevant legislative and regulatory requirements are met.
Implementation	• Assess the suitability of the existing site locations using a Source, Pathway, Receptor (SPR) risk assessment model. • If the current locations are not appropriate, investigate potential alternative sites in proximity to the communities. A multi criteria analysis (MCA) and community consultation should be undertaken to determine the preferred site. • Once a preferred location is chosen (or the existing site deemed adequate) facility designs should be developed outlining the proposed layout of the site and the landfill design. • An Environmental Management Plan (EMP) and Operational Management Plan (OMP) should be developed for each site. • Prepare and submit Works Approval applications to the Department of Water and Environmental Regulation for the construction of the proposed facilities. • Once approval is granted, land tenure secured, and funding raised, construct the facilities in accordance with the Works Approval. • Operate the facilities in accordance with the EMPs, OMPs and Environmental Protection Licences (or the *Environmental Protection (Rural Landfill) Regulations 2002*)

Responsibilities	• REMS contract or Shire of Ngaanyatjarraku if funded
	• Key stakeholders:
	  o Ngaanyatjarra Council
	  o Warburton and Warakurna Community Boards

Cost estimates	Refer to **Section 5** below.

4.2.2 *Environmental Compliance*

Action	**Ensure landfills are managed in accordance with the *Environmental Protection (Rural Landfill) Regulations 2002*.**
Priority	**High**
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. It is believed that most landfills in the Shire are receiving more than 20 tonnes per annum and should be registered as Category 89 landfills under the *Environmental Protection Act 1986* and subject to *Environmental Protection (Rural Landfill) Regulations 2002*.
Implementation	• Landfills receiving more than 20 tonnes per annum should be registered as Category 89 prescribed premises if they are not to be replaced by WRCs (as proposed for Mantamaru, Papulankutja, Irrunytju and Wanarn) or licenced as Category 64 facilities (as proposed for Warburton and Warakurna) • Operate the landfills to meet the minimum regulatory requirements of the *Environmental Protection (Rural Landfill) Regulations 2002*. This includes but is not limited to: o Installing and maintaining boundary fencing o Regularly covering waste with soil (see **Section 4.2.3** below) o Stormwater management controls o Preventing the burning of waste o Protection of ground and surface waters o Preventing the emission of litter from the site.
Responsibilities	• REMS contract or Shire of Ngaanyatjarraku if funded: Project planning, administration, and implementation • Key stakeholders: o Ngaanyatjarra Council o Local Community Boards o Department of Planning, Lands and Heritage o Department of Communities
Cost Estimates	Refer to **Section 5** below.

4.2.3 *Mobile Waste Service Program*

Action	**Plan and implement a program to provide dedicated waste plant to communities on a scheduled basis.**
Priority	**High**

Rationale	Issues:
	• Communities lack access to plant suitable for performing landfill maintenance (cell excavation, waste compaction and cover application), preventing compliance with Rural Landfill Regulations (see **Section** Error! Reference source not found.)
	• Communities are not provided with scheduled cleanup days/weeks where litter, dumped waste, and bulky wastes are collected and disposed to landfill.
	• It is not financially viable to provide all communities with the plant necessary to undertake these works on a permanent basis.
	Recommendation:
	• A mobile waste service that includes human resources, suitable plant and equipment mobilised regularly to assist communities with managing waste and landfill operations will reduce the health, environmental, social and economic problems associated with poor waste management practices.
	• Suitable plant and experienced operators can:
	  o Move and push up surrounding waste into cells.
	  o Separate metals (car bodies, whitegoods) from mixed waste to a stockpile for subsequent retrieval and sale to market. This will also extend the operational life of each cell.
	  o Compact waste and break up bulky waste in the cells, thereby extending operational life.
	  o Applying cover material to limit environmental impacts and exposure hazards.
	  o Cap full cells to entomb the waste to minimise impact to the environment.
	  o Excavate new cells in line with best practice to ensure safe operations i.e. stepped sided trench.

Implementation	• Development of a scope of works, business case and internal bid. • Release a Request for Tender (RFT) based on the scope of works to seek contractor bids for the service provision. • Assess the value of the internal bid vs the tender submissions. • Seek funding to implement the preferred option. • Implement the preferred option.

Responsibilities	• REMS contract or Shire of Ngaanyatjarraku if funded: Project planning, administration, and implementation
	• Key stakeholders:
	  o Ngaanyatjarra Council
	  o Local Community Boards

Cost estimates	Refer to **Section 5** below.

4.2.4 *Building Contractor Guidelines and Policies*

Action	**Develop a set of operating guidelines and policies in relation to the disposal of waste products from construction and demolition projects within the Shire.**
Priority	**High**
Rationale	Construction and demolition waste consumes significantly more landfill space than domestic waste and is difficult to compact and cover without heavy plant. The cost of disposal is being passed from contractors to the community in terms of future liabilities.
Implementation	To control and minimise waste generation from construction and demolition activities within communities, a set of operating guidelines must be prepared in relation to the disposal of construction waste and demolition debris on the Ngaanyatarra Lands. 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 be removed from the Shire to a licenced landfill, or disposed of at a landfill site designated by the Shire, with applicable fees payable. Waste disposal receipts should be provided by contractors to ensure this practice is adhered to, together with on-site audits towards the end of construction projects that are completed by the organisation managing the contract.
Responsibilities	• REMS contract or Shire of Ngaanyatjarraku if funded: Guideline and policy development • Ngaanyatjarra Council and all State Government departments operating on the lands: Implementation of policies and guidelines
Cost Estimates	Estimated $10k to develop guidelines and policies, and $5k per annum to review and update policies and guidelines, and communicate information to key stakeholders,

4.3 RESOURCE RECOVERY

Whilst resource recovery opportunities in the region are limited due to high transport costs, the actions detailed below are recommended as they will:

- Create local employment opportunities.
- Minimise the disposal of toxic waste oil and vehicle batteries to landfill by removing them from communities for recycling.
- Facilitate the removal of waste from small communities that do not have the capacity to manage it effectively.
- Provide greater opportunities for the reuse of materials that would otherwise be disposed to landfill.
- Help preserve scrap vehicles suitable for parts salvaging.
- Protect environmental and human health against risks associated with the storage of scrap vehicles (scrap vehicles no longer suitable for salvaging removed for recycling).
- Provide economic returns to communities through the WA Container Deposit Scheme (CDS).

4.3.1 *Waste and Recovery Centres*

Action	**Plan, construct and operate waste and recovery centres**
Priority	**Medium**
Rationale	With the implementation of a coordinated domestic waste collection service (**Action 4.1.1**), and requirements for building contractors to remove waste from the communities (**Action 4.2.4**), significantly less waste will be disposed of at landfills in Mantamaru, Papulankutja, Irrunytju and Wanarn. The establishment of Waste and Recovery Centres (WRCs) at these communities would be the final step required to enable the landfills to be closed and rehabilitated, whilst providing an improved waste disposal service to residents. The WRCs are proposed to comprise the following elements: • Fenced and gated area close to (or within) the communities • Reuse area for reusable material and goods • Drop-off area for bulky household waste • Waste oil collection facilities • Vehicle battery collection facilities • 660L or 1100L bins for general waste The WRCs would enable community members to drop-off waste and recyclables free of charge at an easily accessible location. General waste in 660L or 1100L bins would be collected by the rear loading collection trucks when completing the weekly collection run. Waste oil, batteries, bulky waste and other items would be collected on a flatbed truck on a monthly basis to be transported to Warburton. Recyclable materials would be stored at Warburton until sufficient quantities develop to warrant transportation to Kalgoorlie. A smaller WRC should also be established at Tjukurla to enable the recovery of waste oil, vehicle batteries and other recyclable materials.
Implementation	Establishment of WRCs will require the following: • Define the waste streams to be managed through the centres. • Define locations for establishment of the centres. • Develop a standard design for the WRC 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 as efficiently as possible. • 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. • Obtain funding for project implementation. • Construct WRCs and commence operations.

Responsibilities	• REMS contract or Shire of Ngaanyatjarraku if funded: Project planning, administration, and implementation
	• Key stakeholders:
	  o Ngaanyatjarra Council
	  o Local Community Boards

Cost estimates	Refer to **Section 5** below.

4.3.2 *Scrap Vehicle Management*

Action	**Plan and implement measures to improve the management of scrap vehicles**
Priority	**Medium**
Rationale	Approximately 2,500 scrap vehicles are located across the Ngaanyatjarra communities presenting the following issues: • Scrap vehicles are often burnt, preventing them from being salvaged for parts and causing soil and air contamination. • Soil contamination from hydrocarbons and other vehicle fluids • Physical and toxicological health hazards to people accessing the storage areas. • Storage areas are generally poorly maintained which is conducive to the dumping of other waste types.

Implementation	• Designate an area at each community for the storage of scrap vehicles.
	• Fence and secure the designated area to prevent access at night.
	• Relocate salvageable vehicles to the area.
	• Stack burnt and unsalvageable vehicles for removal by a scrap metal contractor.
	• Quantify unsalvageable vehicles in each community.
	• Release an expression of interest (EOI) to scrap metal contractors to have unsalvageable vehicles (and other scrap metal) removed from the communities and recycled.
	• Obtain funding to have unsalvageable vehicles removed if the EOI process indicates it will not be cost neutral.
	• Engage contractor to remove unsalvageable vehicles and scrap metal.
	• Develop and implement procedures for the management of scrap vehicles with the objectives of:
	  o Maintaining the designated storage areas in clean and safe manner.
	  o Protecting scrap vehicles from arson.
	  o Minimising hydrocarbon spills.
	  o Preventing scrap vehicles being stored in undesignated areas surrounding communities.
	  o Ensuring vehicles are disposed of in accordance with Department of Transport requirements and that fines are not unnecessarily accrued by community members for failure to return licence plates.

Responsibilities	• REMS contract or Shire of Ngaanyatjarraku if funded: Project planning, administration, and implementation
	• Key stakeholders:
	  o Ngaanyatjarra Council
	  o Local Community Boards

Cost estimates	Refer to **Section 5** below.

4.3.3 *Container Deposit Scheme*

Action	**Facilitate implementation of the WA Container Deposit Scheme to communities outside of Warburton.**
Priority	**Medium**
Rationale	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 and receive an economic benefit for doing so. An additional benefit of the CDS is that it helps minimise litter in areas where the service is provided. Although the Warburton Roadhouse is providing this service which has been well received and utilised by the Warburton community, other communities in the Shire do not have ready access to the service. Applying to participate in the CDS is administratively demanding and local organisations may require assistance. The region's challenging transport logistics warrant a coordinated approach between the communities to realise efficiencies.
Implementation	• Consult with key stakeholders on how the CDS program can be expanded to other communities. • Develop plans to expand the CDS program to other communities. • Provide administrative support for organisations seeking to participate in the scheme.

Responsibilities	• REMS contract or Shire of Ngaanyatjarraku if funded: Project planning and administrative support
	• Key stakeholders:
	  o Ngaanyatjarra Council
	  o Local Community Boards
	  o Containers for Change
	  o Ngaanyatjarra Agency & Transport Services
	  o Warburton Roadhouse
	  o Warakurna Roadhouse
	  o Community Store managers

Cost Estimates	$25k budgeted for 2023/24 to undertake consultation, develop plans, and provide administrative support.

4.4 LEGACY WASTE

As waste sites have been historically mismanaged due to a lack of resourcing, significant human health and environmental liabilities have developed at sites around the Ngaanyatjarra communities. These sites urgently require investigations and remediation works to be undertaken to mitigate the immediate threats posed by hazardous materials and waste. Community landfills also require Post Closure Management Plans (PCMPs) be developed, and eventually closed and rehabilitated in accordance with the PCMPs.

As these are legacy issues and the Shire has not had responsibility for the management and operation of waste sites, the following actions have not been included in the Long Term Financial Plan (**Section 5**), and the actions are deemed to be the responsibility of the Department of Planning, Lands and Heritage.

4.4.1 *Remediation of Waste Sites*

Action	**Contaminated site investigations and remediation of landfills, legacy waste sites, and scrap vehicle storage areas**
Priority	**Urgent**
Rationale	These areas currently pose significant human and environmental health risks and urgently require remediation.

Implementation	• Assess each site to estimate the quantity and types of wastes and contaminants to be disposed of or recovered.
	• Report sites under the Contaminated Sites Act 2003, if required to do so by the Act.
	• Remediate contaminated sites in accordance with the Contaminated Sites Act 2003.
	• Site specific remediation plans should be developed for each community.
	• Site remediation works should at minimum include:
	  o The removal of all asbestos contamination in accordance with the Contaminated Sites Act 2003.
	  o Placement of scrap vehicles in designated areas, stacked in rows.
	  o Removal and disposal of litter and dumped waste.
	  o Levelling and recontouring with bull dozers and heavy plant to create more natural landforms.
	  o Compacting active and historic waste cells with tracked machinery.
	  o Covering all exposed waste and historic waste cells with at least 500mm of soil.

Responsibilities	• Department of Planning, Lands and Heritage
	• Key stakeholders:
	  o Ngaanyatjarra Council
	  o Local Community Boards
	  o Shire of Ngaanyatjarraku

Cost estimates	Cost estimates are not possible without further investigations. Recommended that a Contaminated Sites expert be engaged to plan the investigations and remediation works.

4.4.2 *Landfill Closure and Rehabilitation*

Action	**Close and rehabilitate community landfills**
Priority	**Medium**
Rationale	The implementation of a new waste management system that transfers waste from the smaller communities to Warburton and Warakurna will enable the closure and rehabilitation of landfills at Mantamaru, Papulankutja, Irrunytju and Wanarn. Closure of these sites will reduce environmental and human health risks and avoid the need for significant operational expenditure necessary to operate the sites in accordance with the legislative and regulatory requirements that are currently being contravened. It will also prevent the reformation of financial liabilities associated with future remediation works.
Implementation	• Develop a Post Closure Management Plans (PCMPs) 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 PCMPs to the Minster of Environment for approval in line with requirements of the regulations. • Implement the PCMPs for each facility including post closure monitoring requirements. • Note: An area should be retained at each community for the burial of animal carcasses.

Responsibilities	• Department of Planning, Lands and Heritage
	• Key stakeholders:
	  o Ngaanyatjarra Council
	  o Local Community Boards
	  o Shire of Ngaanyatjarraku

Cost estimates	• PCMP development: $15k to $25k per facility • Closure costs: $300k to $700k per facility • Post closure management and monitoring: $5k to$10k per facility per annum

5 LONG TERM FINANCIAL PLAN

ASK have developed estimates of capital and operational expenditure required to implement the actions detailed in **Section 4**.

Due to the wide scope of works contained in the Action Plan, the many potential implementation models, the urgent timeframe, and the lack of existing services to provide baseline costs, the financial estimates included in the following subsections should be treated as indicative only and are likely subject to change as detailed business cases and implementation plans are developed for each action.

All financial estimates are based on current prices and do not include forecast inflation or wage growth.

ASK previously developed cost estimates to provide a two-year emergency domestic waste collection service to the communities of Warburton, Mantamaru, Papulankutja, Irrunytju, Warakurna, and Wanarn commencing in the 2021/22 financial year. The cost estimates provided below for **Section 4.1.1** are based on these previously developed estimates with the major change being that waste education costs have been moved to a separate action item (**Section 4.1.3**).

5.1 CAPITAL EXPENDITURE

Capital expenditure to implement all actions within the WMP is forecast to range from approximately $1.1 million to $5.5 million per annum over four financial years as shown in **Table 5.1**.

Table 5.1 - Estimated capital expenditure (does not include asset replacement)

This information is deemed Commercial in Confidence as it is intended that tenders will be put out for several actions detailed within the WMP and that public disclosure of this information could jeopardise the tender processes. The Shire also intends to develop internal tenders for service delivery based upon these cost estimates.

5.2 OPERATIONAL EXPENDITURE

Operational expenditure for delivery of the WMP's actions is forecast to range from approximately $1.4 million to $2.65 million per annum, with operational expenditure peaking in 2024/25.

Table 5.2 – Estimated annual operational expenditure

This information is deemed Commercial in Confidence as it is intended that tenders will be put out for several actions detailed within the WMP and that public disclosure of this information could jeopardise the tender processes. The Shire also intends to develop internal tenders for service delivery based upon these cost estimates.

5.3 ANNUALISED COSTS

Annualised costs that include amortised capital and operational costs are forecast to range from approximately $1.6 million to $3.5 million per annum, peaking in the 2024/25 financial year.

Table 5.3 – Estimated annual costs (includes amortised capital cost and annual operational cost)

This information is deemed Commercial in Confidence as it is intended that tenders will be put out for several actions detailed within the WMP and that public disclosure of this information could jeopardise the tender processes. The Shire also intends to develop internal tenders for service delivery based upon these cost estimates.

5.4 CAPITAL ITEMS AND COSTS

Table 5.4 – List of capital items and estimated costs (ex. Procurement and contingency)

This information is deemed Commercial in Confidence as it is intended that tenders will be put out for several actions detailed within the WMP and that public disclosure of this information could jeopardise the tender processes. The Shire also intends to develop internal tenders for service delivery based upon these cost estimates.

6 PROJECT OUTCOMES

6.1 PROTECTION OF HUMAN HEALTH

Implementation of this WMP will significantly reduce human health risks by:

- Educating and engaging with communities on waste related risks.
- Ensuring all communities have access to a domestic waste collection service.
- Preventing the burning of domestic waste (replacing steel drums with MGBs) at households.
- Reducing physical injury and toxicological risks associated with the collection of domestic waste (through use of MGBs and mechanical bin lifting).
- Remediation of sites contaminated with asbestos and other hazardous materials.
- Improving the management of waste disposal facilities.

6.2 LOCAL EMPLOYMENT OPPORTUNITIES

It is estimated that implementation of the WMP will result in approximately thirteen new full time equivalent (FTE) positions by 2024/25. This does not include temporary positions associated with infrastructure works and the distribution and installation of MGBs and bin stands.

Table 6.1 - Estimated new FTE positions

Relevant Section	Action	2021/22	2022/23	2023/24	2024/25	2025/26
4.1.1	Domestic Waste Collection Service	5.0	5.0	5.0	5.0	5.0
4.1.2	Domestic Waste Collection Assistance to Small Communities	0.5	0.5	0.5	0.5	0.5
4.1.3	Waste Education and Community Engagement Strategy	0.7	0.7	0.4	0.2	0.2
4.2.1	Warburton and Warakurna Landfill Improvement Program	0.0	0.0	1.5	2.5	2.5
4.3.1	Waste and Recovery Centres	0.0	0.0	0.0	1.6	1.6
4.2.2	Environmental Compliance	0.0	0.0	1.4	0.6	0.6
4.2.3	Mobile Waste Services Program	0.0	1.2	0.8	0.2	0.2
4.3.2	Scrap Vehicle Management	0.0	0.0	0.0	1.4	1.4
4.3.3	Container Deposit Scheme	0.0	0.0	0.0	1.4	1.4
Total		6.2	7.4	9.6	13.4	13.4

6.3 LOCAL ECONOMIC OPPORTUNITIES

The realisation of this WMP will provide new economic opportunities in the Shire associated with:

- Community participation in the CDS
- Operation of CDS refund points
- Transportation of recyclable wastes (car batteries, scrap metal, waste oil etc) out of the Shire.
- Contracts for the installation of bin stands and the construction of landfill infrastructure, scrap vehicle storage areas, Waste and Recovery Centres, and the Warburton Waste Depot.
- Increased viability for a reopening a mechanical workshop in Warburton to service and repair passenger vehicles, trucks and plant.

6.4 IMPROVED COMMUNITY AMENITY

Improvements to living standards and community amenity will result from cleaner streets, reduced litter, prevention of domestic waste burning, reduced odour and the closure or improved management of waste disposal sites, ultimately making the Ngaanyatjarra communities more attractive places to live and work.

6.5 REDUCED ENVIRONMENTAL RISK

Implementation of the WMP will reduce risks to the environment such as:

- Air pollution from waste burning.
- Landfill leachate contamination of ground and surface waters.
- Emission of windblown litter from landfills.
- Hydrocarbon contamination of soils and groundwater from landfills and scrap vehicle storage areas.

6.6 REDUCED FUTURE LIABILITIES

Waste services on the Ngaanyatjarra lands have been subject to prolonged under resourcing, and prior to the development of this WMP, waste management was not strategically planned. This has resulted in escalating environmental and public health risks that have now been realised as significant financial liabilities for the State to address.

Implementation of this WMP will deliver a proactive approach to waste management on the Ngaanyatjarra Lands and help ensure that future financial liabilities associated with the remediation of environmental and public health risks are minimised.

6.7 LEGISLATIVE AND REGULATORY COMPLIANCE

Implementation of the WMP will ensure that unlike current practice, all relevant state legislative and regulatory requirements will be complied with, specifically the:

- *Environmental Protection Regulations 1987*
- *Environmental Protection Act 1986*
- *Environmental Protection (Rural Landfill) Regulations 2002*
- *Contaminated Sites Act 2003*